Price Risk Management for Agricultural Commodities

Final Report

September 2023

pwc

Letter of submission

Date – 22nd September 2023

To,

Mr. Kapil Dev,

Chief Business Officer-Business Group,

National Commodity & Derivatives Exchange Limited (NCDEX),

Delhi – 110001

Subject: Submission of Final Report for consultancy services to NCDEX Investor Protection Fund Trust (IPFT)

Dear Sir,

We are pleased to submit our Final Report titled **"**Price Risk Management for Agricultural Commodities" towards consultancy services to National Commodity & Derivatives Exchange Limited Investor Protection Fund Trust. This Final Report is being submitted under the Contract dated 19 April 2022 for the sole use and intended reliance of NCDEX IPFT.

Should you have any questions or wish to discuss any aspect of this final report, please do not hesitate to contact us at your convenience.

For and on behalf of **PricewaterhouseCoopers Private Limited**

We remain,

Yours sincerely,

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Name of Consultant: PricewaterhouseCoopers Pvt. Ltd.

In the capacity of: Authorised signatory, for the lead firm

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Executive Summary

Geo-political issues, disruption in supply chain, food security concerns, impact of climate change on crop production are few of the biggest challenges which many countries are facing currently, and this is creating a huge impact on the commodity markets globally including India. Agriculture sector is recognized as an extremely critical sector for a commodity dependent (emerging) economy like India. This sector undergoes a series of risks in terms of production and productivity issues, availability and supply of raw materials or agricultural inputs for food production, price of the produce, and weather/climate related risks. Among all these listed factors, price volatility and the price risk management in Agri value chain requires special attention, as it directly impacts the income of the farmers and other important agri value chain stakeholders.

Commodity price risk intrinsically is the uncertainty faced by private entities to source or sell a product at a given price. The nature and type of commodity price risk varies from industry to industry. Every company procuring a certain commodity will face the challenge of effective price management. Depending on the commodity, it can be treated as a “procurement commodity risk” or “tradable commodity risk”. Procuring risk is more focused towards the physical supply chain side of the business whereas tradable risk is on the financial risk and hedging of the business. Within the commodity value chain, corporates are faced with different types of commodity risks including ‘inventory price risk’ with the risk of falling prices, ‘basis risk’ which is the difference in benchmark price of the physical commodity and the derivative instrument used to hedge the commodity price, and ‘margin risk’ which for a producer is on the risk of falling prices, and consumers on rising prices. Corporates exposed on the procurement side of the value chain initially assess the feasibility of reducing the impact of rising commodity prices by ‘passing it on to the customer on the finished goods. Alternatively, such corporations also tend to negotiate with their suppliers towards a fixed price agreement – which becomes a difficult ordeal where the price discovery and benchmark prices of that commodity are transparent and easily available to all market participants. Similarly, corporates exposed on the sales side of the value chain structure pricing barriers or through stepped-price bands within the sales contract which act as an embedded derivative.

Price Risk Management is a method of strategically using financial instruments to offset the risk of any adverse price movements. In this context, hedging plays a crucial role in the industry today for proper risk management and to protect shareholder’s value. Companies are assessed by shareholders and investors on the basis of how strong their hedging strategy is. Derivative instruments such as forwards, futures, swaps and options are examples of some of the instruments used by companies to mitigate the risk and hedge the physical positions/assets. Hedging can be performed by taking a long or short position against the asset or physical product. Long hedge position is a strategy taken by producers or manufacturers of the commodity to protect from the prices going up in future when they have to source the asset at a future price, whereas short hedge is taken when you are already owning the asset and have to protect from the prices falling in future. In both cases the hedge will offset the loss of rising & falling markets and will protect the companies from having diminished margins.

Therefore, price risk management strategy is an important tool to protect various participants in the derivatives market. However, when it comes to its applicability (in the form of hedging of the Agri-commodities for price risk management) at ground level, it is negligible especially in a vast country like India compared to other advanced countries like USA and China. Majority of the hedging practices in India are still executed through Spot Markets and Forward Contracts. Referring to the SEBI Bulletin (August 2022), the participation of hedgers and value chain participants were only about 6.8% per cent across the exchanges, while that of farmers/ FPOs was negligible at less than 0.1 per cent during 2021-22. Besides, value of trading of agricultural commodity derivatives in Futures & options as a proportion Agri- GDP shows a decline to 12.3 % in 2020-21 from 17.9 % in previous year.

In light of this context, the basic objective of this study is to identify the key factors enabling high levels of hedging in Agri commodities in other global exchange platforms as compared to Indian Exchanges, and to assess the current price risk management strategies adopted by corporates (both domestic and international). The seven commodities covered under this study are - wheat, maize, cotton, soyabean, refined soy oil, chana, and rapeseed (RM seed). This study also highlights the key challenges pertaining to hedging in the Indian Agri-derivatives market (especially Futures and Options) with reference to these seven listed commodities, and subsequently suggesting the recommendations for higher participation of corporates in the Agri derivatives market, based on our primary and secondary analysis. The intended outcome of the study is to suggest best global practices which may be adopted so as to enable a smooth functioning commodity futures market that can help agricultural stakeholders (especially institutional players) to hedge the potential costs of commodity price volatility.

This assigned study has been executed in three broad steps – identification, collection and collation of primary and secondary data points, shortlisting of global commodity exchanges vis-à-vis countries where these exchanges are operating and primarily engaged with these seven commodities (above mentioned). We have shortlisted only those commodity exchanges which cumulatively enjoy a global share of 90% in terms of total value (in US Dollars) of agricultural commodity derivatives traded. In this final stage of the shortlisting process, we have considered the average of the total value of derivatives traded on these exchange platforms during the three consecutive years – 2019, 2020, and 2021. The shortlisted global exchanges whose best practices were studied are Chicago Board of Trade (USA), Dalian Commodity Exchange (DCE) and Zhengzhou Commodity Exchange (ZCE). To understand other areas such as hedging strategies adopted by domestic and international firms, key challenges related to Indian agri-derivatives hedging, exposure of domestic financial institutions to agribusinesses and perspective on promotion of institutional hedging etc, we adopted a mix of various data collection methods such as secondary (desk) research from various research reports and publications, stakeholder interactions with representatives from agribusiness firms, financial institutions, commodity exchanges and Public sector agencies.

Further, we have analysed the participation level of the major stakeholders of proposed commodities on global as well as Indian exchanges. In India, the commodities which constitute the majority of the market share for hedging either come under 'Broad' category and 'Narrow' category. The commodities are Soybean, Soy Oil, RM Seed, Guar, and Crude Palm Oil. However, chana is an exception (which is a sensitive commodity). These commodities either don't face frequent market interventions by Government in terms of MSP/Public procurement or they are historically high volatility. For global exchanges, it has been observed that CBOT is the leading exchange for commodities like wheat and soybean whereas DCE is the leader in soybean oil and maize. For Cotton, ZCE is the leader, and rapeseed mostly is traded on Euronext, followed by NCDEX. It has been observed that refined soya oil is the topmost commodity traded (in terms of total turnover) on Indian exchange during 2020-21, compared to other commodities like soybean, RM seed, chana etc.

Based on our study on global best practices pertaining to hedging, we have found the following key observations:

- Participation of hedgers in the US Agri-derivatives market was 24.89%, far exceeding India's participation at 6.8%. Similar data on the Chinese market was not available. However, according to a study only, 12.5% of the Chinese firms have active risk management through derivatives. Since the volumes contributed by retail traders vary from 50%-95% of the total volume recorded in China, it implies that the degree of trading activity is significantly high in China, as compared to hedging activities.
- Key enabling factors in the US market include policy changes such as Amendment of Final Rule by CFTC (March 2021) and Price Loss Coverage (PLC) under farm Policy (2018). Market factors include high liquidity due to the presence of participants such as hedge funds, financial institutions, biggest trading firms etc, availability of contracts with maturities for more than 3 years and a highly efficient agricultural information system.
- Key enabling factors in the Chinese market include policy changes such as Emergence of Insurance Plus Futures Policy (2015), Chinese Futures and Derivatives Law (2022) which enabled foreign participation and adoption of IFRS 9 for disclosure of risk and hedge accounting. Market factors include high liquidity due to presence of retail participants, significant hedging activities by state-owned enterprises such as COFCO, effective speculation control mechanism such as high margin cost of delivery month positions, concession on trading margins for hedgers etc. and lower transaction cost driven by special incentivization structure for brokers

Based on our primary and secondary analysis, few challenges have been highlighted pertaining to the hedging in Agri-commodities in India. Below listed are some of the challenges observed that needs to be addressed:

- There is a negative impact on market confidence due to abrupt suspensions on Agri-derivatives trading
- Mismatch between futures contracts and physical markets in terms of quality specifications at the time of actual delivery of the contracted commodity
- Issues of liquidity in Agri-derivatives market, and lack of firm policy directive for participation
- Higher trading costs, and
- High degree of market inefficiencies due to lack of reliable data.

Considering above listed challenges and identifying their impact on hedging practices in Agri-commodity derivatives, following recommendations have been put forward:

- Robust policy framework (at country level) is required in Agri derivatives market for making effective settlement of contracts which will include active surveillance mechanism by the commodity derivatives market regulator, and effective enforcement of the same (as opposed to bans)
- Reduction of regulatory constraints on domestic financial institutions such as banks, NBFCs with commodity exposure and FPIs to participate in Agri-commodity derivatives and introduction of alternate incentivization to brokers to reduce transaction cost (learnings from Chinese derivatives market)
- Mandates of State Trading Enterprise should be revised to allow them to hedge their physical exposure on the derivatives market. When option contracts are introduced, such entities can also be allowed as the option writer (for both call and put options)
- Introduction of Dynamic product standardisation and uniform standards to address the change in market FAQ driven by seasonal factors.
- Banks should be incentivized to pursue their borrowers from commodity intensive sectors to hedge their price exposure using the platform of the commodity derivatives market and leveraging commodity financing. With price risks hedged, the risk of credit default would be considerably reduced.
- Development of a Robust Agricultural Market Information System in PPP mode via leveraging technology such as AI, Big data, Remote Sensing, Blockchain etc.

Another component in this report includes analysis of five international and five domestic case studies. These case studies have been derived from various hedging related instances during the past. These case studies reflect various price risk management approaches that have been taken at both firm and country level. Various observations have been identified from these 5 internationals and 5 domestic case studies are summarised below:

Case Study Name	Hedging Strategy by United Farmers of Alberta Co-operative Ltd (UFA), Canada:	Texas Cottonseed: Cross Hedging Strategy for non-listed commodities	China: Futures + Price Insurance model:	Price Risk Management by Feed Mills in Vietnam for Soymeal:	Proprietary forward contract (Min-Max) offered by ADM Inc
Highlight of Case Study	Hedging Strategy by UFA on canola by using sell hedge, hedging principles followed by UFA in different market scenarios and use of Rolling Futures Contracts for more effective price risk mitigation strategy.	Cross-hedging strategy on cottonseed in Texas which includes two scenarios in detail- a) 4-Month Pre-Harvest Cross Hedging Example Using Soybean Future and b) July Storage Cross Hedging Example Using Soybean Meal Futures.	Emergence of “Futures plus Insurance” scheme in China. The case study also features the implementation approach and outcome of Pilot Project of Futures + Insurance model on Maize in Tieling County, 2019	Hedging Strategy used by domestic Vietnamese feed companies who are actively engaged in import operations of soymeal into Vietnam using international index such as the CBOT Soybean Meal futures price.	Use of min-max forward contract by ADM Inc for hedging purposes in US and Latin America
Notable Impact due to hedging	● CAGR of 14.4% in Revenue during 2017-2019 ● CAGR of 32.7% in	LDC’s overall derivative assets value has been 32.49% more than its derivative liabilities between	NA	Chaoren Popkhand Pvt. Ltd’s subsidiary in Vietnam has witnessed a sharp rise in operating margins during	Net unrealized gains on derivatives contracts for ADM Inc. changed from (-) 15 million USD (loss) to +524 million USD

	operating margin during 2017-2019	2017 and 2019 (on average)		2017 to 2019 by more than 86%.	(gain) between 2017-2020

Case Study Name	ITC ABD: Hedging on Soybean and its derivatives Contract:	Option Trading case study: FPO	Cross Border Hedging in Soya Oil	ABC Ltd: Hedging wheat in physical commodity market	Rama Gum Industries Ltd: Inter Commodity Spread strategy
Highlight of Case Study	ITC-ABD's commodity futures hedging strategies and principles on soya. And its derivatives	Benefits of hedging using option tools by an FPO affiliated with Samunnati Financials in backdrop of launch of 'Options in Goods' in the commodity derivatives segment through Exchanges.	Hedging strategy employed by an Indian commodity firm to manage soya oil price risk in the US futures market instead of in the Indian market and illustrates how the firm assessed the viability of cross-border sell hedge by analysing the trend of stable long run relationship (cointegration) between the two markets	Hedging strategies employed by ABC LTD for wheat in the physical market via two types of contracts i.e., export related contract and domestic consumption related contract.	Inter Commodity Spread strategy for Guar and its derivatives as utilised by Rama Gum Industries Pvt. Ltd
Notable Impact due to hedging	ITC has maintained consistent operating margins during 2017 to 2022 within the range of 9-10%.	FPO's operating margin has increased from 12.5% to 13% between 2018 and 2020	The basis risk analysis between NCDEX and CBOT showed that 75% of the risk was eliminated by CBOT hedge even in the short term (for Soya)	. ● Revenue increase of 12.33% between 2018-2021. ● Stable operating margins maintained at nearly 21% during 2018-2021 despite COVID and Russia-Ukraine War	Increase in operating margin of 15.38% and Improvement in Credit ratings from BBB- to BB+ during 2018-2020

1. Background and Rationale

1.1. Context

Ever since its inception, Indian derivatives market has not served the Agro-ecosystem in a significant way so far to break from this boom-and-bust cycle of commodity prices. The purpose of derivatives trading in agricultural market is to reduce uncertainty in the market through the process of price discovery and risk management. Almost every other year Agri-value chain players in India, from farmers to traders to processors- face distress because of volatility in agricultural commodity prices. It points towards lack of efficient agricultural markets devoid of any good instruments for price discovery.. Trading in derivative market ensures that both buyer and seller receive a certain predetermined price for a particular commodity at a specified time in future. An effective commodity derivative market therefore can minimise price risk for all stakeholders in an agricultural value chain.

Commodity markets operate through several risks ranging from price risk to transportation or delivery risk including currency risk (when trade takes place across the countries). The impact of these risks on government and private entities are different as they have a different set of exposure. And in this context, an exchange platform can play a crucial role in bringing all the relevant stakeholders on a common platform, to address a common set of challenges.

Today, commodity futures are traded on numerous exchanges around the world, including the Chicago Mercantile Exchange, the Dalian Commodity Exchange, the São Paulo based Brasil Bolsa Balcão, the South African Futures Exchange and many more. Commodity exchanges can use a broad spectrum of physical, electronic, and institutional infrastructure to facilitate trade, improve market accessibility, and enable the transfer of risk between market participants. Though exchanges can only be effective if certain preconditions, including an appropriate regulatory and legal framework, and physical infrastructure needs are met. Commodity exchanges can help a range of stakeholders, including smallholder farmers, traders and exporters, to manage commodity-related risks including facilitation of price discovery mechanisms for Agri-commodities. Primary as well as secondary information suggests that farmers' and other Agri value chain participant's share in the overall Agri-futures trading in India was just at 6.8 cent in 2021, despite futures and options contracts have been in usage as financial hedging instruments for more than a century now to protect against the underlying market risk and hedging is practised predominantly across the countries. Hence, in Indian context it is very essential to understand the challenges behind low participation, the reasons could range from lack of trust in free functioning of futures markets to abrupt suspensions in Agri-commodity derivatives market.

1.2. Need of the proposed assignment

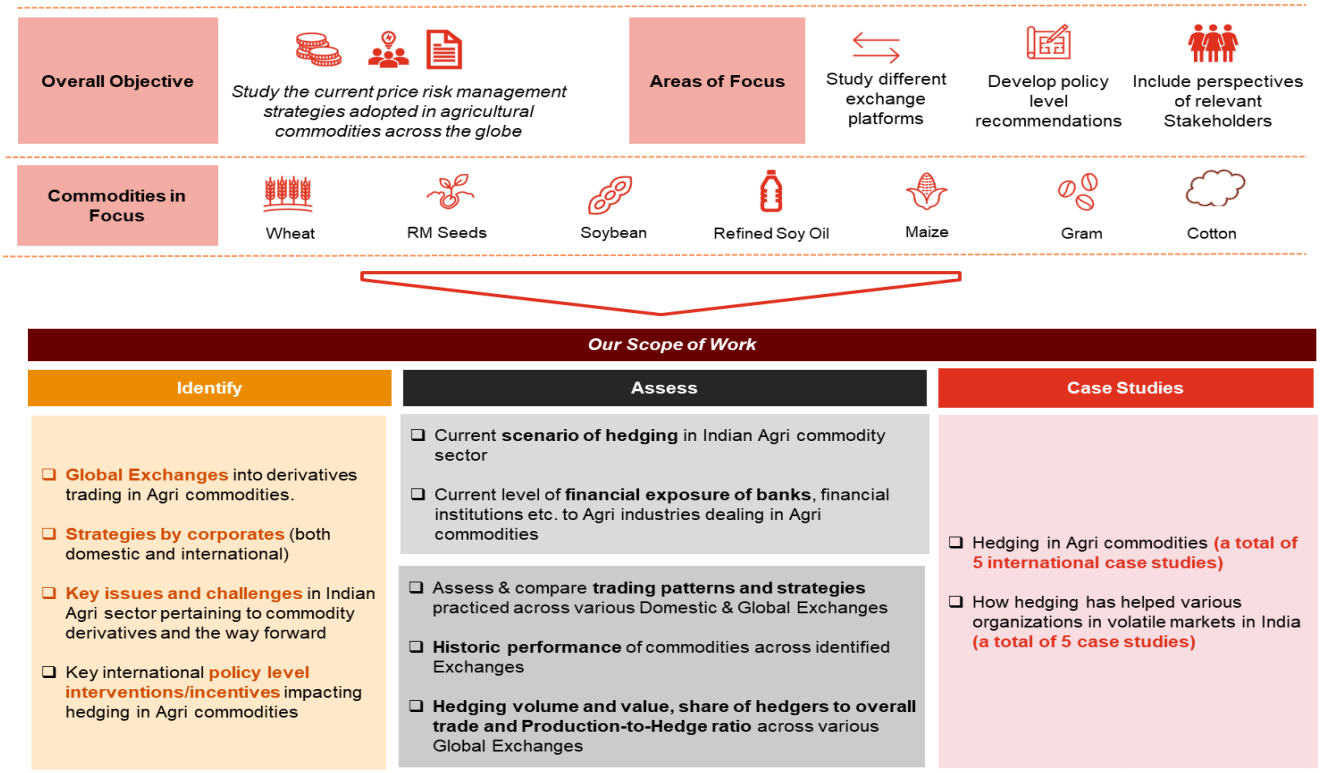
This assignment particularly highlights the challenges which impact hedging in Agri-commodities on the Indian Agri derivatives market and will help in identification of various hedging strategies adopted worldwide in the Agri derivatives market. In order to achieve sustainable growth in commodity markets and associated industries, it is highly required that a robust framework which promotes effective price risk management strategy is adopted. Price volatility creates uncertainty about future revenue from commodity sales (domestic) and exports for most Agri value chain stakeholders especially at government level, where public revenues largely come from commodity exports, and this carries a huge concern. Also, smallholder farmers are subject to vagaries of nature that can threaten their revenue as well as the nation's food security. Hence it is imperative to have a robust price risk management tool in place, in the form of hedging (for Agri derivatives market). It must be implemented at various levels in the country on a mandatory basis. Therefore, the main purpose of this assignment is to assess key challenges pertaining to hedging in the Indian Agri-derivatives market (especially Futures and Options), to study the current price risk management strategies adopted by private sector players in India and across the globe.

2. Objectives and Approach

2.1. Objectives of the study

We understand that the assignment aims to study the current price risk management strategies adopted in agricultural commodities across the globe. The overall objective was to understand the global and domestic price risk management practices and assessing their impact. The specific objective was to highlight the key factors enabling high levels of hedging practices followed by private entities. After studying various examples one of the key objectives was to formulate mould for a hedge policy for various corporations. The assignment includes meeting with hedgers, big and medium size conglomerates which are having physical exposure to Agri-commodities, understanding their strategies for price risk management etc. The assignment also pointed out the key policy level recommendations to promote hedging in agricultural commodities in India.

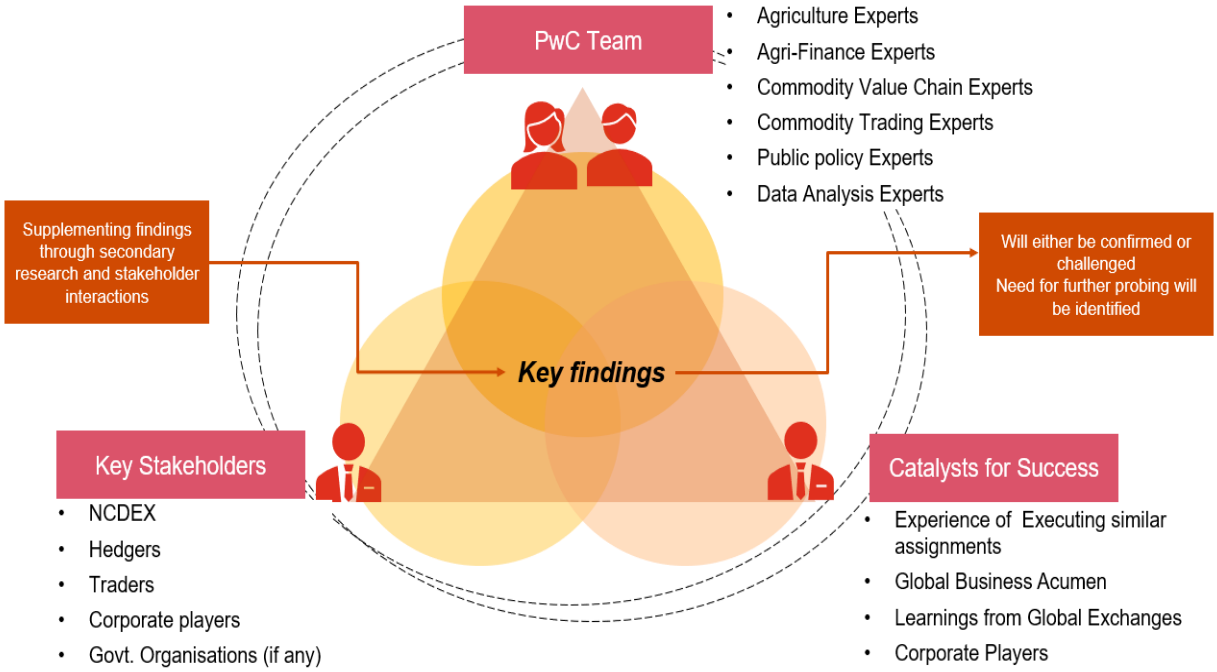
Figure 1 Our Understanding of Project Objective and Scope of Work



2.2. Our approach and methodology

Our methodology includes utilization of our technical expertise, level of experience, and robust research tools to support in the development of actionable insights with appropriate recommendations. These have facilitated the decision-making process after completion of market study. We have used validation through triangulation methodology for this assignment described below.

Figure 2 Validation through triangulation methodology

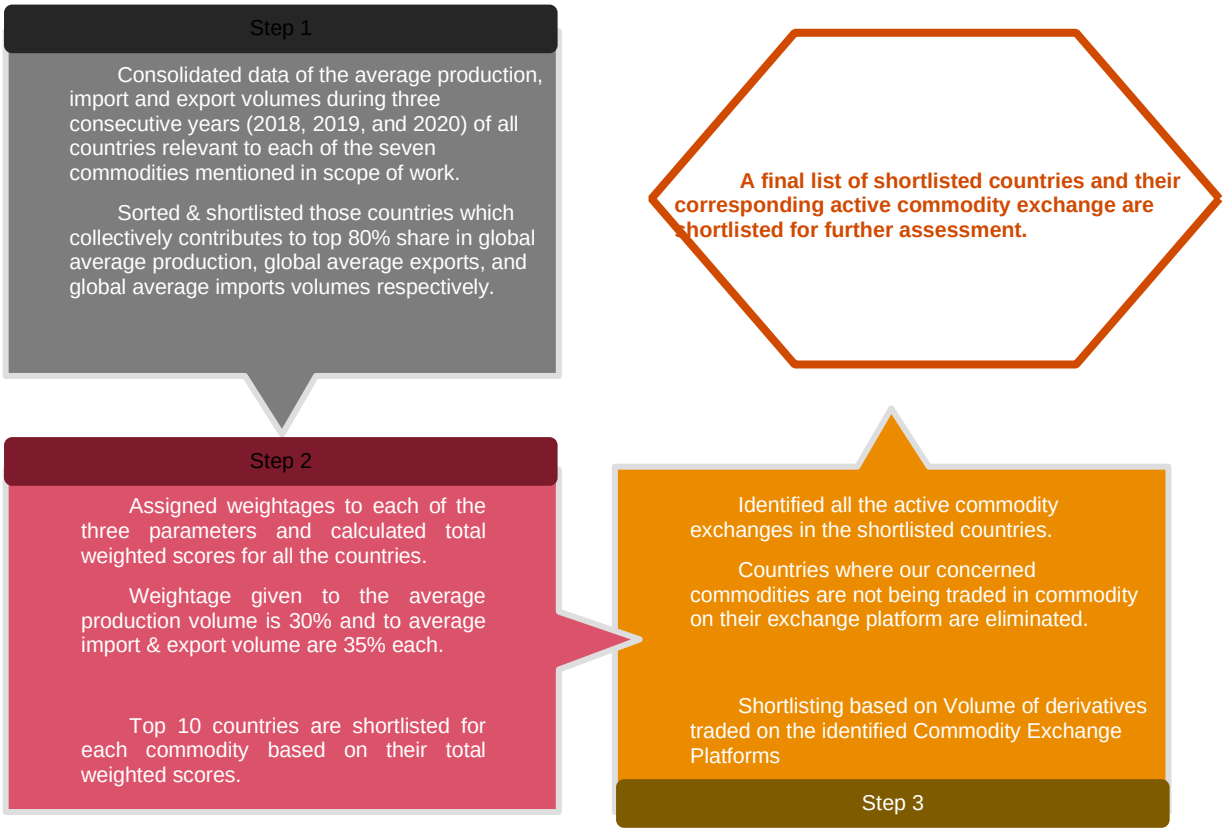


2.2.1. Methodology Adopted for Shortlisting Global Commodity Exchanges to be studied under the assignment

In this section we have highlighted the specific methodology followed to shortlist the relevant commodity exchanges in the global market. We have benchmarked the hedging practices followed at the global commodity exchanges that are relevant to the commodities assigned in the scope of work. To begin with the shortlisting of global commodity exchanges, we have identified countries where these commodity exchanges are operating to be included for study under this assignment.

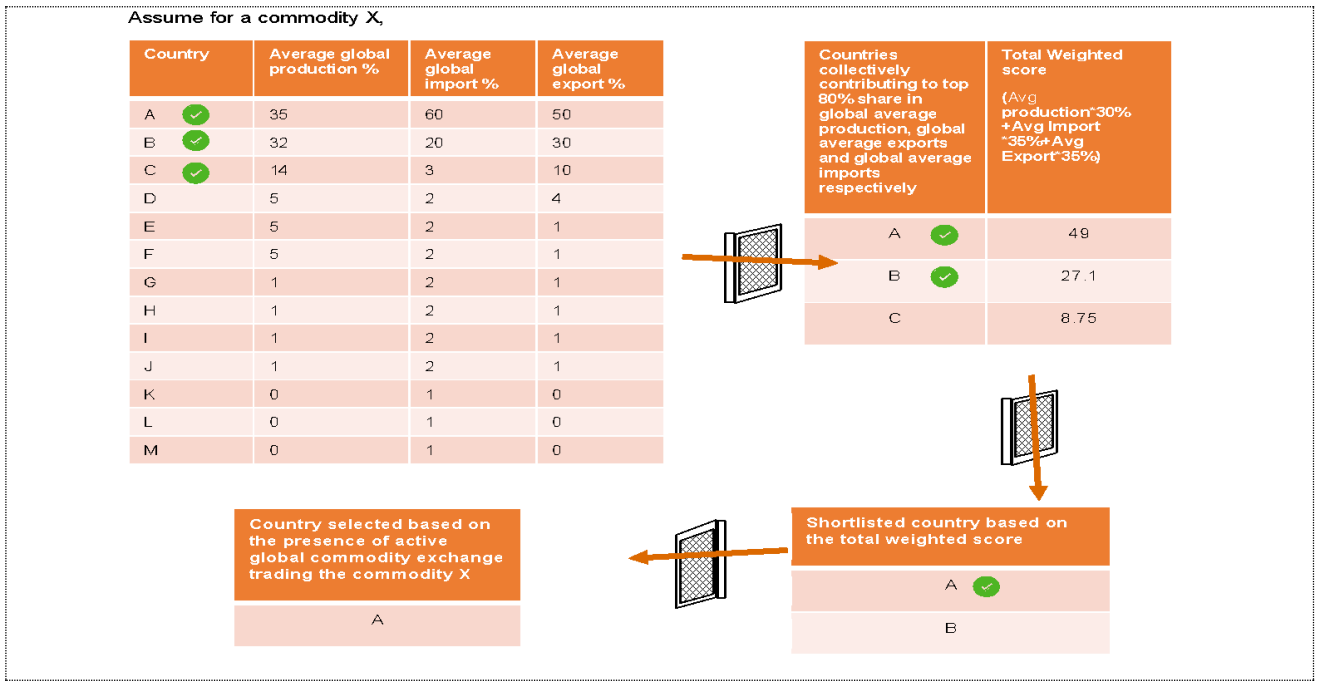
Here is the illustration which outlines our shortlisting process:

Figure 3 Overview of our Shortlisting Process for finalisation of Commodity Exchanges to be studied



Sample Illustration:

Figure 4 Illustration of our Shortlisting Process for countries to be studied



Step 1: Identification and Collation of Data Points

The trading volume of a commodity depends on its consumption status in a country. Since consumption status of a particular commodity in a country can be anticipated from its production, import and export value, we have considered these three parameters for the initial data collection through secondary research.

1. We have collected the production volume of all seven (Wheat, RM Seed, Soybean, Refined Soy Oil, Maize, Chana, and Cotton) selected commodities across various countries globally. relevant to each of the seven pre-defined commodities mentioned in the scope of our work to capture the relevance of production trend of commodities in the domestic scenario we have calculated their average production volume during three consecutive years (2018,2019 & 2020) available in each country.
2. To comprehend the impact of commodities in a global trade we have navigated through their import and export data in each of relevant countries for consecutive three years (2018, 2019 and 2020) and calculated their average value.

Step 2: Shortlisting based on Global Share in Production and Trade Volumes

Lens 1: To filter out of the first set of countries for analysis, the first lens that we have used is the share of the countries in their global production and trade. For each of the seven commodities, we have shortlisted those countries which collectively contributes to top 80% share in global average production, exports and imports.

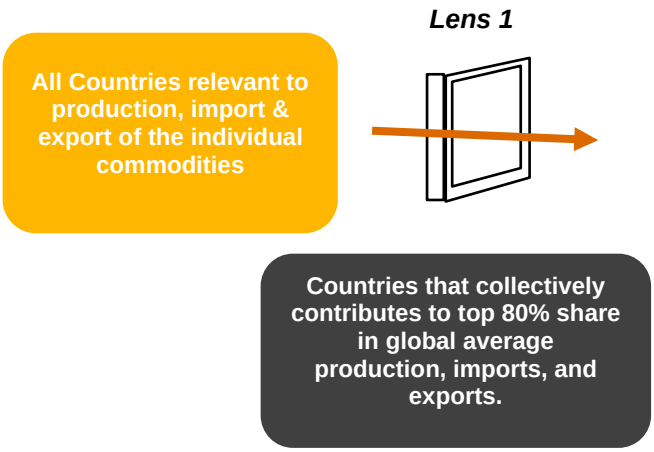


Table 1 Shortlisted countries for the targeted commodities

S. No.	Commodity	No. of shortlisted countries
1	Wheat	46
2	RM seed	16
3	Soyabean	11
4	Refined soya oil	33
5	Maize	31
6	Chana	22
7	Cotton	16

Lens 2: After our Lens 1 filtering process, we have assigned weightages to each parameter (production, import and export) and calculated the total weighted score of all the countries fulfilling either of the three criteria. Average production volume is given 30% weightage since it provides a relevant picture of the commodity in the domestic scenario of the country as well as provides its consumption status in the country which is to some extent dependent on its production volume. Average export and import are given 35% weightage each since we need to check the impact of the commodity in the global trade.

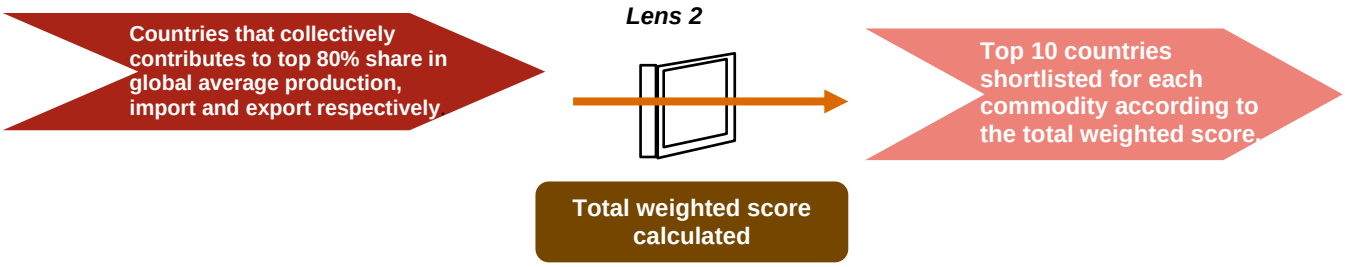


Table 2 Major production and export countries for the targeted commodities

Wheat	RM seed	Soyabean	Refined Soya Oil	Maize/Corn	Chana (Chickpea)	Cotton

USA	Canada	Brazil	Argentina	USA	Turkey	Iran
Russian Federation	China	USA	Algeria	China	Australia	Peru
Egypt	Germany	China	India*	Mexico	Spain	Egypt
Ukraine	France	Argentina	Albania	Japan	Tanzania	Austria
Spain	Belgium	Netherlands	Australia	Brazil	Saudi Arabia	Argentina
Algeria	Netherlands	Mexico	Austria	Argentina	United Arab Emirates	Morocco
Turkey	Japan	Japan	Bangladesh	Vietnam	Myanmar	India*
Indonesia	India*	Egypt	China	Republic of Korea	Pakistan	Bangladesh
Japan	Ukraine	Germany	Brazil	Spain	Iran	China
Bangladesh	Australia	Thailand	USA	Ukraine	Canada	Venezuela

**India is highlighted in the table because our study majorly focussing on global commodity exchanges (existing across various countries in the world excluding India); Source: FAOSTAT*

Step 3: Shortlisting based on Volume of derivatives traded identified Commodity Exchange Platforms

The final lens that we have used to shortlist the countries against each commodity is identification of the commodity exchange where the respective commodities are being actively traded. We have eliminated the countries that do not trade the targeted commodities in their exchange's platform. Please note that some countries have not published any information regarding their commodity exchanges and consequently we have eliminated them from the final selection. It has also been observed that commodity exchange is yet to get launched in Bangladesh and Egypt, so they were also eliminated. The proposed countries to be studied for each commodity are as follows:

Table 3 Major exchanges for the targeted commodities

S. No	Commodity	Shortlisted Countries	Identified Commodity Exchanges
1	Wheat	China	Zhengzhou Commodity Exchange (ZCE)
		USA	CME Group Inc.
		France	Euronext Paris
2	Maize/Corn	USA	CME Group Inc.
		China	Dalian Commodity Exchange (DCE)
		Brazil	Brazilian Mercantile and stock exchange
		Argentina	MATba Rofex
		Vietnam	Mercantile Exchange of Vietnam
3	Cotton	China	Zhengzhou Commodity Exchange (ZCE)
4	Rape Mustard Seeds	China	Zhengzhou Commodity Exchange (ZCE)
		France	Euronext Paris
		Netherlands	Euronext Amsterdam
5	Soybean	Brazil	Brazilian Mercantile and stock exchange
		USA	CME Group Inc.
		China	Dalian Commodity Exchange (DCE)
		Argentina	MATba Rofex
		Japan	Osaka Exchange

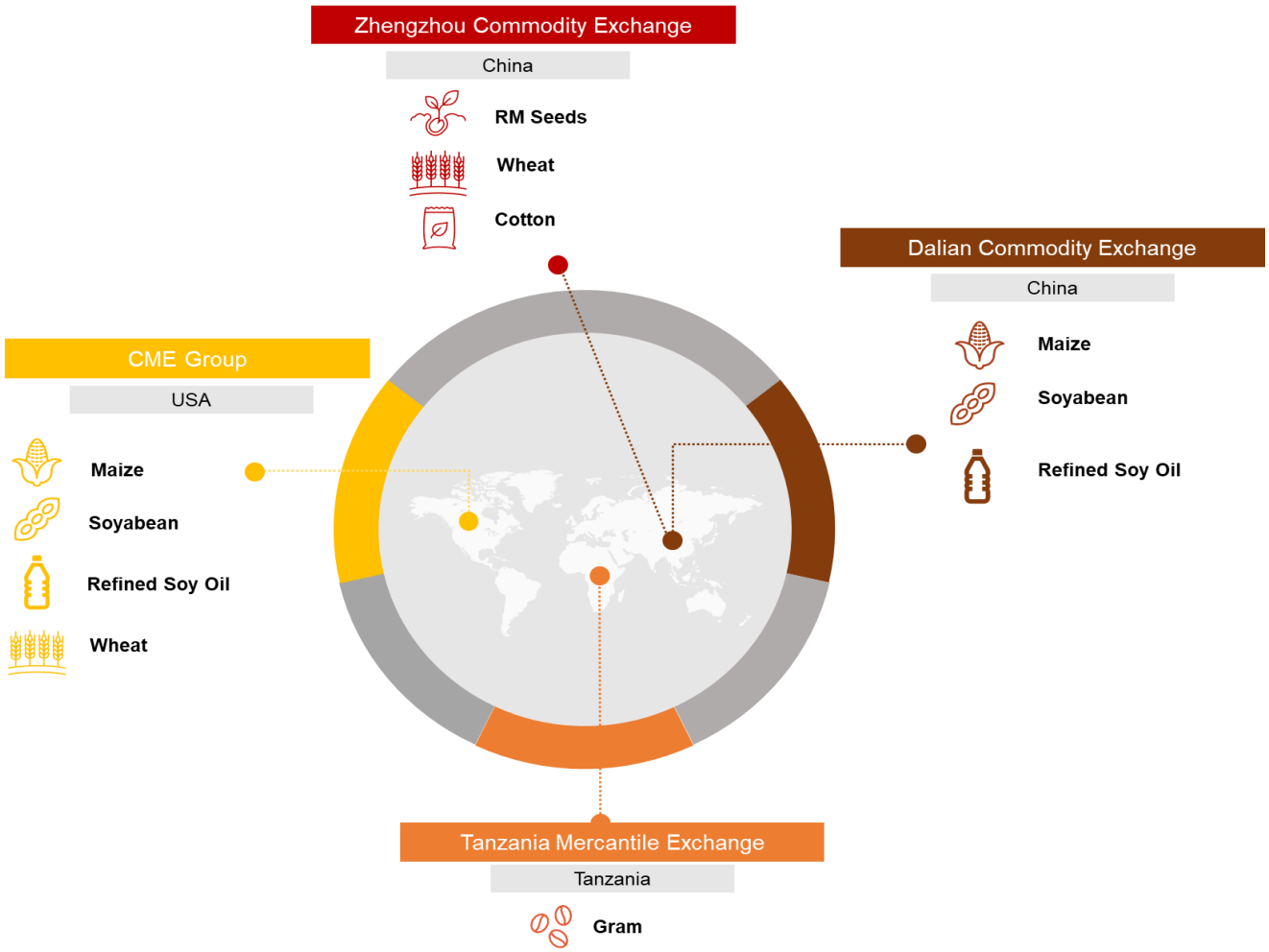
6	Refined Soy Oil	China	Dalian Commodity Exchange (DCE)
		USA	CME Group Inc.
7	Chickpea	Tanzania	Tanzania Mercantile Exchange

After identification of agricultural commodity exchanges which are active in each of the shortlisted countries, we have further shortlisted only those commodity exchanges which cumulatively enjoys a global share of 90% in terms of total value (in USD) of agricultural commodity derivatives traded. In this final stage of shortlisting process, we have considered the average of total value of derivatives traded on these exchange platforms during the three consecutive years – 2019, 2020, and 2021.*Source: World Federation of Exchanges*

However, in the case of Chickpea where very few global exchanges are currently trading (in our case only one- Tanzania Mercantile Exchange), we have considered the identified commodity exchange in our final list.

The following Illustration showcases our Global Commodity Exchanges which we would study in detail:

Figure 5 Shortlisted global commodity exchanges for the targeted commodities



2.2.2. Methodology adopted for Data Collection

We propose to use the following methods for collection of data:

1. **Desk Research:** We have carried out a detailed desk research to study the trading pattern of identified commodities in each of the Agri-commodity exchanges (depending upon the extent of data available online) and challenges in hedging of Agri commodities through derivatives from sources such as information available in published research papers, baseline survey reports, sectoral reports, annual reports, websites of stakeholder organisations etc.

2. **Stakeholder Consultation:** We have conducted interviews and group discussions with relevant stakeholders to understand the issues. Various instruments have been used for collection of information including circulation of questionnaires, personal and telephonic interviews, focus group discussions as applicable.

3. **Expert Opinions and Client View:** We have carried out semi-structured interviews with Industry Experts and other players to obtain their views and opinions and collect opinions of the clients and various departments of government.

The primary data collection instruments that would be used include:

1. Stakeholder discussion
2. Interview templates for Stakeholders, Experts
3. Structured Focus Group discussion with stakeholders

The primary information was collected from the following categories of stakeholders:

1. Private Institutional Players included-
    a. Food Processing firms
    b. Agri-trading firms (Exporters and Importers)
2. State Trading Enterprises (STEs) such as FCI, NAFED etc.
3. Representatives from Shortlisted Global and Indian Exchanges
4. Financial Institutions- PSU Banks, Private Sector Banks and NBFCs
5. Regulatory Bodies such as SEBI, RBI etc.
6. Commodity Participants Association of India (CPAI)

We have conducted these discussions through in-depth individual interviews as well as Focused group Discussions (FGDs) through video conferences by pooling in similar stakeholders together. FGDs were conducted to gather maximum insights within the limited timeframe. To ensure timely completion of the assignment, we targeted a base sample size **of 100 stakeholders**

Table 4 List of key respondents targeted for the primary interaction

Respondent Categories	Target Sample Size
Private Institutional Players	
– Food processing Firms	30
– Agri-trading firms (Exporters and importers)	30
State Trading Enterprises (such as FCI, NAFED etc.)	8
Representatives from Shortlisted Global and Indian Exchanges	10
Financial Institutions- PSU Banks, Private Sector Banks and NBFCs	15
Regulatory Bodies such as SEBI, RBI etc.	2
Commodity Participants Association of India (CPAI)	5

Protocols for interviews*:* For data protection reasons, names and contact details of the stakeholders have been kept confidential and will be shared with NCDEX IPFT. We will not be retaining the details of the stakeholder post execution of the assignment.

To ensure a professional communication, the following guidelines have been followed:

1. The team conducted the stakeholder interviews get trained on recording the responses
2. The team prepared and shared a list of potential stakeholders in consultation with NCDEX IPFT
3. The team checked with the respondent's convenience for their responses during the interview process
4. The team did not make any commitments on behalf of project or any outcomes of this study, to any of the respondents
5. The responses were recorded as shared by the respondents, and were not prompted for any favourable outcomes
6. The team conducted the interview in local language also wherever required, explaining each of the questions in detail to the respondents who were not able to comprehend any of the listed questions.
7. The interviewer recorded the responses quantitatively, by assessing the scenario
8. The interviewer recorded the verbatim responses for open ended questions
9. The interviewer avoided delving deep into any specific topics and topics outside the purview of assigned study
10. The interviewer avoided comments, responses and questions on various government policies and schemes
11. The personal details of the responded were recorded with due permission only

3. Analysis of Indian Derivative market

3.1. About Indian Agricultural derivatives market[1]

After Independence, the Constitution of India placed the subject of "Stock Exchanges and Futures Market" in the Union list and therefore the responsibility for regulation of forward contracts devolved to the Government of India. The Parliament passed the Forward Contracts Regulation Act in 1952 to regulate the forward contracts in commodities across the country. The Forward Contracts Regulation Act (FCRA) 1952 was repealed and regulation of commodity derivatives market was shifted to the Securities and Exchange Board of India (SEBI) under Securities Contracts Regulation Act (SCRA) 1956 with effect from 28th September 2015. Commodity trading in Indian exchanges has reached a sophisticated level. The exchanges offer electronic trading platforms for buyers and sellers to manage their price risks better and to improve the marketing of their physical products. This has made the commodity sector more efficient and competitive. Globally, exchange-traded commodity derivatives have emerged as an investment product often used by institutional investors, hedge funds, sovereign wealth funds besides retail investors. There has been a growing sophistication of commodities investments with the introduction of exotic products such as weather derivatives, power derivatives and environmental emissions trading (carbon credits trading).

To regulate derivatives trading of commodities in India, The Securities and Exchange Board of India (SEBI) – which is the regulatory body for securities markets has defined a framework for classification of commodities. For any given year, the categorization of commodities is based on the

(a) Average of production and import data of past five years on a rolling basis; and

(b) Consideration of factors that affect the trading in derivatives.

The agricultural commodities have been classified into three categories viz., sensitive, broad, and narrow as below:

Table 5 Classification of Commodities as defined by SEBI.

Classification of Commodity	How it is defined by SEBI
Sensitive Commodities	An agricultural commodity is classified as a sensitive commodity if • It is prone to frequent Government/External interventions. These interventions may be stock limits, import/export restrictions or any other trade-related barriers. • It has observed frequent instances of price manipulation in the past five years of derivatives trading.
Broad Commodity	An agricultural commodity is classified as 'Broad Commodity' if it is not 'Sensitive Commodity' and satisfies following criteria: • Average deliverable supply for past five year is at least 10 lakhs Metric Ton (MT) in quantitative term and is at least INR 5,000 Crore in monetary term
Narrow Commodity	An agricultural commodity which does not fall in either of the above two categories, viz 'Sensitive' or 'Broad' commodity, shall be classified as 'Narrow Commodity'

[1] Based on Workbook published by National Institute of Securities Markets, 2019 for NISM-Series-XVI: Commodity Derivatives Certification Examination

Various agricultural commodities which were traded (before Dec 2021) in Indian Derivative exchanges and their respective product category are mentioned in the table below:

Table 6 Major Agricultural Commodity Derivatives Traded in India; NCDEX, MCX, BSE, NSE

Product Category	Products
Cereals and Pulses	Chana, Barley, Bajra, Wheat, Moong, Maize feed industrial grade, Paddy (Basmati)
Fibres	Kapas, 29 mm cotton, Jute
Spices	Turmeric, Coriander, Jeera, Black Pepper, Cardamom
Plantation	Rubber
Oils and Oilseeds	Castor seed, Refined castor oil, Cotton seed oilcake, Soybean, Refined Soy oil, Mustard seed, Crude Palm oil, Natural Whitish sesame seed, Hipro Soy oil, Mentha oil
Others	Guar seed, Guar gum, Isabgol seed,

** Few commodities are highlighted in the table because the SEBI has suspended futures and options trading in these commodities. The suspension came into effect from December 20,2021 and will be applicable for a period of a year.*

Categories of Participants in Indian Commodity Derivatives Market

Broad categories of participants in the commodity derivatives markets include:

- **Value chain participants (VCPs)/hedgers and FPOs and farmers.** These stakeholders are part of 'hedgers and producers' group who trade on an exchange platform to hedge their price risks.
- **Proprietary Traders**: Proprietary traders are those entities or firms which trades derivatives and other financial instruments in its own account, using its own money instead of using clients' money. They often use various strategies such as merger arbitrage, index arbitrage, global macro-trading, and volatility arbitrage to maximise returns.
- **Domestic Financial Institutions**: Domestic financial institutions include Category-3 alternative investment funds (AIFs) which include hedge funds, portfolio management schemes (PMS) and mutual funds. In a move to deepen the market and boost liquidity, SEBI has allowed hedge funds to invest in commodity derivatives since 2018. However, this is subject to certain conditions like hedge funds should not invest more than 10 percent of the investable funds in one underlying commodity. In 2019, SEBI has also allowed Mutual fund schemes to participate in Exchange-traded Commodity Derivatives (ETCDs) of goods (single), not exceeding 10 percent of net asset value of the scheme. However, Mutual funds were barred from trading in derivatives of sensitive commodities. Until then, traders were allowed only through direct membership. It was viewed by market participants that SEBI's decision to amend SEBI (Custodian of Securities) Regulations, 1996 will allow small players to hedge their commodity risk through mutual funds.[2]
- **Others:** The 'Others' category mainly includes client categories of Hindu undivided family (HUF), individual proprietorship firms, partnership firms/limited liability partnerships and corporates.

3.2. Trading pattern in the Indian Agricultural derivatives market

The overall turnover in commodity derivatives market (across all segments) witnessed a decline of 0.02 percent from 2020 to 2021. During 2020-21 it was INR 92.22 Lakh crores as compared to INR 92.24 lakh crores in 2019-2020[3]. The marginal decline in turnover was spread across MCX, NCDEX and ICEX while BSE and NSE showed an increase due to the advent of options trading on their exchanges.

In the agricultural commodities segment, total commodity derivative turnover plummeted to 4.7 per cent in 2020-21 from 6.3 per cent in previous year. Share of non-Agri commodity derivatives contracts rose to 95.3 per cent in 2020-

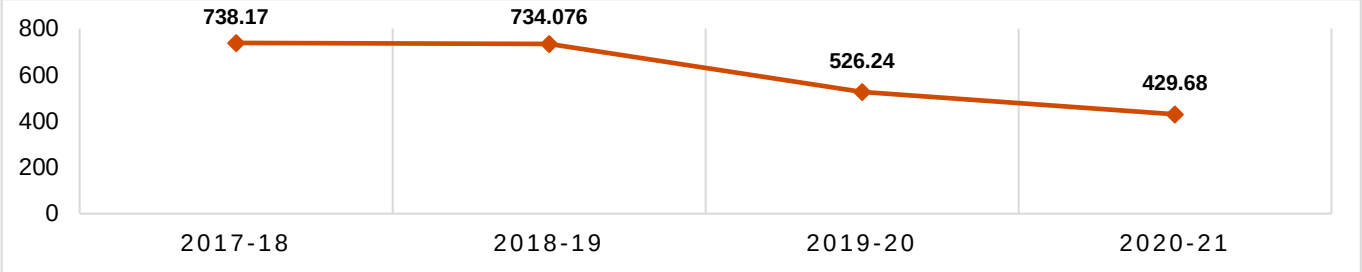
[2] *Statement by Kishore Narne, Associate Director (commodities and currencies), Motilal Oswal Financial Services Ltd to Business Standard (August 2022*)

[3] *Analysis based on Data as published in SEBI Annual Reports 2017,2018,2019,2020 and 2021*

21 from 93.7 per cent in 2019-20. This was mainly due to rise of turnover in bullion where the traded value rose by 72.7 per cent.

The Chart below showcases the trend of overall annual turnover in Agri-derivatives market in India:

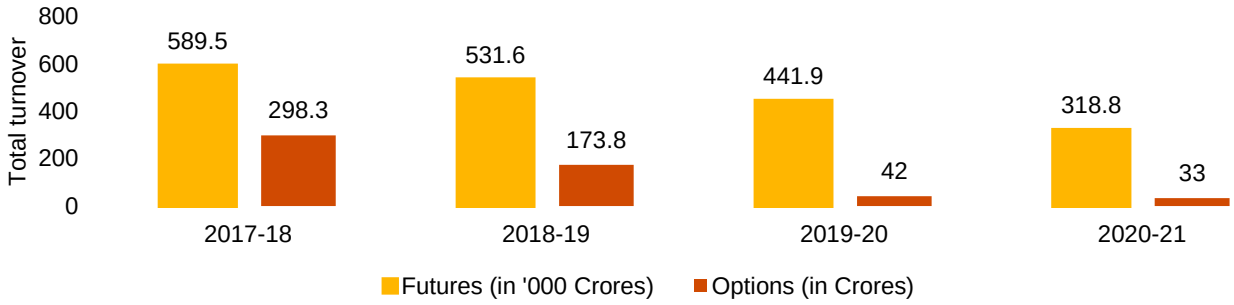
Figure 7: Total Turnover (in '000 Crores) in Agri-derivatives segment (2017-2021); SEBI annual reports



As can be observed from the chart, not only the share of turnover from Agri-derivatives segment in overall commodity derivatives turnover has plummeted, but the absolute turnover values have also witnessed decline since last 4 years (with negative growth of 41.79%), with last 2 years showcasing much steeper decline. The declining turnover value is largely due to declining trading volumes, which indicates lesser interest in the securities among the participants. Lower trading volumes have also translated to lower liquidity in the Agri- derivatives. The value of trading of agricultural commodity derivatives as a proportion of agriculture and allied sector GDP showed a decline to 12.3 per cent in 2020-21 from 17.9 per cent in previous year[4]

We have also analysed turnover patterns in futures and options separately. The Chart below showcases the trends in turnover of NCDEX across both futures and options derivatives:

Figure 8 Total Turnover of NCDEX across Futures and Options; SEBI



Source: SEBI annual report (2017-18, 2018-19, 2019-20 and 2020-21

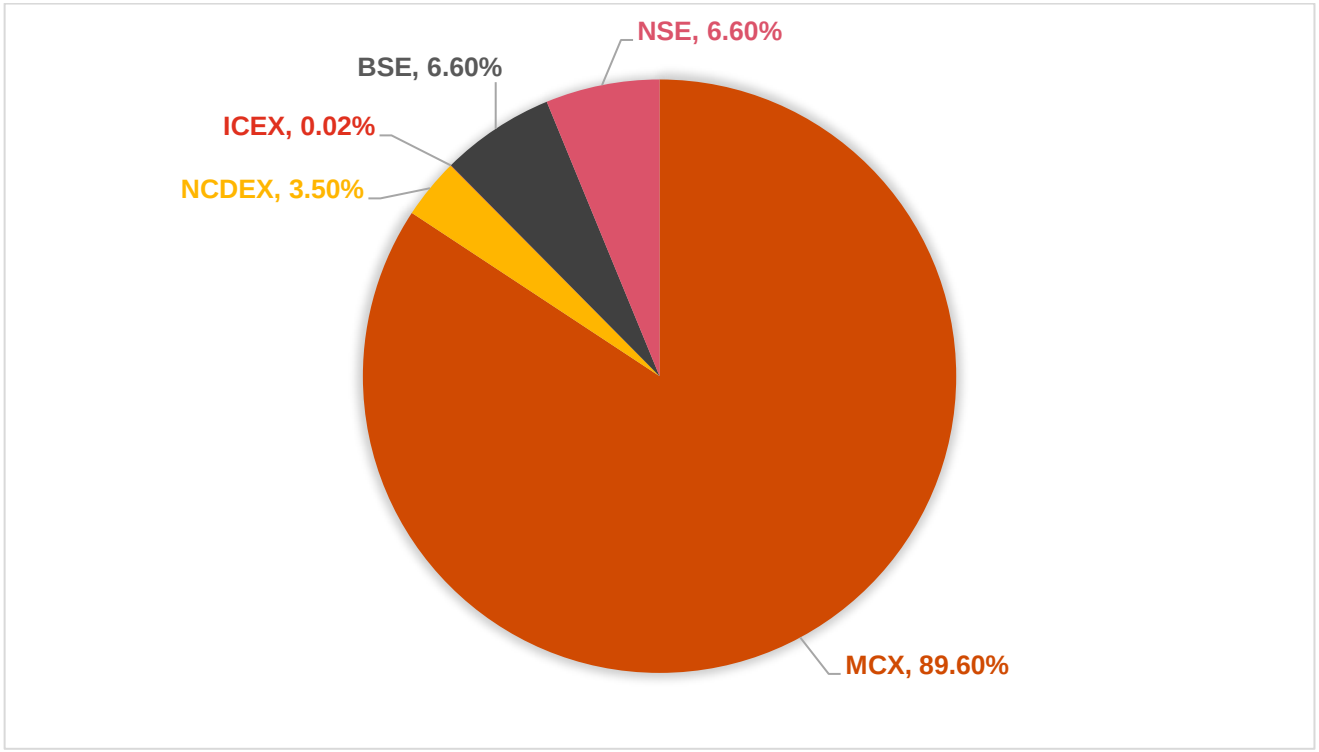
It can be noted that all-India turnover of futures contracts in commodity derivatives has shown a decline of 6.1 per cent and NCDEX futures turnover has followed a similar trend. However, the overall options contracts experiencing a growth of 197.2% in turnover during 2020-21 over previous year (due to commencement and surge in trading volume in bullion options at BSE) contrasts with the declining turnover trend for Agri-commodity options in NCDEX[5].

Concentration of Derivatives trading among Indian Exchanges

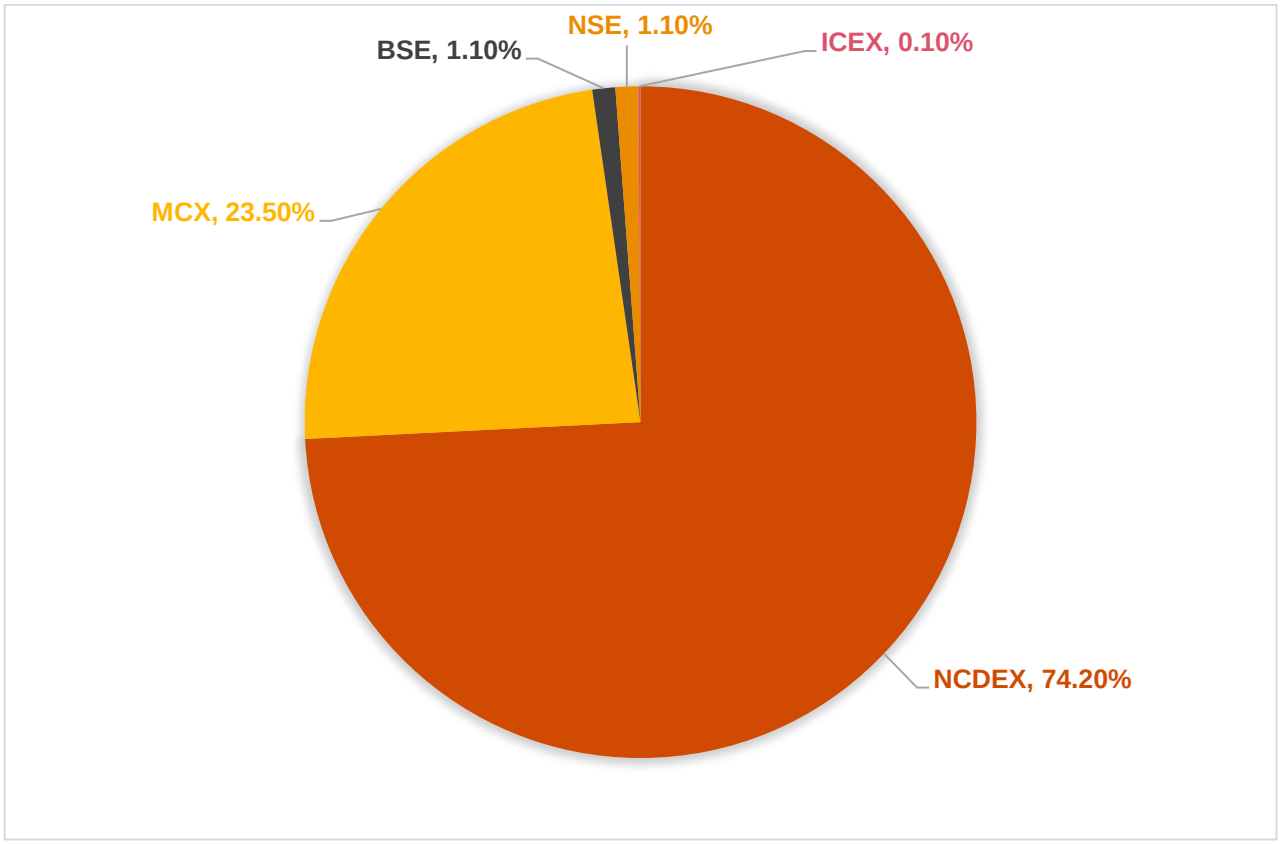
MCX has the lion's share of commodity trading, with 89.6% of total turnover in 2020-21. However, with the addition of bullion options at BSE, share of MCX has decreased.

Figure 9: Exchange-wise Share in Commodity Derivatives turnover 2020-21

[4] *SEBI Annual Report (2020-21)*
[5] *SEBI Annual Report (2020-21)*



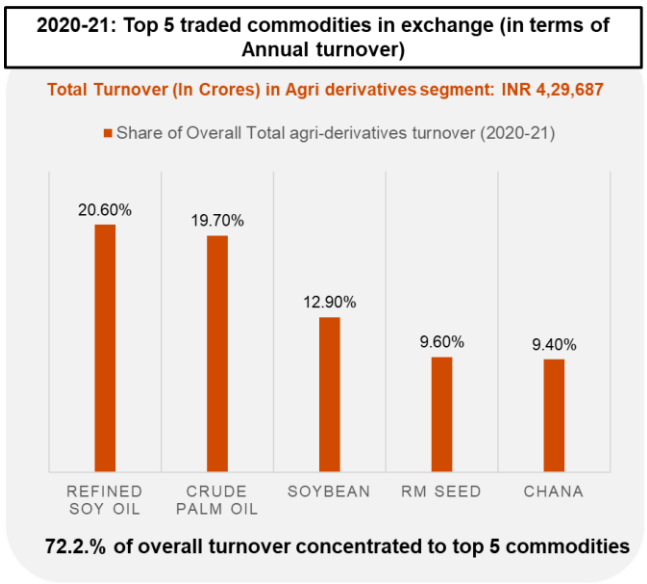
Segment-wise share shows that agri segment trading is concentrated in NCDEX with turnover share of 74.2 per cent

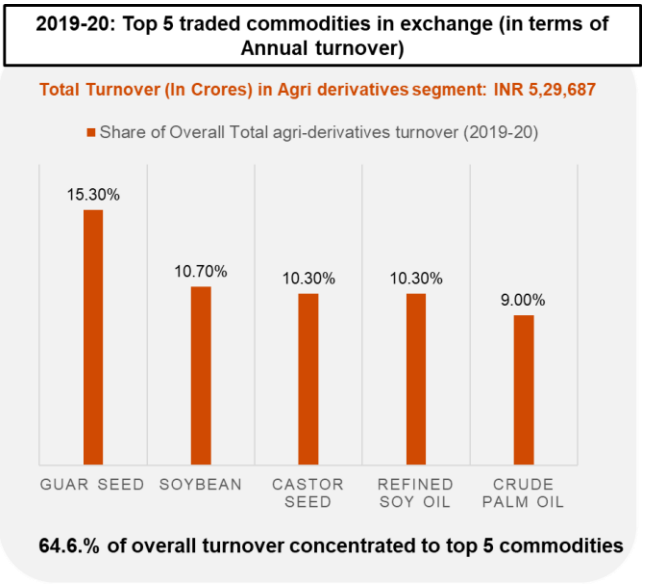


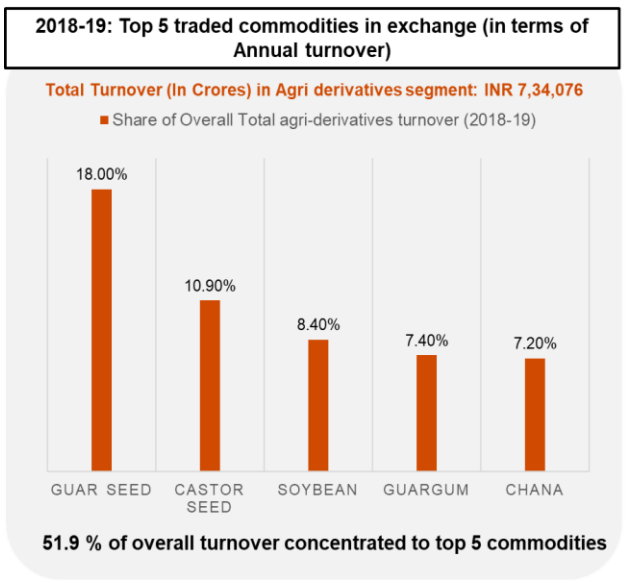
Commodity Trading Pattern Trends

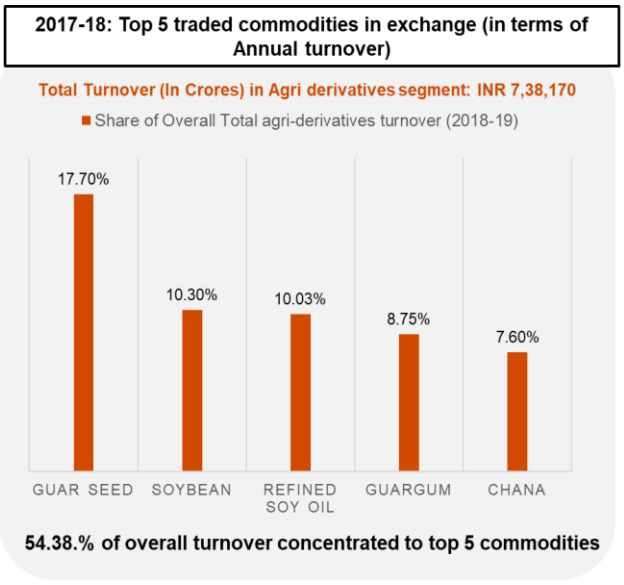
As of 2020-21, 41 agricultural derivatives contracts (futures and options) were traded for 32 unique commodities and/or their variants across all exchanges. However, the trading has been extremely concentrated to 10 commodities (93.8 per cent share of agri segment turnover). Of these, top 5 commodities alone contribute to a total turnover share of 72.2 percent among Agri Commodities.[6] Refined Soy Oil (20.6 per cent) and Crude Palm Oil (19.7 per cent) form a major part of this share along with soybean (12.9 percent), RM seed (9.6 percent), chana (9.4 per cent), guar seed (5.7 percent), cottonseed oil cake (5.4 per cent), guar gum (5.3 per cent), cotton (3.4 per cent) and castor seed (1.9 per cent). [7]

Figure 10 Commodity-wise trading pattern (in terms of annual turnover for top 5 commodities during last 4 years (2017-2021); SEBI Annual Report





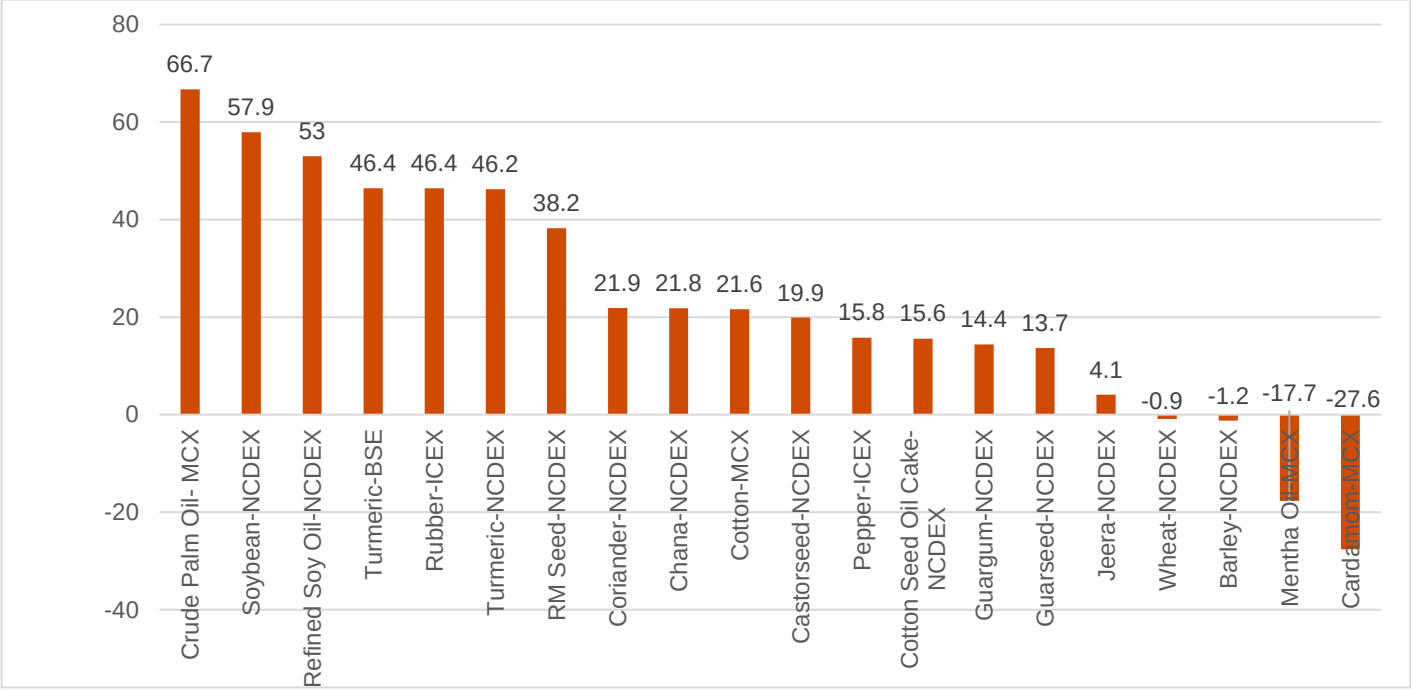




[6] SEBI Annual Report 2020-21
[7] SEBI Annual Report 2020-21

The prices of most commodities traded in domestic exchanges and international referenceable agri commodities experienced uptrends in 2020-21. Crude palm oil futures reported the highest gain, followed by soybean and refined soy oil, while cardamom and mentha oil contracts saw the highest decline.

Figure 11: Variation in Futures Prices (Year-on-Year) of Near-month Contracts Traded at Exchanges during 2020-21; Source: SEBI Annual Report 2020-21



Observations:

- During the last few years, most of the commodities which came to top 5 positions either came under 'Broad' category and 'Narrow' category. However, chana is an exception (which is a sensitive commodity). It can be inferred that guar seed (Broad Commodity) and guar gum (Narrow Commodity), not being controlled by the government, have therefore witnessed high-performance in terms of trading volume and turnover. Although the government declares MSP for chana (Sensitive Commodity) and soybean (Broad Commodity), they are not extensively procured by the State Trading Enterprises and is negligible as compared to scale of procurement done in Wheat, Paddy, and certain oilseeds. However, chana has been subject to high price fluctuations in the past and multiple interventions by the Government in terms of imposing trade restrictions and stock limits.
- Interestingly, in 2020-21, the share of Guar and its derivatives fell drastically (from around 15% to almost 5%). Approximately 80 % of global demand is contributed by India. Guar prices were already negatively affected in 2019 due to weak demand from global markets, and in 2020 the ongoing COVID-19 pandemic made the situation much more challenging for the Guar seed industry. There was a slowdown of demand from the oil rig companies where guar gum usage is high for oil extraction purposes. Slump in demand from the largest importer, the USA, and reduced application in shale oil fracking due to lower crude prices had further weakened the prices.[8]
- Unlike previous years, Crude Palm Oil has taken the top position in 2020-21. According to Solvent Extractors Association of India, in 2020-21 palm oil's share of imports grew to 63% as soft oil imports fell to a five-year low of 4.81 million MT from 5.96 million MT in 2019-20. Reopening of HoReCa [Hotels, Restaurants and Catering] sector coupled with a massive reduction in import duties and allowing RBD palm olein import has helped India's palm oil imports to surge. Also, crude palm oil futures traded at MCX reported the highest gain of 66.7 per cent[9]

[8] *Various News Reports*

[9] *Statement by Anil Kumar Bagani, head of research at Mumbai-based vegetable oil brokerage Sunvin Group told Platts on S&P Global Commodity Insights (Nov 2021)*

- In most of the cases, the top traded commodities are the ones with highest variations in Futures Prices (Year-on-Year) of Near-month Contracts traded at exchanges in that particular year. For example, in 2020-21, crude palm oil futures traded at MCX reported the highest gain of 66.7 percent followed by soybean (57.9 percent) and refined soy oil (53 per cent). These commodities are in top 3 positions in terms of turnover.[10]

Average Annual Open Interest of Commodity futures contracts:

As illustrated in the table below, percentage change in the average annual open interest in the futures contract at various exchanges platforms has a declining trend. In NCDEX, it has dropped significantly by 41.4% from 4614 crore in 2019-20 to 2706 crore in 2020-21. Other exchanges like MCX, BSE, NSE had a decline of 3.3%, 17.6% and 65.7% respectively in the commodity futures trading section.

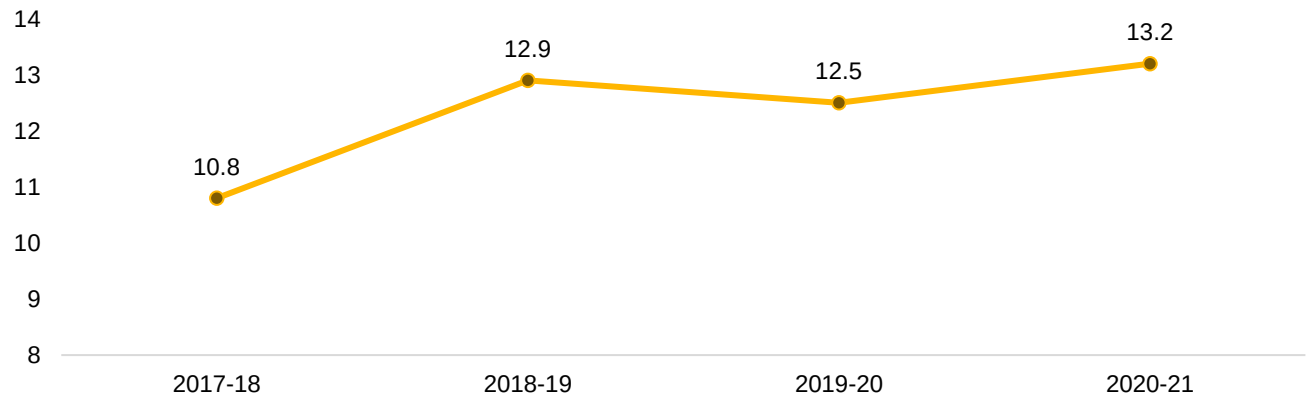
Table 7 Average annual open interest of the commodity futures contracts; SEBI Annual Reports

S. No.	Exchanges	Average annual open interest (2019-20) in INR Crores	Average annual open interest (2020-21) in INR Crores	Change year on year (%)
1	MCX	17398	16820	-3.3
2	NCDEX	4614	2706	-41.4
3	BSE	238	198	-17.6
4	NSE	14	4.8	-65.7

Since open interest is the number of options or futures contracts that are held by traders and investors in active positions, the significant decline in OI shows that buyers (or holders) and sellers (or writers) of contracts are closing out more positions and thus overall market strength is declining.

The benchmark commodity index of NCDEX, NKrishi Index, had its annualised volatility increased to 12.9 percent during the year 2018-19 as compared to 10.8 percent in 2017-18. But in 2019-20 NKrishi Index, recorded a slight fall as nine out of its 10 constituent commodities viz., Barley, Castor Seed, Chana, Coriander, Cotton Seed Oil Cake, Guar Seed, Jeera, Soybean and Turmeric, recorded drop in futures prices during the year. It decreased to 12.5 per cent during the year. In the next year 2020-21, the annualised volatility increased to 13.2 percent as nine out of its ten constituent commodities viz., castor seed, chana, coriander, cotton seed oil cake, guar seed, jeera, soybean, turmeric and rm seed, registered a rising trend in prices towards the year end.

Figure 12 Annualised Volatility (%) of NCDEX NKrishi; SEBI Annual Reports



Besides, as far as liquidity of Derivatives market is concerned, the total value of commodity derivatives traded during 2020-21 accounts for 47.3 percent of GDP[11], showing the potential of further expansion. The value of trading of

[10] SEBI Annual Report 2020-21
[11] SEBI Annual Report 2020-21

agricultural commodity derivatives as a proportion GDP emanating from agriculture and allied activities shows a decline to 12.3 per cent in 2020-21 from 17.9 per cent in previous year.

3.2.1. Commodity Derivative exchange boards in India

Agricultural futures contracts are available for trading at Multi commodity Exchange of India (MCX), National Commodity and Derivative Exchange Limited (NCDEX), National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). In 2020-21. MCX held around 89.6% market share of the overall commodity derivatives market segment. [12]
However, since then the market concentration has slightly diluted with the advent of BSE and NSE in commodity derivatives market.
In terms of agricultural commodity derivatives market, NCDEX holds 74.2 percent of the market share. According to the SEBI Annual Report (2020-21), NCDEX is offering a maximum number of Agri commodities (25 Agri commodities) for trade and the lowest number are traded in NSE (that is only 1 Agri commodity - degummed soy oil). In MCX the number of contracts available for trade in 2020-21 was lower compared to the number of contracts available for trade in NCDEX where the traded contract was highest (i.e., 30 contracts). NSE being a major non Agri stock exchange has recorded just a single traded contract of degummed soy oil.

Table 8 Trading status of Commodity Derivative Exchange boards in India; SEBI Annual Report (2020-2021)

S. No.	Exchanges	No. of Agri commodities offered to trade	No. of contracts available for trade	No. of traded contracts during 2020-21
1	MCX	9	46	6
2	NCDEX	25	16	30
3	BSE	2	11	2
4	NSE	1	33	1

The list of agricultural commodities derivatives traded in different exchanges are as show below:

Table 9 Agricultural commodities derivatives traded in different exchanges in India; NCDEX, MCX, BSE, NSE

Derivatives	NCDEX	MCX	NSE	BSE
Futures	Chana, barley, bajra, wheat, moong, maize feed industrial grade, paddy (Basmati)-PUSA 1121, kapas, 29 MM cotton, castor seed, refined castor oil, cotton seed oilcake, refined soy oil, Mustard Seed, crude palm oil, natural whitish sesame seed, hipro soyabean meal, guar (feed grade), guar seed, guar gum refined splits	Cotton, crude palm oil, kapas, mentha Oil, Rubber	Degummed Soy oil	Cotton, Turmeric
Options	Chana, mustard seed, wheat, maize, soyabean, guar gum refined splits, guar seed	None	None	None

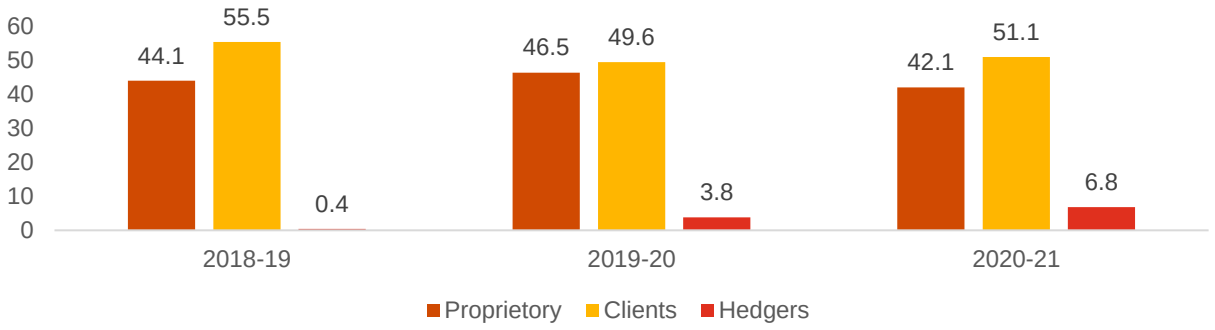
Source: NCDEX, MCX, NSE, BSE

[12] SEBI Annual Report 2020-21

3.3. Current Hedging scenario in Indian exchanges

As mentioned earlier, Broad categories of participants in the commodity derivatives markets include farmers/FPOs, VCPs/hedgers, proprietary traders, Development Financial Institutions (DFIs), and “others” representing clients. During 2020-21, the concentration of participants was also discernible in the agricultural commodity segment. In NCDEX, about 51.1 per cent of turnover was contributed by ‘others’ and 42.1 per cent was by proprietary traders. Participation of VCPs/ hedgers was at 6.8 cent and that of FPOs/farmers was an insignificant 0.01 per cent.

Figure 13 Participant wise share (in %) in Agri commodity derivative trading in NCDEX; SEBI

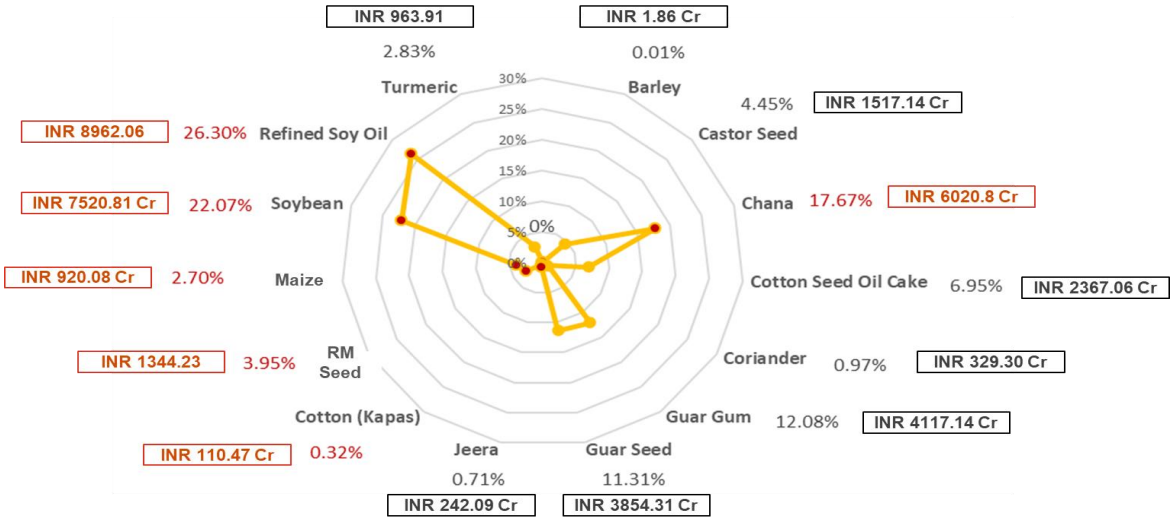


)

Observations: Although, the ratio of hedgers has grown by 6.2 percentile points over the last three years, its participation is still very minimal. The institutional investor participation has not picked up in commodity markets and the trading is highly concentrated among proprietary traders and clients. In the client's category, it can be deduced that Hindu undivided family (HUF) and partnership firms/limited liability partnerships are major contributors to agricultural derivatives trading. As this data shows, hedging and risk management via the derivative platforms is at nascent stage and institutional hedgers participation remains very low in Indian commodity derivative markets.

Commodity-wise participation by VCPs/Hedgers and Farmers/FPOs in 2020-21: Since Farmers/FPOs and VCPs/Hedgers are considered to participate on exchange platform primarily for hedging purpose, we analysed the annual turnover from these classes of stakeholders across different commodity derivatives (Futures only) on NCDEX platform during 2020-21 on NCDEX platform during 2020-21.

Figure 14: Share of commodities-wise turnover (%) due to participation by Hedgers/VCPs/Farmers/FPOs on NCDEX (2020-21)



Source: NCDEX; “Highlighted (in Red) are those commodities which are which within the scope of the assignment (except Wheat- which is not included in the chart as hedgers started to participate in it from March 2021)

Observations:

- In 2020-21, the top 5 commodities in terms of annual turnover from participation of Hedgers /Farmers/VCPs/FPOs are **Refined Soy Oil, Soybean, Chana, Guar Gum, and Guar Seed.** Together they constitute around **89.43%** of turnover from hedging. Most of the commodities which came to top 5 positions either came under the 'Broad' category and 'Narrow' category, except for chana (which is a sensitive commodity). It can be inferred that guar seed (Broad Commodity) and guar gum (Narrow Commodity), not being controlled by the government, have therefore witnessed high-performance in terms of trading volume and turnover. Although the government declares MSP for chana (Sensitive Commodity) and soybean (Broad Commodity), they are not extensively procured by the State Trading Enterprises and is negligible as compared to scale of procurement done in Wheat, Paddy, and certain oilseeds and pulses. However, chana has been subject to high price fluctuations in the past and multiple interventions by the Government in terms of imposing trade restrictions and stock limits.
- In our analysis, we have also observed that participation of hedgers for Moong (Sensitive Commodity) picked up a couple of months after its inception on the platform. As far as Wheat (Sensitive commodity) and Guar (Broad commodity) are concerned, the participation from hedgers picked up almost at the time of its introduction (during March 2021). However, Sesame (Narrow Commodity) and Steel derivatives didn't receive any interest from hedgers during that period.
- Certain commodities such as Cotton, Maize, and RM Seeds- despite being classified under 'Broad Commodity', failed to pique interest from VCPs/hedgers/Farmers/FPOs
- Interestingly, the highest participation in hedging was observed in Soybean and its derivatives, which also witnessed 2nd and 3rd highest positive variation in Futures Prices during 2020-21 in Agri-commodities segment. (After Crude Palm Oil). However, this correlation doesn't hold true for other commodities such as RM seeds, Chana, Guar seeds and Guar Gum. In case of RM seeds and turmeric, future price variation was significant at 38.2% and 46.2% respectively. However, it didn't receive considerable participation from hedgers. This contrasts the situation for Guar and its derivatives (Guar seed and Guar Gum) where the share of turnover in Guar seed and Guar Gum from participation by hedgers was 11.31% and 12.21% respectively even though the future price variation was in the lower spectrum, with around 14.4% and 13.7% respectively.

Impact of COVID-19 on Derivatives Hedging: Stakeholders' Perspective[13]	
Pre-Pandemic Phase	**Post-Pandemic Phase**
The food processing companies have a fixed MRP to deliver their end products to the distribution channels and a fixed processing margin. Their trade margin is generally good enough to absorb the little price volatility present in the commodities they use as raw materials. So, they felt the entire hedging process is an unnecessary hustle for them. In the SEBI Annual report 2020-21, it is reported that in NCDEX 92.8 per cent of physical delivery during 2020-21 was concentrated in six commodities viz. soybean, cotton seed oil cake, RM seed, Chana, guar seed and castor seed. The rest of the commodities that are traded at NCDEX constituted very less share in the physically delivered quantity. But the processing companies needed an assured physical delivery of products for running their business. Along with the price lock they needed a supply lock to their products, so they found it better to engage in the forward contracts. (For example, renowned companies like Britannia and Nestle trades in forwards contract with wheat mill traders.) So, in the pre covid era, companies were either unaware of the hedging procedures and lacked the skill	In the post pandemic period the entire scenario got a major turn. Due to the sudden inflation in the commodity prices companies suddenly started to feel the need for hedging and began looking for price risk management strategies. Now they wanted to learn about hedging and start trading in the futures contract to safeguard their trade margin but the hedging tool itself is unavailable as government has banned trading in seven agri commodities. In 2020 when the oilseed prices soared to almost double, the cattle feed traders didn't get the trade margins they used to get earlier. Their forwards contract started defaulting so they wanted to safeguard their price risk by entering futures contract. Soybean spot market price which used to be around 4000 to 10,000 rupees per quintal unexpectedly rose to 100,000 rupees/quintal. In this situation any processing company using soyabean as raw materials are eager to hedge their price risk. However, SEBI have suspended soyabean trading. As a result, the new potential participants though interested don't have any hedging tool at hand. They are not able to confide on

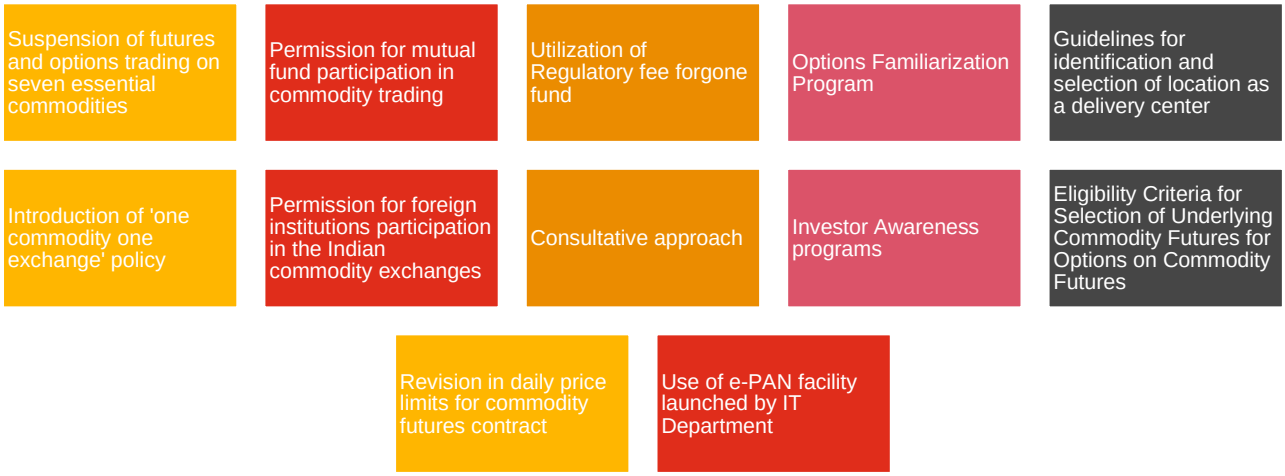
[13] Based on Primary Stakeholder Interactions

of hedging in the derivative exchanges or was uninterested to conduct hedging	the Indian commodity exchanges and staying away from it which is also deteriorating the liquidity of the commodity exchanges.

3.4. Key regulatory and policies amendments by SEBI

Various policy changes undertaken by SEBI for development and regulation of Commodity Derivatives Market are as follows:

Figure 15 Policy changes undertaken by SEBI for development and regulation of Commodity Derivatives Market



1. **Suspension of futures and options trading on seven essential commodities**: The most recent action imposed by SEBI was on suspension of futures and options trading for one year in a host of agricultural commodities including chana, mustard seed, crude palm oil, moong, paddy (non-Basmati), wheat and soybean and its derivatives. The announcement was made based on concern over rising inflation — wholesale inflation rose to a record 14.23% in November 2021. The current suspension has unsettled the entire commodity derivatives ecosystem including that of broking firms that is now left only with metal and energy contracts to trade.

2. **Permission for mutual fund participation in commodity trading**: SEBI has allowed the mutual funds participation in commodity derivative market, but as instructed, mutual fund investment is not allowed in the sensitive commodities (sensitive commodities are those which are prone to frequent government interventions / trade restrictions in the past 5 years/stock limit etc.). Until now, traders were allowed only through direct membership but Sebi's decision to amend Sebi (Custodian of Securities) Regulations, 1996 will allow small players to hedge their commodity risk through mutual funds.

3. **Utilization of Regulatory fee forgone fund**: With a part of the regulatory fee that was forgone by Sebi was instructed to create a separate fund for encouraging the farmers and FPO participation in the agricultural commodity derivative market. But due to the pandemic and various other challenges the participation from farmers and FPOs was much less than what was expected. So, in the vide circular dated, October 19,2020 SEBI instructed to utilize the remaining the fund in the following activities:
   - Reimbursement of mandi tax
   - Reimbursement of assaying, cleaning, drying, sorting, storage, and transportation charges
   - Reimbursement of put option premium
   - Reimbursement of fees levied by clearing corporation

4. **Options Familiarization Program**: NCDEX launched this Program for FPOs in November 2020 in Chana and Mustard Seed contracts, wherein FPOs registered as clients with members of NCDEX were eligible to buy put options and lock-in a price in these two commodities. The premium cost up to Rs300 per quintal to purchase the Put options was reimbursed by NCDEX from the aforesaid regulatory fee forgone by SEBI

5. **Guidelines for identification and selection of location as a delivery centre**: The delivery location plays a major role for the buyers and sellers as this not only enables their delivery decision but also affects the

pricing of the commodity. Earlier every stock exchange had different criteria for identification and selection of a location as a delivery centre for different commodities according to its internal policy decisions but to bring about a uniformity, in a vide circular dated May 26,2020 certain factors were laid down by SEBI to be considered before choosing a particular location as delivery centre. These factors are as follows:

- Demand/ Supply dynamics
- Liquidity of contract
- Value chain participants
- Infrastructure support
- Trade feedback

6. **Introduction of 'one commodity one exchange' policy**: SEBI proposed a 'one commodity one exchange' policy to reduce fragmentation of liquidity among various stock exchanges and instead SEBI wants the exchanges to focus on gaining liquidity on a specific commodity. The main objective of developing the concept is to help every exchange to develop an exclusive set of un fragmented liquid contracts on specific commodities. The regulator has classified agricultural commodities into three categories -- sensitive, broad, and narrow and have proposed that the concept should only be applicable for narrow Agri-commodities. The 'exclusivity' status of the commodities is supposed to continue for around 3 to 5 years from the date of Sebi's approval. If the exchange wants, it can withdraw the status before 3 years but there is a condition to it i.e., the product must bring continuous liquidity at least for 12 months

7. **Permission for foreign institutions participation in the Indian commodity exchanges**: SEBI has proposed FDI to invest in all the non-agricultural and some broad Agricultural commodities. This decision was taken to enhance the market depth and liquidity of the Indian commodity derivative exchanges so that India can shift its role from price taker to price maker and can serve as a global benchmark for various commodities.

8. **Consultative approach**: Commodity Derivative Advisory Committee (CDAC) was constituted in 2016 so that it can review the norms and practices of the commodity derivative market and suggest SEBI in drafting new norms for the improvement and deepening of the market. In the 9th meeting of CDAC held on June 18, 2020, it was proposed to constitute two sub-groups namely 'Sub-group on Agricultural Goods' and 'Sub-group on Base Metals/Industrial Metals/Ores, Coal' to assist CDAC on various important policy matters in a more efficient way. The specific task of the Subgroup on the agricultural goods is to deliberate and suggest measures for deepening of the agricultural commodity derivatives markets, reduction in cost of transaction including delivery and storage, increasing participation of farmers/ FPOs, ease of doing business by farmers/FPOs etc.

9. **Investor Awareness programs**: Lack of trust and understanding about the commodity derivative exchanges is a major factor behind the lack of participation in the derivatives trading. SEBI issued guidelines for the exchanges to conduct at least one third of their total investor awareness programs (IAPs) for FPOs in every financial year.

10. **Eligibility Criteria for Selection of Underlying Commodity Futures for Options on Commodity Futures**: SEBI vide circular dated June 13, 2017, on options on commodity derivatives- product design and risk management framework had proposed that only the commodity futures which will be amongst the top five futures contracts in terms of total trading turnover will have the eligibility criteria as the underlying for options. To increase the choice of the underlying for the launch of options, vide circular dated July 20,2020 repealed the old eligibility criteria and permitted the launch of options on all underlying commodity futures.

11. **Revision in daily price limits for commodity futures contract**: The Daily price limit of the commodity in the futures market defines the maximum movement of the prices that can happen within one trading session. Vide circular dated January 11,2021, norms of DPL were revised to form category wise DPL instead of having same DPL for all the commodities. According to the new norms, DPL in agriculture have been linked to the various classification of categories into sensitive, narrow, and broad categories of commodity.

12. **Use of e-PAN facility launched by IT Department:** According to a circular dated September 16, 2016, the collection and maintenance of Permanent Account Number (PAN) of clients by their respective members, was mandated. To rationalise this compliance requirement, vide circular dated March 08, 2021, was passed to amend the previous circular and enhance the use of e-PAN facility launched by Income Tax (IT) Department. This will help in easing out the process of doing business in the commodity derivatives markets.

4. Analysis of shortlisted Global Derivative Markets (Country level) for the proposed study

4.1. An overview of Agricultural derivatives market in shortlisted countries

4.1.1. United States of America: Chicago Board of Trade (CBOT)

Established in 1848, Chicago Board of Trade is a commodity exchange offering futures and options over a wide range of commodities such as Agri commodities, gold, silver, US treasury bonds and energy. It is a part of the Chicago Mercantile Exchange (CME) group. The Chicago Mercantile Exchange (CME) Group and Chicago Board of Trade (CBOT) merged in 2007, which led to addition of interest rates, agriculture, and equity products to the CME group's original product offerings[14]. The CME Group Inc is one of the world's leading derivative marketplaces made up of 4 exchanges- CME, CBOT, NYMEX, COMEX. Each exchange offers global benchmark products in the widest range of asset classes including agricultural products, currencies, energy, interest rates, metals, stock indexes and crypto currencies future. The company offers electronic trade on futures contracts and options on futures contracts globally on CME Globex platform. CME Group offers innovative trading tools and data globally to help market participants capture opportunity by managing the risk with utmost efficiency[15].

The CME Group Inc is one of the world's leading derivative marketplaces made up of 4 exchanges- CME, CBOT, NYMEX, COMEX.

- Each exchange offers global benchmark products in the widest range of asset classes including agricultural products, currencies, energy, interest rates, metals, stock indexes and crypto currencies future. The company offers electronic trade on futures contracts and options on futures contracts globally on CME Globex platform. CME Group offers innovative trading tools and data globally to help market participants capture opportunity by managing the risk with utmost efficiency.
- Agri Products traded in CME Group Inc: Corn, Wheat, Soybean, Soymeal, Soy oil, Malaysian Crude Palm Oil

Table 10 List of Agri commodities traded in CME Group Inc., CME Group

Agri commodities traded in CME Group Inc.					
Corn	Wheat	Soyabean	Soymeal	Soy oil	Malaysian CPO

Table 11 List of commodity contracts of targeted commodities on CBOT

Commodities traded in Futures	Commodities traded in Options
Corn, Wheat, Soybean, Soy meal, Soy oil	Soybean, Soy meal, Soy oil, Malaysian Crude Palm oil

[14] CFTC
[15] CME Group

We have also identified those derivatives which are highly traded in CBOT as shown below:

Table 12 Top 3 products on CBOT by trading volume (2019); FIA

Exchange	% Share of exchange in global volume of the asset class	Product	Contract Size	2019 Trading Volume (Contracts)	% Share of trading volume among all agricultural products on the Exchange
CBOT	18.2%	Corn futures	5000 bushels	134,508,582	41.8%
		Soyabean futures	5000 bushels	66,841,024	20.8%
		Chicago soft red winter wheat futures	5000 bushels	37,753,766	11.7%

The above table lists the highly traded commodities in CBOT. According to 2019 data, the highest volume of corn futures was traded in CBOT followed by Soybean futures and Chicago soft red winter wheat futures. For an average American consumer these commodities don't count to be sensitive commodity in terms of food security since they are primarily used as feed materials. Corn accounts for 95% of total feed grain production and it is the primary feed grain used in US. More than 70% of soybeans are used as animal feed in the US. Although wheat is used as a food item, it is not sensitive with respect to food security. Red Winter wheats are used as the animal feed in North America. The US is a net exporter of Corn, Wheat and Soybean.

So, considering these factors we can conclude that high performing commodities in CBOT are feed based crops which are not sensitive from the food security perspective, and they own a decent share in the global trade. Besides, a wide range of commodity contracts are offered in the US Commodity market which provide flexibility to the trader to diversify their plan and manage long term investment. High liquidity in commodity markets incentivises the participants to actively participate in hedging. The diversification of commodity contracts also supports in safeguarding the interest of participants against unexpected macro events and hence serves a vital risk management purpose.

4.1.2. China: Dalian Commodity Exchange and Zhengzhou Commodity Exchange

Dalian Commodity Exchange (DCE) (China)

It is the largest agricultural derivative exchange located in mainland China and commands 48% globally in terms of traded volume in the Agri-derivatives segment. It is one of the four futures exchanges under the supervision and administration of the China Securities Regulatory Commission (CSRC). Apart from providing scopes for global trading on futures and options on several agricultural commodities, it also performs some other functions like developing contracts, settlement of the goods delivery, market surveillance, formulating and implementing risk management rules, market data and information services etc.

According to Futures Industry Association (FIA), DCE ranked 9th worldwide in 2021 in terms of trading volume, becoming a major futures market for agricultural products, plastics, coke, coal, and iron ore in the world.

Agri products traded in DCE group: Corn, corn starch, no. 1 soybean, no. 2 soybean, soybean meal, soybean oil, RBD palm olein[16].

Assessment of Key Commodities Traded in Agricultural Derivatives- DCE

DCE is the largest agricultural derivative exchange located in mainland China.

- It is one of the four futures exchanges under the supervision and administration of the China Securities Regulatory Commission (CSRC).

[16] CFTC

- Apart from providing scopes for global trading on futures and options on several agricultural commodities, it also performs some other functions like developing contracts, settlement of the goods delivery, market surveillance, formulating and implementing risk management rules, market data and information services etc.
- According to Futures Industry Association (FIA), DCE ranked 9th worldwide in 2021 in terms of trading volume, becoming a major futures market for agricultural products, plastics, coke, coal, and iron ore in the world.
- Agri products traded in DCE group**:** Corn, corn starch, no. 1 soybean, no. 2 soybean, soybean meal, soybean oil, RBD palm olein.

Table 13 List of Agri commodities traded in DCE.

Agri commodities traded in DCE						
						
Corn	Corn Starch	No.1 Soyabean	No.2 Soyabean	Soyabean Meal	Soyabean Oil	RBD Palm Olein

Source: DCE

Table 14 Different types of tools to trade targeted commodity on DCE;

Commodities traded in Futures	Commodities traded in Options
Corn, corn starch, No. 1 Soybean, No. 2 Soyabean, Soy meal, Soy oil, RBD Palm Olein	Corn, Soybean meal, RBD Palm Olein

We have also identified those commodities which are highly traded in DCE as shown below:

Table 15 Top 3 products on DCE by trading volume (2019); FIA

Exchange	% Share of exchange in global volume of the asset class	Product	Contract Size	2019 Trading Volume(Contracts)	% Share of trading volume in all agricultural products on the Exchange
DCE	40.2%	Soyabean meal futures	10 Metric Tonnes	272,869,691	38.4%
		RDB palm olein futures	10 Metric Tonnes	135,504,196	19.1%
		Corn futures	10 Metric Tonnes	99,119,054	14.0%

The above table lists the highly traded commodities in DCE. According to 2019 data, the highest volume of Soybean meal futures was traded in DCE followed by RDB palm olein and Corn futures. Among these 3 commodities Soyabean meal is a major feed-based commodity used by China. Earlier China used to import Soybean and crush it for oil and meal but in 2020-21 owing to the price rise in Soybeans and negative crush margins, China started to gradually increase soyabean meal imports out of Argentina and Brazil. China imports a massive quantity of corn from the US as it is a major constituent of feed mixture. Palm olein is the only product that is used as a food material, but it has good domestic consumption demand.

So, considering all these factors we can conclude that the high performing commodities in DCE are feed based crops, has a high domestic demand, and has a good share in the global import.

Zhengzhou Commodity Exchange (ZCE) (China)

The Zhengzhou Commodity Exchange (ZCE) was founded in October 1990. ZCE was initially established as a pilot exchange in the China futures market and is regulated by China Securities Regulatory Commission (CSRC). ZCE is the second largest derivative exchange in China with a global share of 27.20 % in terms of traded volume in the Agri-derivatives segment. It deals with several diverse agricultural commodities. It is a self-disciplinary exchange that provides the venue for an impartial and open trade. To enhance its international influence, ZCE has signed cooperative agreements with several international exchanges such as CME, MCX, MOEX, SGX etc.

ZCE has launched 23 futures products including agricultural commodities such as common wheat, strong gluten wheat, early rice, late indica rice, japonica rice, cotton, cotton yarn, rapeseed, rapeseed oil, rapeseed meal, white sugar, apple, Chinese Jujube etc. By the end of June 2022, ZCE trading volume accounted for 33% of the national trading volume[17].

Assessment of Key Commodities Traded in Agricultural Derivatives- ZCE

ZCE has launched 23 futures products including agricultural commodities such as common wheat, strong gluten wheat, early rice, late indica rice, japonica rice, cotton, cotton yarn, rapeseed, rapeseed oil, rapeseed meal, white sugar, apple, Chinese Jujube etc. By the end of June 2022, ZCE trading volume accounted for 33% of the national trading volume. According to the developments and innovations in the market ZCE consistently improves its implementation of trading rules. ZCE has a well-functioning electronic system for trading, delivery, settlement, information release and risk monitoring.

- Agri products traded in ZCE group: Wheat, Cotton, White sugar, Rapeseed oil, Early Japonica rice, rapeseed, rapeseed meal, Late Indica Rice, cotton Yarn, apple, Chinese Jujube kernel

Table 16 List of Agri commodities traded in ZCE:

Agri commodities traded in ZCE									
Wheat	Cotton	Rapeseed Oil	Early Japonica Rice	Rapeseed	Rapeseed meal	Late Indica Rice	Cotton Yarn	Apple	Chinese Jujube Kernel

Table 17 Different types of tools to trade targeted commodity on ZCE.

Commodities traded in Futures	Commodities traded in Options
Wheat WH, Wheat PM, Cotton, White sugar, Rapeseed oil, Early Japonica rice, rapeseed, rapeseed meal, Late Indica Rice, cotton Yarn, apple, Chinese Jujube, peanut kernel	White sugar, cotton, Rapeseed meal

We have also identified those commodities which are highly traded in ZCE as shown below:

Table 18 Top 3 products on ZCE by trading volume (2019), FIA

Exchange	% Share of exchange in global volume of the asset class	Product	Contract Size	2019 Trading Volume (Contracts)	% Share of trading volume in all agricultural products on the Exchange
ZCE	24.3%	Rapeseed meal futures	10 Metric Tonnes	138,085,360	32.1%

[17] http://english.czce.com.cn/enportal/AboutZCE/Overview/Overview/H69010101index_1.htm

		White Sugar futures	10 Metric Tonnes	119,288,327	27.8%
		Cotton no. 1 futures	5 Metric Tonnes	63,971,129	14.9%

The above table lists the highly traded commodities in ZCE. According to 2019 data, the highest volume of rapeseed meal futures was traded in ZCE followed by White sugar futures and Cotton no.1 futures. Among these 3 commodities none of the products are sensitive in terms of food security. Cotton is a fibre crop; Rapeseed meal is a feed crop and white sugar is important for commercial use. Moreover, China ranks second in global rapeseed meal import and ranks first in global cotton import.

So, considering all these factors we can conclude that the high performing commodities crops in ZCE are not food-based crops and has a good share in the global import of these commodities.

4.2. Trading pattern of selected commodities in Agricultural derivatives Market

4.2.1. The Global Scenario[18]

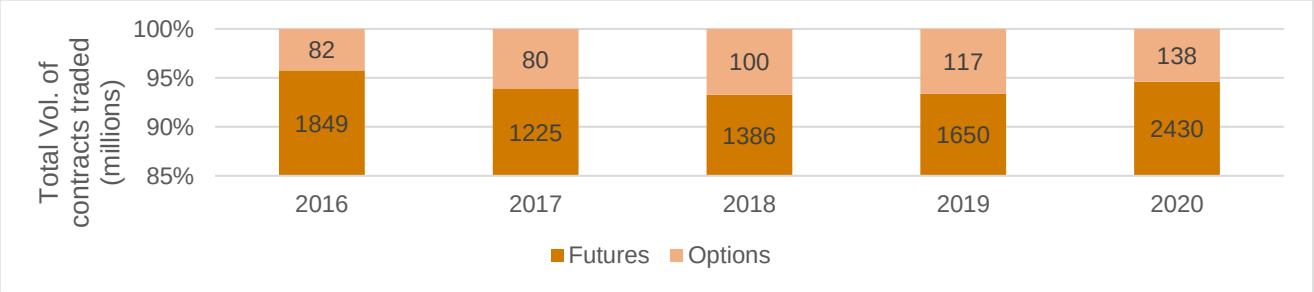
Considering the year 2021, China and USA are the frontrunners accounting for 75% percent (2.05 billion contracts) and 18 percent (0.34 billion contracts) of the total global agricultural futures and options trade. In terms of volume of agricultural derivatives traded, China dominates the market with a major share of around 75%. In China, an overall 2 billion agricultural futures and options contracts were traded across the world in 2021. Having started in 1993, China has witnessed an outstanding performance in terms of its contribution to the global agricultural derivatives trade. Within China, Dalian Commodity Exchange enjoys a lion's share of 62% while Zhengzhou commodities exchange has a 38% market share. However, ZCE has witnessed sharper growth in volume of contracts traded (especially during 2020-2021), while DCE showed a slight decline during the same period.

Figure 20 Agriculture options and futures - Volume of Contracts Traded (2019-2021), FIA

The historic data collected for the targeted commodities was analysed and assessed to draw insights about the targeted global Agricultural Derivatives Market. There was a reported increase in the number of Agri futures and Agri options contract with respect to the volumes of contract traded since 2018.

[18] World Federation of Exchanges

Figure 21 Share of Agri Futures vs Agri Options, FIA



In comparison of trends across agricultural futures vs agricultural options, the overall share of volumes traded on Agri Futures cover the larger share of total Agri trade (>94%) and the total Agri option account for 4-6% of total Agri trade. Historically, the share of Agri futures decreased slightly from 96% in 2016 to 93% till 2019 only to increase to 94% in 2020.

A major boost in the Agri commodity market was observed in 2020 due to COVID to a level of 45%. This was mainly because of a 47% increase in Agri Futures volume transacted in 2020 with respect to 2019. It was during this year, the Agri commodity market recovered from the slump of 32.7% of 2017.

In terms of Open Interest, there was an increase in the open interest in Agri commodity market (2.8% increase) from Dec'20 to Dec'21 which is more than the overall increase in commodity market (2.6% increase)

On the other hand, the global commodity market showed a steep continuous decline in futures ratio from 63% in 2016 to 47 % in 2021 as shown in the table below.

Table 20 Historic Trends in Global Exchange Contract Traded, FIA

Total Vol. of contracts (Millions)	2016	2017	2018	2019	2020	2021
Futures	15892	14842	17151	19,240	25545	29,275
Options	9327	10356	13131	15234	21221	33309
Futures & Options	25220	25198	30282	34474	46767	62584
Future %	63%	59%	57%	56%	55%	47%

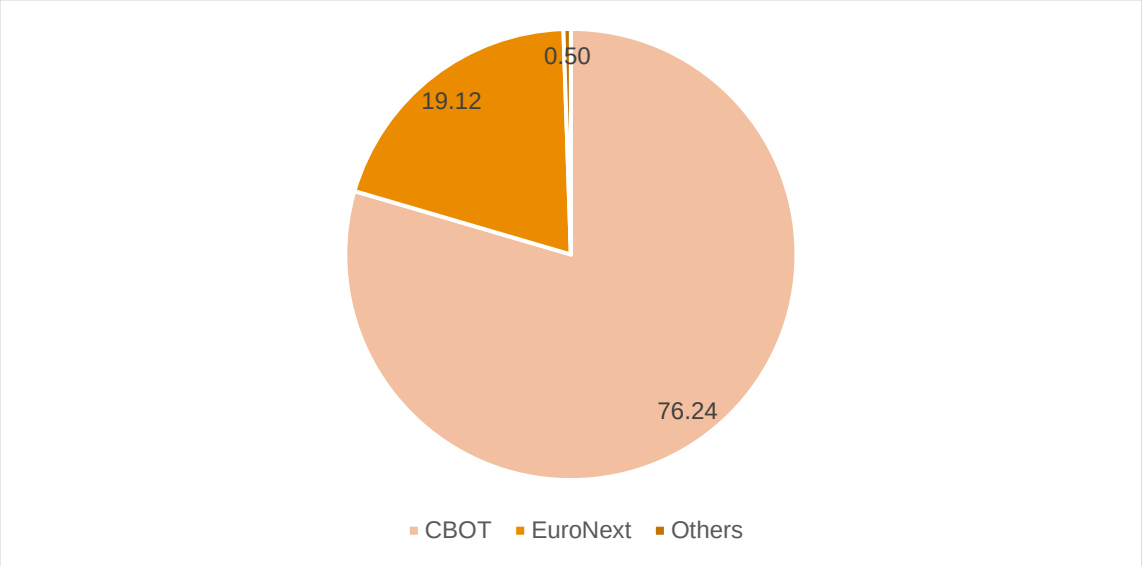
4.2.2. Commodity-wise statistics[19]

Wheat

1. Global Volume Traded
   In terms of the total volume of contracts traded for wheat, CBOT is the largest and major exchange for wheat throughout the world dealing in 76% of wheat contracts in 2020 (futures and options included) with France's Euronext exchange as the only other major exchange (19.1%). In China, Zhengzhou Commodities Exchange (ZCE) is the leading wheat trading exchange. Among others, France's Euronext Derivatives, JSE Securities of South Africa, ASX 24 of Australia and MATba ROFEX of Argentina also deals with different varieties of wheat.

[19] Analysed from global trading data derived from reports of FIA

Figure 22 Share of Volume of wheat traded in the global exchanges, FIA



2. Varieties and their geographical location

   Predominantly there are three major varieties of wheat being traded on CBOT in the form of both futures and options. Largest traded variety includes Chicago soft red winter (also the largest traded wheat variety in the world) followed by KC hard red winter. Other two varieties traded include EU wheat and Mini wheat. EU wheat and Mini wheat however are traded in less than 2% of the total quantity of wheat traded on the platform.

Figure 23 Wheat Futures (CBOT); FIA

3. Inferences drawn on the data
   a. 15-17% of the wheat traded on CBOT is via Options; the ratio increased and reached 17% in 2018 and decreased to 16% in 2020
   b. In comparison to 2016, there has been a decrease of Chicago Red Soft Wheat being traded on CBOT Futures, however total wheat traded has increased
   c. 2018 was an outlier year for wheat trading when the trading volumes increased at an average of 12% on CBOT

Figure 24 Wheat Options (CBOT); FIA

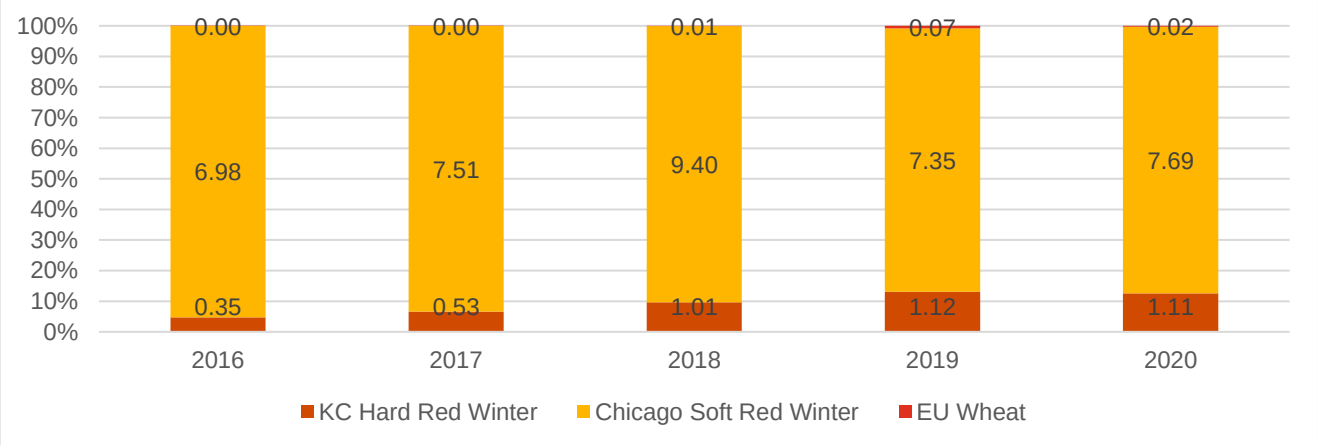
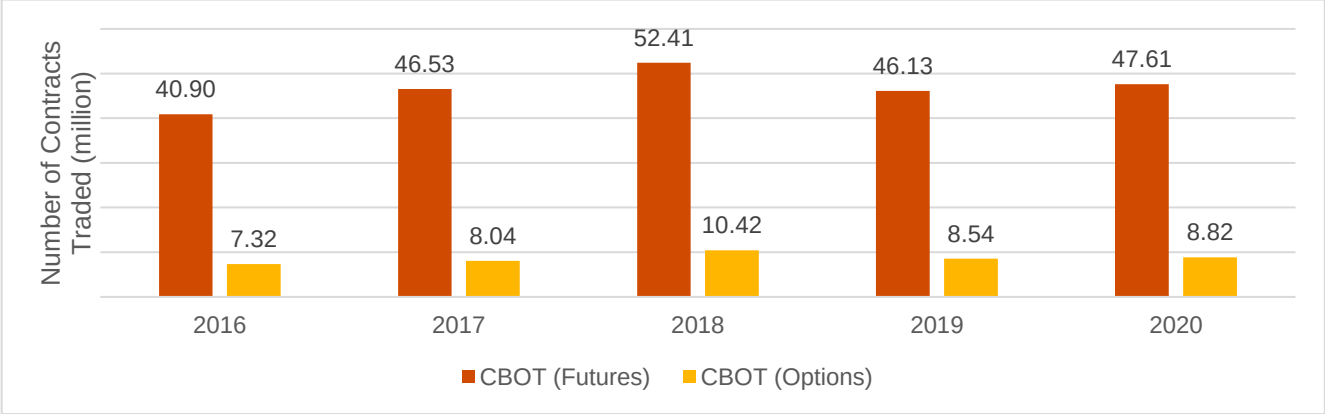
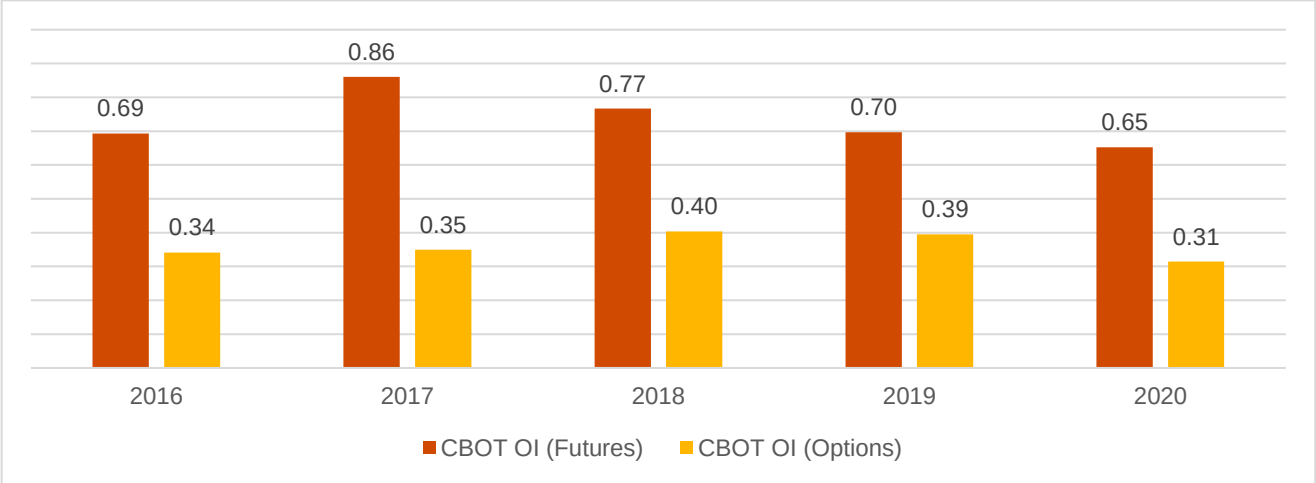


Figure 25 Wheat Contracts Traded (CBOT), FIA



4. Open Interest Data
   According to the outstanding number of contracts in a particular year, the open interest of the selective commodity is calculated. There was a total decline of over 35 per cent in the open interest of wheat traded on CBOT from 2017 to 2020. In the case of options, the decline in Open Interest started from the year 2018 as it decreased 29 per cent by the year 2020. Only OI increased was that of EU wheat and Mini wheat varieties in CBOT which was still substantially less.

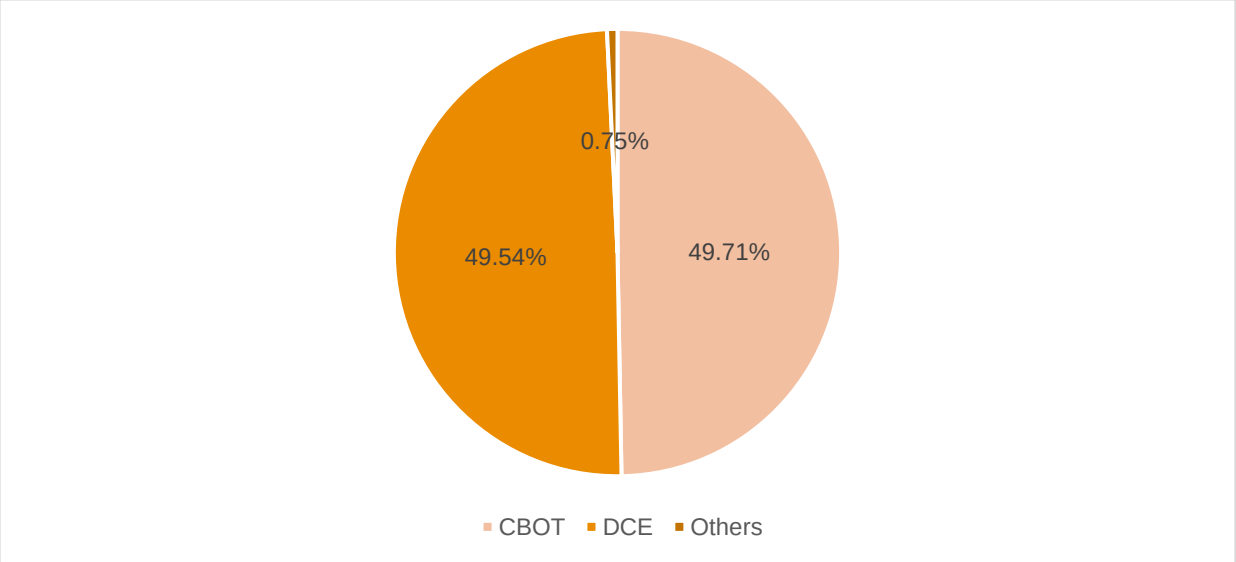
Figure 26 Wheat Open Interest (CBOT); FIA



Soybean

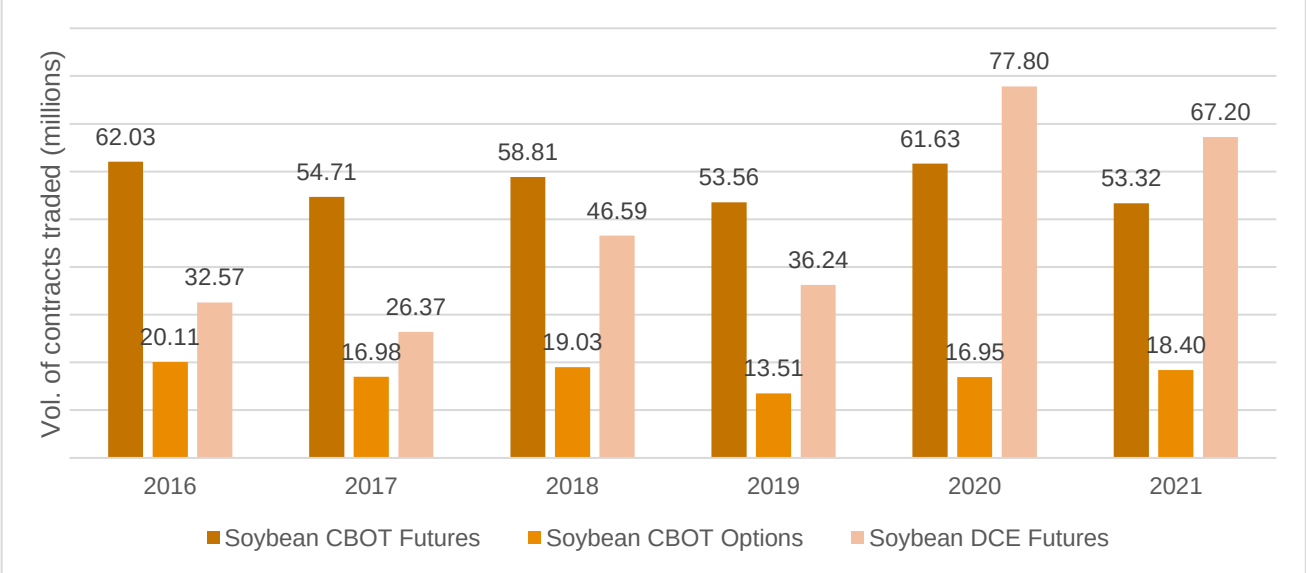
1. Global Volume Traded
   In terms of the total volume of contracts traded for soybean, DCE and CBOT are the largest exchanges in the world trading 99.25% of the total soybean in the world. Other exchanges trading Soybean are MATba ROFEX of Argentina, JSE Securities of South Africa and North America Derivatives Exchange of the USA.

Figure 27 Share of Soyabean traded on global exchanges (2020), FIA



2. Varieties and their geographical location
    a. In case of futures, the soybean traded on CBOT is primarily of two varieties namely Soybean and Mini Soybean, whereas on DCE, they are Soybean No. 1 and Soybean No. 2. On one hand where Soybean is the major traded variety on CBOT, Soybean no. 2 is the most popular variety on DCE.
    b. In case of options, only CBOT trades soybean

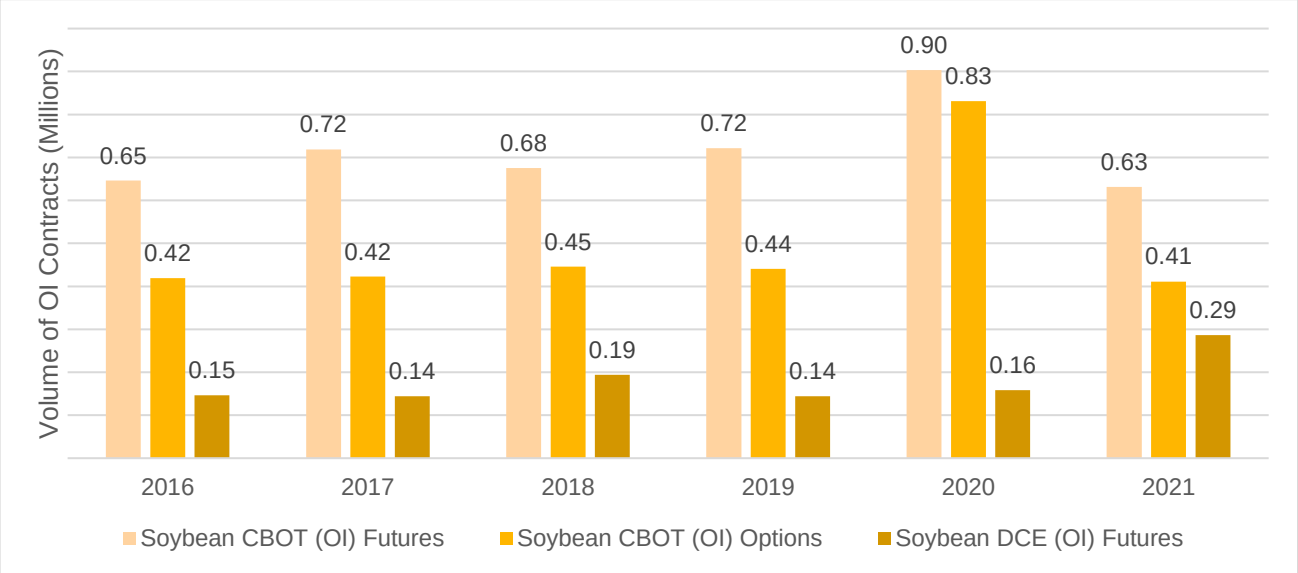
Figure 28 Soybean traded across major exchanges, FIA



3. Inference drawn on the data
    a. There has been a decline in the soybean futures and options on CBOT in last five years, whereas a steep increase in the soybean futures on DCE
    b. Soybean of CBOT is still the most traded soybean variety followed by Soybean No. 1 (which is traded in DCE)
    c. Option trading accounts for more than 1/3rd of traded volume on CBOT
    d. The market share of DCE has witnessed a growth of nearly 100% during 2016-2021
    e. In fact, Soybean futures traded in DCE was also exchange-wise third largest agricultural commodity traded in 2021
4. Open Interest Data

Open market interest for soybean futures and options on CBOT reduced over the span whereas its futures witnessed a steep increase on DCE. DCE is now trading more Soybean futures than CBOT. Soybean has shown highest OI is highest on CBOT across both futures and options.

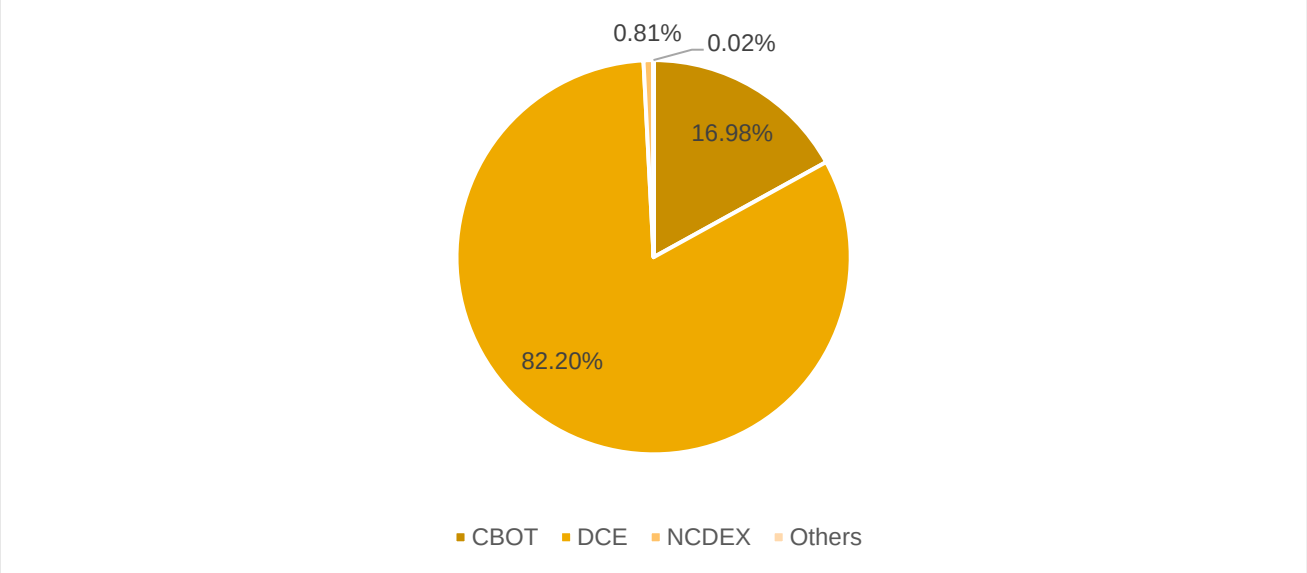
Figure 29 Soybean Open Interest across all exchanges; FIA



Soybean Oil

1. Global Volume Traded
   As per 2020 data, in terms of the global volume of contracts traded, DCE is the major exchange trading in Soybean Oil as it makes up to 82.20% of total volume traded globally. Even though CBOT allows Soybean Oil trade in both futures and options (against only futures on DCE), it only trades 16.98% of the total volume traded. Besides, NCDEX of India trades 0.81% of global Soybean Oil trade. Other exchanges which deal in the same are JSE Securities of South Africa and NSE of India.

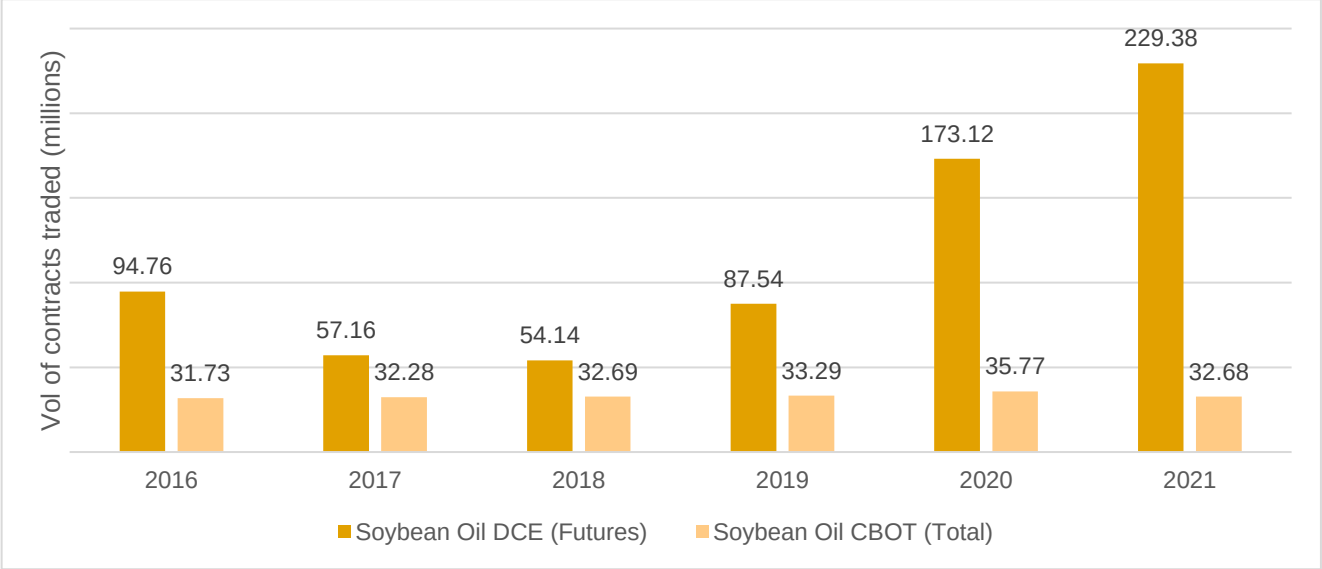
Figure 30 Share of Soybean oil traded on global exchanges (2020), FIA



2. Inferences drawn on the data
   a. Soybean Oil volume traded has increased over the last 5 years on both the major exchanges DCE and CBOT.

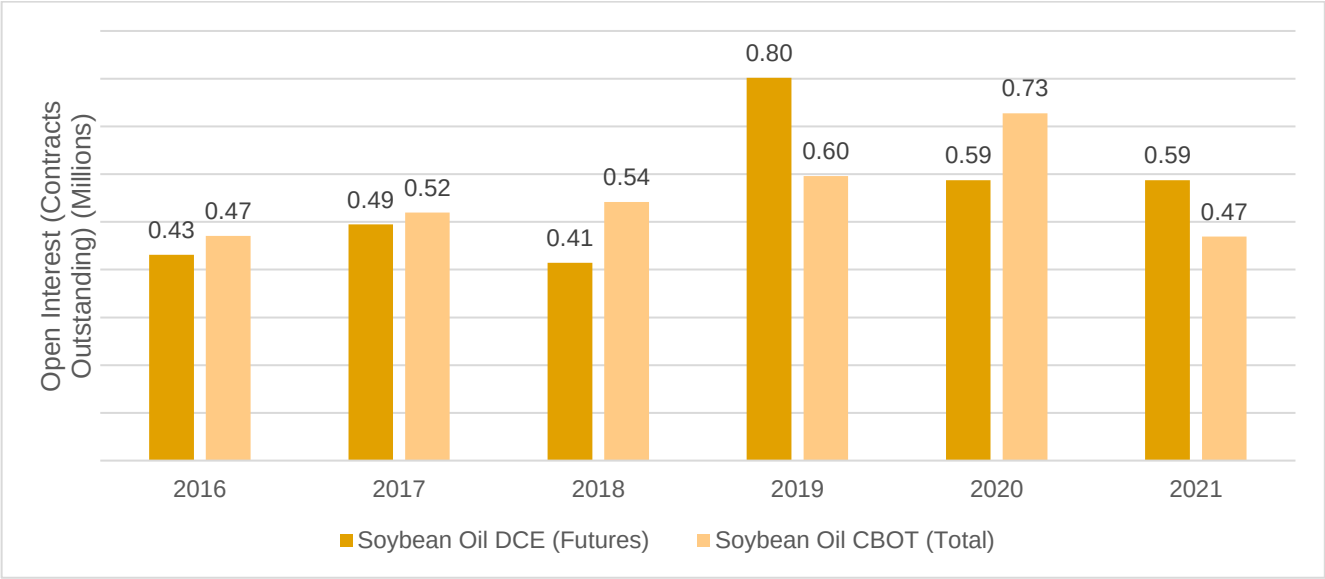
b. Soybean oil traded on DCE platform has the highest number of contracts traded in the case of Soybean oil trading more than double than the amount of oil traded on CBOT (futures and options combined) and as high as 7 times the quantity in 2021

Figure 31 Soybean oil traded across exchanges, FIA



3. Open Interest Data
There was a steep increase in the Open Interest on DCE in 2019 whereas CBOT saw a steep increase in OI during 2020.

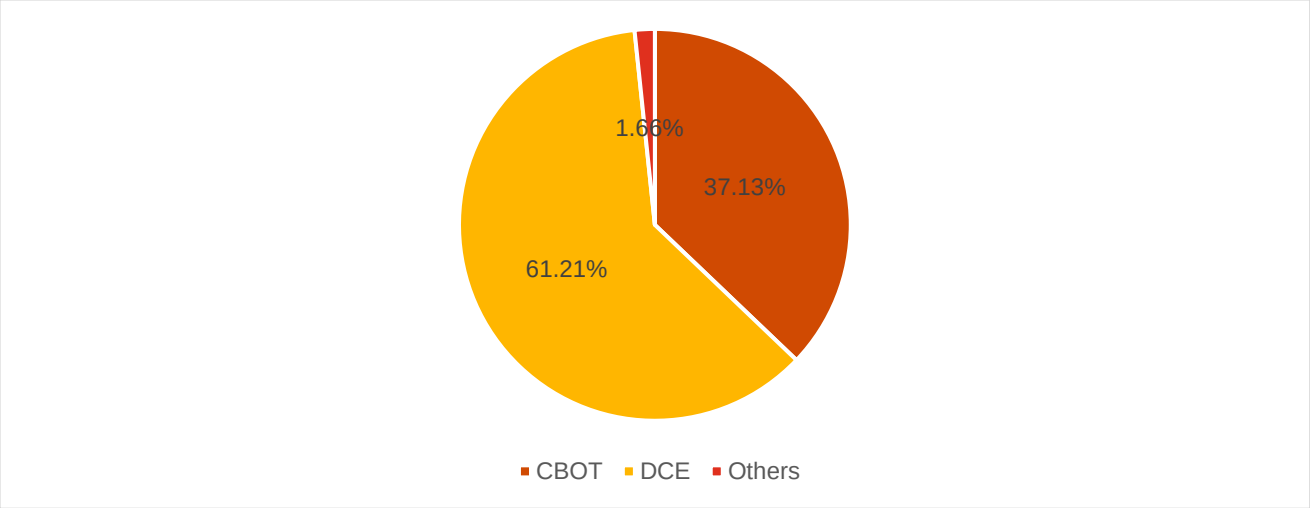
Figure 32 Soybean Oil Open Interest Across Exchanges; FIA



Maize

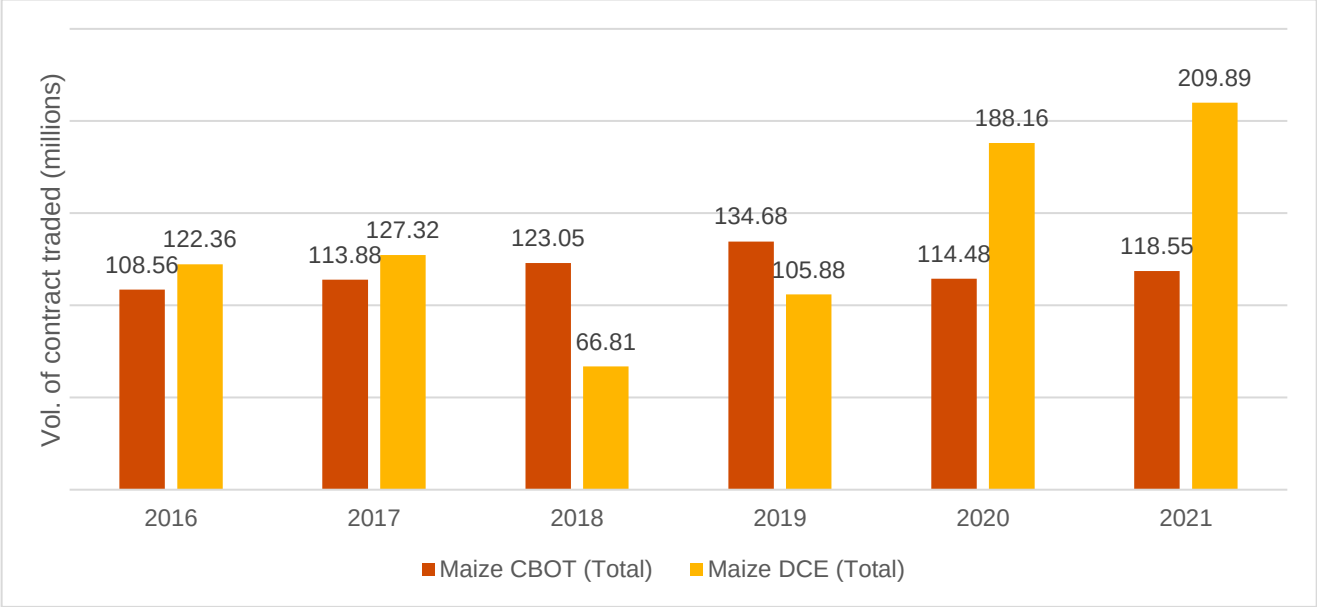
1. Global Volume Traded
As per 2020 reports, almost 61% of the total volume of maize is traded on DCE platform with CBOT being the other major maize trading platform handling 37% of the global volume. Both futures and options of Maize are traded on these two platforms. Other exchanges dealing in maize include JSE from South Africa and B3 exchange from Brazil.

Figure 33 Share of Maize Traded across the exchanges (2020), FIA



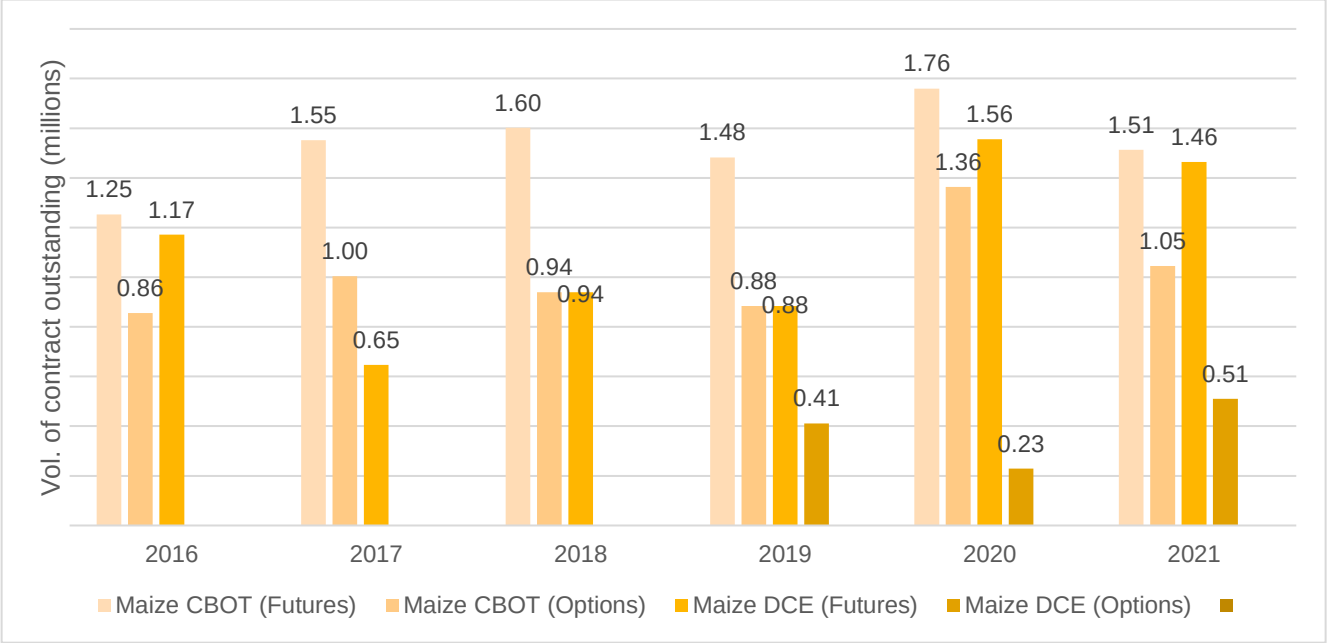
2. Variety and geographical location
   On DCE, maize is only traded in one variety i.e., Corn, whereas on CBOT maize is traded in two varieties namely Corn and Mini Corn with the former being the major traded variety. Maize is traded on both DCE and CBOT in options contracts. However, option contracts on DCE were introduced only in 2019.
3. Inference drawn on the data
   a. Maize futures on DCE are the fifth largest agricultural commodity traded in 2021
   b. Volume of contracts traded on DCE is almost twice as much as the volume traded on CBOT (futures and options combined 2021)

Figure 34 Total Maize Traded across the Global Exchanges, FIA



4. Open Interest Data
   In terms of Open Interest, the majority of the maize OI is still in futures which has increased through the years. Even though Maize on DCE fetched maximum volume of contract, maize on CBOT gathers highest Open Interest.

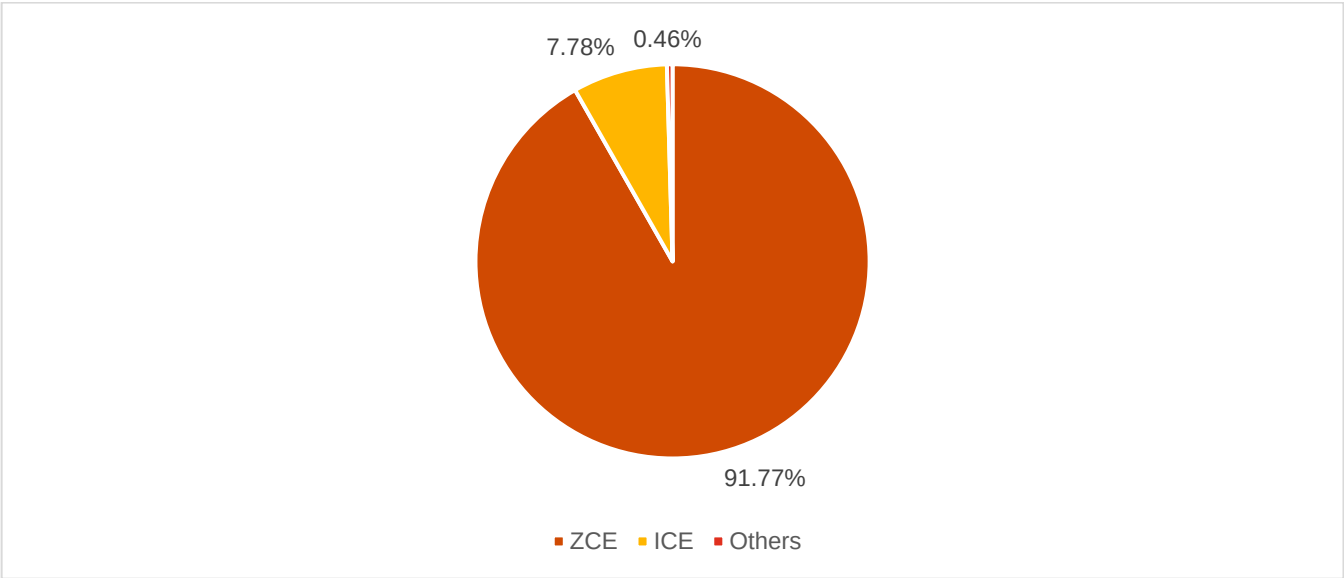
Figure 35 Open Interest of Maize Futures and Options across the global exchanges (Millions); FIA



Cotton

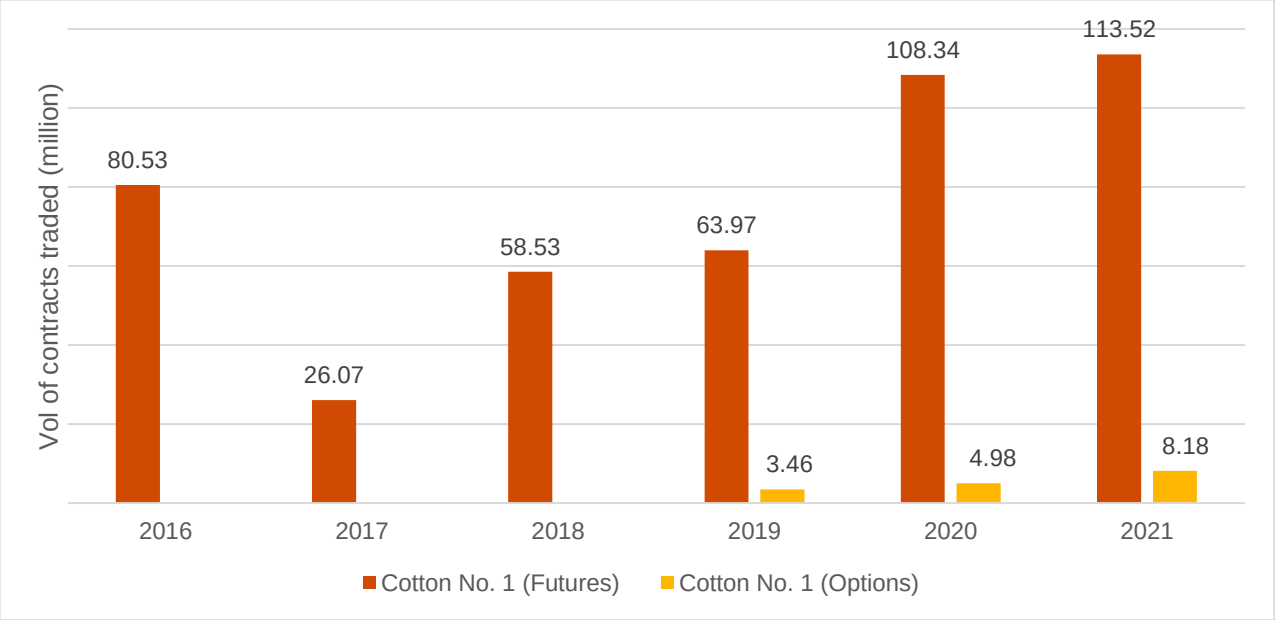
1. Global Volume Traded
   As per the data of year 2020, ZCE of China is by far the major trading platform in the world dealing with 91.77% of cotton in 2020 (9th largest traded agricultural commodity in the world in 2021). The ICE exchange of the USA deals with 7.78% of the global cotton. Other exchanges dealing with cotton include NCDEX and MCX of India and PCE of Pakistan.

Figure 36 Share of cotton trade on global exchanges (2020), FIA



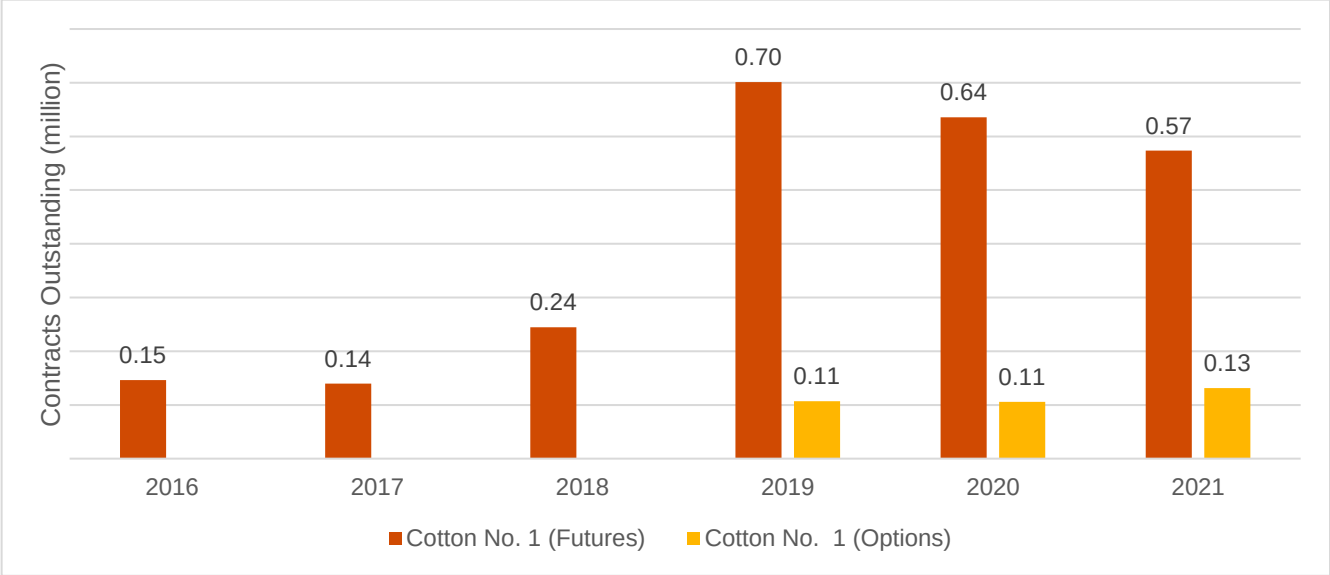
2. Varieties and geographical location
   Cotton No. 1 variety is being traded on ZCE platform in both options and futures whereas it's the Cotton No. 2 variety on ICE. It's traded under the name Kapas on NCDEX.
3. Inference drawn on the data
   a. ZCE introduced options in cotton trading in the year 2019
   b. The volume of both futures and options of cotton on ZCE has been increasing continuously since last 5 years

Figure 37 Total cotton traded on ZCE, FIA



4. Open Interest data
   There has been a slight decline in cotton future Open interest however Cotton options OI increased since being introduced in 2018.

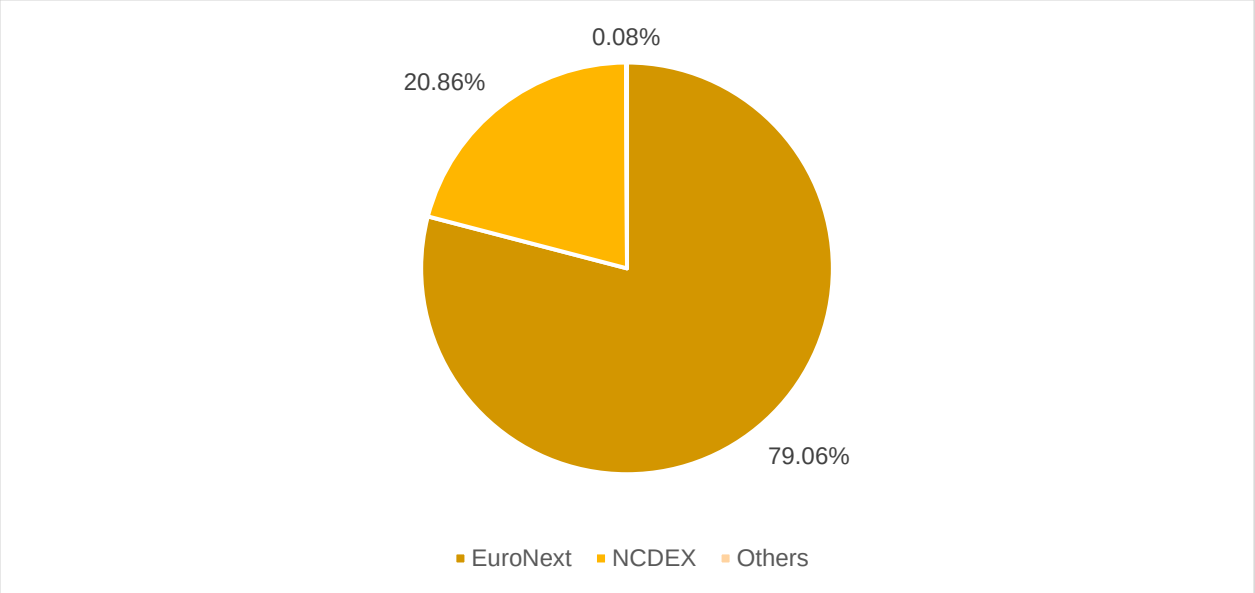
Figure 38 Open Interest of Cotton Futures and Options across ZCE; FIA



Rapeseed

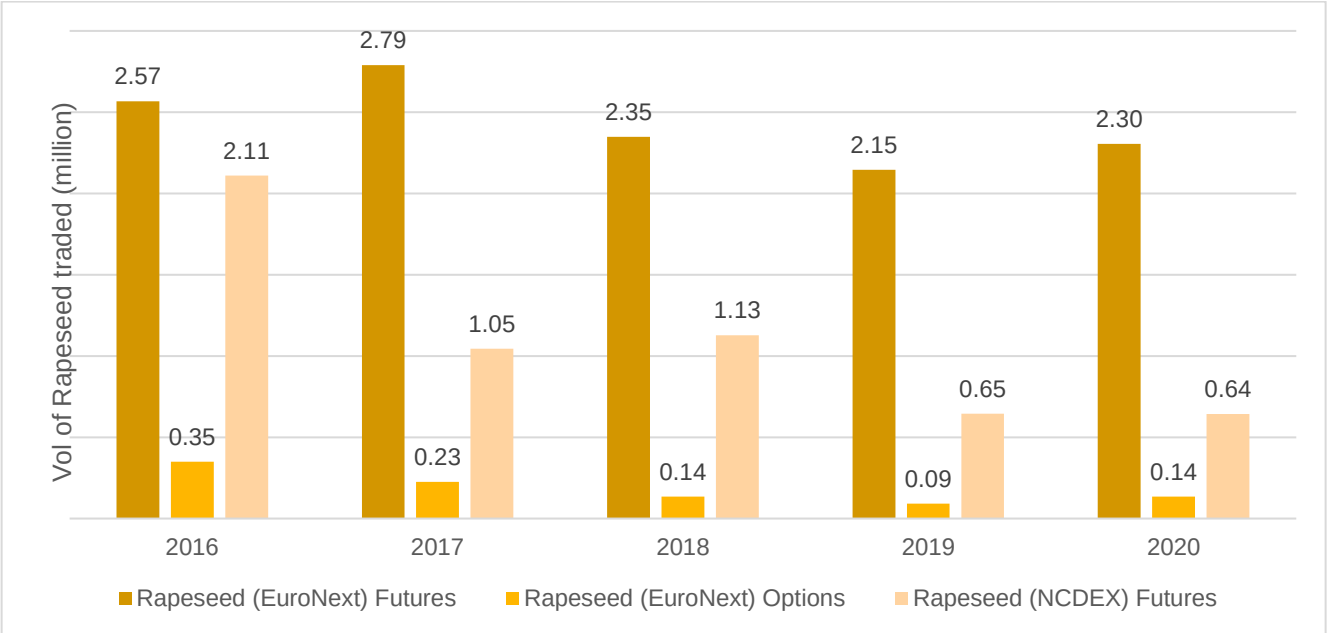
1. Global Volume Traded
   As per 2020, a major share of the total rapeseed volume is traded on Euronext Derivatives in France (79%). Other popular exchanges include NCDEX of India (20.86%) and ZCE of China.

Figure 39 Share of Rapeseed traded across the global exchanges, FIA



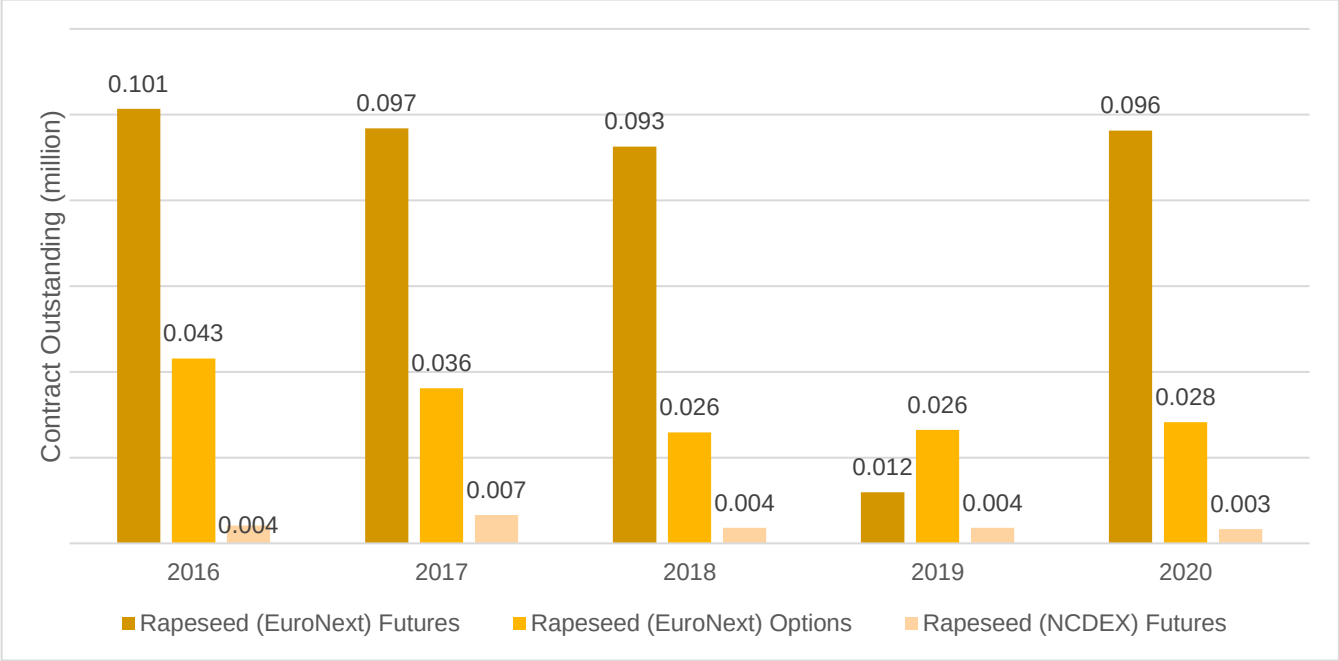
2. Inference drawn on the data
   a. There has been an increase in Rapeseed contracts on Euronext in 2020 to break a trend of decreasing contract volumes on the exchange
   b. However, the volume of Rapeseed traded on NCDEX has seen a declining trend in the last 5 years.
   c. NCDEX also introduced option trading for Rapeseed in 2020

Figure 40 Total Rapeseed Traded across the global exchanges, FIA



3. Open Interest
   The highest OI for Rapeseed has been observed in Euronext futures followed by Euronext options and NCDEX futures. The open interest of rapeseed has noticed an overall decrease in 2020 when compared to 2016.

Figure 41 Open Interest of Rapeseed Futures and Options across exchanges; FIA



4.2.3. Conclusion

- CBOT is the leading exchange for commodities such as Wheat, Soybean whereas DCE is the leader in Soybean Oil and Maize commodities.
- For Cotton, ZCE is the leading global exchange in terms of volume and ICE exchange of the USA comes second after ZCE. None of CBOT or DCE deals in Cotton.
- For Rapeseed, Euronext derivatives trade the majority of rapeseed with NCDEX following.
- Futures are still more popular type of trade contract against options. However, they have gained popularity recently in commodities such as Soyabean Oil and Maize

4.3. Current hedging scenario in the shortlisted global exchanges

4.3.1. Our Approach to assess hedging activity across Shortlisted Exchanges

To assess the current hedging scenario for the targeted global exchanges, we have analysed two major parameters- Volume of Agri-derivatives traded and Open Interest. Futures markets, characterised by a high level of speculative trading, are likely to show less open interest relative to the volume, as hedgers are expected to hold on to their open positions to achieve their desired outcomes. On the other hand, speculators are expected to close out their positions too frequently to take advantage of market movements. Given these distinct characteristics of speculators and hedgers, it is feasible to track the degree of speculative trading in the market by tracking the level of open interest relative to the volume. We have attempted to assess the degree of hedging activities in the shortlisted commodity exchanges by analysing the commodity-wise participation of hedgers. However, unlike the US market where the CFTC (or SEBI, in case of Indian market) provides a database that identifies trades separately for hedgers and pure speculators, such data is not available for the Chinese market.

Hence, we examine two key indicators which relate the open interest to volume for the list of liquid commodities contracts. The two proxies that capture the tendency of the derivatives market are: (a) the ratio of daily open interest to volume, and (b) the ratio of the daily change in open interest to volume. These ratios are signed to reflect the hedging/trading activity in the analysis. The two signed indicators are expected to reflect the speculative instincts in the market, as a high value of the ratio of open interest to volume would reflect a more hedger driven market.

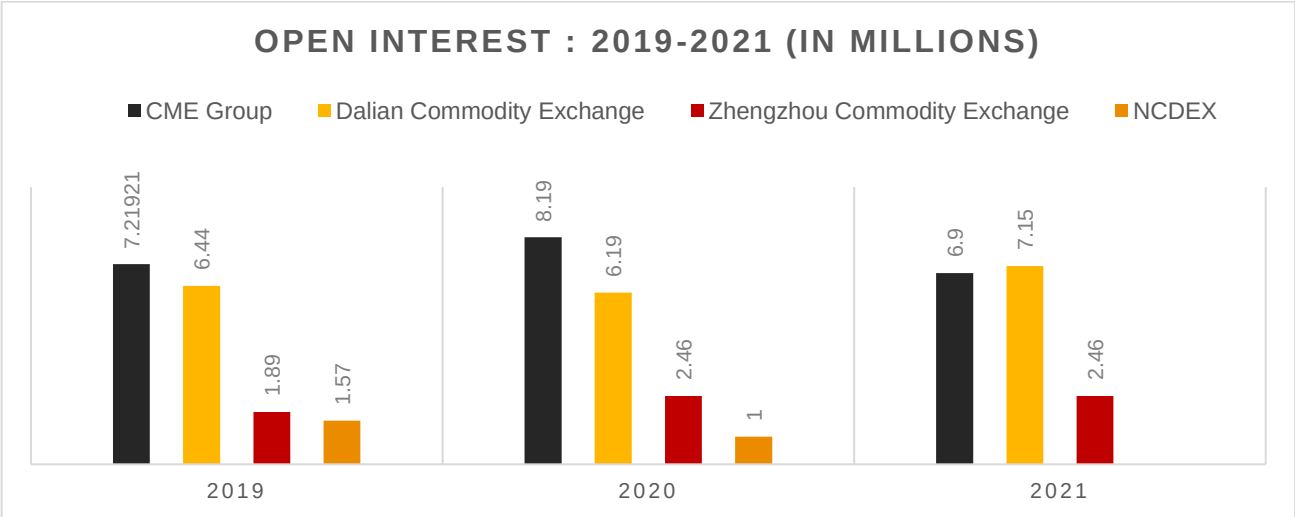
4.3.2. Hedging Activity in Global Scenario

China and US accounts for about 75% percent (2.05 billion contracts) and 18 percent (0.34 billion contracts) in terms of volume of agricultural derivatives traded.

To assess the current hedging scenario for the targeted global exchanges, we have analysed two major parameters- Volume of Agri-derivatives traded and Open Interest.

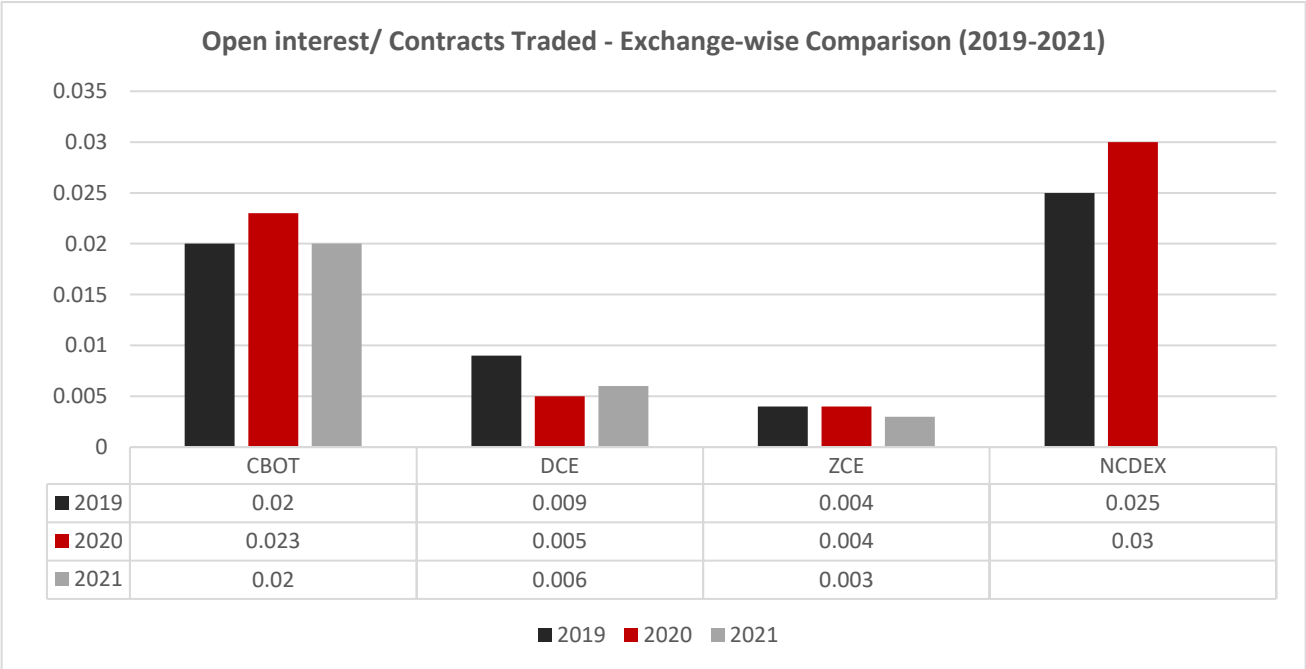
Till 2021, US topped the charts in terms of number of Agri-derivatives (futures and options) contracts with open interest. However, in 2020-21, DCE witnessed a significant growth of 11% in terms of outstanding open interest. The Dalian Commodity Exchange surpassed the CBOT with a dominating share of 43% in Open Interest among CBOT, DCE and ZCE. On the other hand, CBOT witnessed a decline in open interest and ended up with a market share of around 41%. In terms of absolute number of OI, NCDEX lagged far behind the other global commodity exchanges, especially CBOT and DCE.

Figure 42 Agriculture Futures and Options- Open Interest (2019-2021), FIA



However, consideration of Open Interest and Volume reveals an interesting aspect as shown in table below:

Figure 43: (Open interest/ Contracts Traded)- Exchange-wise Comparison (2019-2021); Source: FIA; PwC Analysis



	CBOT	DCE	ZCE	NCDEX
2019	0.02	0.009	0.004	0.025
2020	0.023	0.005	0.004	0.03
2021	0.02	0.006	0.003	

Among global exchanges, CBOT shows stable hedging activity since (OI/Volume) ratio is roughly the same for all years. Even though the number of Open Interest showed a significant increase in Chinese commodity exchanges, the overall value of Open Interest/Trade Volume shows notable decline, implying that Chinese Agri-derivatives market exhibited an increasingly dominant trait of trading activity, as compared to hedging activity. In terms of volumes, NCDEX has shown slightly increasing hedging activities in 2020 as compared to 2019.

4.3.3. Commodity-wise assessment of Hedging activity

We have observed that major global exchanges, including CBOT and NCDEX publish data on hedging activity in the public domain. However, in the case of Chinese exchanges it is not the case. Hence, participation of hedging activity in the Chinese derivatives market cannot be concluded. However, to analyse the commodity-wise percentage share of hedgers in the US Market, we have studied the positions held by commercial hedgers. The report usually breaks down the positions by futures contracts and shows the percentage of open interest held by each category of traders, including commercial hedgers.[20] We then calculated the percentage share of hedgers by dividing the open interest held by commercial hedgers by the total open interest (for 2020 and 2021) in the market for each futures contract to get a commodity-wise percentage share of hedgers.

4.3.3.1. Hedging Activity in US Derivatives Market

For the physical commodity markets, the CFTC divides the traders into four categories:

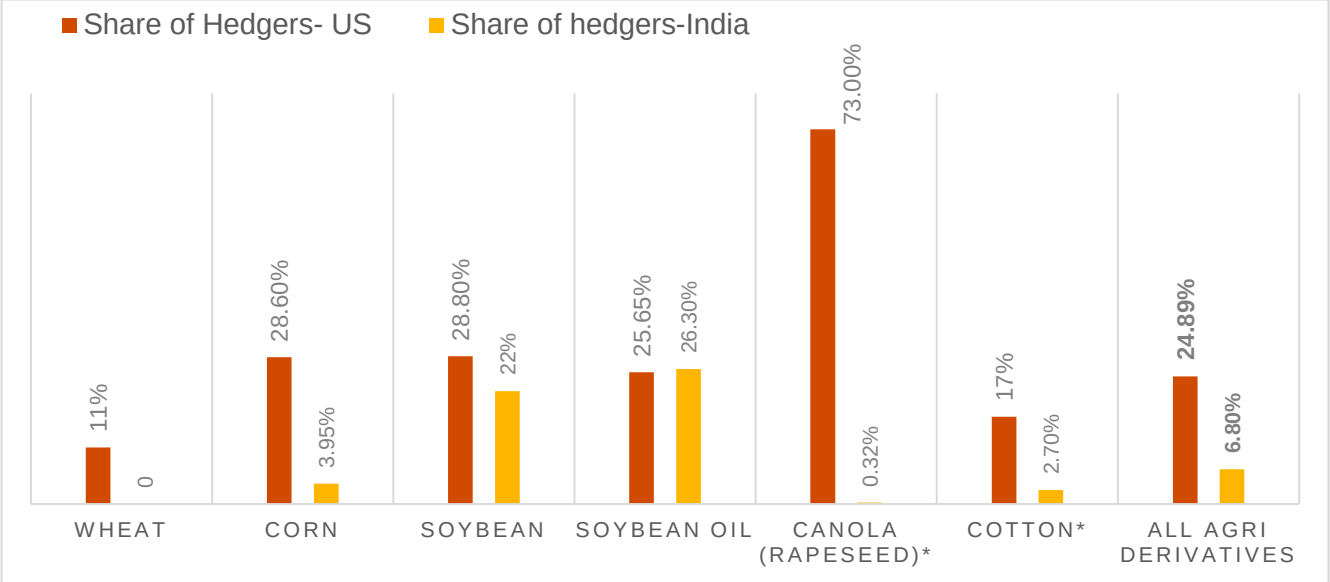
- **Producer/Merchant/Processor/User**: These are traders who use futures or options contracts to hedge their exposure to the underlying commodity or market. They are usually producers, processors, or users of the commodity. For example, a wheat farmer who sells wheat futures to lock in a price for his crop is a producer/merchant/processor/user.
- **Swap Dealers:** These are traders who use futures or options contracts to hedge their swaps or other over-the-counter derivatives positions. They are usually banks, brokers, or dealers who offer swaps or other derivatives to their clients. For example, a bank that sells a swap to a client and hedges it with a futures contract is a swap dealer.
- **Managed Money:** These are traders who use futures or options contracts to speculate on the price movements of the underlying commodity or market. They are usually hedge funds, commodity pools, or other money managers who trade on behalf of their clients. For example, a hedge fund that buys corn futures to profit from an expected rise in corn prices is a managed money trader.
- **Other Reportable:** These are traders who do not fit into any of the above categories, but still hold positions above the reporting levels established by the CFTC and the respective exchanges. They are usually large traders, such as institutional investors or individual speculators. For example, an insurance company that buys soybean futures to diversify its portfolio is another reportable trader.
- **Non-reportable traders:** These are traders who hold positions below the reporting levels established by the CFTC and the respective exchanges. They are usually small traders, such as retail investors or speculators. For example, an individual investor who buys soybean options to bet on a price change is a non-reportable trader

Insights on Hedging activity with respect to participation of hedgers

During 2020-21, the overall share of hedgers in the US derivatives market across all agricultural derivatives turned out to be 24.89%. This portrays a significant difference in terms of the degree of hedging activity between the US market and Indian market (where participation of VCPs/ hedgers stood out at 6.8%). The following table illustrates the comparison of participation of hedgers across USA and India:

[20] Based on Reports from Commitment of Traders (COT), as published by CFTC and CBOT
*Note: Share of hedgers in cotton derivatives are based on ICE Futures U.S.

Table 21: Participation of Hedgers: USA and India (2020-21)



Observations:

- Overall participation of Hedgers across all Agri derivatives contracts in the USA surpasses that of the Indian market by a huge margin. The key reasons attributed are high liquidity present in financial markets along with presence of a large number of big sized participating entities such as Venture Capitalists, hedging organisations, investment bankers etc, availability of a wide range of contracts which provide flexibility to the trader to diversify their plan and manage long term investment and hedging strategy. Besides, the USA has a highly efficient price discovery mechanism as compared to India.
- Among all the commodities in the US Market, Canola has demonstrated to have the highest share of hedgers participation. Hedging activity tends to be more prevalent due to the importance of canola as a physical commodity and the volatility of canola prices during the 2020-21 due to surging demand for renewable diesel. In Canada, Western Producers reported that increased biofuel demand for canola oil is expected to increase price volatility for the commodity moving forward. The Canadian Oilseed Processors Association also expected the biofuel market responsible for 23% of canola demand by the end of the decade, a giant increase from just 9% in 2020.[21]
- Considerable share of hedgers participation in corn and soyabean is because US is the largest producer as well as net exporter in terms of volume. Besides, presence of world's largest group of trading companies- ADM, Bunge, Cargill and Louis Dreyfus and their significant stake in these commodities makes hedging on futures all more prudent. Corn accounts for 95% of total feed grain production and it is the primary feed grain used in US. More than 70% of Soyabean used as animal feed in US. Although wheat is used as a food item, but it is not sensitive with respect to the food security. Red Winter wheats are used as the animal feed in North America.
- Cotton has witnessed hedging participation of around 17% during 2020-21. American cotton makes up about 38 percent of the world export market, which is more than the next five exporters combined. However, the United States exports most of its crop, with most of these exports going to meet the needs of Indian and Chinese textile manufacturers. As a result, U.S. cotton producers rely on favourable trade conditions to thrive. The year 2020-21 witnessed higher volatility in prices due to COVID restrictions as well as the continued trade tensions between the two nations since 2018. Once tariffs were implemented in spring 2018, it became an arduous task for US domestic cotton producers to maintain pre-tariff price levels—cotton prices dropped 36.6 percent from June 2018 to August 2019. By January 2020, cotton prices still had not rebounded, even after the two countries agreed to the phase one trade deal (a partial agreement

[21] https://www.producer.com/markets/canolas-biofuel-link-to-raise-volatility-2/

in which China agreed to purchase $200 billion worth of goods over two years, and the United States agreed to ease tariffs on Chinese goods).[22]

Participation of Foreign Entities in U.S. Derivatives Market[23]

As of 2022, the participation of foreign entities across various agricultural derivatives are shown as below:

S.No.	Commodity Contract		Exchange	Participation Degree (% of Open Interest in 2022)	Remarks
1	Corn		CBOT	40%	China is the largest foreign participant in the CBOT corn market, followed by Japan and Mexico. China is a major importer of corn, and it uses the CBOT to hedge its import needs. Japan and Mexico are also major importers of corn, and they use the CBOT to secure their corn supplies.
2	Wheat		CBOT	25%	China is the largest foreign participant in the CBOT wheat market, followed by Egypt and Turkey. China is a major importer of wheat, and it uses the CBOT to hedge its import needs. Egypt and Turkey are also major exporters of wheat, and they use the CBOT to market their wheat.
3	Soyabean		CBOT	35%	China is also the largest foreign participant in the CBOT soybean market, followed by South Korea and Brazil. China is a major importer of soybeans, and it uses the CBOT to hedge its import needs. South Korea and Brazil are also major exporters of soybeans, and they use the CBOT to market their soybeans.
4	Mustard		CBOT	30%	India is the largest foreign participant in the CBOT mustard market, followed by China and Canada. India is a major producer and exporter of mustard, and it uses the CBOT to market its mustard. China and Canada are also major producers of mustard, and they use the CBOT to hedge their production risks.
5	Cotton	ICE Cotton No. 2 (U.S.)	ICE	65%	China is the largest foreign participant in the ICE cotton No. 2 (US) market, followed by India and Pakistan. China is a major importer of cotton, and it uses the ICE to hedge its import needs. India and Pakistan are also major producers and

[22] U.S. Bureau of Labor Statistics Publications, October 2020
[23] Based on Analysis from Reports from Commitment of Traders (COT), as published by CFTC

					exporters of cotton, and they use the ICE to market their cotton.
		ICE Cotton No.1 (Brazil)		50%	China is also the largest foreign participant in the ICE cotton No. 1 (Brazil) market, followed by Pakistan and India. China is a major importer of cotton, and it uses the ICE to hedge its import needs. Pakistan and India are also major producers and exporters of cotton, and they use the ICE to market their cotton.
		ICE Cotton No. 3 (Egypt)		40%	China is the largest foreign participant in the ICE cotton No. 3 (Egypt) market, followed by Turkey and India. China is a major importer of cotton, and it uses the ICE to hedge its import needs. Turkey and India are also major producers and exporters of cotton, and they use the ICE to market their cotton.

4.3.3.2. Hedging Activity in Chinese Derivatives Market

The high-level of speculative activities in the Chinese market is an outcome of the participation of wealth managers and retail traders, who are attracted to profit from the commodities market volatility. These findings imply that market volumes are significantly determined by the speculative trading in the Chinese market rather than hedging demand emerging from the industrial firms.
One of the success factors behind the deep liquidity in the Chinese commodities derivatives market is the presence of a vast pool of retail investors. In many commodities contracts, the volumes contributed by retail traders vary from 50%-95% of the total volume recorded[24]. The extent of retail participation in the Chinese market is highlighted by the fact that as of December 2016, the open interest held by retail traders accounted for more than 86% in China, as compared to less than 15% in the US.[25]

Relative to the other markets such as the US, the hedging demand in the Chinese market from its domestic corporate remained subdued given its economic interest in the commodity. A recent study shows that only 12.5% of the Chinese firms have active risk management through derivatives as against 58.5% of the US and world average of about 61%[26].The key reasons behind the low hedging preference of Chinese firms. However, despite the low demand for hedging among the Chinese firms, their risk management needs are mostly met within the domestic market for the following reasons:

- Only qualified state-owned enterprises are allowed to trade in international derivative contracts. This excludes the majority of the state-owned firms in China and creates demand for domestic derivatives products from the state-owned _rms for their hedging needs.
- While the private enterprises are not explicitly disallowed to trade in derivative contracts traded in international markets, they are restricted through the foreign exchange quota. [27]The restriction on the private firms effectively limits their ability to freely access the international hedging contracts and is known to create demand for domestically traded hedging products.
- The risk management approach of the Chinese firms appears to be more opportunistic and view-driven than being guided by a systematic risk management approach. The perceived need for risk management strongly arises only when the perceived probability of a loss event is considered high.

[24] (a) CFA Yearbook, 2018 (b) Fan, John Hua, and Tingxi Zhang. The untold story of commodity futures in China." Journal of Futures Markets 40.4 (2020): 671-706.
[25] Fan, John Hua, and Tingxi Zhang. The untold story of commodity futures in China." Journal of Futures Markets 40.4 (2020): 671-706.
[26] Bartram, Sohnke M. \Corporate hedging and speculation with derivatives." Journal of Corporate Finance 57 (2019)
[27] Governed by State Administration of Foreign Exchange (SAFE).

The top leadership of Chinese firms are averse to losses emerging out of hedging decisions. They claimed that part of the reason for the view-driven risk management is due to the strong state back-up of the Chinese firms, as it can underwrite an unexpected loss event[28]

4.3.3.3. Derivative Market Tendency Analysis of Shortlisted Global Exchanges:

Derivative Market Tendency Analysis of Shortlisted Global Exchanges:

For carrying out commodity wise derivative market tendency, we have applied the hedger-speculator approach wherein the basic assumption is that the speculators do not take open position in the market by the end of the year as they look to square off their position in the market as and when it is profitable for them. Hedgers on the other hand will not square off their positions as they are looking to safeguard their risks through their position.

With that assumption, we calculate the ratio of open interests and volume of contracts traded for the year (X). X is the fundamental ratio, to understand the dominance of speculation or hedging for the commodity in the market.

$$X = \frac{No.of\ contracts\ outstanding\ for\ the\ year\ (Open\ Interest\ (OI))}{Total\ volume\ of\ the\ contracts\ for\ the\ year}$$

Analysis of relative trend of Open Interest with respect to the number of contracts traded on an exchange level provided the nature of market in terms of participation in true hedging as stated below:

- If the change in Open Interest is more than the change in total volume of contracts in the year, then the number of hedgers in the market is more than the number of speculators, hence indicating a hedging dominated market.
- If the change in Open Interest is less than the total volume of contracts in the year, then the number of speculators in the market is more as more positions have been squared off in the calendar year, hence indicating a trading market

Wheat

Table 22 Hedging vs Trading for Wheat; PwC Analysis

Wheat Trading	2016-2017			2017-2018			2018-2019			2019-2020		
Futures (%)	**Vol. Change**	**OI Change**	**Trend**	**Vol. Change**	**OI Change**	**Trend**	**Vol. Change**	**OI Change**	**Vol. Change**	**OI Change**	**Trend**	**Dominant Trend**
CBOT Chicago Soft Red Winter Wheat	8.6%	16.8%	Hedging	9.2%	-15.6%	Trading	-17.4%	-7.5%	Hedging	9.7%	-2.1%	Trading
CBOT KC Hard Red Winter Wheat	30.3%	38.6%	Hedging	21.5%	-10.9%	Trading	0.7%	-10.0%	Trading	-11.0%	-18.1%	Trading
CBOT EU Wheat	55.7%	-52.0%	Trading	48.7%	2403.6%	Hedging	0.7%	-26.0%	Trading	69.4%	49.8%	Trading
CBOT Mini Wheat	-9.3%	10.2%	Hedging	-9.3%	10.2%	Hedging	0.3%	-29.6%	Trading	98.2%	208.6%	Hedging
ZCE Strong Gluten Wheat	-24.5%	-86.7%	Trading	-71.6%	-71.6%	NA	-88.4%	-71.9%	Hedging	158.7%	289.6%	Hedging

[28] Fan, John Hua, and Tingxi Zhang. The untold story of commodity futures in China." Journal of Futures Markets 40.4 (2020): 671-706.

ZCE Common Wheat	-52.6 %	-66.7 %	Trading	267.1 %	267.1 %	NA	-75.4 %	-81.3%	Trading	923.0 %	666.7%	Trading
Options (%)	**Vol. Change**	**OI Change**	**Trend**	**Vol. Change**	**OI Change**	**Trend**	**Vol. Change**	**OI Change**	**Vol. Change**	**OI Change**	**Trend**	**Dominant Trend**
CBOT Chicago Soft Red Winter Wheat	7.7%	-1.6%	Trading	25.2 %	5.59 %	Trading	-21.9 %	-0.3%	Hedging	4.7%	-15.8 %	Trading
CBOT KC Hard Red Winter Wheat	52.9 %	42.0 %	Trading	90.4 %	77.45 %	Trading	11.2 %	-19.2%	Trading	-1.2%	-31.5 %	Trading
CBOT EU Wheat	18.8 %	-100.0 %	Trading	1362.3%	390.74%	Trading	848.3%	313.0 %	Trading	-67.3%	-99.9 %	Trading

Observations: As seen in the table above, we can observe that the trend observed for wheat futures was a mixed one with separate varieties being hedged consecutively where others are being speculated. For example, in the year 2016-2017, wheat varieties of Chicago Soft Red Winter, KC Hard Red Winter and Mini Wheat traded on CBOT were primarily hedged and the other varieties on ZCE and CBOT were being speculated. Similarly in the subsequent year, the major wheat varieties being traded in CBOT were speculated and others were hedged. However, in the case of wheat options, there has been a clear trend of trading in the market.

Table 23 Average Hedging vs Trading for Wheat; PwC Analysis

Wheat Average Trading	Average Change in Volume (2016-2020)	Average Change in Open Interest (2016-2020)	Average Trend
Futures			
CBOT Chicago Soft Red Winter Wheat	7.42%	-10.73%	Trading
CBOT KC Hard Red Winter Wheat	42.01%	-8.96%	Trading
CBOT EU Wheat	295.04%	1232.07%	Hedging
CBOT Mini Wheat	134.43%	161.75%	Hedging
ZCE Strong Gluten Wheat	-93.58%	-94.75%	Trading
ZCE Common Wheat	337.57%	666.67%	Hedging
Options			
CBOT Chicago Soft Red Winter Wheat	102.46%	-12.67%	Trading
CBOT KC Hard Red Winter Wheat	219.94%	39.45%	Trading
CBOT EU Wheat	5293.88%	-96.15%	Trading

Observations: As seen in the table above, the average trend over the last 5 years indicate that there has been a lot of trading for the wheat commodity except the minor wheat varieties traded on the exchanges namely EU Wheat and Mini Wheat on CBOT and Common Wheat on ZCE. Options market has been largely a speculative market in the past 5 years.

Soybean

Table 24 Hedging vs Trading for Soybean; PwC Analysis

Soybean Trading	2016-2017			2017-2018			2018-2019			2019-2020		
Futures	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**
Soybean (CBOT)	-11.7%	12.3%	Hedging	7.4%	-6.1%	Trading	-8.9%	7.3%	Hedging	14.6%	24.7%	Hedging
No. 1 Soybean (DCE)	-19.2%	-4.4%	Hedging	33.6%	-0.6%	Trading	-16.6%	5.3%	Hedging	222.2%	9.5%	Trading
Mini Soybean (CBOT)	-30.9%	-34.2%	Trading	-16.0%	-33.2%	Trading	-16.8%	-16.5%	Hedging	121.3%	64.9%	Trading
No. 2 Soybean (DCE)	2220.1%	38418.2%	Hedging	57423.3%	2284.7%	Trading	-27.3%	-54.5%	Trading	3.2%	10.6%	Hedging
Options	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**
Soybean (CBOT)	-15.6%	0.8%	Hedging	12.08%	5.49%	Trading	-29.0%	-1.2%	Hedging	25.5%	88.6%	Hedging

Observations: As seen in the table above, we observe that the trend in the soybean market is dependent on the year of trade. The market was fairly hedging dominated in 2016-2017, 2018-2019 and 2019-2020 whereas it is largely speculative in 2017-2018. Similar trends were also observed in the options market for Soybean on CBOT.

Table 25 Average Hedging vs Trading for Soybean; PwC Analysis

Soybean Average Trading (Futures)	Average Change in Volume (2016-2020)	Average Change in Open Interest (2016-2020)	Average Trend
Soybean (CBOT)	-0.98%	41.05%	Hedging
No. 1 Soybean (DCE)	82.51%	-26.41%	Trading
Mini Soybean (CBOT)	70.08%	-9.92%	Trading
No. 2 Soybean (DCE)	1000970.61%	462400.00%	Trading

Observations: Soybean market, overall, has been highly speculative in nature for the last 5 years. However, the highly traded soybean on CBOT has been dominated by hedging.

Soybean Oil

Table 26 Hedging vs Trading for Soybean Oil; PwC Analysis

Soybean Oil	2016-2017			2017-2018			2018-2019			2019-2020		
Futures	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**

Soybean Oil (DCE)	-39.7%	14.6%	Hedging	-5.3%	-16.2%	Trading	61.7%	93.5%	Hedging	97.7%	-26.8%	Trading
Soybean Oil (CBOT)	2.7%	19.7%	Hedging	3.4%	7.0%	Hedging	1.4%	5.6%	Hedging	4.0%	-6.3%	Trading
Options	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**
Soybean Oil (CBOT)	-10.8%	-24.1%	Trading	-30.5%	-11.1%	Hedging	12.2%	41.1%	Hedging	75.3%	172.2%	Hedging

Observations: As seen in the table above, we observe that the soybean oil has been highly hedged in the global exchanges. Except for 2019-2020, soybean oil has been majorly hedged on CBOT and Speculated on DCE. A major portion of hedging is also done on options for Soybean Oil.

Table 27 Average Hedging vs Trading in the Soybean Oil Market; PwC Analysis

Soybean Oil Trading	Average Change in Volume (2016-2020)	Average Change in Open Interest (2016-2020)	Average Trend
Futures			
Soybean Oil (DCE)	82.68%	36.20%	Trading
Soybean Oil (CBOT)	12.00%	26.56%	Hedging
Options			
Soybean Oil (CBOT)	22.02%	159.34%	Hedging

Observations: The average trend of Soybean Oil trade suggests that Soybean Oil is highly hedged on CBOT whereas it is being speculated on DCE.

Maize

Table 28 Hedging vs Trading of Maize; PwC Analysis

Maize Traded	2016-2017			2017-2018			2018-2019			2019-2020		
Futures	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**
Corn (DCE)	4.1%	-44.7%	Trading	8.4%	3.4%	Trading	6.0%	-7.5%	Trading	79.3%	31.7%	Trading
Corn (CBOT)	5.0%	24.6%	Hedging	-47.5%	20.7%	Hedging	48.4%	51.2%	Hedging	-13.0%	18.8%	Hedging
Mini Corn (CBOT)	-19.6%	-2.2%	Hedging	2.8%	-0.5%	Trading	45.0%	4.8%	Trading	93.3%	3.4%	Trading

Options	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend
Corn (CBOT)	4.8%	17.3%	Hedging	-6.4%	6.9%	Hedging	22.6%	-5.9%	Trading	-22.1%	54.3%	Hedging

Observations: As seen in the table above, we observe that the corn traded in CBOT in both future and options is hedged in the past 5 years. On the other hand, Corn traded on DCE has been trading driven.

Table 29 Average Hedging vs Trading in the Maize Market; PwC Analysis

Maize Traded	Average Change in Volume (2016-2020)	Average Change in Open Interest (2016-2020)	Average Trend
Future			
Corn (DCE)	45.23	32.89%	Trading
Corn (CBOT)	4.82%	41.42%	Hedging
Mini Corn (CBOT)	131.73%	-39.75%	Trading
Options			
Corn (CBOT)	7.02%	59.35%	Hedging
Corn (DCE) (2018-2020)	54.50%	-44.30%	Trading

Observations: As seen in the table above, the average trend observed across the maize market was speculative on DCE and Hedging based on CBOT. Larger amount of Maize has been traded on CBOT where hedging is the dominant trade.

Cotton

Table 30 Hedging vs Trading Analysis for Cotton; PwC Analysis

Cotton Traded	2016-2017			2017-2018			2018-2019			2019-2020		
Futures	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend
Cotton No. 1 (ZCE)	-67.6%	5.8%	Hedging	124.5%	75.2%	Trading	9.3%	186.7%	Hedging	69.4%	-9.4%	Trading
Options	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend	Vol Change	OI Change	Trend
Cotton No. 1 (ZCE)										43.8%	-1.2%	Trading

Observations: As seen in the table above, we observe that the cotton market for the future has been hedging dominant from 2016-2020. In terms of cotton options, the market has been speculative during the same duration.

Table 31 Average Hedging vs Trading in the Cotton Market, PwC Analysis

Cotton Traded	Average Change in Volume (2016-2020)	Average Change in Open Interest (2016-2020)	Average Trend

Future			
Cotton No. 1 (ZCE)	34.53%	335.24%	Hedging
Options			
Cotton No. 1 (ZCE)	43.86%	-1.19%	Trading

Observations: The average trend in the market suggests that the cotton market has been hedging dominant in the case of futures and speculative in case of options.

Rapeseed

Table 32 Hedging vs Trading for Rapeseed; PwC Analysis

Rapeseed Traded	2016-2017			2017-2018			2018-2019			2019-2020		
Future	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**
Rapeseed (Euronext)	8.69%	-4.53%	Trading	-15.84%	-4.36%	Hedging	-8.60%	-87.12%	Trading	7.36%	707.53%	Hedging
Rapeseed (NCDEX)	-50.47%	61.00%	Hedging	7.85%	-45.67%	Trading	-42.77%	0.11%	Hedging	-0.31%	-7.99%	Trading
Rapeseed (ZCE)	-89.89%	98.88%	Hedging	-29.04%	-600%	Trading	4600.52%	-85.71%	Trading	-96.26%	100%	Hedging
Option	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**	**Vol Change**	**OI Change**	**Trend**
Rapeseed (Euronext)	-35.24%	-16.11%	Hedging	-40.27%	-28.59%	Hedging	-31.85%	2.38%	Hedging	46.74%	6.90%	Trading

Observations: As seen in the table above, trading and hedging has been equally dominant through the years in the rapeseed market. However, Rapeseed has been largely hedged as options on Euronext.

Table 33 Average Hedging vs Trading in the Rapeseed Market; PwC Analysis

Rapeseed Traded	Average Change in Volume (2016-2020)	Average Change in Open Interest (2016-2020)	Average Trend
Futures			
Rapeseed (Euronext)	-10.24%	-5.01%	Hedging
Rapeseed (NCDEX)	-69.52%	-19.43%	Hedging
Rapeseed (ZCE)	-87.40%	-100%	Trading
Options			
Rapeseed (Euronext)	-61.31%	-34.44%	Hedging

Observations: Rapeseed futures and options, on an average have been hedged on both Euronext and NCDEX (futures only) and are speculated on ZCE.

Observations on Commodity Derivatives Contracts offered by Shortlisted Exchanges:[29]

- The initial margins in China are lower than that of Indian exchanges, this leads to reducing the cost of hedging and encouraging SME sector to use market driven tools for hedging. This enables larger participation of small retail investors in China in the commodity markets
- Commodities Transaction Tax (CTT) was introduced in Indian commodity market in 2013, however such tax is not applicable in China Commodity Market hence promoting retail traders to increase their participation in the market
- The commodity markets of China and USA have provisions to trade in two or more varieties of the same commodity (for example Wheat Chicago SRW, High Gluten Wheat etc), however, Indian exchanges provide contracts for only one variety of wheat.
- In China and India, normally the trading volume ranges from 5MT to 10MT per lot, whereas in the USA the contracts range from 130MT to 150MT.This also indicates the type and volume of suppliers present in the commodity market supply chain. This could also be the reason for higher volumes in China in terms of the number of contracts traded (as lot size is small, value of contract is far less as compared to US).

[29] Assessment based on ZCE- *Detailed Rules for Futures Delivery of Zhengzhou Commodity Exchange, CME Group, NCDEX*

5. Analysis of shortlisted Global Derivative Markets (Country level) for the proposed study

5.1. Key factors enabling hedging in Agricultural derivatives globally (at shortlisted countries level)

To promote and facilitate trading on their respective exchanges, these global exchanges have introduced key reforms throughout the years.

5.1.1. US Agricultural Commodity Policies

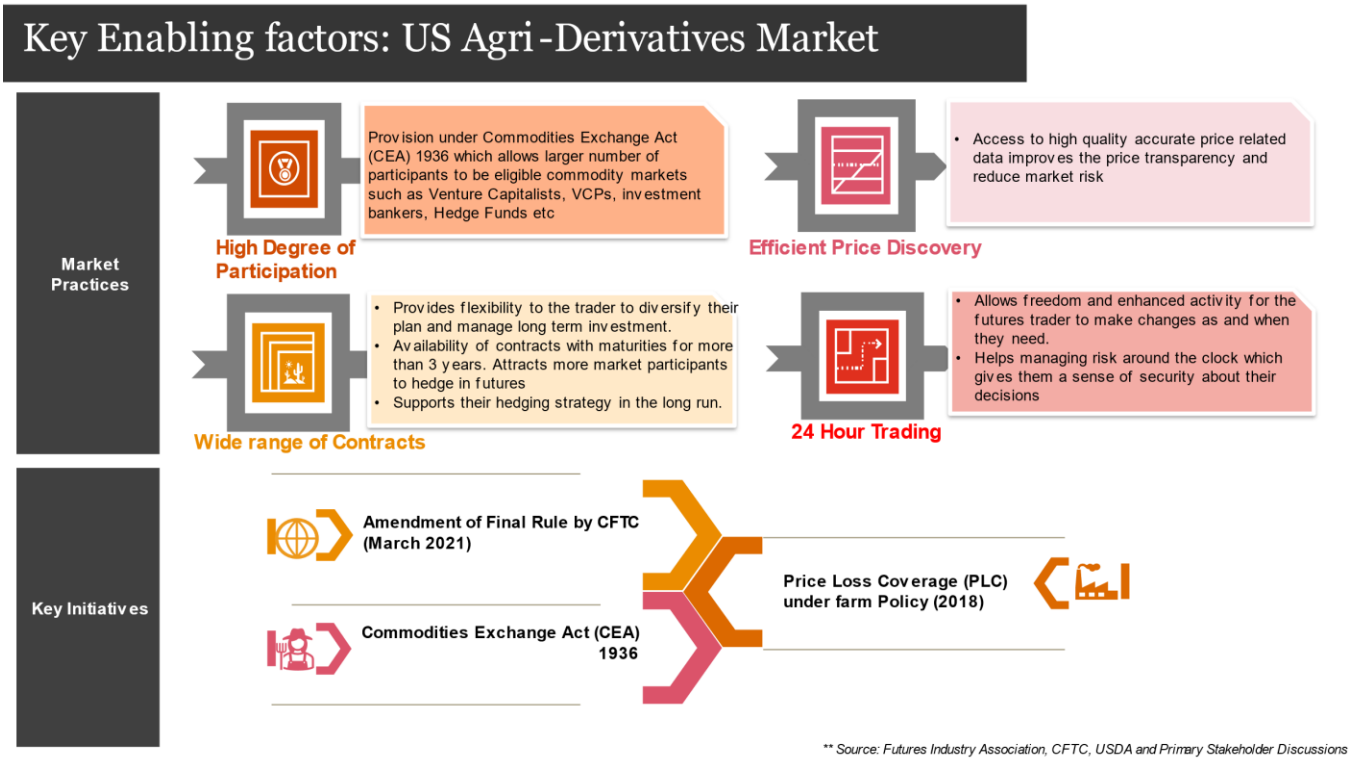
The Chicago Board of Trade (CBOT) in the USA is the oldest player in the agricultural derivative market, with its origins dating back to 1865. CBOT was initially established as a spot wheat market in 1848, and its success was attributed to its large-scale grain inventory, well-developed transportation, and exposure to financial risk. The spot market for grains like corn and wheat, which were seasonal, led to high price volatility. The need for hedging was met through futures trade, which was also introduced in the New York Cotton Exchange in 1870. Both commodities were initially traded between English and American traders.

The regulation of financial derivatives in the US is handled by both the Securities and Exchange Commissions (SEC) and the Commodity Futures Trading Commission (CFTC). The parties of financial derivative contracts are regulated by the Financial Industry Regulatory Authority (FINRA). The National Futures Association (NFA) also has an important role to play in the oversight of these markets and their participants. The Commodity Exchange Act (CEA) regulates the trading of commodity futures in the United States. Passed in 1936, it has been amended several times since then. The CEA establishes the statutory framework under which the CFTC operates. Under this Act, the CFTC has authority to establish regulations that are published in title 17 of the Code of Federal Regulations.

CFTC regulations regarding hedging[30]:

- A futures commissions merchant must provide an opportunity to each customer, when it first opens a futures account, foreign futures account or cleared swaps with such futures commission merchant, to designate such account as a hedging account. The futures commission merchant must indicate prominently in the accounting records in which it maintains open trade balances whether the account designated is a hedging account.
- A futures commission merchant may permit the customer to open an account as a hedging account only if it obtains the customer's written representation that the customer's trading of futures or options on futures, foreign futures, or options on foreign futures, or cleared swaps (as applicable) in the account constitutes hedging.
- The futures commission merchant may continue to designate as a hedging account any account with respect to which the futures commission merchant received written hedging instructions from the customer.
- A futures commission merchant may designate an existing futures account, foreign futures account or cleared swaps account of a particular customer as a hedging account, if it has obtained the required representation set out respectively.
- Permitted Risk -mitigating hedging activities include risk-mitigating hedging activities of a banking entity in connection with and related to individual or aggregated positions, contracts, or other holdings of the banking entity and designed to reduce the specific risks to the banking entity in connection with and related to such positions, contracts, or other holdings.

[30] https://www.ecfr.gov/search?search%5Bhierarchy%5D%5Bchapter%5D=I&search%5Bhierarchy%5D%5Btitle%5D=17&search%5Bquery%5D=Hedging



Amendment of Final Rule

Starting from March 2021, the US CFTC amended its rules ("Final Rule") to limit speculation in the market for selected commodities. The Final rule has expanded the contracts for selected commodities to 25 from 9 which will provide predictability and certainty to the market participants. The amendment mandated changes in reporting requirements by participants from weekly basis to daily basis. This was done to ensure improvement in accuracy, completeness and timeliness of data reporting.

Price Loss Coverage (PLC)

US agricultural policy, also known as farm policy, producing farm acts for every 5 years as a part of its legislative cycle[31]. The most recent of them is the Agricultural Improvement Act 2018[32] (2018 Farm Bill) replacing the farm bill of 2014. The commodity trading legislations relevant to the study in this includes[33]- Price Loss Coverage Program (PLC) for covered commodities. The current Farm Act has updated their existing Price Loss Coverage program to support the producers with historical base in acres when the covered commodity's market based effective price falls below the reference price. It also offers the producers with a one-time opportunity to update their payment yields (beginning with 2020). The covered commodities include wheat, corn, sorghum, barley, oats, seed cotton, long and medium grain rice, pulses, soybean and oil seeds and peanuts. Under the Marketing Association Loan (MAL) Program, commodities include wheat, corn, sorghum, barley, oats, extra-long-staple cotton, long- and medium-grain rice, soybeans/other oilseeds, certain pulses, peanuts, sugar, honey, wool, and mohair.

Characteristics of US Commodity Market which act as key drivers for Participation and Hedging

- **Provision of 24-hour trading**: The futures market of the USA is accessible for all 24 hours of the day, 6 times a week. This allows freedom and enhanced activity for the futures trader to make changes as and when they need. They can manage risk around the clock which gives them a sense of security about their decisions
- **High Liquidity:** Larger number of participants in the commodity markets of the country corresponds to the increased rate of liquidity present in the financial markets. Higher commodity corresponds to increased

[31] USDA-ERS: Farm and Commodity Policy
[32] https://www.congress.gov/115/bills/hr2/BILLS-115hr2enr.pdf
[33] USDA: Agriculture Improvement Act of 2018

competition which leads to deep levels of market liquidity. Also, there are a large number of big sized participating entities such as Venture Capitalists, hedging organisations, investment bankers etc.

- **Wide range of contracts:** The commodity contracts offered in the US Commodity market are of several types which provide flexibility to the trader to diversify their plan and manage long term investment. It also supports their hedging strategy in the long run. The diversification of commodity contracts can also support the interest of participants against unexpected macro events and hence serves a vital risk management purpose.
- **Efficient and Accurate price discovery:** The participants in the US Commodity Markets have access to high quality accurate price related data.. It improves the price transparency and promotion of accurate price related data which supports the traders to make accurate decisions and reduce risks.
- **Availability of warehousing facilities**: Facilities for regular and widespread delivery of Agricultural contracts such as soybean, soybean oil, wheat etc., also support the trading for Agricultural commodities as it provides the traders to get the delivery of commodity in the most convenient and cost-effective manner

5.1.2. China Agricultural Derivatives Policies

Traditional Policy Instruments

The main channels for supporting Chinese farmers include provision of Market Price Support. It is provided through domestic prices as well as the trade policies. It includes policies such as the minimum purchase prices for wheat and rice, tariff rate quotas (TRQ) and state trading. Other key budgetary programs include: the agricultural support and protection subsidy, combining direct payments for grain producers, subsidies for agricultural inputs, and subsidies for improved seed variety, all paid on per unit of land basis; subsidies for purchases of agricultural machinery; subsidies for land consolidation; subsidies for farmland irrigation construction; subsidies for agricultural insurance schemes; subsidies for returning farmland to forests and excluding degraded grassland from grazing[34].

The government's support to gross farm receipts given to the agricultural producers in China increased continuously for two decades before declining in 2016. During 2018-20, this support was ranging between 12%-13% due to policy reforms in terms of market intervention of crops such as soybeans, rapeseed, cotton and maize, and the policy changes regarding the minimum purchase price for wheat and rice. Another factor affecting the price gaps and market price support (MPS) stabilisation in China is the minimal depreciation of Chinese Yen against the dollar since 2014. Since 2014, there has been an increase in the payments based on plant area due to the reforms. However, MPS still remains a major part of the total support.

The launch of the Central Document (2021) and the 14th Five-Year Plan 2021-2025 was aimed towards boosting the availability of food and boosting grain yield and domestic seed industry along with the use of digital technology in Agriculture. This 14th Five-Year Plan 2021-2025 increased in minimum support prices for both wheat and rice[35].

China's futures and derivatives market has been regularly strengthened by administrative regulations like, core legislation for futures trading, enhanced liquidity in the market, the regulators and exchanges developed rules and regulations to guide the futures markets.

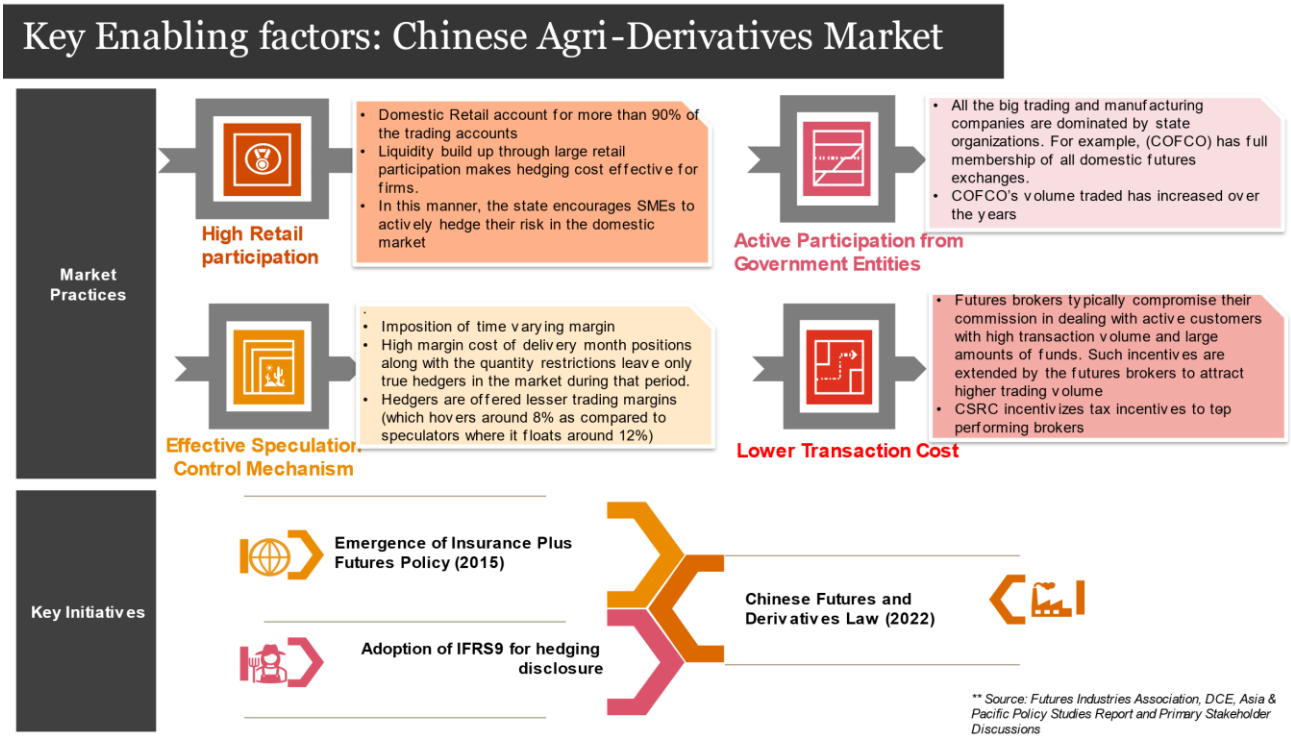
Shift in Policy from Minimum Price Structure to Market determined Price Structure

Since 2004, China's central government has been engaged in active domestic procurement operations of agricultural commodities at above international market prices directly from the farmers and putting it into storage, while domestic food processing companies have been largely importing the commodities which were entering the consumption chains.

Due to a period of high international agricultural commodity prices in the 2000s, the Chinese Government started establishing minimum price supports and state purchasing institutional infrastructure across core agricultural commodities. State procurement was initiated for commodities such as oilseeds, cotton, corn, rice, and wheat. However, later, drop in international commodity prices and shipping costs made imports more lucrative for Agri-industry stakeholders. The resulting distorted market meant that crushers and processors were importing cheaper foreign commodities while the state was purchasing at higher costs and storing the commodities. Black market imports of agricultural commodities coupled with state minimum purchase price plans meant that crushers and processors stopped purchasing from the State, and stockpiles grew.

However, this system is currently in the process of getting dismantled by the Government. It was planned to replace the existing system with an interim system of provincially set target prices. The system will be backed up by with state support with the objective developing agricultural income insurance and agricultural futures contracts.

[34] http://www5.agr.gc.ca/resources/prod/doc/pol/pub/oecd-oced/pdf/china_e.pdf
[35] https://www.oecd-ilibrary.org/agriculture-and-food/agricultural-policy-monitoring-and-evaluation-2021_eedc7e5b-en



Emergence of Insurance Plus Futures Policy

In 2015, the Insurance plus Futures policy was formulated to offer insurance companies with government subsidies so that they design agricultural income insurance policies based on fluctuating futures prices. Such models were eventually planned to be trialled in small-scale pilots. Across the central government, the broad policy consensus was to abandon state domestic procurement, thus moving all agricultural commodities through a staggered interim target-price policy system before finally transforming towards full marketisation of agricultural commodity prices (CPC Central Committee Policy Research Office of Economic Affairs 2015; Lin 2016). Eventually, the "Futures + Insurance" program got initiated in China during 2016. The Chinese Government opted to shift from a state-controlled economy of minimum price support towards a market determined price structure in future. In this transition, the scheme was launched to offer subsidies to insurance companies to offer Agri-insurance policies based on futures prices of exchanges such as Dalian Commodities Exchange (DCE) and Zhengzhou Commodities Exchange (ZCE). The futures companies were expected to provide services with the objective to protect the farmer households, family farms and rural cooperatives against the price risks/fluctuations via "Futures + Insurance" projects. The commodity price data related to the insurance contracts are based on the corresponding DCE futures data.

Chinese futures and derivatives law

This is the first law for the regulation of futures and derivatives markets in China. Passed on 1 August 2022, it provides a comprehensive legal and regulatory framework for the operation of the futures market in China. It covers the entire operation range for exchanges such as trading, clearing, settlement, licensing etc.

It also includes norms against the market misconduct, cross border trading and overseas future investing market for Chinese investors. Further, it provides the legal basis for regulating the trading in futures and derivatives along with protecting traders' interest and promoting futures and derivatives market of the nation[36].

The salient features of Futures and Derivatives law of China (2022) are:

1. It serves as a risk prevention system to safeguard national economic security. It covers all aspects of future trading, such as the trader eligibility regime, margin requirements, risk reserves system, position limit system, mark to market system, large trader reporting system, forced position reduction, futures market risk monitoring system and emergency handling mechanism.

[36] FIA- China's FDL Overview and Insights

2. It defines derivatives trading for the first time, establishing a basic derivative trading system and ensuring basic regulatory framework of derivatives.
3. The law further supports market functions in discovering prices, managing risks, allocating resources and encouraging hedging. The law defines hedging for the first time and encourages enterprises to engage in hedging and clarifies that whoever engages in hedging and other risk management activities may apply for the exemption of position limit. Also, it restricts excessive speculation. The administration measure for the position limit and hedging shall be developed by the futures regulatory agency of the state council.
4. The law also changes the current approval system into a registration system for listing of new futures contract products. By optimising the listing system of futures contracts products, market players may launch more futures products that meet the requirements.
5. The law allows China to have its certain commodity future products to be traded by foreign investors. Chinese enterprises, traders and brokers can participate in the overseas futures and derivatives market now that the gap of lack of legal provisions to support this internationalisation has been filled by the help of FDL.
6. Also, the law provides a special chapter regarding cross-border trading and regulatory cooperation, clarifying the registration requirements for overseas future exchange in providing service to domestic traders, the rules of foreign institutions to set up representative offices and carry out marketing activities in China, the rules for domestic entities to participate in overseas futures trading, and registration requirements for overseas futures operating institutions.
7. The law also establishes traders' classification mechanism and suitability management rules to strengthen the protection of ordinary traders. This is done by:
    a. Traders shall be divided into two classes: ordinary traders and professional traders according to their asset status, trading knowledge and experience, professional capability, and other related factors.
    b. Further, traders now have the right to know, right to query and confidentiality rights. It increases the cost of violations of laws and regulations by raising the amount of fines to protect the rights and interests of traders.
8. The law expands the scope of futures companies. Currently, Chinese companies focus on single brokerage business, which amounts for a higher proportion of their commission income. According to this law, futures companies now may also operate investment trading consulting, market making transactions, asset management and other trading businesses.
9. The law also regulates the operation and management of intermediate service agencies such as accounting firms, law firms, asset appraisal institutions, futures margins depository institutions, delivery warehouses and information technology providers.
10. For supervising and administrating the futures market, the futures regulatory authority of the state council will perform duties of risk monitoring and prevention according to law, supervise the fintech and information security of the futures and investigate and punish illegal futures activities.

Adoption of IFRS 9

From 2006, until recently (January 1, 2018) the disclosure requirements for risk management were guided by the Chinese Accounting Standards (mostly CAS37), which was argued to be largely consistent with the IFRS standards. While the accounting standard required firms to describe the hedging approach, disclose the hedging tools and fair value assessment of the hedged positions, CAS37 did not require the firms to separately disclose their risk and hedging activities under different categories such as financial and operational risk. Firms listed exclusively in China have poorer reporting standards compared to firms following IFRS. Consequently, detailed disclosure about the sources and nature of risks faced by firms were largely voluntary in nature. However, effective from January 1, 2018, China has adopted IFRS 9 for disclosure of risk and hedge accounting. The adoption of the IFRS standards is likely push more firms towards risk management and consequently may increase the presence of hedgers in the market[37].

Characteristics of Chinese Commodity Derivatives Market which act as key drivers for hedging and trading

1. **Liquidity enhancement through greater retail participation:** The Chinese commodities market is dominated by domestic retail traders. They account for more than 90% of the trading accounts. It is well-acknowledged

[37] Insights from Stakeholder interaction with Prof. Joshy Jacob, Indian Institute of Management, Ahmedabad

that the Chinese commodities market trading is dominated by domestic retail traders with more than 85% of the volume share accounted by retail traders. The lot size employed in the Chinese commodities futures contracts is only a fraction of those employed in CME, LME, Comex and NYMEX. It allows easier access of the retail traders to participate in the commodities market volatility. As an outcome, the market is characterised by short-term traders with open interest less than average daily volume for most of the contracts. The settlement of futures accounts for only a tiny fraction of the trading volume. Consequently, liquidity is limited to the short end of the contracts. The retail participants tend to be more speculative in their approach to the commodities derivative's positions. A significant fraction of the volume is the arbitrage trade between the Chinese commodities markets and the international markets. While mutual funds and banks are not allowed to participate in the commodity's derivative markets, investment and portfolio management firms are strongly present in the commodities markets. High net worth individuals also prefer significant allocation to commodities. Furthermore, in 2020, CSRC has approved the launch of the commodity ETFs which will provide exposure to energy, metal, and agricultural futures traded on Chinese commodity exchanges. The launch of the ETFs is expected to further deepen retail participation in the market.

The Chinese experience shows that liquidity build up through large retail participation makes hedging cost effective for firms. In this manner, the state encourages their small and medium segment firms to actively hedge their risk in the domestic market through indirect incentives.

Besides, there is a widespread belief among retail traders that China controls the price sensitive information related to major commodities, given its dominant role in the global commodity demand and supply. This makes traders believe that they would be able to profitably trade in the market.[38]

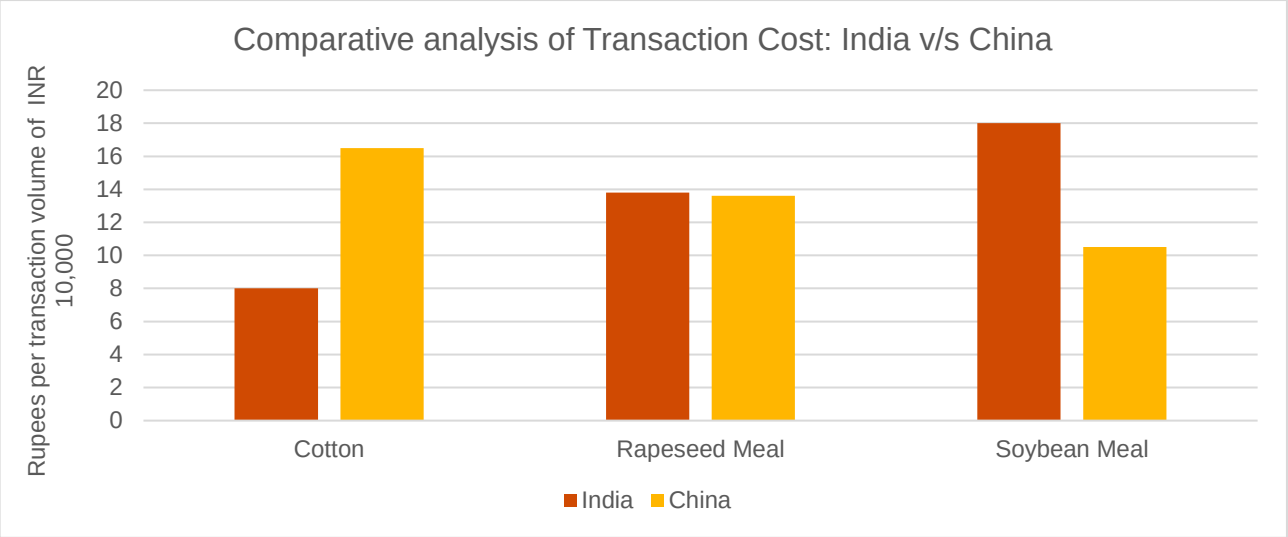
2. **Effective Speculation Control Mechanism:** As trading in the Chinese commodities market is dominated by domestic retail traders the market regulation focuses on reducing the impact of speculative trading. The Chinese market follows a time-varying margin which increases as the life cycle of the contract approaches maturity. The time-varying margins are found to force the speculators to leave the market as the contract approaches maturity. The position limits curb the degree of speculative positions likely to be taken by retail traders. Furthermore, the price limits act as stabilisers in the market, as applied elsewhere in the world. The combination of a margin system with increasing margins along with the position restrictions and price limits dis-incentivize retail investors from holding the near month contracts. Effectively, they dry up the speculative instincts in these contracts. Consequently, the liquidity of the near month contract in the Chinese market is lower compared to other markets, where the near month contracts have the highest liquidity. The near month contracts only attract about 10% of the traded volume. There is also evidence that the higher regulatory cost imposed on the near month contracts leads to price distortions for such contracts. The effective intervention to prevent excess volatility build-up in the market helps to ensure a relatively smooth functioning of the commodities market, despite the high volumes of retail trading. The high margin cost of delivery month positions along with the quantity restrictions leave only true hedgers in the market during that period. Besides, the hedgers are offered lesser trading margins (which hovers around 8% as compared to speculators where it floats around 12%).

3. **Participation from Government structures:** All the big trading and manufacturing companies are dominated by state organisations. For example, China National Cereals, Oils and Foodstuffs Corporation (COFCO) Futures Group in China founded in 1952 is a state-owned food processing holding company and is the largest food processor, manufacturer, and trader in China. It is directly administered by China's state council and is the sole agricultural products importer and exporter operating under direct control of the central Government. COFCO Futures has full membership of all domestic futures exchanges. COFCO's volume traded has increased over the years and they trade in agricultural commodities like soybean oil and meal, palm oil, cotton, sugar, etc. in the last ten years. In 2019, COFCO entered into a long-term supply contract with a Brazilian sugar mill to purchase 500,000 metric tons of raw sugar per year for five years, starting from 2020. The contract price was fixed at $0.15 per pound, which was lower than the prevailing market price at the time of signing the contract. However, due to the COVID-19 pandemic and the decline in global demand for sugar, the market price of raw sugar dropped significantly in 2020, reaching as low as $0.09 per pound in April. This meant that COFCO was locked into a higher price than the market price and faced a potential loss of $60 million per year if the market price remained low. To hedge its exposure to the downside risk of sugar price, COFCO decided to use put options on raw sugar futures contracts traded on the Intercontinental Exchange (ICE). A put option gives the

[38] Insights from Stakeholder interaction with Prof. Joshy Jacob, Indian Institute of Management, Ahmedabad

buyer the right, but not the obligation, to sell a specified quantity of an underlying asset at a predetermined price (strike price) before or on a specified date (expiration date). In May 2020, COFCO bought 5,000 put options on raw sugar futures contracts expiring in October 2020, with a strike price of $0.12 per pound. Each option contract represented 112,000 pounds of raw sugar. The premium paid for each option was $0.005 per pound, or $560 per contract. The total cost of buying the options was $2.8 million. By buying the put options, COFCO secured the right to sell 560 million pounds of raw sugar at $0.12 per pound in October 2020, regardless of the market price at that time. This effectively created a floor price for COFCO's sugar purchase contract and limited its potential loss to $16.8 million per year ($0.15 - $0.12 - $0.005 = $0.035 loss per pound x 500 million pounds x 0.9072 conversion factor from pounds to metric tons x 1 year).

4. **Lower transaction cost**: [39]The Chinese commodities markets operations are strongly cost competitive through: (a) the support of cost-effective warehousing and delivery arrangements, and (b) the integration of technology in the institutional infrastructure of the futures market including exchange and broker operations. Most of the operations including legal compliance reporting are paperless for the brokers. The unified margin and risk monitoring system focused on net capital maintained by the China Futures Margin Monitoring Centre also helps to cost effectively streamline the operations.
   Futures brokers typically compromise their commission in dealing with active customers with high transaction volume and large amounts of funds. For instance, brokers charge only 1.1 times or even 1.05 times the transaction fee as charged by the exchanges. For example, for sugar, if the exchange charges 3 yuan per lot, the futures brokers will charge only 1.05 times of that to the customer (3.15 yuan per lot). Such incentives are extended by the futures brokers to attract higher trading volume. A comparison of the all-in round-trip transaction cost for proprietary traders, executing a trade of INR 100,000 for a range of commodities derivative contracts in India and China is provided in the chart below. The figure compares the transaction cost for select agriculture commodities traded in both the Chinese and Indian commodities derivatives market.



The round- trip transaction cost in China is lower. Only in the case of Cotton traders enjoy a lower cost in the Indian market. Excluding Cotton, the average transaction costs in China are about 64% of the cost of trading the same commodity in India. The trading costs are only marginally lower in China for Rapeseed Meal.

[39] Insights from Stakeholder interaction with Prof. Joshy Jacob, Indian Institute of Management, Ahmedabad

6. Assessment of Primary Survey Outcomes

6.1. Primary Survey Assessment

6.1.1. Agribusiness Firms

For Agribusiness firm's category, we reached out to 50 stakeholders which can further be categorised into two broad heads:

a) Food Processing Firms – Domestic and International

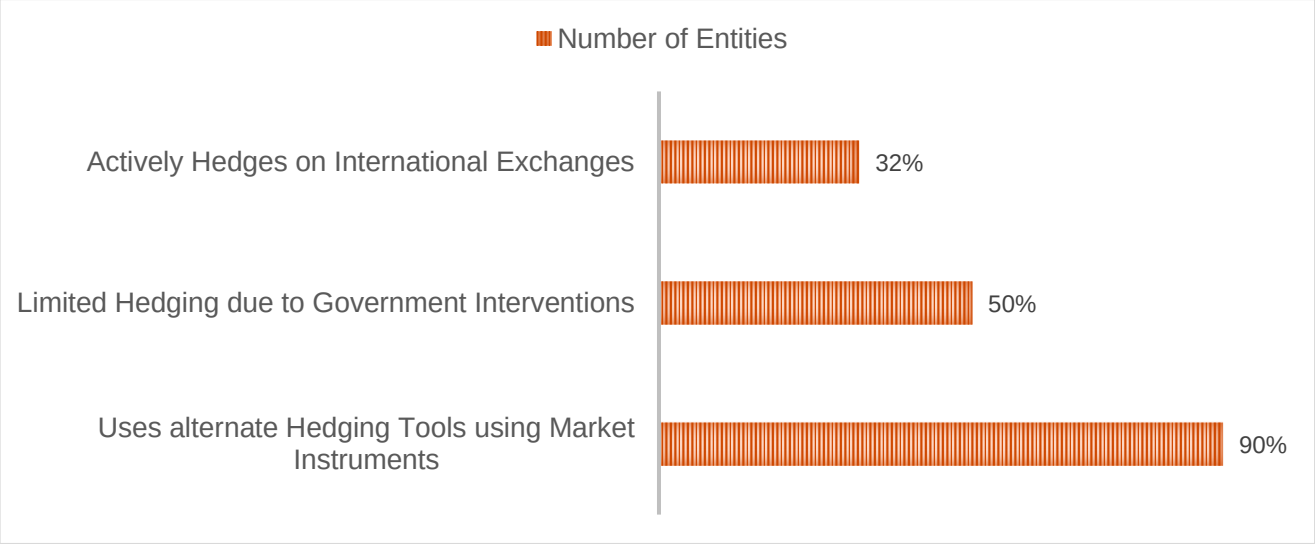
b) Agri-trading Firms: Exporters and Importers

From each of these categories of stakeholders, we were able to draw critical insights on relevant subjects such as current hedging strategy, challenges pertaining to hedging on futures and options, gaps, and challenges existing in the Indian Agri-derivatives market etc. These observations were then analysed, and the findings are being detailed as follows:

6.1.2. Hedging activities at Firm level

Current level of Hedging activities at firm level were assessed and our observations are presented as below:

Figure 44 Assessment of Current Hedging Activities: Agribusiness Firms; PwC Analysis



Across all the entities that have been surveyed, it is indicated that there was limited hedging via Futures and Options across the Domestic Exchanges. The low participation of agri-business firms can be explained as follows:

- **Limited Hedging due to Government Interventions:** Around 50% of the entities stated that they were actively hedging via Futures on Domestic Exchanges. Entities included MNCs, exporters, importers, and regional traders. Frequent market interventions due to regulations has significantly limited their ability to hedge against commodity price risks. Suspensions on trading, restrictions on export and import of commodities, frequent changes in stocking restrictions on private trade were some of the key factors which have been stated by the surveyed entities. Suspensions and hikes in margins are often targeted towards commodities which are sensitive in nature on account of food security concerns (For example, chana, wheat etc.). The stakeholder's perspective can also be visualised from the COVID-19 pandemic angle as follows:
    - **Pre pandemic scenario**: The food processing companies have a fixed MRP to -deliver their end products to the distribution channels and a fixed processing margin. Their trade margin is generally

good enough to absorb the little price volatility present in the commodities they use as raw materials. So, they felt the entire hedging process was an unnecessary hustle for them. Besides, in addition to the price lock they needed a supply lock to their products, so they found it better to engage in the forward contracts. (For example, renowned companies like ITC and Nestle trade in forward contracts with wheat mill traders.). So, in the pre covid era, companies were either unaware of the hedging procedures and lacked the skill of hedging in the derivative exchanges or were uninterested in conducting hedging.

- **Post pandemic scenario**: In the post pandemic period the entire scenario got a major turn. Due to major supply risks, firms started to feel the need for hedging and began looking for new price risk management strategies. Now they experienced the need to understand how market driven tools could be used to hedge their price risk using futures. For example, in 2020 when the oilseed prices soared to almost double, the cattle feed traders didn't get the trade margins they used to get earlier. Their forwards contract started defaulting so they wanted to safeguard their price risk by entering futures contract.
  However, by that time, hedging tool itself was rendered unavailable as derivatives trading in seven Agri commodities was banned on December 2021

- **Active Hedging on International commodity exchanges:** Around 32% of the agribusiness entities hedge their commodity price risk on international exchanges. These entities were International Agri-trading firms (such as Cargill) and Indian Food MNCs who have affiliates in countries like Singapore and Geneva. All these entities hedged on CBOT. According to them, hedging via international commodity exchanges is far more safe than Indian exchanges. In India, regulatory uncertainty in trade of essential agricultural commodities resulted in dwindling participant interest. Whereas CBOT did not bear such risks. They are essentially well established and trusted by the global participants. For example: Britannia practices hedging in wheat in the Chicago Board of Trade which is one of the oldest operating futures and options exchanges in the world and Cargill Inc. is an international firm which hedges only on established exchanges such as CBOT, ICE etc.

- **Usage of alternative Hedging Tools such as Forward Contracts:** About 90% of the entities stated that they utilise forward contracts as their dominant hedging strategy. Besides being easy to understand, these contracts can be matched against the time of exposure as well as for the cash size of the exposure. Besides, they are tailor made and can be written for any amount and term. Large MNCs utilise forward contracts with regional traders/millers to secure their supply. Supply security was considered more important than price security. Besides, they are termed to be the best possible option in uncertain and volatile trade regulations (such as Export ban).

6.1.3. Hedging Strategies adopted by Agribusinesses

Forward contracts and futures contracts are both widely used by agribusiness firms for hedging purposes. Forward contracts are OTC contracts that facilitate planning and marketing by allowing traders to lock in forward prices and securing a processing margin. In a forward contract, the buyer agrees to take delivery and the seller agrees to make delivery of a specified quantity of a commodity of choice at an agreed future date at an agreed price. In a forward contract, unlike in a futures contract, physical delivery and the actual payment take place at the maturity of the contract. If the prevailing market price is greater than the contract price, the buyer will make a profit at the expense of the seller. If, on the other hand, the market price is lower than the contract price, the seller will make a profit at the expense of the buyer. In a forward contract, the seller hedges the risk of holding the commodity while the buyer hedges the risk of the need to acquire it at a future date. This is known as "forward cover." In an organised forward market, this involves simultaneous execution of an offsetting transaction. For example, if a trader holds a certain commodity, he can insure against a possible decrease in the price of that commodity by selling the same quantity in the forward market at the prevailing forward price. At maturity of the contract, the trader sells the commodity at the specified price, and hence, avoids the risk of a price decline. There are two basic characteristics of forward contracts. First, exchange of cash does not take place when the contract is signed. Second, since there is an inherent risk of default (seller not delivering the commodity or buyer not paying the agreed price), the successful execution of a forward contract entirely depends upon the reputation of the two parties entering the agreement.
However, there are several reasons why forward contracts are preferred among agribusiness firms as compared to futures contracts:

- Customization: Forward contracts are typically customised to meet the specific needs of the buyer and seller. Agribusiness firms can negotiate terms such as quantity, quality, delivery location, and timing to better match their specific needs. Futures contracts, on the other hand, are standardised and offer less flexibility in terms of customization.

- Counterparty Risk: Forward contracts are privately negotiated contracts between two parties, so there is a risk of counterparty default. However, agribusiness firms can mitigate this risk by selecting reputable counterparties with a strong financial position. Futures contracts are traded on regulated exchanges, so counterparty risk is generally lower.

- Margin Requirements: Futures contracts typically require initial margin and daily variation margin payments, which can tie up a significant amount of capital. In contrast, forward contracts do not have margin requirements, which may be more attractive to agribusiness firms that have limited access to capital.

- Lower Transaction Costs: Forward contracts typically have lower transaction costs compared to futures contracts, which can be more attractive to agribusiness firms that are looking to manage costs.

Overall, forward contracts offer greater flexibility and customization compared to futures contracts and may be more attractive to agribusiness firms that have specific hedging needs. However, it's important to note that futures contracts offer greater liquidity, transparency, and standardisation, which may be important factors for some market participants.

The following table highlights the predominant hedging practices as stated by the entities:

Table 34: List of Hedging Strategies adopted by Private Sector Players; PwC Stakeholder Discussions

Category of Stakeholders	Region where Hedging is Executed	Commonly used hedging instruments
Food Processing Firms	India	(a) Forward (Fixed Contracts) (b) Deferred Contracts (c) Forex Derivatives
Agri-Trading Firms	India	(a) Forward (Fixed Contracts) (b) Forex Derivatives
	US, Latin America, and EU	(a) Futures Contract (b) Options on Futures (c) Forward (Fixed Contracts) (d) Price-to-be fixed contracts (e) Minimum Price Contracts (f) Futures based forward contract such as Hedge-to Arrive (HTA) and Basis contracts

6.1.3.1. Key Physical hedging by Agribusiness firms

Each of these physical/spot hedging instruments utilised by agribusiness firms have been described as below:

- **Forward contracts:** The agribusiness firms execute following types of forward contracts:

    - Fixed price contract: A fixed price (or flat price) contract is the most common type of contract used by ABC. In a fixed-price forward contract, the trader is bound to deliver wheat at an agreed time for specific quality and quantity. The trader is only paid on delivery. In a few cases, premiums and discounts may be established for the product that does not match specified quality standards. However, the trader carries the opportunity risk of losing potential gains when market prices rise.

    - Deferred pricing contract: In this arrangement, farmer/supplier delivers the commodity and transfers ownership on the agreed date as mentioned on contract but maintains control over when it is priced. This contract enables the farmer/supplier to separate the pricing decision from the delivery decision. By transferring the ownership, the storage risks are passed to the buyer during delivery time and the contract might also be utilized as a substitute for storage when unavailable. While this gives the farmer/supplier the opportunity to benefit from price increment, he also carries the market risk that prices will decline between the time the contract is entered and the date on which the sales price is determined. In India, however, this contracting arrangement is currently being used on a very small scale on an experimental basis by the company for small scale farmers, especially where there is an established level of confidence in the buyer

    - Price-to-be-fixed contract: Price-to-be-fixed (PTBF) contracts, also called executable orders (in sugar trade) or on call contracts (in cotton trade), are the most common form of export contracts for commodities

from Latin America. They are also very common in Asia (especially China), and although still common in Africa, are relatively less used. Unlike other forward contracts where the used reference prices are commonly futures market prices, in this case the seller (or the buyer, in case of processors, importers or end-users) has the active ability to fix the prices now deemed most opportune.

- Minimum price contract: This forward contract is like a fixed-price forward contract, except that it guarantees a minimum price with an opportunity to participate in future price gains. From the farmer's side, this eliminates an important risk factor, and the incentive to default on the contract is less than that with fixed-price contracts. On the other hand, the buyer (elevator or packer) can also hedge the assumed risks by taking opposite positions. The farmer can be required to pay a certain price to take advantage of this benefit. In practice, many farmers in developing countries have no access to forward contracts that contain this kind of price risk management component.

- Basis contract (also known as fix price later, unpriced or basis fix contract): A basis contract is another type of a deferred pricing contract. There are two elements to this contract: futures value of the commodity and a predetermined basis. The price of this contract is determined by applying a specified fixed basis to a particular futures price, usually when desired by the farmer. For example, a contract may state on 1 July that a farmer sells a specified quantity for November delivery at US$0.20. (The 1 November cash price minus a set basis of 20 cents, or the 1 November futures price plus a set basis of 20 cents.) Thus, the farmer has eliminated the basis part of price risk but has retained the risk of futures prices. Sellers generally use the basis contract when the basis level is attractive but overall prices are unattractive due to low futures prices. Since the basis tends to be most narrow when futures levels are low, most sellers use the basis contract when they are confident that the futures price will go up.

- Hedge-to-arrive contract (no basis established contract): A hedge-to-arrive (HTA) contract is opposite to the basis contract. It fixes the futures price but leaves the basis level to be determined later (usually no later than the date of delivery). When a HTA contract is agreed, the buyer of the commodity immediately sells futures consistent with the time that the seller agrees to make delivery of the physical commodity; in this way, the futures price is locked in. No matter whether prices subsequently rise or fall, the seller's cash price will be based upon the price of the futures position initiated by the buyer. When the seller delivers the physical, the buyer will determine the cash price by adjusting the locked-in futures price by the basis that prevails at that time. In other words, the basis is variable throughout the life of the contract. The seller eliminates futures price risk with a HTA contract but assumes basis risk. When a producer believes that the basis will narrow, he might use this type of contract. Since the futures price is established in the contract, any gain or loss to the producer will be on the basis. This contract enables farmers to lock in a favourable futures price when the basis is unfavourable. However, the risks for the provider of these instruments can be very difficult to manage; many US cooperatives lost major sums of money in the late 1990s when they were unable to maintain the margin requirements of the exchanges necessary to continue covering these contractual arrangements with producers.

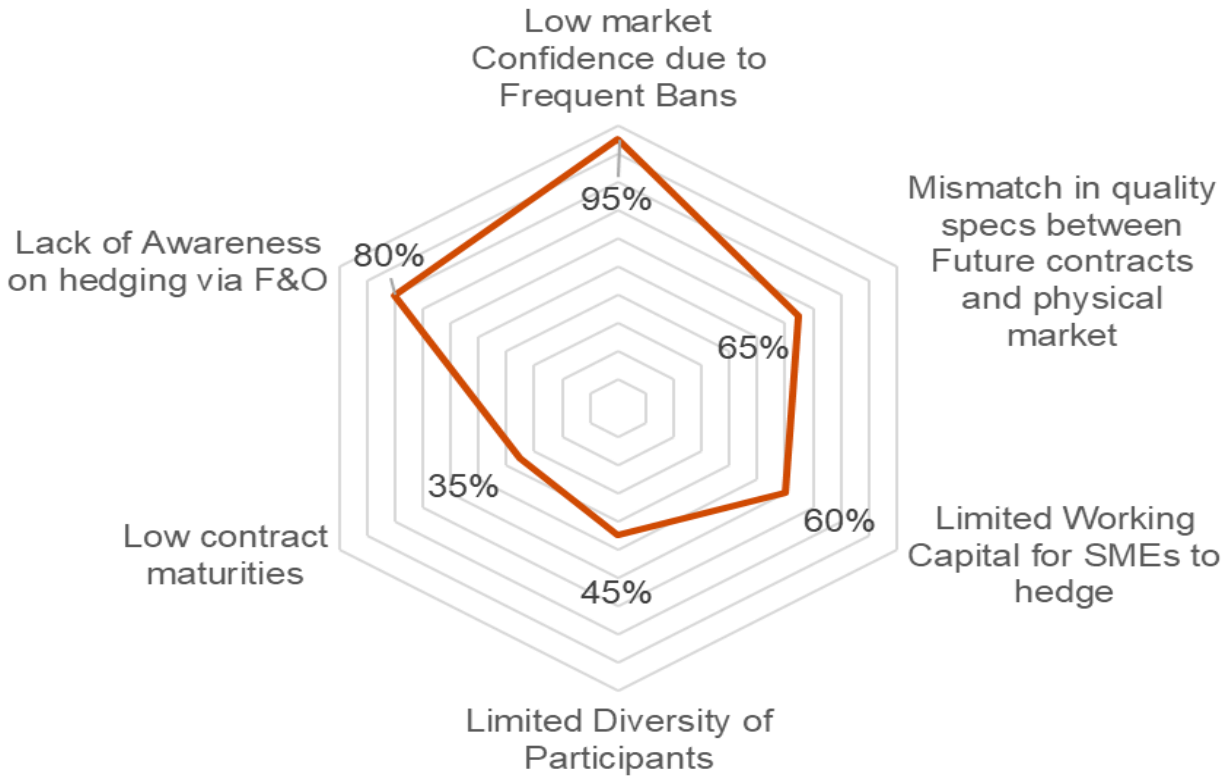
6.1.3.2. Key Financial hedging by Agribusiness firms

- **Futures and Options Derivatives contracts:** The agribusiness firms especially the International Agri-trading firms execute hedging on established exchanges (such as CBOT) to hedge their physical exposure in import-export operations. Such firms purchasing physical commodities on a basis contract can manage its buying price by purchasing futures contracts or can manage its purchase price risk by purchasing call options. A company purchasing physical commodity on a fixed price contract can manage its purchase price risk by purchasing put options. For example, if a firm priced its soymeal parcel as a basis against the Soybean Meal futures price (on CBOT), the firm can offset its price risk with either a futures contract or a call option contract. Fundamentally, utilising a futures contract would enable the firm to fix the cost of soymeal, whereas a call option would enable the firm the ability to fix the cost of soymeal if soymeal prices increase above a predetermined price, but would also enable the firm to capture a cost benefit if soymeal prices decline.

- **Forex Derivatives:** Most of the Large Domestic food processing firms and International Agri-trading firms hedge their financial risks through the currency derivatives. The company books their finances in dollars and hedges in domestic and international exchanges. This helps them to avoid the price risk management of agricultural commodity trade. The foreign commodities shield the underlying trade risks through effective hedging.

6.1.4. Perceived Challenges and constraints with respect to hedging on Domestic Exchanges

The following illustration summarises key Challenges and Constraints for Indian Agribusiness firms to participate in the derivatives market, where the percentage (%) figures indicate share of total respondents covered in our primary stakeholder interactions.



- **Low Market Confidence due to suspensions on Agri-derivatives trading:** Although Indian Agri-future markets are more than a century old, suspensions on commodity trading started since the mid-1960s. Since then, the constant government interventions at frequent intervals have disrupted the stability of commodity trading in India. According to the respondents, outright suspensions on trading, restrictions on export and import of commodities, frequent changes in stocking restrictions on private trade, have adversely impacted the potential for hedging on Agri-derivatives in India. Suspensions and hikes in margins are often targeted towards commodities which are sensitive from the perspective of food security (For example, tur, urad, rice, wheat etc.).

Snippets from Stakeholders: Opportunity Costs of Non-Hedging

ABC Feed Company:

An agribusiness company that produces broiler feed from maize had thinner-than-expected margins of earnings before interest, taxes, depreciation, and amortization of 10 to 15 percent (against an expected 20 to 25 percent). Analysing the company's operations revealed that while most of its sales contracts were signed based on fixed prices in advance of delivery (for instance, 3 months), the company purchased maize at spot prices (which reflected monthly market prices).

Because the company had no way to pass on the increased price of maize if it needed to, its margins were vulnerable to fluctuations in the price of maize. The company overhauled its hedging strategy and incorporated an approach that maize prices at volumes that correspond to feed sales volumes on a rolling basis. Further analysis has shown that this systematic approach would have helped the company avoid €15 million to €18 million in annual losses that would've resulted from the volatility of the spread between feed and maize prices.

Adani Wilmar Case:

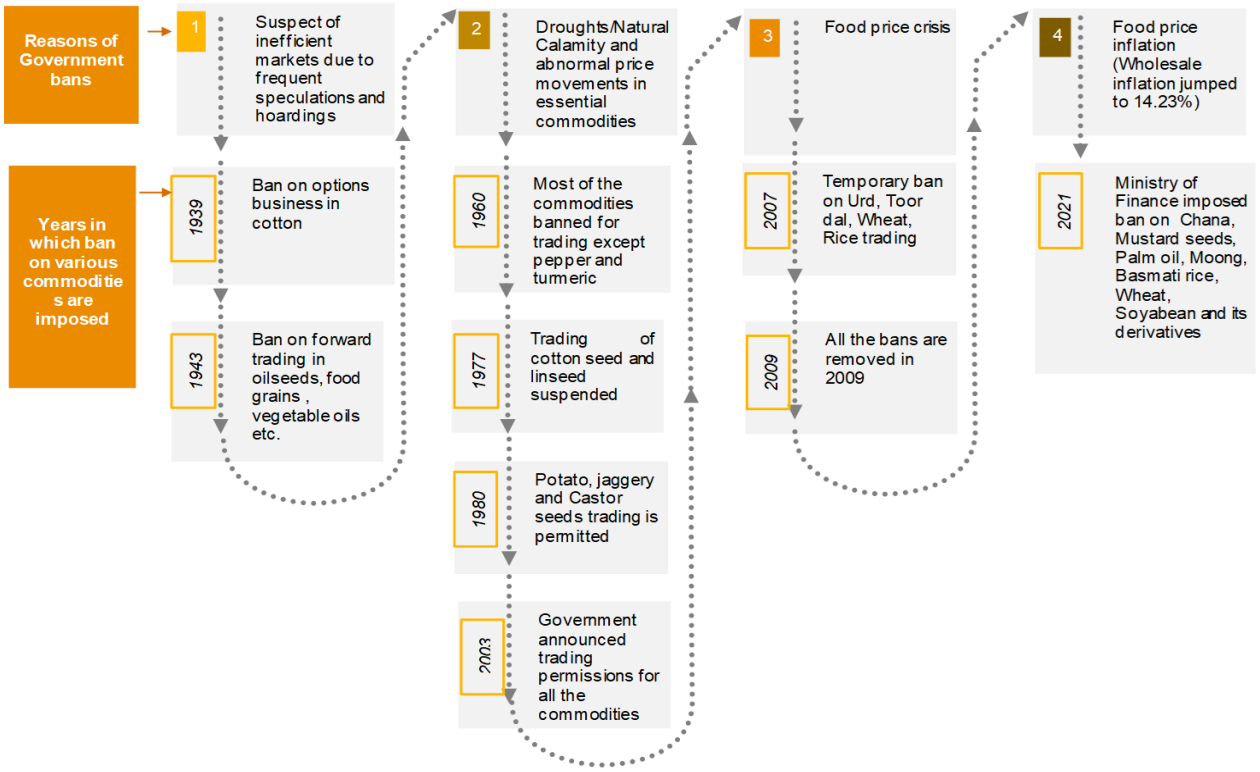
Geopolitical and climatic factors such as drought in Argentina, the Ukraine-Russia war and monsoon created significant disruption in supply chains and impacted the prices of edible oils. Adani Wilmar reported a loss of Rs 79 crore in the June 2023 quarter and revenue was down 12%. This is against a profit of Rs 194 crore during the the corresponding quarter of FY 2023. The company's annual revenues also declined 12% to Rs 12,928 crore from Rs 14,724 crore during the same period.

The company experienced significant losses because edible oil prices have come off very sharply and Adani Wilmar was not able to contra-hedge the local oils, particularly in India, as there is no such hedging mechanism. The firm has only been able to hedge in the BMD and CBOT

In January 2024, Adani group reported that they are in talks to sell its entire 43.97 per cent stake in Adani Wilmar Ltd, and the deal is likely to be finalised within February 2024. This comes at a time when the company has been posting losses for two consecutive quarters. In December 2023, it reported a consolidated net loss of Rs 130.73 crore for the July-September quarter, as profitability was severely impacted in the cooking oil business

As described in the below illustration, it is a historical trend that futures markets are the first ones to be blamed when it comes to inflation in commodities with respect to food security of the country. The government has suspected future trading to be its primary reason and have imposed bans on their trading in the exchanges. These abrupt interventions reflect the lack of awareness of the functioning of the market among the policy makers in the country.

Figure 45 Negative Impact due to suspension on Agri-derivative trading



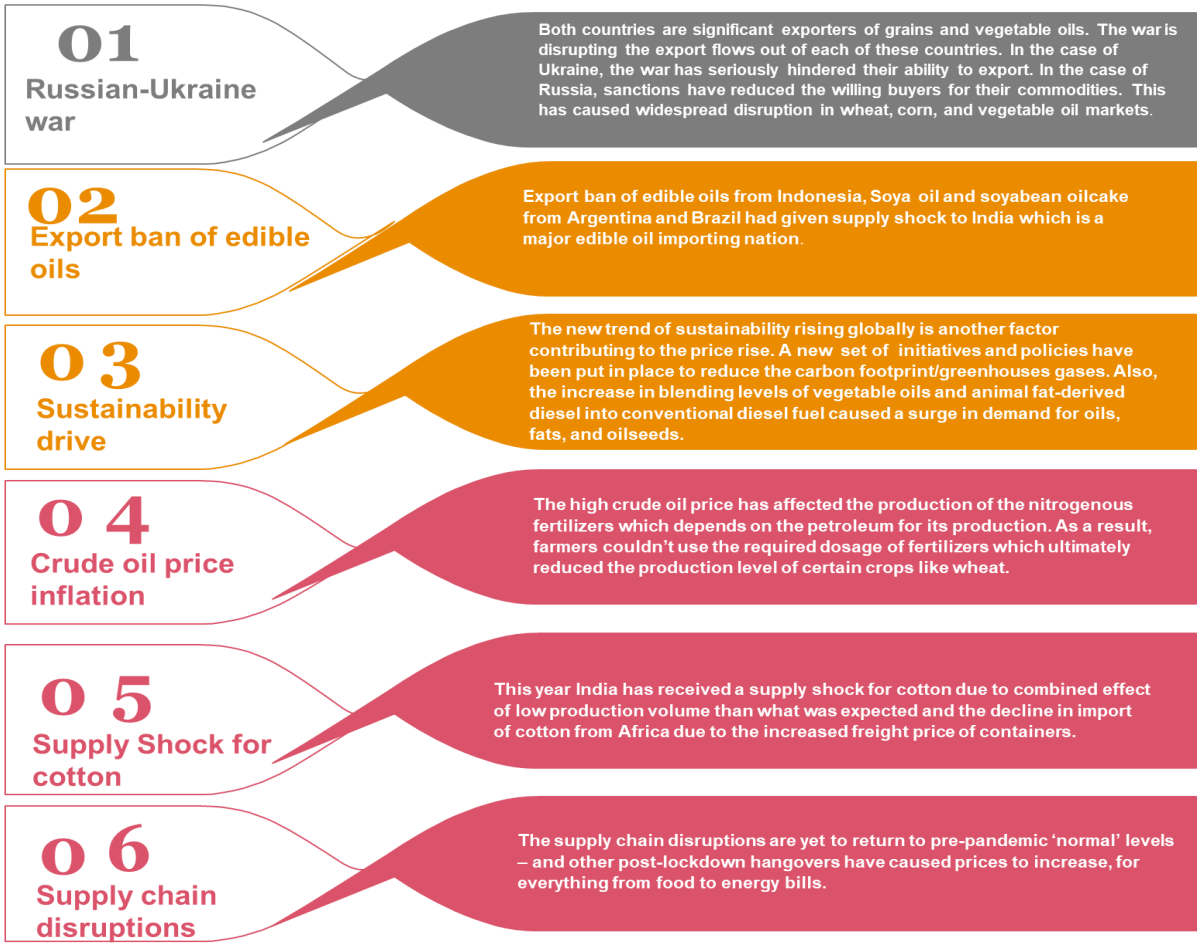
From the above illustration we can observe, it is a historical trend that futures markets are the first ones to be blamed when it comes to inflation in commodities with respect to food security of the country. The government has suspected future trading to be its primary reason and have imposed bans on their trading in the exchanges. These abrupt interventions reflect the lack of awareness of the functioning of the market among the policy makers in the country.

Because of price inflation, the introduction of new derivatives contracts in paddy (non-basmati), wheat, chana, mustard seeds and its derivatives, soya bean and its derivatives, crude palm oil and moong was suspended for a year on December 21, 2021, by the Securities and Exchange Board of India (SEBI).

On August 26, 2022, the regulator, in consultation with the stakeholders, suspended the trading in all cotton futures contracts of January 2023, and subsequent contracts of cotton futures on Multi Commodity Exchange of India Ltd (MCX), for revision of the contract specifications.

- **List of commodities banned**: The commodities put under the ban list include wheat, paddy (non-basmati), chana, mustard seeds and their derivatives, soya bean, crude palm oil and moong.
- **Reason for ban**: Annual wholesale price inflation accelerated to 14.23 per cent. To protect the nation from this consistent double-digit inflation the Government imposed a ban on seven commodities.
- **Reasons for price inflation**: The road leading to this food and agricultural commodity inflation level has been a long and winding one with many unrelated factors since mid-2020. Since India is an open market the unsteady global price movement has equally affected the Indian market. Staple goods like grains and vegetable oils are among the worst affected foodstuffs. However, according to most respondents, there is a lack of empirical evidence between price inflation and ban on Agri-derivatives trading. The key reasons for price inflation in 2021 as cited by the respondents were as shown in following illustrative:

Figure 46 Reasons for the price inflations



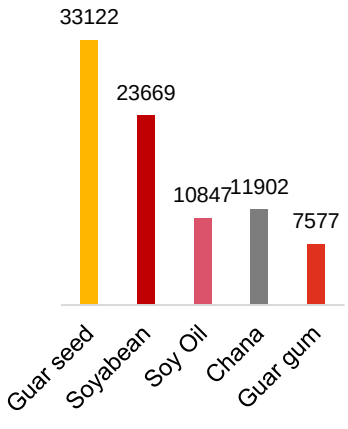
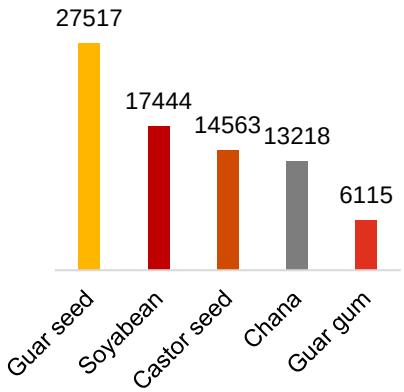
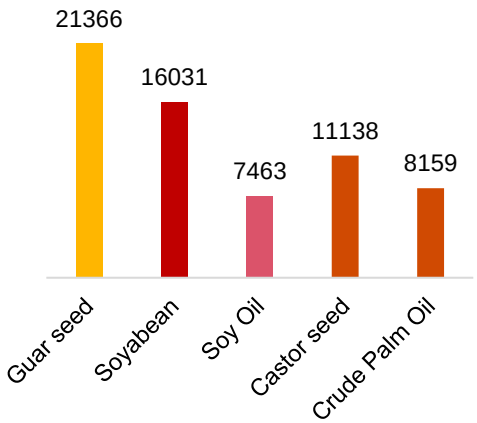
- **Impact on hedging due to Market Regulation by Government:**
  India has a robust and regulated market structure due to the presence of various price supporting elements:

The state government of India established APMC or Agricultural Produce Market Committee to regulate the marketing of notified agricultural produce and livestock in physical, electronic, or other such mode. Based on the recommendation made by the Commission for Agricultural Costs and Prices (CACP), every year, at the beginning of the farming season, the Government of India announces the minimum support prices for certain crops. MSP insure farm items against any sharp drop of Agri prices. The procurement of the crops in the APMC mandis at MSP is carried out by the Food Corporation of India (FCI) through the respective state agencies to safeguard price volatility in the market and ensure food security in the nation. The procurement of rice was earlier mainly in the states of Punjab, Andhra Pradesh/Telangana, and Haryana, but in recent years, states like Uttar Pradesh, Chhattisgarh and Odisha have joined, resulting in its higher production. Similarly, wheat procurement was confined to Punjab and Haryana, but over the past decade or so, Madhya Pradesh and Uttar Pradesh have become major contributors. While APMC mandis are majorly involved in cereal procurement, cotton corporation of India helps cotton farmers by ensuring them remunerative price for their produce and thereby protect their interest.

In case of the bulky commodities, MSP acts as a base price, so the price discovery mechanism in the exchanges is of no use to the farmers or the private companies. The bulky commodities that are sensitive in terms of food security are readily procured by the government agencies from the farmers at a predetermined price and thus no risk of serious price fluctuation is associated with the products. If there is no fluctuation in prices, the need to hedge risk is minimal and therefore the volume of futures trade will remain thin. And as far as various food processing companies are considered they either buy their raw material from the traders sitting in the mandis or enter the forward market if at all feels the need for it. (For example, in the case of Britannia they directly procure the wheat flour from the traders sitting in the mandi). Consequently, neither the buyer nor the seller shows interest in getting into a much complex trading mechanism.

In the tables illustrated below we have mentioned 5 commodities who have shown best performance in terms of annual traded volume (in 2017-18, 2018-19 and 2019-20) in the Indian derivative exchanges.

Figure 47 Top 5 commodities in terms of annual traded volume (in 2017-18, 2018-19 and 2019-20) in the Indian derivative exchanges; Source: SEBI

2017-18: Top 5 traded commodities in exchange (Annual traded volume in '000 Tonnes)	2018-19: Top 5 traded commodities in exchange (Annual traded volume in '000 Tonnes)	2019-20: Top 5 traded commodities in exchange (Annual traded volume in '000 Tonnes)
		

Observations:

- Guar seed and Soybean are the two commodities that are high performing in terms of annual volume traded in the exchanges for three consecutive years.
- Annual traded volume of Castor seeds, Soy oil, Guar gum and Chana is higher than other commodities for 2 years

- Annual traded volume of crude palm oil is high for only 2019-20.

Conclusion: From the observations we can deduce **that Guar seed and Guar gum** are **niche commodities** that are not controlled by the government and are high-performance**.** Though government declares **MSP** for **Chana** and **soya bean,** but they are not extensively traded**.**

- **Frequent Mismatch between futures contracts and physical markets in terms of quality specifications:** One of the major problems of the underlying physical markets is meeting the quality standards of futures contracts. As the majority of the farmers are small and marginal, they produce small quantities of different qualities and varieties of the same commodity. Therefore, farmers do not have the quality goods which are specified by the exchanges. Besides, the contract specifications are designed well in advance of actual crop arrivals. So even if the crop is affected by weather factors or pest incidences, changes cannot be made to allow other specifications of the same crop because the contract is already signed on predefined conditions. Eventually it leads to default in delivery of physical commodities to the warehouse locations. Since physical delivery is of paramount importance to hedgers, such market conditions reduce the attractiveness of the contract for hedging. In such cases, many market participants shift to speculations since they already anticipate that there would be limited actual delivery of the physical commodity.

- **High Price Discovery In-efficiency:** Another important constraint to hedging quoted by respondents is the availability of timely information on commodity fundamentals like demand and supply scenarios to facilitate the pricing decisions of market participants when trading in derivatives contracts. While the Agriculture Ministry releases Advance Estimates of production for all major agricultural commodities, they are aggregate estimates of the commodity and may not indicate the quantity of specific variety and quality of the commodity that can meet the standards of futures contracts. For instance, the official production estimates of cotton output in the country do not reflect the output of a specific variety traded in futures markets and the actual quantity may be much smaller leading to price variations between derivatives and physical markets. Further, information on the demand side is sparse with no official estimates available for many agricultural commodities tracking domestic consumption.

- **Low Liquidity in Agri-derivatives market:** Low Liquidity in most of the Agri-derivatives contracts have been cited as one of the key impediments of institutional hedging. In our survey, international Agri-trading firms show preference for international exchanges over domestic exchanges due to lack of depth in the market. Domestic exchange futures were found to be more liquid for the near month and the mid-month, but liquidity plummeted quite sharply after that. However, CBOT futures were more liquid even in the near month and there was considerable liquidity for several months. Higher liquidity in contracts traded on International Exchanges led to the development of other hedging tools such as Options, Spread contracts and mini-sized contracts. Although SEBI has allowed Foreign Portfolio Investors (FPIs) to participate in the exchange-traded commodity derivatives segment to boost liquidity, the FPI' s extent of participation is only limited to non-agricultural commodity derivative contracts and indices. With emergence and rapid growth collateral management services in recent years, many respondents believe that incorporation of financial institutions with considerable exposure to commodity financing will bring greater liquidity to the derivatives market.

- **Low Contract Maturities in Domestic Exchanges:** While Domestic exchanges offered futures contracts with a maturity of only 6 months, CBOT futures contracts were available with maturities of more than 3 years. According to many respondents, increase in maturity of contracts will potentially attract more market participants to hedge in futures.

- Lack of Hedging Facilitation to Small and Medium Sized Enterprises: The small and medium enterprises (SMEs), too has been a significant beneficiary of the commodity futures market, which can be increased manifold by allowing banks to provide a facilitative role. Given the recent broad-based volatility in commodity prices, maintaining profitability has emerged as a major challenge for SMEs that generally grapple with the problem of rigid product price. Price volatility also compels them to seek increased working capital to mitigate risks. Due to the small quantum of purchase, SMEs are also unable to get into long-term contracts with suppliers. Hence, hedging appears to be extremely necessary for the survival of SMEs. However, as hedging involves developing suitable risk management strategies and taking well-timed market decisions, the limited capital base and wherewithal at the disposal of SMEs poses challenges for these businesses. Moreover, the inability to hedge results in a decline in their creditworthiness. Using over-the-counter derivatives is out of bounds for small stakeholders such as SMEs due to the high cost of these instruments and lack of knowledge on their usage.

- **Limited Awareness on hedging via Futures and Options:** In our survey, it was found that about 10% of the entities were not well versed with Futures and options as hedging tools. Most of these respondents were regional traders/suppliers who usually supply bulk commodities to Multinational firms. They already have an assured market in the form of arrangements like that of big multinationals buying from them via brokers. These alternate arrangements (usually in form of forward contracts) provide assured markets to the regional/local traders or millers and therefore they do not feel the need to mitigate risk and futures market is therefore not indispensable. They are yet to understand the complex mechanisms, functionalities, and benefits of hedging on F&O. Even if they understand the need of hedging, they don't know how to go about the process and ultimately resort to their traditional means to market their produce. Therefore, such companies are either unaware of the hedging procedures and lacked the requisite awareness of hedging on derivative exchanges or were uninterested to conduct hedging.

- **Adani Wilmar Case (2023):** Geopolitical and climatic factors such as drought in Argentina, the Ukraine-Russia war and monsoon created significant disruption in supply chains and impacted the prices of edible oils. Edible oil prices have come off very sharply and thus the firm were not able to contra-hedge the local oils, particularly in India, as there is no such hedging mechanism. Since the firm has only been able to hedge in the BMD and CBOT.

6.2. State Trading Enterprises (STEs)

This stage of the primary interaction included contacting stakeholder groups related to stake trading enterprises to understand their level of participation in the derivatives trading market. For this purpose, we interacted with the representatives of STE's namely Cotton Corporation of India (CCI), National Agricultural Cooperative Marketing Federation of India (NAFED) and Food Corporation of India (FCI). The interactions with relevant stakeholders enabled us to understand the reasons behind the lack of participation of these state trading enterprises on the India exchanges.

6.2.1. Response of the STEs interacted

Food Corporation of India (FCI)

The Food Corporation of India (FCI) was established under the food corporation act of 1964 to fulfil the following components of the food policy[40]:

- Effective price support operations for safeguarding the interests of the farmers by ensuring procurement at MSP (Minimum Support Price), storage and distribution of the grains
- Distribution of food grains throughout the country for a public distribution system.
- Maintaining satisfactory level of operational and buffer stocks of food grains to ensure National Food Security

FCI has been able to provide remunerative prices to farmers and made possible for the consumers to avail food grains at reasonable prices as well. Furthermore, it also maintains buffer stock as a measure of food security and intervenes in the market for price stabilisation. As of March 2021, FCI stands at a break even with no profit and no loss[41].

Table 35: Purchase Volume and value of food grains and pulses by FCI; Source: FCI

Purchases	2020-2021		2019-2020	
	Volume (Million Tones)	Value (Crore Rs.)	Volume (Million Tones)	Value (Crore Rs.)
Food grains, Foodstuff, and gunnies	67.29	187953.01	50.15	134438.16
Pulses	0.03	145.37	-	19.04

Hedging related activities

[40] FCI
[41] FCI Annual Report 2020-2021

The Food Corporation of India (FCI) does not actively use futures contracts for hedging purposes. FCI is a government-owned agency that procures and distributes food grains in India. The agency is responsible for maintaining buffer stocks of essential commodities to ensure food security in the country. FCI procures food grains from farmers at the minimum support price (MSP) and distributes them through the public distribution system (PDS) at subsidised prices. Since FCI procures food grains at a fixed MSP, the agency does not typically face price risks that would require hedging in the futures market. Instead, FCI may use other physical hedging strategies, such as forward contracts, to manage its price risks. These strategies allow FCI to lock in prices for its procurement and distribution operations, reducing its exposure to price volatility in the market.

However, FCI used to hedge on CBOT to protect itself against the risk of rising food prices in 2010-11. However, FCI stopped hedging on CBOT ever since. One of the key reasons cited was that the Indian government decided to provide FCI with a direct subsidy to cover the cost of any unexpected increases in food prices. This essentially meant that FCI no longer needed to hedge against the price spike. Secondly, the Indian government wanted to reduce its reliance on foreign markets for food grains. By hedging on CBOT, FCI was essentially betting on the future prices of food grains in the U.S. market. This exposed FCI to the risk of losses if the price of food grains in India fell below the price of food grains in the U.S.

It's worth noting, however, that FCI's operations are highly regulated by the government, and the agency must follow strict guidelines and procedures for procurement, distribution, and pricing. This can make it challenging for FCI to use financial instruments such as futures contracts, which may be subject to market volatility and regulatory oversight.

National Agricultural Cooperative Marketing Federation of India (NAFED)

NAFED is an apex cooperative marketing federation in India. It was established on 2nd October 1958 with a vision to promote the trade of agricultural and forest resources across the country. NAFED has widespread infrastructure across the country with branches in every state along with other facilities such as warehouses, cold storages, precooling units, consumer marketing division etc. NAFED is the largest such marketing agency in the world. NAFED. It is supporting the implementation of the two schemes namely Price Support Scheme and Price Stabilisation fund by the government. All the related schemes implemented by the state are done via NAFED.

As of 2020-2021, NAFED obtained a total turnover of Rs 36,894.95 Crores and earned a gross profit of Rs 467.78 crore as well as a net profit of Rs 243.94 Crores. This included

- Procurement of 24,35,454 MT of Pulses (PSS/PSF) valuing Rs 12159.94 Crore
- Procurement of 10,97,860 MT of Oilseeds valuing Rs 5,135.68 Crore under PSS
- Seed Business of Rs 35.85 Crore
- Bio Fertilizer Business of Rs 0.16 Crore
- Procurement of 1,03,008.71 MT of Onion valuing Rs 118.12 Crore under PSF
- Procurement of 5,64,036.58 MT of Food Grains valuing Rs 1,342.93 Crore

Apart from undertaking procurement of various commodities under Govt. of India schemes, NAFED also undertakes procurement in an outright account utilising its own funds. During the year 2020-2021, NAFED procured:

- 2004.96 MT of pulses for Rs 13.42 Crore
- 69.31 MT of spices for Rs 1.70 Crore

Business Operations of NAFED

Domestic

NAFED is one of the central nodal agencies to procure wheat, paddy, oilseeds, and pulses under the Price Support Scheme (PSS) of the Government. NAFED undertakes procurement of 16 notified Agricultural commodities of India (pulses, oilseeds, dehusked coconut, Milling/Ball Copra) and provides remunerative prices to the farmers for their produce. As per the Price Support Scheme, if the market price of the commodity falls below MSP, NAFED will start procurement and purchases at PSS. Purchases will be taken care of by the respective state branches and state-wise policies and schemes for the procurement will be followed. A Nodal State Agency on behalf of Food Corporation of India and the State Governments under Decentralized Procurement (DCP) scheme for procurement of Wheat and Paddy at MSP.

International

NAFED undertakes the supply of Agri commodities and other countries through decades of experience and infrastructure for exporting goods such as pulses, food grains, spices, edible oils etc. NAFED also supplies it to other countries towards humanitarian assistance on behalf of the Ministry of External Affairs under commercial trade.

Table 36 International Operations of NAFED (2020-2021); NAFED

S.No.	Country	Commodity	Quantity	Period	Value (in Rs Lakh)
1	Maldives	Rice, Wheat Flour, Sugar, Tur Dal, Onion, Potato	580 MT	May 2020	329.39
2	Zambia	Non-Basmati Raw Rice	1000 MT	July 2020	599.50
3	Zimbabwe	Non-Basmati Raw Rice	1000 MT	August 2020	514.75
4	Malawi	Non-Basmati Raw Rice	1000 MT	August 2020	534.50
5	Sierra Leone	Non-Basmati Parboiled Rice	1000 MT	August 2020	418.00
6	Syria	Non-Basmati Parboiled Rice	2000 MT	December 2020	725.98

Commercial

Besides, NAFED is also involved in its retail business by selling grocery items through a chain of "NAFED Bazaars" at affordable rates. The NAFED brand pulses, spices, tea, egg powder, besan, rice, honey, saffron, cherry, rice bran oil, mustard oil, makhana and other products.[42] Retail business is not a considerably profitable arm of the organisation. In the case of NAFED business, they have not done a lot of commercial activity, but since they are already handling huge quantities of MSS, they are not able to introduce it. They have tried it earlier in case of coriander and mustard, but when the government nullified it in PSS, they have not purchased such crops in the last 22 years. During the FY 2020-21, sales of Grocery (including Tea) by the Consumer Marketing Division was to the tune of 2417 Lakhs.

Hedging related activities

Being a cooperative, NAFED has priorities and objectives aligned at serving the interests of its members and ensuring stability of the availability of essential commodities. Their mandate limits their role to actively engage in hedging activities via futures. However, considering the vast volume and spectrum of commodities handled via their commercial business segment, NAFED's business segment has a huge potential to participate in hedging for price risk management.

Cotton Corporation of India (CCI)

India consumes 3.25 Lakhs bales of cotton every year. To fulfil the demand, cotton is both produced as well as imported from other countries. 22,24,27 and 28 mm lengths of cotton are widely produced in India whereas longer length cotton (32-36 mm) is imported. Hence, cotton growers in India face price risks, for tackling which CCI was established.
Established on 31st July 1970 under the Ministry of Textiles, CCI was set up as a public sector undertaking under the companies act 1956. The corporation is the central nodal agency to conduct MSP operations when the market price of cotton falls below the MSP. Their strategy headquarter is in Kolkata as they mainly export to Bangladesh. It is assigned with the following roles for its operations:

- To undertake price support operations for Kapas: 8992389 bales of cotton were procured by CCI in 2020, 1 crore+ cotton was purchased in 2010 (highest ever for the entity).
- To undertake commercial operations of its own for Kapas

During the financial year 2021-22, the Corporation has procured 0.06 Lakh bales (under commercial operations) as against 112.67 Lakh bales (i.e. 0.02 Lakh under commercial operations and 112.65 Lakh under MSP operations) during the previous year and sold 104.41 Lakh bales (i.e. 0.06 Lakh bales under commercial operations and 104.35 Lakh bales under MSP) during the current year as compared to 84.51 Lakh bales (i.e. 0.09 Lakh under commercial operations and 84.42 Lakh bales under MSP operation) during the previous year.[43]

Functioning of CCI:

Domestic
Cotton seed is processed and simultaneously auctioned in the Indian market. CCI kicks into action when the current price of Cotton seed is lower than the Minimum Support Price (MSP) released by the government. In this case, CCI procures cotton at MSP from the stakeholders such as farmers, dealers, spinners, and other traders such as MNCs like OLAM. Once they procure the cotton, they hire spinners and settle contract indents. After the settlement of the contract, they store the cotton in their own warehouses. After the processing of cotton, they are carried into e-auctions under different names as per the varieties such as H4, Y1 etc. Players come to participate in the CCI auctions if they have failed to secure cotton from anywhere else as a last resort. Traders, Millers, KVIC all participate in the process and separate contracts are made for them.

[42] NAFED
[43] Cotton Corporation of India

Once they are auctioned, CCI takes in 20-25% of their total contract value within 5 days of the contract. If unable to send the money, an interest rate of 1.1% per month is charged to make sure there is no default. These buyers are the last stakeholders of the CCI.

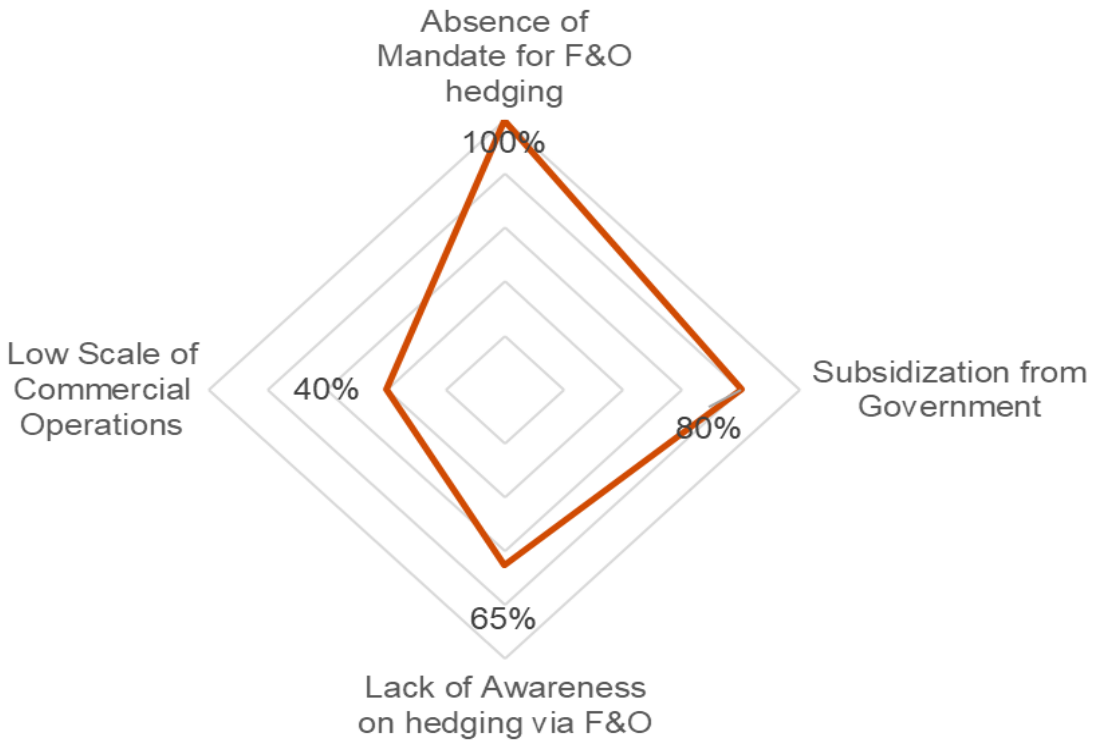
Commercial
Besides, CCI has also started their commercial operations to compete with the market. They buy cotton from farmers or from the dealers in the form of bales at market price. Buying ready-made bales from the dealers is more profitable as the cost of making 1 bale of cotton is between 75000 to 65000 in the market. Ready bales undergo reverse auctions from the selected set of traders. However, since CCI had limited capacity, they were unable to undertake commercial operations to a full scale. Company has now stopped commercial operations as of now and are at a neither profit nor loss situation.

Hedging related activities

CCI has mentioned that they have no mandate in their role which may enable them to participate in hedging activities via futures.CCI's operations are highly regulated by the government, making it difficult for them to use financial instruments such as futures contracts, which may be subject to market volatility and regulatory oversight. However, in case of export related – operations, CCI minimises the risk arising from adverse currency movements by hedging the risk to achieve greater predictability and stability. Foreign currency exposures are recognized from the time an export contract is signed and as per contractual maturity prior to opening of Letters of Credit by foreign buyers.

6.2.2. Perceived Challenges and constraints with respect to hedging on Domestic Exchanges

The following illustration summarises key Challenges and Constraints for STEs to participate in the derivatives market, where the percentage (%) figures indicate share of total respondents covered in our primary stakeholder interactions.



- Purpose of these entities as a government nodal agency is to maintain supply of their commodities in India and not to hold stock to get profit. Cost management is not a requirement for them, as being a nodal agency, they need to provide support to stakeholders irrespective of the losses. Organisation’s mandate is to provide

price support to the stakeholders and not to generate profits. This is the reason why public entities are not involved in trading on exchanges or hedging of risk

- MSP is levied by the government and their mandate is to procure according to the mandate released. They are not involved in managing the MSP for risk mitigation
- They do not have a robust warehousing supply chain, the existing warehouses are only to supplement retail business of the firm
- They are neither the custodian of most of the stocks, they can only trade or hedge the stocks they own and not what they hold.
- They are doing clear-cut communication with the legal boundary through which they manage risk. There is no price risk management strategy and hence there is no speculation either
- Schemes like Price Support Schemes are taken care of by the market decision and does not interfere with the profit and is a matter of demand and supply. But since the government manages all these schemes, these nodal execution organisations have no direct link with it.
- There is no written mandate for hedging in these organisations
- Limited awareness about hedging and its benefits for commercial operations
- ***FCI Case:*** *FCI had taken positions on global exchanges like CME due to lack of depth in the onshore exchanges (for example, during the high global food prices of 2005 and 2006).*

6.3. Potential for financial institutions to participate in commodity derivatives Market

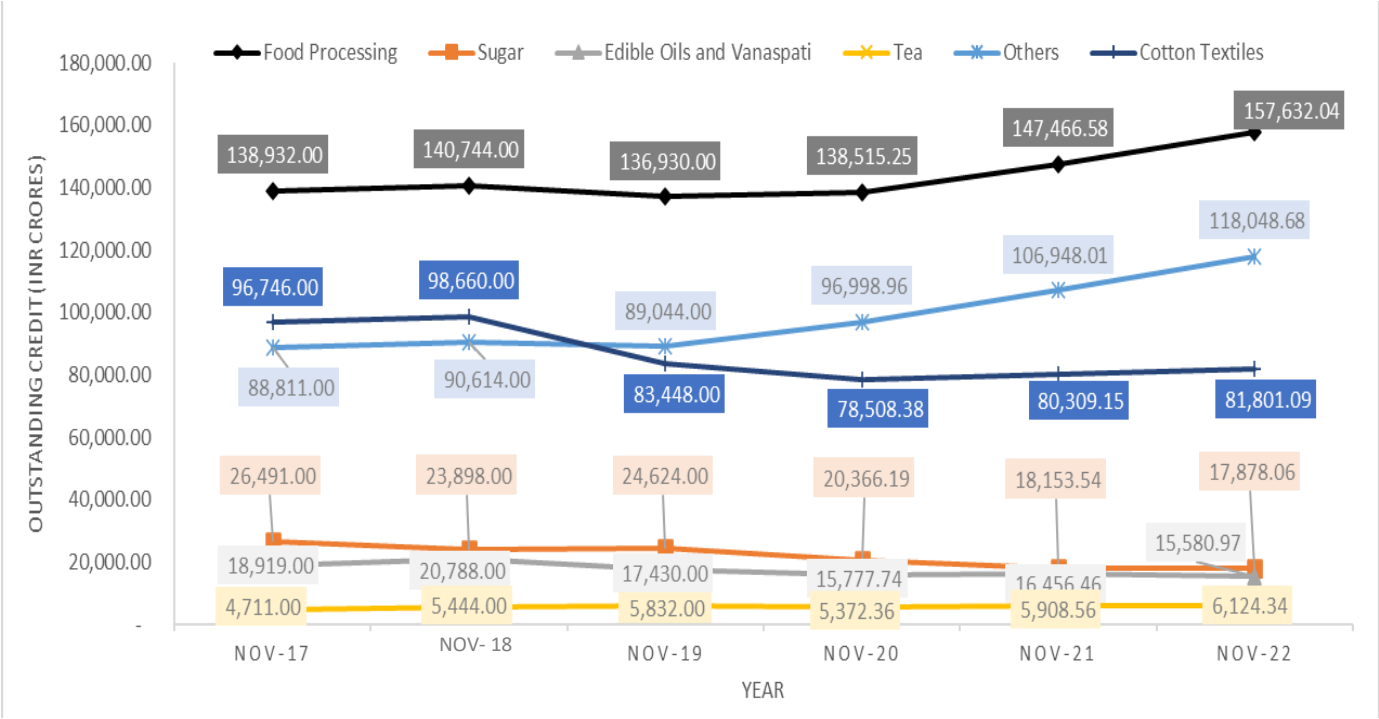
Within an appropriate regulatory structure, commodity derivatives markets can be leveraged to provide benefits to market participants, and the economy. It has widely been said that participation of multiple and diverse entities such as Financial Institutions such as Banks and NBFCs in such a market not only strengthens the institution, but also brings more depth and liquidity to the market. It leads to a high degree of financialization of commodities, which eventually leads to creation of more derivatives instruments such as Options, spread contracts etc. Recently, SEBI has already allowed institutional investors such as Category III Alternative Investment Funds (AIFs), Portfolio Management Services and Mutual Funds to participate in the Exchange Traded Currency Derivatives (ETCD) market with an allowable position limit of 20 percent of the client level position limit in a particular commodity derivative contract. However, the participation of FPIs is limited to cash settled non-agricultural commodity derivative contracts and indices comprising non-agricultural commodities. However, presently, in India, banks are not allowed to participate in the commodity derivatives markets. Such non-participation of the most important financial institutions of the country—banks—is an important missing link in the evolution of this market in India.

6.3.1. Current level of financial exposure of banks, financial institutions etc. to Agri industries dealing in Agri commodities

6.3.1.1. Assessment of trend of commodity-wise outstanding bank credit (during 2017-2022)

While participation of financial institutions such as banks in the commodity derivatives market will undoubtedly contribute to the depth and width of the market, the availability of an unparalleled risk management platform for the banks themselves is of bigger significance. An examination into the trend of commodity-wise outstanding bank credit (during 2017-2022) substantiates the statement as shown below:

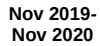
Figure 48 Commodity-wise deployment of Gross Bank Credit (INR Crore); Source: RBI

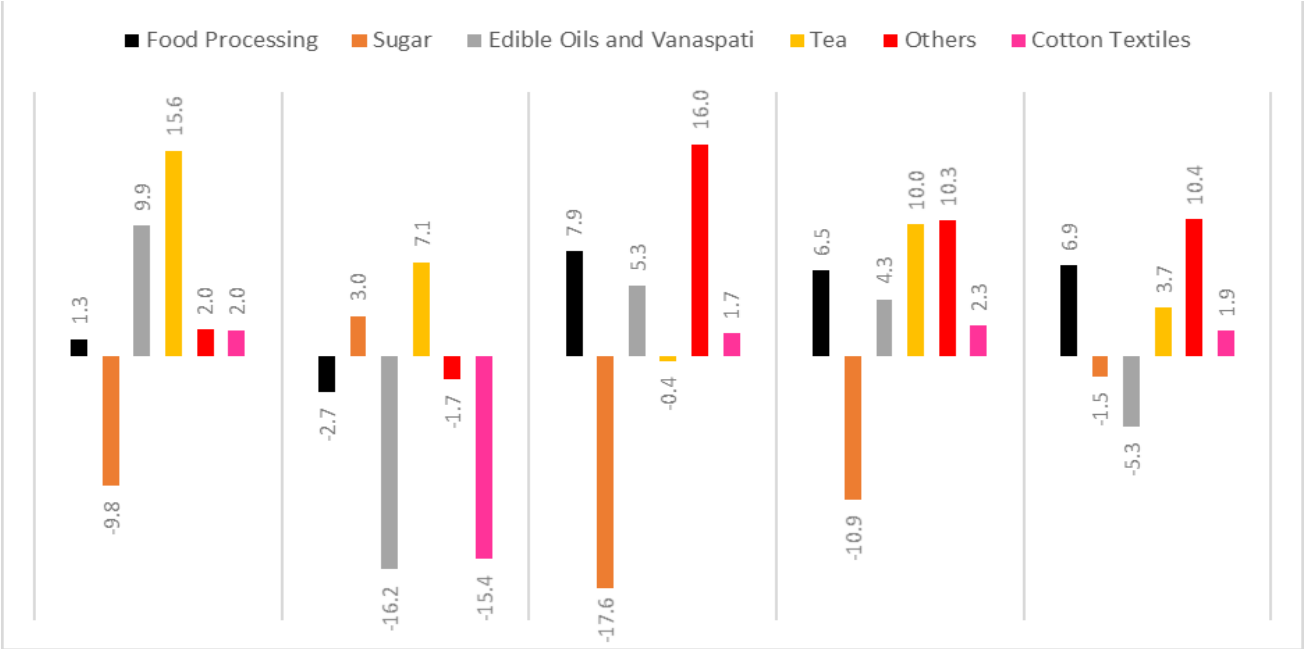


Observations

- In the overall food processing sector, the outstanding credit has shown an overall growth of 13.8% during the last five years.
- Commodities classified under “Others” category has witnessed highest growth of 32.5%, and has been a major factor influencing the high growth rate of overall credit to food processing industry
- Sugar is the only commodity to have witnessed negative Y-o-Y growth in outstanding credit. However, the value of the negative growth has been shown a decrement during the period
- Cotton has witnessed a rather fluctuating trend in terms of Y-o-Y growth of outstanding credit. It exhibited a sharp decline in outstanding credit during 2018-2019. However, the growth has picked up ever since, albeit at a slower growth rate as compared to other commodities

Figure 49 Outstanding Credit-Variation (Y-o-Y); Source: RBI





During 2022, the surge in commodity prices in the wake of the Russia-Ukraine war may have turned out to be a boon for banks in India as lenders are now witnessing higher demand for working capital. The increased cost of raw materials has led to companies utilising their working capital limits and even seeking top-ups. The credit offtake improved during FY22, with the gradual return of normalcy after two waves of the pandemic and despite a relatively milder third wave. Overall food credit extended by banks grew 6.9% year-on-year (y-o-y) as of November 2022. As per our primary survey, corporates who have been utilising their limits have also been coming for additional working capital because the cost of production has gone up. Rising commodity prices are playing a crucial part in the improved credit growth and utilisation is getting better and there is also more demand for LCs (letters of credit) by manufacturers.

In its monetary policy report for April 2022, the RBI said the firming up of global crude oil prices was the main factor that impacted prices of industrial inputs such as naphtha, aviation turbine fuel, bitumen, petroleum coke and furnace oil. They also contributed to double-digit inflation in high-speed diesel, which in turn drove up farm input price inflation. Other contributory factors comprise fertiliser prices that edged up in sympathy with international prices, and prices of some non-food articles that remained in double digits – raw cotton and oilseeds.

6.3.1.2. Assessment of Financial Exposure in Commodity Financing

Non-performing assets in the Indian banking sector increased significantly in the 2010s, followed by a slowdown in credit and GDP growth rates. Detailed Research[44] of the balance sheets of non-financial firms in India illustrate that the profitability of firms and international commodity prices are tightly linked. Fall in international commodity prices leads to a fall in raw material costs but it also leads to a more than a proportionate decline in sales revenue, and that in combination with fixed labour costs, squeezes the margins of these firms considerably.

A careful examination of the data unravels legit economic reasons for the increase in NPAs. The increase in NPAs from 2011 onwards coincides with the fall in international commodity prices. Similarly, during 2008, plummet in commodity prices led to a rise in NPAs, and the decline in commodity prices in the late 1990s too strained the balance sheets of banks in India. As commodity prices recovered, NPAs also declined in these events. However, these two previous downturns in the commodity market were not as prolonged and impacting as the one between 2011 -16, thus, the latter was expected to strain the balance sheets of banks.

The persistent decline in commodity prices during the 2010s added pressure to firm margins, rendering many firms unable to sustain their debt burdens. In other words, significant adverse movements in prices, compared to the projected prices in 2010 and before on which business decisions were made, caused higher corporate default. Hence, it was found that banks that were more exposed to sectors that experienced a large decline in prices had higher NPAs than other banks which were not exposed to such price changes.[45]

Results from a range of models suggest that a 1% decline in nominal exposure increases non-performing assets by 0.20-1.35% and these models explain 30% of the increase in non-performing assets[46]

Downward movement in commodity prices has a vital role in causing non-performing assets to rise post -2011, as in the past. This is the reason that in the last two years, despite economic crisis due to COVID-19, there has hardly been any stress in the banking sector, because of higher commodity prices. Therefore, it is important to draw out here that banks as a stakeholder in the Agri ecosystem perceive that they would benefit if more & more borrowers in the value chain hedge their price risk.

6.3.1.3. Warehouse Receipt Financing

Warehouse Receipt Financing: A Market Estimation

Agricultural warehousing in India currently has a total capacity of approximately 91 MMT, with state agencies owning 41% of the capacity and the remainder distributed among private entrepreneurs, cooperative societies, farmers, and so on. Agricultural warehousing accounts for 15% of India's warehousing market, with a value of INR 8,500 crore. However, the market potential is estimated to be INR 40,000+ Cr [47]. From the point of view of the farmers, processors and traders, the availability of reasonably priced credit from the organised sector against harvested produce is certainly an advantage. While providing liquidity for investment in the next crop cycle and other needs, it prevents distress sales at unfavourable prices, and enables the farmer to time sales for the best price.

A large part of this initiative is linked to the organisation and certification standards that have been put out as part of the Warehousing Development and Regulation Act. The number of good quality agriculture warehouses in India has grown in the last few decades, but not fast enough to meet demand.

Meanwhile, a new ‘collateral management’ sector has emerged. These are large, often private-equity-backed companies that manage (either own or lease) warehouses, certify and value deposited goods there, organise security and insurance and monitor commodity prices in real time. They also provide auxiliary such as commodity trading advice, and assistance with sourcing and selling commodities. Banks often rely on these warehousing companies to help source loan applications and track commodity prices. The past few years have seen warehousing

[44] Research paper: Commodity Price Shocks and Non-Performing Assets in the Indian Banking Sector: Abhishek Kumar, Rakesh Mohan and Divya Srinivasan

[45] Research paper: Commodity Price Shocks and Non-Performing Assets in the Indian Banking Sector: Abhishek Kumar, Rakesh Mohan and Divya Srinivasan

[46] Research paper: Commodity Price Shocks and Non-Performing Assets in the Indian Banking Sector: Abhishek Kumar, Rakesh Mohan and Divya Srinivasan

[47] Problems and opportunities existing in Agri-Warehousing in India, Credit Analysis & Research Ltd. (CARE Ratings)

and logistics companies queue up for NBFC (non-bank financial company) licences, as they start taking on the role of financier. They typically offer loans at interest rates a few percentage points higher than bank rates.

In 2015, the Central government merged the Forward Market Commission into the Security and Exchange Board of India (SEBI), and thus the regulation of commodity future exchanges came under the purview of SEBI. From January 2019, the settlement of derivative contracts of agricultural commodities became compulsory through e-NWRs only. Thus, traceability of stocks in future trading in agricultural commodities was achieved. Both farmers and businesses can store their produce in WDRA-registered warehouses and seek loans from banks against them. In 2021, the Reserve Bank of India increased the loan limits for bank lending against NWRs and e-NWRs to ₹70 lakh from ₹50 lakh per borrower. This will ensure greater flow of credit to the farmers against pledge or hypothecation of agricultural produce and encourage use of NWRs and e-NWRs issued by regulated warehouses as a preferred instrument for availing such finance by farmers. However, formalisation has met only limited success so far and most of India's agricultural produce is still stored in un-registered warehouses.

At present only 10% of the warehouses in the country are registered because banks are continuing to extend pledge finance against local warehouses receipts or storage receipts. There are only 3,643 warehouses (including 1673 inactive ones) registered with the WDRA, as on 31 March 2021. Their total capacity is 150 lakh tonnes.

As per our analysis, [48]15 crops account for 93% of the total value available for storage/trading, i.e., INR 4.3 lakh Crores (from a total of INR 4.73 lakh Crore). The list is shown as below:

Table 37 Total share and value for Storage/Trading of commodities

S.No.	Crop	Total Value available for Storage/Trading (INR Crores)	Share in total surplus (%)
1.	Wheat	97,065	20%
2.	Paddy	80,153	17%
3.	Maize	43,402	9%
4.	Gram	38,357	8%
5.	Soyabean	38,179	8%
6.	Rapeseed & Mustard	32,765	7%
7.	Groundnut	27,826	6%
8.	Moong (Green Gram)	12,488	3%
9.	Arhar/Tur	12,314	3%
10.	Urad	11,921	3%
11.	Dry chillies	10,812	2%
12.	Bajra	9,668	2%
13.	Turmeric	8,117	2%
14.	Castor seed	6,053	1%
15.	Jowar	6,044	1%

Source: Ministry of agriculture and farmers welfare website (Area and Production Statistics) and PwC analysis

[48] Methodology is described in detail in Annexure

We have also identified the states which account for around 60% of the value available for trading for the shortlisted crops under consideration. As per our analysis, identified 6 states account for 60% of the value available for trading for the crops under consideration. The list of the states are as follows:

Table 38: State-wise value available for storage/trading

S.No.	State	Total Value available for Storage/Trading (INR Crores)	Share in Total
1.	Madhya Pradesh	88,730	19%
2.	Uttar Pradesh	64,215	14%
3.	Maharashtra	36,264	8%
4.	Karnataka	31,915	7%
5.	Gujarat	29,394	6%
6.	Bihar	24,439	5%

Source: Ministry of agriculture and farmers welfare website (Area and Production Statistics) and Arya Collateral analysis

The shortlisted states also account for 75 % of Major Collateral Agencies we have interacted with. Out of the shortlisted states, Gujarat, Maharashtra, Madhya Pradesh, Bihar account for 40% of potential and 70% of Collateral Management business and Uttar Pradesh and Karnataka account for 21% of potential and 4% of Collateral Management Business.

Estimation of warehousing capacity in the organised sector in the country is difficult in the absence of a centralised data basis. However as per the secondary data obtained from various sources, the current capacity of the organised warehouses operated by the public agencies, cooperatives and private sector is about 166.2 million tons as detailed below.

Major chunk of the organised warehousing capacity in the country is still being managed by government through Public Sector Undertakings (PSUs) such as Food Corporation of India (FCI), Central Warehousing Corporation, State Warehousing Corporation (SWC), State marketing federations, State Civil Supplies Corporations, etc.

Table 39: Organization-wise storage capacity as of 31/03/2021

S.No.	Name of the Organisation/ Sector	Storage Capacity in million tonnes (as on 31.03.2021)
1.	Food Corporation of India (FCI)	12.70
2.	Central Warehousing Corporation	14.5
3.	State Warehousing Corporation (SWC) and other state agencies (excluding CAP storage)	43.91
4.	Cooperative sector	16.53
5.	Private Sector	78.56[49]

Source: WDRA Annual Report 2020-2021

Categorising the estimated demand potential on the basis negotiable (e.g., e-NWR) vs. non-negotiable WRF (e.g., pledge financing)

Table 40: Estimated Demand Potential on the basis negotiable v/s non-negotiable WRF

SI No.	Year	No. of NWRs/e-NWR issued	Total Quantity of Stocks against NWR/eNWR (In Lakh Ton)	Total loan against NWRs/e-NWR (Rs. In crores)

[49] *Includes capacity created under the support of Integrated Scheme for Agricultural Marketing (ISAM) scheme for Directorate of Agri Marketing & Inspection and Private Entrepreneurs Guarantee Scheme of FCI*

1	2011-12	8056	1.35	591
2	2012-13	8242	1.39	105.65
3	2013-14	6121	2.57	108.02
4	2014-15	16993	5.12	388.42
5	2015-16	15178	5.69	203.47
6	2016-17	19350	3.58	148.4
7	2017-18	12313	3.47947	118.51(against e-NWR-Rs.0.20Cr)
		(e-NWR-114)	(eNWR–1.79947)	
8	2018-19	89114	7.215309	135.5974
		(e-NWR-77332)	(eNWR–5.215309)	(Against- e-NWR-28.2774)
9	2019-20	138637	9.49649(eNWR	437.9965(e-NWR-379.7265)
		(e-NWR-134939)	–8.98649)	
10	2020-21	eNWR-88480	eNWR-7.7974	eNWR-731.7982
11	2021-22	eNWR-17975	eNWR-1.69007	eNWR-176.8159
	Total	**420459**	**47.698739**	**3145.678**

Key Challenges in Warehouse Receipt Financing

- Financial institutions are wary of lending to farmers and FPOs as the ticket size is small which increases the cost of lending. As the current process of storage in warehouses is also not standardised, warehouses are present in remote locations, there is another risk of safety of stocks which can alter the final price realised for the produce.
- Fidelity issues due to multiplicity of Warehouse receipts caused by non-transparent system

.

- Availability of good warehouses near the primary catchment market where farmers produce and want to store the commodity, inability to get fidelity insurance claims which leads to a doubt about the safety of the product, price guarantee as farmers are unable to honour the margins.

- For Collateral Management Agencies, it was noted that they are facing the challenge of operational viability of smaller warehouses, the risk sharing between FIs, and CMAs are skewed. There is a need for WDRA to extend concessions for CMAs.

6.3.2. Perspective of Financial Institutions with respect to Agri-derivatives market

Under Banks and Financial Institutions category, we reached out to 10 stakeholders which can further be categorised into three types:

a) Public Sector Banks
b) Private Sector Banks
c) NBFCs having exposure in Agri-commodity financing

From each of these categories of stakeholders, we were able to draw important and conclusive insights with respect to potential and scope for financial institutions in India as an important market participant in commodity derivatives market. These observations will be then analysed, and the findings are being detailed as follows:

- **Commodity Financing via Derivatives Market:** One of the major concerns in commodity financing is the risk of default, particularly in events of extreme commodity price swings. Consequently, financial institutions including banks are less inclined to finance the commodity sector, especially those exposed to high price

volatility. The element of risk in lending gets reflected in a risk premium in the pricing of loan products, pushing up the cost of finance as well as subjecting such finance to higher haircut margins. There, however, appears to be a way out of this problem in a manner which creates a win-win situation for both banks as well as their clients. Banks can encourage their borrowers from commodity intensive sectors to hedge their price exposure using the platform of the commodity derivatives market. With price risks hedged, the risk of credit default would considerably reduce. As a result, the risk premium would reduce, and banks would be comfortable even in seeking lower hair-cut margins as well as in providing finance at competitive interest rates.

- **Need to optimally tap warehouse receipt financing:** During the recent years, the growth of warehouse receipt financing has been promising and emergence of Collateral Management Agencies has played a major role in popularising warehouse receipt finance, especially among traders. The CMAs have played a critical role in smoothening farmers' incomes by providing liquidity, at times when cash-flows dry out. Unfortunately, despite these large benefits, the huge potential of warehouse receipt financing is yet to be optimally tapped in India. Hence, there is an immediate need to promote warehouse receipt financing by augmenting awareness about this form of finance, technology, backed by the necessary infrastructure of accredited scientific warehouses supported by skilled manpower. Finally, warehouse receipt financing can bring in still larger benefits, if the commodity price risk exposure is hedged through the derivatives market. Here again, with reduced default risks, banks will be more comfortable in lending with lower hair-cut margins as well as at competitive rates.

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7. Highlighting the key challenges relates to Hedging in Indian Agri-derivatives market

Based on the response from relevant stakeholders' during primary survey, and subsequent secondary research, we are highlighting the key challenges related to hedging in Agri-derivatives across India. These constraints can be categorised broadly into six thematic areas: regulatory risk, limited liquidity, limitations in product offering and contract design, barriers to market participation, limited awareness and limited financing support. The overall assessment has been summarised as shown below:

S.No.	Key challenges observed to Hedging across India (basis primary and secondary research)	Detailed description of key challenges	Thematic areas					
			Regulatory risk	Limited liquidity	Limitations in product offering and contract design	Barriers to market participation	Limited awareness on F&O trading	Limited financing support
1.	Frequent bans on futures trading	Banning of commodity futures contracts is one of the critical sources of regulatory uncertainty. General assumption is that any manipulation in the futures market leads to influencing spot prices of commodities. However, there is no substantial evidence to establish it. Few of the studies in India (for example Abhijeet Sen Committee's Report, 2008) and Report of the IOSCO Task Force on Commodity Futures Markets, 2009 suggest that any unexpected increase in prices of commodities and volatility in the spot market exist because of local demand and supply factors, and it cannot be attributed to its derivatives trading. There is also no substantial evidence that an outright ban will prevent future manipulation or would help in further improving the market quality. In other contexts, studies show that outright bans on financial	√	√		√		

		services and products have an adverse effect on the welfare, both for direct users as well as for the overall economy. Market manipulation is often an outcome of a mismatch between the size of futures positions and the deliverable supply of the underlying goods/commodity.						
2.	Limited number of active market participants	Only firms and individuals are permitted to take positions in commodity derivatives markets. Domestic financial institutions are not permitted because of explicit regulation and there is a lack of regulatory clarity on whether they can use these derivatives. For example, banks are explicitly not permitted as according to section 8 in the Banking Regulation Act, 1949. Similar type of regulatory restriction holds for mutual funds, insurance firms and pension funds. Large public sector firms that have exposure to trade, such as Food Corporation of India, State Trading Corporation of India do not participate in this market. The Government of India has taken positions on global exchanges like CME due to lack of depth in the onshore exchanges (for example, during the high global food prices of 2005 and 2006). Foreign participation in Agri-commodity derivatives is not permitted.	√	√		√		√
3.	Low position limits in Contract design	Position limits in commodity derivatives on the Indian exchanges are defined at both levels - client and the trading members. Across commodities, limits at trading members are typically three to five times of the limits at client's level. This sets a limit on how large a client base the trading member can create. Offshore exchanges define position limits for near-month and all-month positions, which is a way of managing the concentration limits without constraining the business development of the trading member. Position limits on Indian exchanges are smaller than those at offshore in terms of number of contracts. This is compounded by onshore contract sizes being smaller than contract sizes offshore. For example, the size of a wheat contract on CME is 136 metric tonnes, while that on NCDEX is 10 metric tonnes.		√	√			

		Also, while domestic exchanges offered futures contracts with a maturity of 6 months only, the futures contract at CBOT would be available with maturities for more than 3 years. And hence longer maturity period of contracts attracts more market participants to hedge in futures.						
4.	High degree of market interventions by Government entities	Market interventions by State Trading Enterprises for procurement of commodities, and this is especially the case when procurement is a large proportion of the production of Agri-commodities (for example, rice and wheat in particular). Such large volumes of commodities are not being hedged in the derivatives market. The government is having a larger control over the market price existing for a commodity. This also influences the traders for deciding their future actions in terms of storage or for warehousing the respective commodity. Pervasive government interventions particularly for wheat, rice, and sugar, may adversely affect the viability of derivatives on these commodities. Besides, the state government is also having wide control over storage and levying the stock limits for a particular commodity across the state that leads to disturbing the delivery cycle of products which further results in glut or shortfalls for the settlement of that respective commodity.	√	√				
5.	Quality Standards issue in contracts	As the exchange contracts are standardised, they are required to meet various quality standards issued by multiple agencies. However, the underlying markets of such commodities may not be following these quality standards at primary sales or even at secondary sales but are followed only when ultimately used at consumption level. Such quality prescriptions act as an obstacle for large number of physical participants to transact their goods for sale on exchange platforms. For example: there are two Maize contracts in NCDEX: Maize Kharif and Maize Rabi in the futures market. In contrast, in the spot market, there are three variants and six locations for this commodity. Eventually it leads to default in delivery of physical commodities to the warehouse locations. Since		√	√			

		physical delivery is of paramount importance to hedgers, such market conditions reduce the attractiveness of the contract for hedging. In such cases, many market participants shift to speculations since they anticipate that there would be limited actual delivery of the physical commodity.						
6.	High Trading costs	For exchange-based commodity derivatives, participation costs include: (1) costs associated with market access, such as exchange membership fees and net worth requirements for members and brokerage fees for clients, (2) regulatory fees, (3) trading costs in the form of margins, and (4) exchange fees and clearing costs. In general, margins defined in the contract specifications in India are comparable with margins internationally. However, in the Indian markets, regulators and exchanges are allowed to impose special margins on an ad hoc basis from time to time. These increase the cost of transactions for participants and add to the uncertainty under which they must operate. Further, participation of SMEs and Farmer Producer Organizations (FPOs) is rendered difficult since many of them cannot afford to bear the participation and trading costs required by the derivatives exchanges.		√	√	√		
7.	Lack of Financial Support Mechanism to promote hedging on Derivatives	Given the recent broad-based volatility in commodity prices, maintaining profitability has emerged as a major challenge for SMEs that generally grapple with the problem of rigid product price. Price volatility also compels them to seek increased working capital to mitigate risks. Due to the small quantum of purchase, SMEs are also unable to get into long-term contracts with suppliers. Hence, hedging appears to be extremely necessary for the survival of SMEs. However, as hedging involves developing suitable risk management strategies and taking well-timed market decisions, the limited capital base and wherewithal at the disposal of SMEs poses challenges for these businesses. Moreover, the inability to hedge results in a decline in their creditworthiness. Using over-the-counter derivatives is out of bounds for small		√	√	√		√

		stakeholders such as SMEs due to the high cost of these instruments and lack of knowledge on their usage						
8.	High Degree of Market inefficiency due to lack of reliable data	While the data of primary agricultural spot market transactions at APMCs mandis are available to policy makers, the mechanism to collect and disseminate the data for the secondary market transactions that occur throughout the year and are also dispersed across the country is inadequate. There is a need for a sound institutional mechanism to collect, collate and disseminate the data of spot market transactions, both primary and secondary markets, on a regular basis.				√		
9.	Limited Awareness on hedging via Futures and Options	In our survey, it was found that about 10% of the entities were not well versed with Futures and options as hedging tools. Most of these respondents were regional traders/suppliers who usually supply bulk commodities to Multinational firms. They already have an assured market in the form of arrangements like that of big multinationals buying from them via brokers. These alternate arrangements (usually in form of forward contracts) provide assured markets to the regional/local traders or millers and therefore they do not feel the need to mitigate risk and futures market is therefore not indispensable. They are yet to understand the complex mechanisms, functionalities, and benefits of hedging on F&O. Even if they understand the need of hedging, they don't know how to go about the process and ultimately resort to their traditional means to market their produce. Therefore, such companies are either unaware of the hedging procedures and lacked the skill of hedging in the derivative exchanges or was uninterested to conduct hedging		√		√	√	

8. Suggested recommendations to promote Institutional Hedging in India

Based on the key challenges highlighted, pertaining to the hedging in targeted Agri-commodities, we have identified some of the critical thematic areas which can be leveraged further to improve the penetration of institutional hedging in Agri-derivatives across India. The suggested recommendations are put-forth which derived from the insights and learnings after surveying relevant stakeholders like agribusiness firms and financial institutions, academicians from reputed institutions, hedgers, and experts with experience on international exchanges. The potential impact of these suggested recommendations can further be categorised into various focused areas - Enabling regulatory environment, High liquidity, Improved version of contract design, Strong financial channels, and High awareness on F&O trading. These recommendations were also categorised based intervention timelines (short term, medium term, and long term) and action point entities. Action Point entities are those stakeholders in the ecosystem who can drive and provide necessary implementation support to bring the recommended changes. The suggested recommendations are enlisted below:

S.No.	Challenges/Constraint to Hedging	Key Policy Recommendations	Intervention Timeframe	Action Point Entities	Potential Outcomes on Hedging in terms of				
					Enabling regulatory environment	High liquidity	Improved version of Contract design	Strong financial channels	High awareness on F&O Trading
1.	Frequent bans on futures trading	There is a need of an improved version of the policy framework which would deliver the followings: ▪ Active surveillance by the commodity derivatives market regulator, and effective enforcement of the same (as opposed to bans) ▪ A coherent legal framework and physical infrastructure to ensure effective delivery for settlement of contracts ▪ Incorporation of data driven decision making process (based on empirical evidence) for regulation of derivatives market The Chinese derivatives market serves as a prime example of effective regulation of a	Long Term	State Governments, Ministry of Agriculture, Ministry of Consumer Affairs, SEBI, Exchanges, and stakeholders	√	√			

		market prone to speculation with large scale retail participation through stringent control measures. Some of the key practices which might be replicated in Indian context are: ▪ There are stringent position limits on the number of contracts that can be held by retail traders. Unlike in most other futures markets, the retail investors are not allowed to trade in near month contracts. The positions are compulsorily liquidated if the position limits are breached by participants. ▪ Price limits are kept more stringent in the non-delivery months, as part of the regulatory control measures. As against an expanded price limit in the Chinese market, most other markets do not impose a price limit during the delivery month/s. Furthermore, the price limits are frequently adjusted in China whenever the regulator feels it is necessary to control the market. While the strong price limits are meant to control the excessive speculation in a market, it can compromise the informational efficiency of a market ▪ Imposition of a time-varying margin which increases as the contract approaches maturity, unlike in many other markets which have volatility linked margins. Further, the margins are increased if the contract reaches the price limit. It is noticed that the increasing margins leads to the exit of speculative investors before the contract enters into the prior.							

2.	Limited number of Active market participants	Higher market participants can be achieved in following ways: ▪ Reduce or eliminate regulatory constraints on domestic financial institutions such as banks, NBFCs with commodity exposure and FPIs to participate in Agri-commodity derivatives. ▪ Applying alternate incentivization to brokers (learnings from Chinese derivatives market) - The top ranked brokers can be incentivized to make soft commitments to-wards a certain volume of active market participants. The exchanges can reward the future brokers for such commitments through lower margins and set-off against their annual fee/s. The leading futures brokers can thus derive a part of their income through such incentives shared by the futures exchanges. ▪ It is advisable for markets like India to set up a common funding pool for market development through systematic contributions from the for-profit entities operating in the market.	Medium Term	SEBI, RBI, Exchanges, Brokers	√	√		√	
3.	High degree of market interventions by State Trading Enterprises	● The Mandate of State Trading Enterprises like FCI, CCI and NAFED should be revised so that these entities are allowed to hedge their physical exposure on the derivatives market. When option contracts are introduced, such entities can also be allowed as the option writer (for both call and put options). ● Also, the commercial business segment of these STEs can be allowed to leverage the hedging tools offered by derivatives market as this business segment holds greater accountability to P&L status		State Trading Enterprise, Ministry of Agriculture, Ministry of Consumer Affairs, SEBI	√	√			
4.	Quality standards	Primarily there are two major standards, viz: AGMARK and FSSAI. In addition to these 2	Medium Term	SEBI, BIS, FSSAI,		√	√		

	issue in contracts	standards there are various other standards for specific purposes like FCI standards, CODEX standards and APDEA standards. It may be explored if a unified organisation could prescribe standards across all agricultural commodities. The unified agency could prepare a common set of standards that is easy to implement, ensuring uniformity of standards across various segments of the market depending upon end use. Integration of the spot and derivatives market can go a long way to tackle these issues. There should be a product standardisation and uniform standards for assaying and warehousing in respect of the contracts/commodities which are traded in the spot and derivatives market. This will lead to a better integration of spot and derivatives. As the Indian markets cannot be left in isolation, the objective should be alignment of domestic spot and derivatives market with reference to international markets wherever feasible.		APEDA, AGMARK					
5.	High Participation Costs	These can be done in two ways: ▪ Exchanges may offer standard contracts to the bigger players/hedgers and incentivise actual hedgers/VCPs via low margins. For example, the high margin cost of delivery month positions along with the quantity restrictions leave only true hedgers in the market during that period. ▪ Taking reference from USA's market conditions, mini contracts can be designed and implemented for the smaller players. One of the reasons for heightened liquidity creation in the Chinese futures market through retail participation is the relatively smaller lot size underlying the contracts compared to the other international markets. Admittedly, smaller contracts may result	Short term	SEBI, Exchanges		√	√	√	

		in higher transaction costs for a given trade value. A smaller trading lot size, as compared to delivery lot size, also helps in generating trading interest and liquidity.							
6.	Lack of financial support mechanism to promote hedging on Derivatives	These can be done in two ways: ▪ Banks should be incentivized to pursue their borrowers from commodity intensive sectors to hedge their price exposure using the platform of the commodity derivatives market. With price risks hedged, the risk of credit default would be considerably reduced. As a result, the risk premium would reduce, and banks will be in a comfortable situation even in seeking lower hair-cut margins as well as in providing lending at competitive rate of interest (ROI). ▪ Warehouse receipt financing can produce higher benefits if the commodity price risk exposure is hedged through the derivatives market. Here again, with reduced default risks, banks will be in a comfortable position to lend with lower margins at competitive ROI. ▪ Emphasis on Pilots on innovative examples such as Put Options as alternative to MSP, Futures + Insurance model (from Chinese model). For example, put options can complement MSPs by reducing the government's burden of procuring and storing surplus crops and transferring the price risk from farmers to market participants. Put options can also enable farmers to benefit from higher market prices when they are available, while having a safety net in case of price fall. Put options can also serve as a tool to make farmers truly self-reliant, as they can hedge their price risk without depending on the government's intervention or subsidy. Put options can	Medium Term	Exchanges, SEBI, RBI, Financial Institutions		√	√	√	

		also promote market efficiency and price discovery, as they reflect the demand and supply conditions of the underlying asset.							
7.	High degree of market inefficiencies due to lack of reliable data	In view of the huge amount of data that is being generated across the Agri value chains by a multitude of players and in different case scenarios, the Government of India has introduced a number of policies and guidelines for appropriate and ethical use of data management systems. To establish a profound digital ecosystem in agricultural and allied fields, it is necessary to consider long-term views of various aspects like interoperability of data, ethical data governance, data quality management, data standardisation, security features, and privacy, apart from promoting open innovations in terms of data transparency and transferability, there is a need for a single policy instrument that covers all these aspects. Therefore, it becomes imperative to develop a consolidated robust agricultural information system via collaborations between government entities, and the private sectors, by forming a public-private partnership to enable the application of some advanced technologies related to AI and big data, and other emerging technology innovations in this sector. Understanding the current processes of global information systems in the agricultural sector becomes a critical factor to create an enabling environment of coherent data management systems and capacity building across the value chain participants.	Long term	Ministry of Agriculture, Department of Consumer Affairs, Technology service providers, Exchanges, private players etc.	√	√	√		

8.	Limited Awareness on hedging via Futures and Options	Exchanges can leverage the network of its brokers (combined with the previously proposed incentivization mode) to increase the awareness level on hedging via futures and options. The futures brokers can be actively involved in providing the education and basic knowledge (on hedging) to potential industry players and retail traders. They can organise conferences and seminars on any new upcoming products and facilities.	Medium term	Exchanges, Brokers		√			√

9. Comprehensive Approach to create an Effective Corporate Hedging Policy

9.1. Need for an effective corporate hedging policy

Hedging is a way for global commodity buyers and sellers to mitigate the risks of price fluctuations for feedstocks, which are the raw material inputs for final products. However, increased geopolitical and climatological unpredictability have contributed to uncertainty around commodity outputs, leading to persistent volatility in prices. The availability of new financial instruments to hedge the price volatility of commodities presents an opportunity to reduce agribusiness companies' financial risk. However, many companies struggle to gain from commodity hedging due to not using it as part of a comprehensive risk management program. Stakeholders have mentioned multiple instances in which companies have incurred significant losses from mishandled hedging, sometimes amounting to 5 to 25 percent of the average annual earnings before interest, taxes, depreciation, and amortisation (EBITDA).

Commodity hedging is an opportunity only if it is part of a comprehensive risk management program aimed at mitigating EBITDA-margin volatility. It requires the involvement of multiple parts of the organisation, a deep understanding of commodity price risks, and an optimised hedging strategy. The best hedging strategy should involve considering long-term fixed-price arrangements with both suppliers and buyers, as well as an expanded presence in the value chain to avoid exposure to intermediate markets or financial instruments. Companies that successfully hedge commodity prices can smooth out their bottom-line performance, while less-skilled competitors may falter. It is important to consider all options and fully understand the implications of each commodity before selecting an approach to hedging, as limited liquidity can introduce additional risk into an organisation's strategy.

9.2. Key factors to consider for framing an effective commodity hedging policy

A comprehensive hedging strategy can reduce EBITDA-margin volatility by 20-25% for commodity feedstock-intensive businesses. [50]However, many companies approach hedging in the wrong way, trying to manage commodity prices in isolation from other elements of margin. To manage this risk, the sales and operations planning (S&OP) organisation must be integrated into the price-risk and hedging process. Additionally, organisations must actively manage inventory price risks and avoid making bets on the commodities market.

Mitigation of feedstock price risks with end-product pricing

The most crucial information is that the costs of many end agricultural products, (for e.g. edible oils) may already be associated with the pricing of their raw materials. Feedstock hedging may not be necessary if edible oils are sold on a floating-price basis. However, if the correlation of product prices and feedstock costs are staggered—often by three to six months—a short-term time-spread [51]hedging can be instrumental in avoiding a sudden drop in margins if product prices are fixed. Organisations should monitor and review correlations between product prices and feedstock costs before making hedging decisions, as external shocks, such as trade tariffs between China and the United States, can disrupt established market correlations and introduce additional risk.

When the prices of products sold are fixed, the prices of the corresponding quantity of feedstock should also be fixed. When feedstock prices fluctuate, the cost should get reflected in the price of end products to the extent that the market will bear. However, pricing decisions of sales organisations are often independent of commodity

[50] Estimates were calculated using the financials of a hypothetical company for which the cost of goods sold represents 70 percent of revenue and EBITDA makes up the remaining 30 percent of revenue. This model further assumes that commodities comprise 50 percent of cost of goods sold, demonstrating the effects of commodity price volatility.
[51] A time-spread hedge can be any combination of instruments in a family of spreads that involve options of the same stock, at the same strike price, but with different expiration months.

procurement and hedging decisions. A systematic, coordinated approach to hedging policy can avoid losses related to these kinds of exposure.

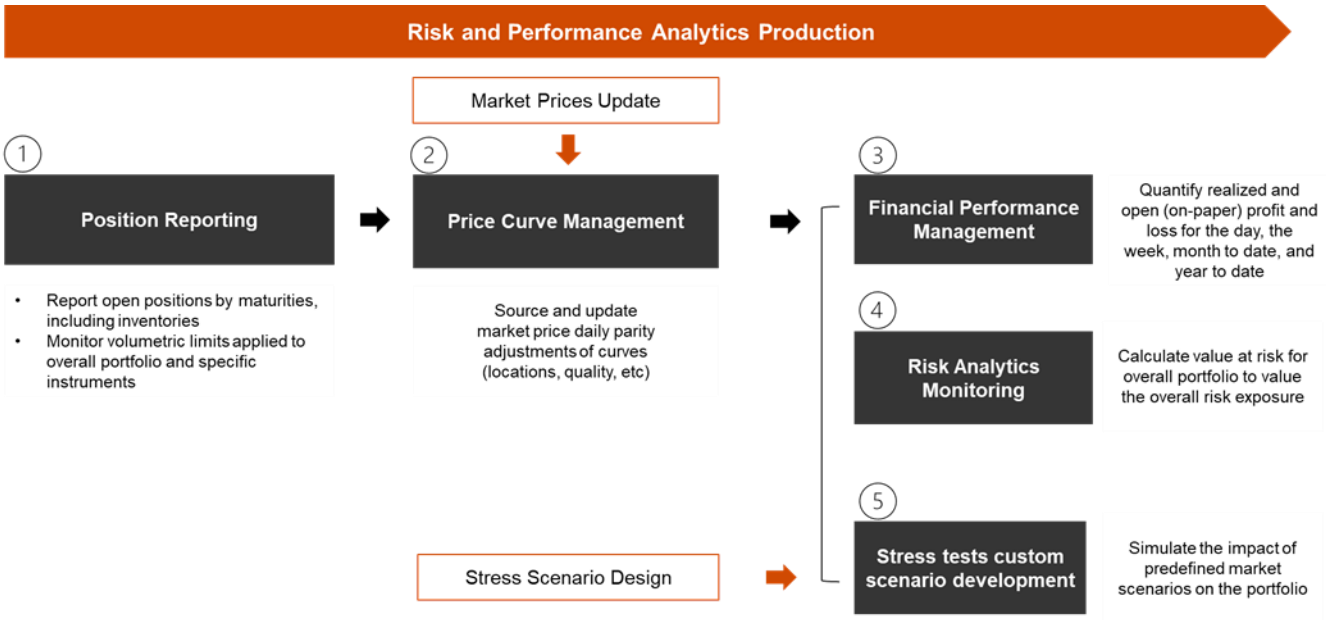
An agribusiness company that produces broiler feed from maize had thinner-than-expected margins of earnings before interest, taxes, depreciation, and amortization of 10 to 15 percent (against an expected 20 to 25 percent). Analysing the company's operations revealed that while most of its sales contracts were signed based on fixed prices in advance of delivery (for instance, 3 months), the company purchased maize at spot prices (which reflected monthly market prices). Because the company had no way to pass on the increased price of maize if it needed to, its margins were vulnerable to fluctuations in the price of maize

The company overhauled its hedging strategy and incorporated an approach that maize prices at volumes that correspond to feed sales volumes on a rolling basis. Further analysis has shown that this systematic approach would have helped the company avoid €15 million to €18 million in annual losses that would've resulted from the volatility of the spread between feed and maize prices.

Companies must analyse and investigate the correlations between feedstock prices and their end products to understand their exposure to commodity price risks. Developing analytics can help companies test their abilities to withstand scenarios with varying volumes and prices for both feedstocks and products.

If companies want to fully understand their commodity-price risk exposure to make prudent hedging decisions, they must first ensure that they have capabilities in place that help measure their exposure to commodity price risks as shown below:

Figure 50: An exposure risk model can help companies make considered hedging decisions.



Companies can use a model to forecast volumes of feedstock needed as a function of product volume sales. This model can be used to determine the share and corresponding volumes of products to sell or feedstocks to purchase at a fixed price and identify associated hedging needs. Companies can quantify the value at risk from their portfolios and perform stress tests before making hedging decisions, and quantify their exposure to commodity-price fluctuations after hedging.

Ensure participation of Sales and Operations Departments in hedging decisions

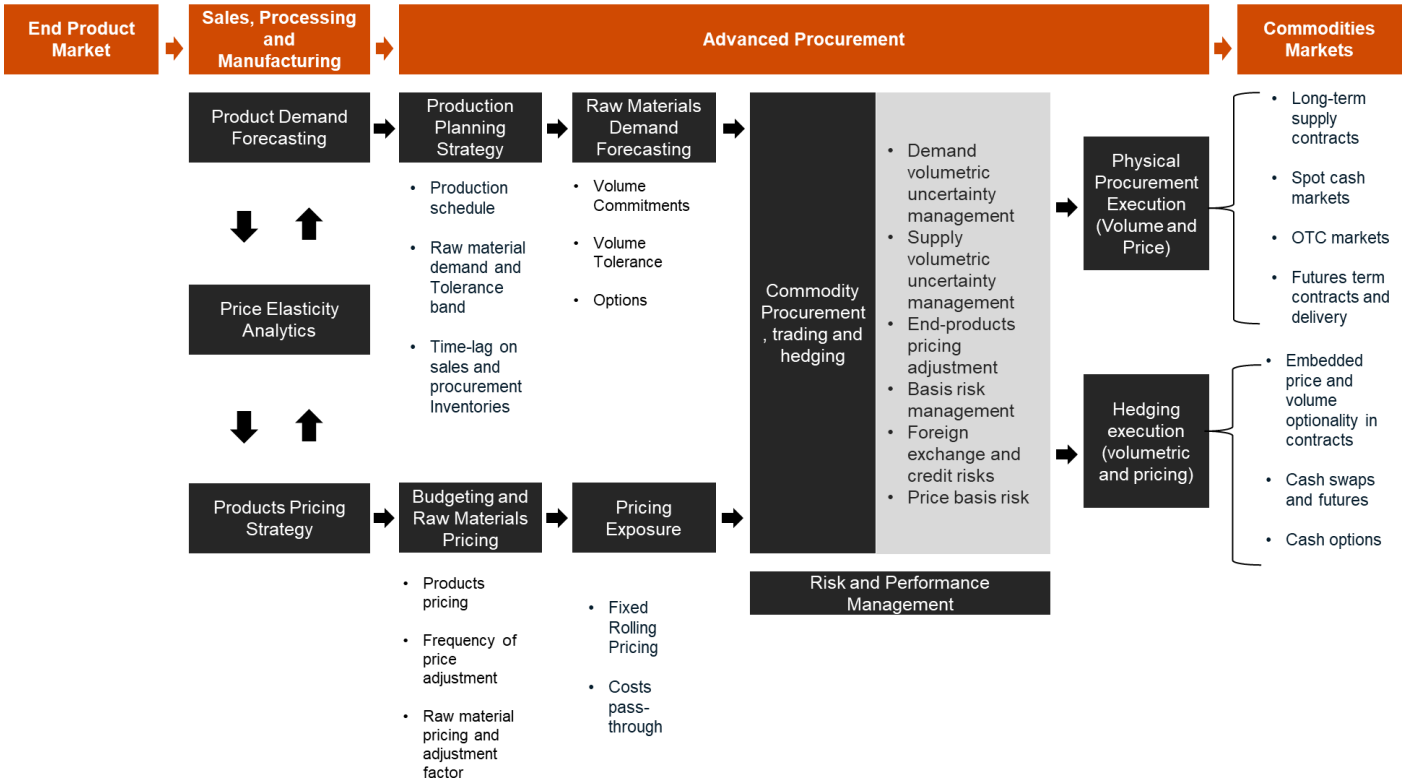
The S&OP function is essential for maintaining a smooth supply chain and ensuring production output matches sales demand and inventory volumes. It can also play a crucial intermediary role in hedging decisions, as cross-functional forecasting can help decrease commodity inventory risks. The commodity-feedstock procurement

function should work closely with the sales and marketing group, with S&OP mediating to ensure purchases and sales are in line with production and storage capacities.

The three groups should strive to maximise margins by managing inventory levels, securing incremental supplies, and accelerating end-product sales. S&OP should ensure production capacity is as flexible as possible, and coordinate and share information between sales and procurement functions to optimise hedging decisions.

There are process that companies can follow to better manage price fluctuations as shown below:

Figure 51: An advanced procurement function should include hedging and trading.



The S&OP function is essential for companies to ensure their exposure to commodity price fluctuations is at an acceptable level. However, many companies lack formalised S&OP processes due to the complexity and difficulty of integrating the procurement, sales, and supply chain functions. Sales may advocate for higher inventory levels to guarantee responsiveness to short term demand, while procurement may see this approach as a source of additional market risk.

Organisations can delegate decisions around commodities procurement and hedging activities to a multidisciplinary group that can optimise the flow of feedstock and capture arbitrage opportunities. However, these activities often lack strong forecasting capabilities, such as advanced price forecasting, risk-adjusted value forecasting, and arbitrage decision modelling. Corporate processes and governance structures often don't facilitate the exchange of helpful information between procurement, S&OP, and sales. Building and reinforcing these analytical capabilities is key to realising the benefits from new ways of managing risk through multiple functions. Building and reinforcing analytical capabilities is key to realising the benefits of new ways of managing risk through multiple functions, such as procurement, S&OP, and sales.

Proactive Management of inventory price risks

Companies can hedge inventory risks in addition to margin risks to mitigate market price risk. If commodity inventory is above a certain threshold, companies can hedge its feedstock and product inventory on a rolling basis. This helps to mitigate the risk of fluctuating prices before selling or processing the inventory. Hedging can help protect a company from write-offs of inventory value if commodities are revalued at lower prices. Managing inventory levels can also be an implicit hedge, such as if a tire manufacturing company expects short-term rubber prices to increase. It is important to monitor inventory risks, hedge them when necessary, or use commodity inventories to hedge anticipated short term price risks.

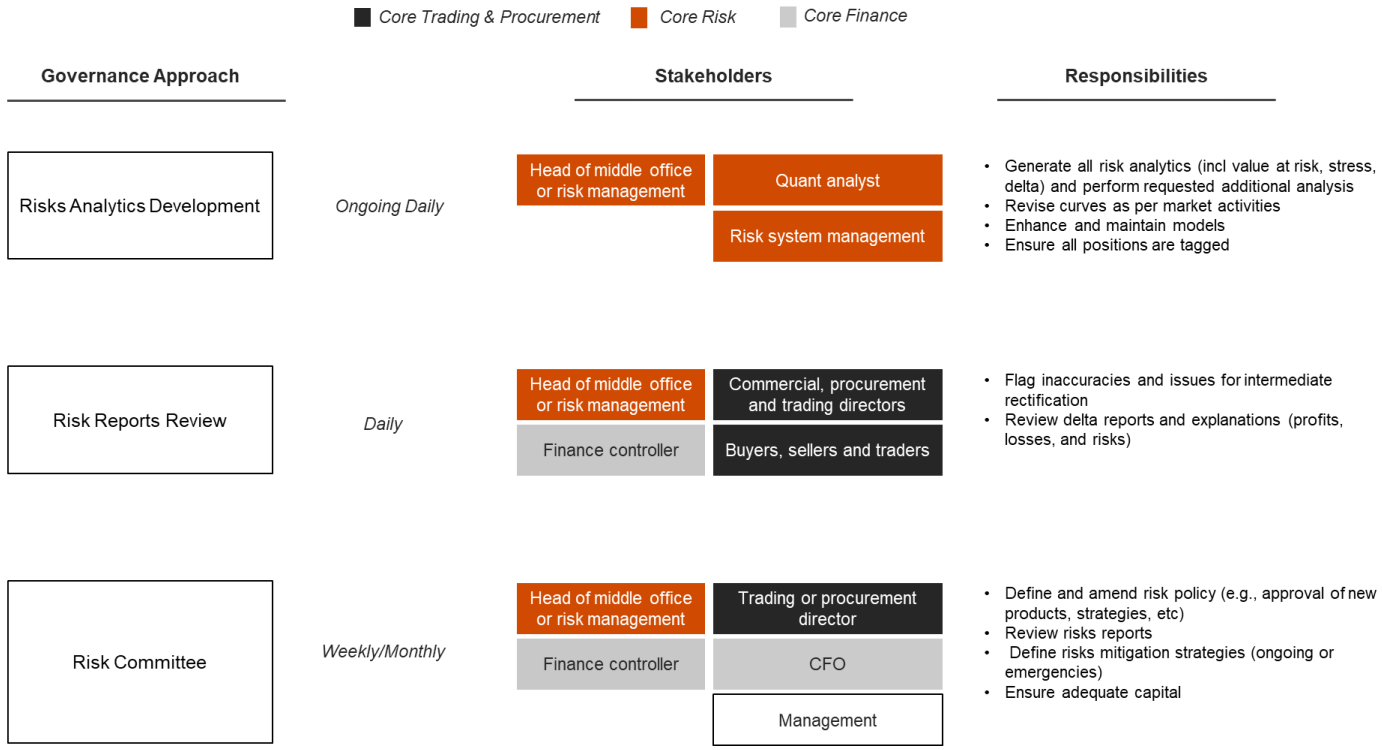
Limited betting on the market

Companies should refrain from hedging their feedstock prices when market prices are low, as this behaviour is equivalent to betting on the market. To achieve short-term EBITDA stability, companies can hedge short-term feedstock volumes on a rolling basis to mitigate commodity-pricing risk. However, short-term hedging only makes sense in rare cases, such as when short term revenues are predictable or when locking in feedstock prices will result in a nearly locked-in margin. Stakeholders should only make such decisions after careful consideration.

Development of the right governance and policies to monitor hedging activities

The management of commodity price risks and the use of instruments to hedge them require a strong governance structure. This structure should ensure that all activities related to risk monitoring and mitigation are compliant with enterprise policies and managed appropriately. A risk committee must define the company's risk tolerance and articulate policies that limit its exposure to an acceptable level. A group of functional experts should assess risk reports generated by a group dedicated to risk analytics.

Figure 52: Governance Structure to manage risk.



To stay competitive, industrials must reconsider how they handle the risks posed by the cost of their raw materials. Margin protection may be achieved with the right hedging strategy, and businesses that control their hedging activities can use their stable bottom line as a competitive advantage. Deep analysis and cross-functional cooperation are required for this. The benefits are worth it: organisations that correctly manage their hedging practices can transform their bottom-line stability into a competitive advantage and a deliberate, comprehensive strategy to hedging can protect profits.

Aligning Basis Risk with Hedge Policy

Basis risk is the difference between the cash price and the futures price of a commodity at a given location and time. Hedging is a strategy to reduce the price risk by taking an opposite position in the futures market. Agribusinesses that deal with commodities can use hedging to align the basis risk with their hedge policy, which is a set of rules and guidelines for managing price risk.

One way to align the basis risk with the hedge policy is to use historical basis data to estimate the expected basis at the time of hedging and at the time of lifting the hedge. This can help agribusinesses to choose the optimal futures contract month and hedge ratio that minimise their exposure to basis risk. For example, if the historical basis data shows that the basis tends to be stronger (more positive or less negative) in December than in March, an

agribusiness that plans to sell corn in December may choose to hedge with a March futures contract rather than a December futures contract, as this would result in a higher net price after lifting the hedge.

Another way to align the basis risk with the hedge policy is to use basis contracts or options to lock in or protect the basis level at the time of hedging. A basis contract is an agreement between a buyer and a seller of a commodity that specifies the cash price as a fixed or variable amount over or under a futures price. An option is a contract that gives the buyer the right, but not the obligation, to buy or sell a commodity or a futures contract at a specified price within a specified period. By using basis contracts or options, agribusinesses can eliminate or reduce the uncertainty of the basis and focus on managing the futures price risk.

9.3. Risk management policies/practices – An example of WestGold Resources Ltd.

Company- Sources of Risk

Westgold is an Australian reporting company headquartered in Perth, Western Australia which, via its wholly owned subsidiaries, hold extensive landholdings in Western Australia and the Northern Territory. Westgold is listed on the Australian Securities Exchange (ASX). Westgold is exposed to fluctuations in movements in gold, oil and gas prices and foreign exchange rates (in particular AUD/USD) and movements in interest rates. Specifically, Westgold is exposed to falling prices in gold, appreciation of the AUD against the USD and rising oil and gas prices.

Company Risk Management Objectives

The primary objective of West Gold's price risk management program is to accommodate participation in favourable commodity price movements whilst eliminating a proportion of the downside risk at an adequate margin above operating cash costs of site operations. Management acknowledges that as circumstances change, these risk management objectives may change and hence will be reconsidered and revised as part of the annual review process. The authorised risk management program is mandated to comply with the hedging requirements of the financing institutions and be thoroughly understood by Westgold's Board and executive officers with specific attention to the full range of financial outcomes of the hedge. This policy outlines the parameters permitted in achieving these objectives, ensuring the program is conducted in a controlled and prudent manner.

Structure and Responsibilities

To ensure adequate segregation of duties facilitating independent checks, reducing the risk of error, breach of limits and fraud, West Gold's risk management structure and responsibilities can be viewed in three main groups: the Board of Directors, the Audit and Risk Committee and the Execution Team. The authorities and roles of each of these groups are defined below.

The Board of Directors: The Board of Directors will establish the business strategy and objectives for risk management activities, acceptable risk appetite, approve policy and procedures. This group is responsible for:

- Determining the extent of corporate exposures through appropriate discussion and analysis that determines these Policy Limits.
- Delegation of these Policy Limits to the Execution Team; and
- Minimum Annual review of Policy Limits.

The Audit and Risk Committee: The Audit and Risk Committee will monitor and enforce compliance with the policy and procedures. This group is responsible for:

- Oversight of the risk management processes adopted by the company.
- Ensuring compliance with the terms of this policy; and
- Minimum Annual review of Policy Limits. Execution Team composed of the Managing Director, CFO, Company Secretary and Treasury/Financial Accountant (for execution only).

Specific roles of the Execution Team include:

- Implement hedging strategies within these Policy parameters (only the Managing Director, CFO, or Company Secretary can provide final authorisation for a transaction).

- Manage and administer hedging transactions in accordance with the Commodity Risk Management & Hedging Policy.
- Properly record transactions in the books of the Company.
- Keep records of all transactions; and
- Reconcile Company records. In the absence of Execution Team members authority for execution of a transaction may be delegated to a Non-Executive Director.

The Treasury/Financial Accountant will provide independent confirmation of market transactions and recording of terms, calculation of settlement amounts, monitor and report on compliance with policy and procedures, financial reporting of risk management activity and documentation.

Risk Measurement and Limits

West Gold's key focus is on ensuring that high production costs in early years are adequately covered by hedging. The company reviews its position regularly to ensure that given its risk profile, forecast operating cash flows will be reasonably covered by gold sales subject to a range of price forecast alternatives. Given West Gold's risk management objective is to maximise participation to favourable commodity price movements whilst protecting the minimum forecast site operating costs, the firm adopts a medium risk tolerance profile. Commodity price and foreign exchange risk will be measured by determining the sensitivity of cash flows to changes in gold prices and foreign exchange rates as they relate to the output from West Gold's operations. The volume of risk is determined by the Life of Mine Models. To ensure the effectiveness of the hedging program at firm level, certain limits are implemented which will guide all the hedging activities undertaken. Hedging limits are calculated on a percentage of the forecast gold produced. The firm ensures a sound forecasting process, capable of recasting production forward each year for the life of the Projects**.**

Limits for Market Risk

Westgold has a medium risk tolerance profile which implies a low to medium percentage of hedging for highly probable exposures. Speculation (as defined as any transaction that increases Westgold's exposure to market risks above scheduled production) is not permitted under any circumstances. Hedges will be initiated on the basis of ensuring that operating cash costs are covered by future sales based upon forecast price expectations. Determining the total overall level of hedging between the minimum and maximum levels will be decided by the Execution Team, where factors such as current market conditions and consensus views, actual versus forecast production and the existing hedge position will be discussed. On the basis of the above criteria, the commodity and foreign exchange framework for hedging West Gold's market risk exposures, using hedge ratios (i.e., percentage of notional exposure hedged) are as follows:

Metal		Currency		Fuel/Energy	
Gold		AUD/USD		Oil/Gas	
Min*	Max	Min*	Max	Min*	Max
0%	60%	0%	60%	0%	60%

* *Minimum hedge levels will be driven by mandatory hedging requirements of banks and beyond that period, reviewed by the Execution Team using financial drivers to determine minimum requirements.*

Limits for Hedging Instruments

The hedge program is only implemented using Over the Counter (OTC) authorised instruments (as outlined in below) with approved counterparties. Any other product requires the prior approval of the Board of Directors

Metal	Currency	Fuel/Energy
Gold	AUD/USD	Oil/Gas
Cash (in A$ & US$)	Spot (A$/US$)	Cash A$/US$

Gold forwards (in A$ & US$)	Forward Exchange Contract (A$/US$)	Forward Contracts (A$/US$)
Bought gold put options (in A$ & US$)	Bought US$ put/ A$ call options	Put and call options Collar Instruments (in US$)
Collar Instruments (A$/US$)	Collar options (A$/US$)	Collar options (A$/US$)

Additionally, hedges are to conform to the following directives:

- Hedges will cover no more than 3 years of production.
- Any hedge beyond these policy limits will require specific approval by the Board of Directors.
- No hedge will extend beyond scheduled production.
- Only instruments set out above will be used.
- Compliance will be reviewed and reported to the Board at the time of any update to the Life of My models.
- This policy will be reviewed at the time of any refinancing for compliance to new loan documentation.
- Mark to markets of the hedging portfolio will be produced no less than six monthly.
- The Board and Company's financing institutions will be informed of hedging levels to ensure compliance with any financing facility; and
- Where timing and production differences require, hedge contracts may be rolled at historic rates and adjusted accordingly to the prevailing forward market rate (subject to approval from hedge counterparties) and only within 6 months of restructure date.

Credit Risk

Credit risk is created through the firm having the risk of financial loss by a counterparty failing to deliver on its obligations. Credit risk is measured as the net current market value of transactions that company has outstanding with any single credit counterparty, by credit rating. Current market value is an indication of the amount owed by/to the counterparty in the event that party defaults on their obligations. Counterparty credit risk is managed by dealing with an agreed range of suitable financial institutions based on their credit rating. The firm monitors counterparty credit ratings and its exposure to each and reports on these on a regular basis.

Pricing Risk

Pricing risk is the risk that firm's counterparties fail to offer fair and reasonable prices in relation to hedging any of the identified market risks as outlined in "Sources of Risk". The company closely monitors pricing provided by approved counterparties and endeavour to introduce alternative dealing counterparties when appropriate to ensure greater flexibility and competitiveness in pricing.

10. Case studies: Agri-commodity Hedging

10.1. International Case Studies

10.1.1. Hedging Strategy by United Farmers of Alberta Co-operative Ltd (UFA), Canada[52]

About the Cooperative

Founded in 1909, UFA is one of Canada's biggest cooperatives which has evolved from a small-scale local co-operative to an extensive commercial entity with retail operations. Their business model involves products, services and solutions to the farmers, ranchers, members, consumers, and commercial customers in Western Canada. One of their core lines of business includes products and services related to Grain storage and handling, seed manufacturing, crop protection, livestock supplements, and Agri-financing.

Very often, farm products witness rises and falls in prices because of changes in supply or demand (real or perceived) for that product. Periods of tight supplies usually lead to high prices. In such cases, UFA does not hold grain or marketable livestock particularly at situations when the price is high. Therefore, the cooperative members use futures contracts (on ICE) as a tool to lock the prices during higher pricing periods.

For example, a farmer member of UFA intends to plant a field of canola. At certain point during the growing season, he hedges the canola crop by selling futures contracts, he then keeps an opposite position in cash market and the futures market.

Although sell hedges have been instrumental in managing price risk, there are direct costs associated with using this hedging strategy. These costs include the exchange fees, and commissions charged by the commodity brokers for their services. The costs may vary with futures exchange, the futures contract being traded, and the brokerage company.

Example of Sell Hedge by UFA on Canola

During spring, a UFA producer member decides to aim for a local cash canola price of $450/ton for 100 tons of canola that he expects to have at the time of sale during November. He utilises hedging to protect that target price if the opportunity arises. He knows that at some point of time at his location, the difference between the cash price and the canola futures price in November is $20/ton under January futures. Therefore, if the producer member needs the price of Canola at $450/ton, or even better, cash price with a basis of $20/ton, then he would need January canola futures to be at least $470 per tonne.

Two months later (On May 3), the trading price of next January's canola futures were found to be $470/ton and thus, the hedge opportunity occurred. To hedge, the producer member requests his commodity broker to sell January canola futures contracts. The actual selling price of the futures contract is $470 when the futures contracts were sold on ICE Futures.

In the Post-harvest period (On November 23), the producer member decided to sell 100 tonnes of canola to a local crusher for $400/ton. The actual basis that the producer sells is the cash canola at $20/ton under January canola futures.

At the same time the producer member opts to offset his canola hedge by calling his broker to buy back 5 January canola futures contracts. This purchase order is filled at $420/ton. The calculation looks like this:

[52] United Farmers of Alberta Co-operative Ltd (UFA), Canada Website: https://ufa.com/
Agriculture Marketing Guide, Government of Alberta: https://www.alberta.ca/agricultural-marketing-guide.aspx

Table 41 Calculation for final Price of Canola

Date	Cash Market Price	Basis	Futures Action	Futures Price
During Spring Planting	$450/ton (target cash price)	$ 20/ton under (expected fall basis)	Sell Order (Hedge)	Target Futures at $470/ton or better
May 3			Sell (filled)	$470/ton
November 23	$400/ton (cash price received)	$20/ton under (actual)	Buy (offset)	$420/ton
November 23 Result	Lower Cash Income $50/ton			Futures Gain $50/ton

From the calculation, it turns out that the final canola sale price is equal to cash received $400/ton plus futures gain $50/ton ($450/ton).

The producer member was able to make a sale of his canola at the highest prevailing local cash market price when he wanted to sell. He got $400/ton from the cash sale with an additional $50/ton in profits from the hedged futures contract. In the above example, the combined price turned out to be $450/ton – right at the target price set in the spring. However, this is the situation of a perfect hedge since the final return exactly matched the producer member's original target price. Hedging allowed the producer member to lock in a futures price, later check with buyers for the strongest basis level and get it delivered to the selected buyer.

However, in real market scenarios, hedging does not assure that the profit/loss made in the futures market will fully offset the loss/profit in the cash or physical market. This is defined as the basis risk. It is the difference between spot and futures prices. The expected purchase or sales price in hedging with futures can therefore be said to be the sum of the futures (when the futures contract is purchased) price plus the basis at the time of closing out. There are several factors for this, some of them include:

- The specific physical commodity to be hedged may not have the same price development as that of the standardised futures contract.
- The exporting markets to which a firm supply is not necessarily the same as those where futures markets are located. Hence, the price developments on the customer market differs from those on the futures exchange.
- Hedging quantity may not be equal to the quantity mentioned in the underlying contract.
- The relationship between futures prices and spot market prices may get disrupted. For instance, attempts to manipulate the market by hoarding or by supply shortages

The second example considers the same canola example but with a strengthening basis:

Table 42 Calculation of canola sale price with strengthening basis

Date	Cash Market Price	Basis	Futures Action	Futures Price
During Spring Planting	$450/ton (target cash price)	$ 20/ton under (expected fall basis)	Sell Order (Hedge)	Target Futures at $470/ton or better
May 3			Sell (filled)	$470/ton
November 23	$405/ton (cash price received)	$15/ton under (actual)	Buy (offset)	$420/ton

November 23 Result	Lower Cash Income $45/ton			Futures Gain $50/ton

As it is evident from the example, the final canola sale is equal to cash received $405/ton along with futures gain of $50/ton (totalling to $455/ton). Here, the combination of selling at cash market plus futures hedging returned $5/ton above the target price set by the producer member in the spring. The cash price was $405/ton even though the futures price during the selling time was the same in the previous example. The actual basis was $5/ton stronger than that of estimated basis when the hedging was initiated.

The third example considers the same canola example but with a weakening basis:

Table 43 Calculation of canola sale price with weakness basis

Date	Cash Market Price	Basis	Futures Action	Futures Price
During Spring Planting	$450/ton (target cash price)	$20/ton under (expected fall basis)	Sell Order (Hedge)	Target Futures at $470/ ton or better
May 3			Sell (filled)	$470/ton
November 23	$390/ton (cash price received)	$30/ton under (actual)	Buy (offset)	$420/ton
November 23 Result	Lower Cash Income $60/ton			Futures Gain $50/ton

In the above calculations, it shows that the final canola sale price is equal to cash received plus futures gain $440/ton equals $390/ton plus $50/ton. In this scenario, the basis weakened from an expected $20/ton to $30/ton- which ultimately led to some degree of reduction in effectiveness of the hedge. The final price turned out to be $10 less than the target price of $450/ton because the basis weakened by $10/ton.

However, as per the UFA, the probability of change in basis is less than the overall price risk. Historically, in Alberta, canola basis levels at a given location have seen fluctuation by approximately $20/ton-$40/ton within a crop year. The actual cash price variation for canola usually ranges by $150/ton or more over the same period. As per UFA's experience, cash price risk has been about 5 times greater than basis risk.

Hedging Guidelines followed by UFA

For hedging purposes, one rule of thumb followed by the UFA is to pick up a futures contract month just after the product is expected to be sold. For example, if the UFA opts to sell cash canola in February, then they use a March (or possibly a May) canola futures contract. Opting a month close to the time of the expected cash sale ensures the UFA that the futures price and the cash price will closely follow each other. Using a month just after the planned cash sale often simplifies the hedging process for UFA and the need to buy back (or offset) the hedge gets eliminated before the cash grain is priced.

UFA never holds a futures contract into the delivery month. For example, UFA typically does not hold a March futures contract into March. According to them, the prices of futures contracts can potentially have unpredictable price fluctuations during trading within a delivery or expiry month. Besides, holding a futures contract into the delivery or expiry month can also lead to undertaking a physical delivery process though the futures market (which doesn't match the original intention of the hedge by UFA).

Another reason quoted by UFA to lift a hedge before the expiry month is that trading activity of a futures contract during its expiry month is often very "thin". A thin market implies that there are very few buyers and sellers and very little trading. UFA favours trading contracts with lots of buyers and sellers actively trading.

Benefits of using Rolling Futures as stated by UFA

Rolling a short hedge forward involves purchasing back the original sell futures contract, and at the same time opting to sell a new futures contract in a more distant month. For UFA, this is often necessary because of the following reasons:

1. Rolling becomes essential when UFA is unable to use a futures month that follows the planned cash grain sale date. For example, during January, a canola producer chose to hedge some of next year's unseeded canola crop for delivery 15 months later in April. However, there is so little trading in next May's contracts (a thin market) that the hedge order cannot get filled. Instead, the producer member opts to sell on next January's contract with the plan to roll the hedge forward to the May contract sometime before January.

2. Rolling is also needed if some choice is made to delay the cash grain pricing beyond the futures month used when the original hedge was placed. For example, in December, a producer opts to sell the grain in late February, so he performs hedging by selling a March canola contract. As February approaches, the basis is very weak. A stronger basis (usually caused by tighter supplies) is expected in late May or June. Therefore, in such cases, cash grain selling gets delayed. Hence, to protect the futures price with a hedge, the futures contract is rolled. During late February, the original March sell contract is purchased back, and the July futures contract is sold. When the cash grain is priced in June or before, the July contract is purchased back, and the hedge is then completed.

Study on Effectiveness of hedging on UFA's Overall Price Risk Management Strategy

Study Background

Hedging with futures may be an effective way of managing price risk for some producers. There are no wheat futures contracts that trade on Canadian exchanges. Instead, Canadian wheat hedgers look to one of the three wheat futures contracts that trade on U.S.-based exchanges. Most of the wheat grown in Canada is hard red spring wheat, which most closely resembles the contract specifications of the Minneapolis futures contract. For Canadian producers, using a U.S. futures contract in U.S. dollars has the potential to increase basis risk, including foreign exchange risk, possibly reducing its effectiveness to hedge prices. The basis risk is not just in the currency, as this could also theoretically be hedged. When the cash market exposure is in a different country than the delivery location of the futures contract there is also the potential for additional variability between cash and futures market price behaviour due to factors such as government policy, logistics and trade flows that might affect prices differently in one country than the other. Several farmers may be reluctant to use futures contracts due to their perceived complexity but may be more comfortable with cash forward contracts that are typically available in Canadian dollars. For some producers who may be reluctant to use futures contracts due to complexity or the requirement for posting margin funds, using forward contracts may be an alternative in several situations.

Study Methodology

With the objective to examine the effectiveness of the Minneapolis hard red spring wheat futures contract to reduce hard red spring wheat cash market price risk in Alberta, Department of Agribusiness and Agricultural Economics, University of Manitoba, Winnipeg, Canada carried out the study on UFA (since UFA also dealt in significant volumes of wheat as well). This study uses average elevator prices for hard red spring wheat in Alberta. Weekly prices are collected from September 2013 to July 2020. Futures prices are taken from the Minneapolis Grain Exchange (MGE) hard red spring wheat contract. The contract month used is the one immediately after the period that the hedge is in place. For example, a hedge for the month of January would use the next futures contract month, which is March. Currency values are taken from the Chicago Mercantile Exchange (CME) Canadian dollar futures contract.

Under the study, the hedging analysis was performed on Alberta hard red spring wheat prices using the Minneapolis hard red spring wheat futures contract using a naïve and a minimum variance hedge ratios and considered against an expected basis level that is unchanged from the previous month, a three-year seasonal average, and an average of the basis unchanged from the previous month and the three-year seasonal average. This will measure the extent to which hedging reduces the variability of actual returns relative to expected returns based on three different methods of forecasting basis.

Summary of results

The first result looks at the extent to which hedging with futures reduces the variability of Alberta wheat prices, both in outright terms and relative to price expectations. Since futures prices and the currency can be hedged, price expectations are largely based on a forecast for cash basis levels. The variability is measured by mean square error (MSE) and standard deviation. Below table shows the results for unhedged and hedged positions for Alberta wheat prices.

Mean square error (MSE) and Standard Deviation for Manitoba Hard Red Spring Wheat Returns for Unhedged, a Naïve Hedge and a Hedge Using a Rolling Three-Year Hedge Ratio Relative to Expected Returns[53]*

Position	Basis Unchanged		Basis Avg. of Previous 3 Years for Hedge Period		Basis Average of Previous Month and Avg. of Previous 3 Years for Hedge Period	
	MSE	Std. Dev	MSE	Std. Dev	MSE	Std. Dev
No hedge	139.08	11.64	262.14	15.95	171.29	12.90
Naïve Hedge	11.23	3.18	112.40	10.45	33.03	5.67
Hedge Ratio	13.47	3.45	117.85	10.71	36.91	6.00

The MSE for unhedged cash prices with an expectation that basis levels will remain unchanged from the current spot basis during the one-month hedge period is 139.08 for the 40 observations between the 2016/17 and 2019/20 marketing years, with a standard deviation of $11.64 per metric tonne. When incorporating a naïve hedge, the MSE drops significantly, to just 11.23, while the standard deviation slips to just $3.18 per tonne. In other words, incorporating a simple one-for-one hedge and assuming the basis level will remain unchanged during the hedge period greatly reduces the variability of returns. The MSE is also reduced significantly when using a three-year moving average hedge ratio and expecting that the basis remains unchanged, to 13.47 and a standard deviation of $3.45, somewhat more than the naïve hedge.

One of the challenges for UFA hedgers is that there are years when the relationship between cash and futures prices is more variable and less predictable. This impacts results that draw on information from previous years to make hedging decisions. For example, the 2013/14 season (e.g., September 2013 to June 2014) showed a divergence between Alberta wheat prices and the Minneapolis futures price. An extended logistical backlog severely impaired rail movement in Western Canada during the winter, which depressed local prices to producers. US grain movement was not impacted in the same way, which in turn caused a greater disconnect between Alberta cash prices and Minneapolis futures prices. This affects the decisions for, e.g., the subsequent three years in when using the three-year rolling hedge ratio or using the three-year 44 average basis for the hedging period when making price forecasts. This caused a hedge ratio of just 0.58 for the 2016/17 marketing year. The data from the 2013/14 crop year drop off for the next two crop years as a three-year rolling average is used. This caused the subsequent hedge ratios for 2017/18 and 2018/19 to increase to 0.83 and 0.86, respectively. This reflects how the hard red spring wheat price relationship between Canadian cash and the Minneapolis futures are susceptible to 'shocks' that are less easily arbitraged away in a manner that might be more likely with U.S. cash markets, including either directly through, or by the threat of, the delivery mechanism of the futures market. The basis variability from one year to the next also materially impacts the ability to lock in a price relative to price expectations if those expectations are formulated based on prices from previous years. This shows up in the MSE results across both unhedged and hedged positions. In the case of an unhedged position, when the price expectation is based on the three-year average basis for the hedge period, the MSE is 262.14 and the standard deviation is $15.95 per tonne. When the price expectation is based on a forecast basis of an average of the previous month and the three year average the MSE is 171.29 and the standard deviation is $12.90 per tonne. Both figures are much higher than the MSE when the price expectation assumes that the basis remains unchanged during the hedge period. A similar trend shows up in the effectiveness of a hedged position to reduce the MSE relative to the expected price, both for a naïve hedge and a hedge ratio calculated on a rolling three-year basis. The MSE for a naïve hedge when the forecast basis is the average of the period for the previous three years was 112.40, well below the unhedged MSE of 262.14. However, the hedged MSE is not significantly lower than the unhedged MSE when assuming the basis remains unchanged during the observation period. In other words, while hedging significantly reduces the variability in realized returns relative to expectations, the great deal of basis variability in one season to the next in Alberta wheat prices means that incorporating previous years' prices into the expectations increases the variability of actual returns relative to projected returns, when compared to assuming that basis levels will remain unchanged during the hedge period. This doesn't affect the ability to reduce the variability of returns within the season, but the volatility in basis levels from one marketing year to the next greatly reduces the ability for producers to generate price expectations on a more forward-looking basis. Note that all the results assumed that the currency was hedged as well.

[53] Note: MSE is calculated based on expected returns. Forecasting an expected return requires a forecast of the basis at the end of the hedge period. The methods for forecasting basis are the basis remaining unchanged from the beginning of the hedge period, the basis being the average of the previous three years for that hedge period, and the basis being the average of that period for the previous three years and the basis at the beginning of the hedge period. Results show that both the MSE and the Standard Deviation declines significantly with both a naïve hedge and using a hedge ratio across all three methods of forecasting basis. The MSE and Standard Deviation show the largest decline when if the basis remains unchanged relative to basis expectations that incorporate previous years in the forecast

In summary, hedging with the Minneapolis hard red spring wheat futures contract greatly reduces the variability of returns for Alberta hard red spring wheat producers. This is particularly the case when price expectations are based on recent basis levels. When price expectations incorporate the history of previous years then the variability of actual returns relative to expected returns becomes more volatile. This reflects how much basis levels in Alberta fluctuate from one year to the next, reducing the extent to which history can help forecast future returns.

Impact of Hedging on a Firm's Financials: United Farmers of Alberta Co-operative Ltd

The Cooperative's revenue structure in Canada is as follows:

Table 44: Revenue Structure- UFA Ltd

	Revenue (USD Million)		
Year	**2017**	**2018**	**2019**
Canada	9.7	10.1	11.1
Operating Margins (%)	8.2 %	8.8 %	9.5%

During 2017-2019, the cooperative has witnessed a considerable rise in revenue (CAGR 14.4%) as well as operating margin (CAGR 32.7%). This trend has been attributed primarily to the firm's effective management of diversified portfolio hedging instruments-which includes futures, forwards and options derivatives. Lately, the cooperative has also started utilizing currency derivatives on account of its inception of export business in 2018. It hedges on multiple international derivatives exchanges such as ICE, CBOT and Euronext.

10.1.2. Texas Cottonseed: Cross Hedging Strategy for non-listed commodities[54]

Background

The Chicago Board of Trade (CBOT) offers futures contracts for several agricultural commodities, such as corn, cotton, soybeans, and wheat. However, some Agri-commodities do not have a futures market due to various factors such as a thin market, which basically implies there are relatively few buyers or sellers. For example: Cottonseed and Peanuts.

In cases where the futures market for the commodity is non-existent, cross-hedging is considered an effective hedging tool to manage price risk. Cross-hedging utilizes futures contracts for one commodity to hedge the loss risk of a different underlying commodity.

In cases of cross-hedging, the selection of the right available futures contract is very important. The commodity's price movements are required to match the cash commodity most closely. In other words, the most suitable futures contract is one which shows the highest correlation between its price and the cash price of the commodity considered. Fundamentals are the same as normal hedging, with the only difference being the use of two different commodities (one cash commodity and a different commodity's futures contract).

Cross-Hedging Fundamentals

- The initial step is to assess the relationship between the price of the cash commodity and the price of the futures contract for the potential commodity used to cross-hedge. This is very essential, as it indicates the optimal cross-hedge. Optimal cross-hedge is defined as the quantity of the cash commodity that is being hedged by a unit of the futures commodity.

[54] Stakeholder Discussion with Shaikh Rahman, Texas Tech University
Cotton Incorporated: https://www.cottoninc.com/market-data/supply-chain-insights/

- Computing the number of futures contracts that need to be bought. This is deemed essential because parameters of futures contracts are fixed for specific values (e.g., 5,000 bushels of corn). Typically, futures contracts are available for whole values only. Therefore, one may need to round to the nearest value to execute proper hedging
- The final process involves analysing whether the futures commodity would turn out to be a proper cross-hedge. This step is about calculating how much of the variation in the cash commodity's price is explained by the price of the other commodity's futures contract. There should be a high degree of causality. If there is very less degree of causality between price of the futures contract and cash commodity price, cross-hedging may not be the appropriate strategy

Case Study of Texas: The need for Cross-hedging in Cottonseed

In Texas, cottonseed is an important commodity. Whole cottonseed is deemed as an essential ingredient in livestock rations, especially for dairy cattle. According to the Cotton Incorporated, 1/4th of the U.S. whole cottonseed gets sold directly from gins as livestock feed, while another quarter is distributed and supplied as livestock feed products after processing of cottonseed oil mills.

Most of the cottonseed arrival in the market happens during September to December after the typical harvest period in Texas. The value of whole cottonseed has been used to offset ginning costs and there has been frequent occurrence of past swings in prices due to limited storage capacities. Historical observations of Texas whole cottonseed price indicated that most of the time the price fluctuated within the range of +/- $65 per ton around the average price. Such a degree of volatility was considered significant enough to expose growers to occasional increments in ginning cost. The data also showcased significant risk to the financial position of gins, cotton cooperatives, livestock feeders etc. Price risk management practices undertaken usually consisted of longer-term storage, forward contracting, and using futures markets. However, the futures market for cottonseed was non-existent. This sole factor greatly limited the stakeholder's capacity in terms of price risk mitigation strategies.

For this reason, Texas government Extension agricultural economists and Cotton Incorporated carried out a feasibility analysis of hedging whole cottonseed using soybean and soymeal futures contracts traded on the Chicago Board of Trade (CBOT).

Computation of Optimal Hedge Ratios

Cotton Incorporated carried out correlations analysis between the weekly West Texas whole cottonseed cash price and weekly near month futures prices of the CBOT contracts. The correlations were computed for the price level, price changes and percent changes in price. Soybeans and soymeal futures turned out to be the most aligned with Texas cottonseed price movement. After correlation test, optimal hedge ratios were computed at price level using a simple ordinary least squares (OLS) regression model. The aim was to calculate the suitable number of contracts needed within the futures position to adequately hedge one's cash position. After computing the ideal number of contracts, empirical tests simulating cross hedging strategies were carried out to analyse cotton gin returns in both hedged and unhedged cases. The simulation study was done from the perspective of a cotton gin or a physical seed seller. Since the Texas cotton harvest period occurs during late August, gins start receiving cottonseed from the ginning process currently and cottonseed sales operations are carried out during August-December. The seed are supplied to either oil mills or livestock feeders.

Cross-Hedge Scenarios Considered

Two primary scenarios were considered. Gins can adopt either a pre-harvest-based cross hedge or one that takes the limited storage time into consideration.

Table 45 Overview of Cross-Hedging Scenarios

Overview of Cross-Hedging Scenarios	
Scenario 1 Backdrop	***Cross-Hedge Design for Scenario 1***
A pre-harvest cross hedge includes taking a short position in the futures market before harvest time of cotton and then lifting that position after taking possession of and selling the cottonseed. For removing the	The pre-harvest cross hedge was implemented by placing the hedge 4 months before the expected sale date and then lifting the short position in the futures market once the physical seed was sold during the September-December. 4 months before the harvest month was opted as the time because during this time the gin

hedge, a gin manager must purchase back an equal number of futures contracts to offset the short position	manager will likely be aware of the cotton acres planted and can calculate the expected production and cottonseed volume.
Scenario 2 Backdrop	***Cross-Hedge Design for Scenario 2***
In the scenario of storing and holding cottonseed stock before the sale date, a short position is taken in the nearest futures delivery month when the seed arrives, and the hedge is maintained until the time for selling begins. In this case, if cottonseed remains in storage when the futures contract attains maturity, the cross hedge is lifted and rolled forward into the next delivery month as necessary	The cross hedge was designed while considering storage. It is done by placing the hedge in the nearby futures on the first week of July and lifting it at the time of sale between the first week of September through the last week of December. In this case, the date of application of hedge remained constant (i.e., first week of July), while the selling of cottonseed changed by a week over the four-month time. Adopting the hedge during this period enabled the gin to compute their storage capabilities and cotton yields in a more accurate manner just before harvest period while still being able to shield against falling prices after taking possession of the seed.

Examples

Scenario 1: 4-Month Pre-Harvest Cross Hedging Example Using Soybean Future

It was the 1st week of May in 2014 and the price of cottonseed in the West Texas cash market was trading around $430/ton. Considering the requirement to sell 1,000 tons of cottonseed at what the gin manager foresees as a possibly lower price at harvest, the manager sells 4 soybean future contracts on CBOT which is currently trading at $488.37/ton. Moving fast forward to the 1st week of September, the gin makes a sale of his cottonseed at the now traded cash price of $287.50/ton. The total revenue thus totals to $287,500. Given the fact that the gin did not own the seed back in May, this implied a $142.50/ton decline in the spot price. At the same time, the manager lifts the hedge by purchasing 4 soybean futures contracts for $339.73/ton. The futures transaction results in a profit of $148.64/ton per contract (please note that commission on trades has not been included), or a total payoff of $89,191. With the total return of $376,69, the gin realises $376.69/ton. This net price is $89.19/ton higher than what the gin would have collected by selling unhedged cottonseed in the Texas cash market. This example is shown in table below:

Table 46 4 Month Pre-Harvest Cross Hedging Example

Scenario 1: 4-Month Pre-Harvest Cross Hedging Example Using Soybean Future		
Period	***Cash***	***Futures***
First week of May 2014 (Four Months Prior to Sale Date)	$ 430/ton	Sell 4 soybean futures contracts @ $488.37/ton
First Week of September 2014	Sell 1,000 tons of cottonseed @ $287.50/ton	Buy 4 soybean futures contracts @ $339.73/ton Gain = $148.64/ton
• Revenue from selling cash cottonseed = $287.50 × 1,000 = $287,500 • Profit from futures transaction = $148.64 × 150 × 4 = $89,191 • Total revenue = $287,500 + 89,191 = $376,691		
Net effective price = $376,69/1,000 = $376.69/ton		

The same calculations were carried out every week until the last week of December with the futures position taken 4 months before the selling date and lifted when the physical cottonseed was sold. This cross-hedge strategy led to an effective net price received due to cross hedging that was higher than the unhedged cash price 69% of the time, over the same months in 2007 through 2015, with the mean effective price being $289.36/ton compared to $271.03/ton in an unhedged scenario.

Scenario 2: July Storage Cross Hedging Example Using Soybean Meal Futures

This type of hedging starts with the seller of cottonseed taking a short position in the futures market on the 1st week of July regardless of the expected date of sale. July was opted for hedging as during this period value chain participants can make a more accurate assessment of storage capacity and cotton yields leading up to. Out of all the months observed, this month represented the highest and most frequent profit from the futures transaction. The hedge will be lifted by the gin manager once the sale occurs in the cash market. In this example, cottonseed is traded at $327.50/ton and nearby soymeal futures are trading at $350.93/ton during 1st week of July in 2015. Taking

short positions on 7 soymeal contracts is important for the gin to hedge against a plummet in price for 1,000 tons of cottonseed (as described earlier using the optimal hedge ratio). When ginning operations get started and new crop cottonseed comes into the warehouse, the gin manager opts to store the cottonseed until the last week of December with the expectation that cash prices will increase later during harvest or post-harvest phase. However, during the last week of December when the physical cottonseed was sold, the cash market price declined to $265.50/ ton. On the other hand, soymeal futures price also plummeted by $76.60/ton and is found to be trading at $274.33/ton. Once the futures position is reversed and the hedge gets lifted, the transaction witnesses a subsequent gain of $53,620 (excluding the commission cost). The sale of cottonseed is made to an oil mill or livestock feeder at this time for a total amount of $265,500. The sale combined with the gain in the futures led to a total return of $319,120 or an effective price of $319.12/ton received by the gin, which surpassed the unhedged cash market price by $53.62/ton. These calculations are showcased in below table:

Table 47 Scenario 2: July Cross Hedging Example

Scenario 2: July Storage Cross Hedging Example Using Soybean Meal Futures		
Period	***Cash***	***Futures***
First week of July 2015	$327.50/ton	Sell 7 soybean meal futures contract @ $350.93/ton
Last Week of September 2015	Sell 1,000 tons of cottonseed @ $265.50/ton	Buy 7 soybean futures contracts @ $274.33/ton Gain = $76.60/ton
• Revenue from selling cash cottonseed = $265.50 × 1,000 = $265,500 • Profit from futures transaction = $76.60 × 100 × 7 = $53,620 • Total revenue = $265,500 + 53,620 = $319,120		
		Net effective price = $319,120/1,000 = $319.12/ton

Hedging using soymeal futures during 1st week of July and lifting the position every week from the 1st week of September until the last week of December led to a higher realised price as compared to an unhedged price by an average of $24.62/ton.

Financial Implications of Cross-Hedging

The effective net prices were averaged for both cross hedged scenarios and the unhedged approach concerning the different weeks examined between the first week of September and the end of December over the 2007 through 2015 sample period. The differences between the strategies can be seen in Approach 1 for the hedges using the soybean contract and Approach 2 where soybean meal was the hedging vehicle. The prices over the observed weeks indicated that the storage-like hedge using either the soybean contract or the soybean meal contract will on average result in an effective net price that is greater than the effective net price found for both the unhedged scenario and the approach where the cross hedge is executed four months prior to selling in the cash market. As noted previously, there is the possibility of experiencing a loss, or a lower effective net price because of hedging. This takes place in instances where price movement between futures and cash markets become dissimilar. Though these occurrences were observed less frequently with lower magnitudes using this historical data, the average and maximum amounts when hedged prices were lower than unhedged prices are reported in Table below. The average and maximum values for gains when the hedged prices were higher are also represented. The threat of losses is notable from a financial risk standpoint because they signify occasions when margin requirements must be met by the hedging gins. This could reduce operating funds and become a cash flow issue if the losses from short positions stretch over lengthy periods of time. However, the overall results tend to support that on average the probability of more consistent and higher gains outweigh the less frequent and less severe threat of lower realised prices through hedging.

Table 48: Financial Implications of Cross Hedging

Parameters	**Cash Cottonseed**	**Soybean July Hedge**	**Soybean 4 Mo. Hedge**	**Soybean Meal July Hedge**	**Soybean Meal 4 Mo. Hedge**
Average Net Price (USD/ton)	271.03	296.60	289.36	295.65	289.06
% Of time Hedged Net Price > Cash Price		74%	69%	67%	63%

Avg. Amount Over Cash Price		25.58	18.81	24.62	18.51
Average Gain Over Unhedged Price		50.14	44.09	51.44	46.31
Max. Gain Over Unhedged Price		161.94	143.11	135.29	165.65
Average Loss Below Unhedged Price		(37.50)	(36.49)	(26.54)	(29.65)
Max. Loss Below Unhedged Price		(85.70)	(73.33)	(67.80)	(77.05)

Impact of Hedging on a Firm's Financials: Louis Dreyfus Company (LDC)

Louis Dreyfus Company (LDC) is a global commodity trading company. LDC is a major cottonseed processor in Texas, with operations in several cities. The following table shows an analysis of derivative assets and liabilities recorded at fair value

Table 49: Derivative Assets and Liabilities (2017-2019): LDC

	Year		
Derivative Assets (USD Millions)	2017	2018	2019
Forward Purchase and Sales Agreement	503	777	690
Futures	114	231	334
Options	6	11	46
Total	**623**	**1019**	**1070**
Derivative Liabilities (USD Millions)			
Forward Purchase and Sales Agreement	380	453	488
Futures	177	85	172
Options	2	2	29
Total	**559**	**540**	**689**

As it can be seen, the company's derivative assets value has been more than its derivative liabilities between 2017 and 2019. This implies that the company has a net positive exposure to derivatives and has likely benefited from hedging provided that the prices of the underlying assets of the derivatives had moved in a favourable direction. For example, in 2020, hedging helped LDC to reduce its risk exposure to the sharp decline in cotton prices. This helped the company to protect its profits and financial stability.

10.1.3. China: Futures + Price Insurance model[55]

Background

Since 2004, China's central government has been engaged in active domestic procurement operations of agricultural commodities at above international market prices directly from the farmers and putting it into storage, while domestic food processing companies have been largely importing the commodities which were entering into the consumption chains.
Due to a period of high international agricultural commodity prices in the 2000s, the Chinese Government started establishing minimum price supports and state purchasing institutional infrastructure across core agricultural commodities. State procurement was initiated for commodities such as oilseeds, cotton, corn, rice and wheat. However, later, drop in international commodity prices and shipping costs made imports more lucrative for Agri-industry stakeholders. The resulting distorted market meant that crushers and processors were importing cheaper foreign commodities while the state was purchasing at higher costs and storing the commodities. Black market

[55] Paper on Insurance Plus Futures: Agricultural Commodity Price Reform in China by Tristan Kenderdine (Australian National University)
Dalian Commodity Exchange Market Services Resources

imports of agricultural commodities coupled with state minimum purchase price plans meant that crushers and processors stopped purchasing from the State, and stockpiles grew.
However, this system is currently in the process of getting dismantled by the Government. It was planned to replace the existing system with an interim system of provincially set target prices. The system will be backed up with state support with the objective of developing agricultural income insurance and agricultural futures contracts.

Emergence of Insurance Plus Futures Policy

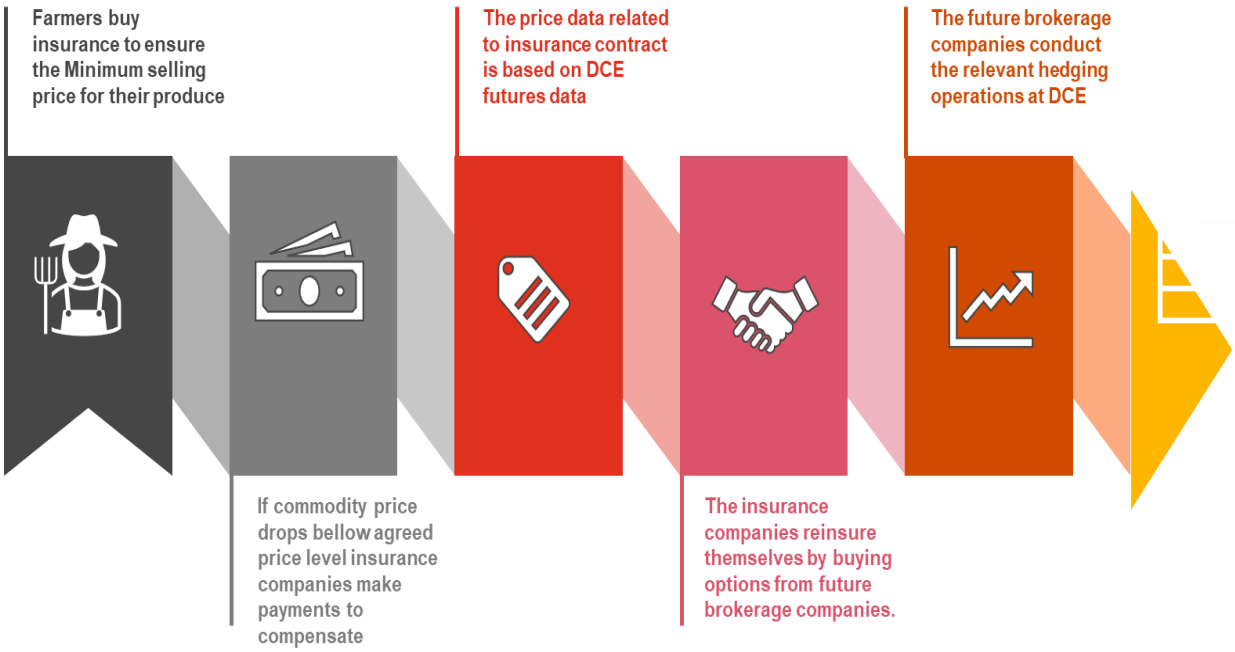
In 2015, the Insurance plus Futures policy was formulated to offer insurance companies with government subsidies so that they design agricultural income insurance policies based on fluctuating futures prices. Such models were eventually planned to be trialled in small-scale pilots. Across the central government, the broad policy consensus was to abandon state domestic procurement, thus moving all agricultural commodities through a staggered interim target-price policy system before finally transforming towards full marketisation of agricultural commodity prices (CPC Central Committee Policy Research Office of Economic Affairs 2015; Lin 2016).
Eventually, the “Futures + Insurance” program got initiated in China during 2016. The Chinese Government opted to shift from a state-controlled economy of minimum price support towards a market determined price structure in future. In this transition, the scheme was launched to offer subsidies to insurance companies to offer Agri-insurance policies based on futures prices of exchanges such as Dalian Commodities Exchange (DCE) and Zhengzhou Commodities Exchange (ZCE). The futures companies were expected to make provision of services with the objective to protect the farmer households, family farms and rural cooperatives against the price risks/fluctuations via "Futures + Insurance" projects. The commodity price data related to the insurance contracts are based on the corresponding DCE futures data.

How does the scheme work?

The scheme works as follows:

Farmers/Cooperatives purchase insurance to ensure the minimum selling prices /earnings, (2) The insurance company make payments to compensate when commodity prices turn out to be less than agreed futures price levels (based on DCE futures), (3) The price data related to the insurance contracts were based on DCE futures data. (4) Reinsurance by purchasing options from futures brokerage firms and (5) the futures brokerage firms performed relevant hedging operations at DCE.

Figure 53: Insurance Mechanism under "Futures + Price Insurance" Model



The status of the program (as published by DCE in 2017) is given in table below:

Table 50 Status of insurance program by DCE

Particulars	2016	2017
Number of Pilots	12	32
Commodities	Corn and Soyabean	Corn and Soyabean
Provinces	Heilongjiang, Jilin, Liaoning, Inner Mongolia, Anhui and other provincial regions	Heilongjiang, Jilin, Liaoning, Inner Mongolia, Hebei, Anhui and Chongqing,
Number of Households	4158 farming households	NA
Quantity of Produce	200,000 tonnes of spot corn and soybean	678,300 tons of spot corns, 114,000 tons of spot soybeans
Claim Settled	RMB 4.82 million recorded in claim settlement	NA
Area Covered	NA	2,068,700 mu of total planting area.
Number of Insurance firms involved	12 futures companies and 7 insurance companies	NA

Futures + Insurance model on Maize (Tieling County, 2019)[56]

A "Futures + Insurance + Bank" on maize was launched in Tieling County, Liaoning Province during January 2019. It was jointly promoted by the following key stakeholders:

- People's Government of Tieling County
- Huatai Futures
- China United Property Insurance (Liaoning Branch)
- Postal Savings Bank of Liaoning Province
- Liaoning Securities Regulatory Bureau

On the account of the pilot project, a multilateral cooperation framework was signed among the entities in 2018

With assistance of the local government of Teiling County and the Dalian Commodity Exchange (DCE), the project introduced the Postal Savings Bank innovatively and expanded the model from "Futures + Insurance" to "Futures + Insurance + Bank", which achieved cross-border integration of services for agriculture, rural areas and farmers. From the loan for purchasing agricultural materials to solving risks associated with maize price fluctuations, the project addressed the difficulties and high risk of loans in rural household development and presented a new access to price risk management and financing for maize growers/cooperatives.

Tieling County serves as a key maize producing belt in Liaoning Province. For several years, the planting area of maize in the county had surpassed 700,000 mu (around 10,500,000 Hectares), which accounted for more than 60% of overall grain production in the region. This implied that maize played a critical role in the county's agricultural production and regional economic development. The pilot project was formulated as follows for the purpose of ensuring the income of maize growers:

China United Property Insurance took the agreed income as the subject matter of insurance and designed corresponding income insurance products. The agreed income was calculated by multiplying the agreed maize price and agreed maize output. The farmers of the cooperatives purchased income insurance products from China United Property Insurance as the policy holder, while the Postal Savings Bank pledged the insurance policy to provide credit support for the maize cooperatives. In scenarios where claim income fails to reach the agreed income when the insurance expires, an insurance accident shall be deemed to occur, for which China United Property Insurance were required to compensate the policy holder as agreed. Huatai Great Wall Capital offered option products that matched the price risk, while China United Property Insurance were required to pay the premium to Huatai Great Wall Capital to purchase the option products for hedging the price risk. Huatai Great Wall Capital then hedged the risk of option products via the futures market.

The project involved 20,000 tons of maize, covering over 33,000 mu (or 4,95,000 Hectares) of maize growing area and 1,200 insured households. Under the premise of making the best of the hedging function of futures and insurance markets, the project adopted two core fundamentals in agricultural production – commodity price and commodity output - into account and played an active role in ensuring the income of maize growers. On the basis

[56] East Asia Forum

of cross-border cooperation with the local government, insurance and bank, the pilot project offered a market-oriented solution mechanism for mitigating agricultural product price risks, to protect the maize farmers from price fluctuations, while creating avenues for utilisation of the financial derivatives platforms (such as Options). It helped the stakeholders effectively realising the original intention of futures markets to serve the agricultural industry and the real economy. The project partners demonstrated their professional competencies and integrated various resources to help maize farmers solve the shortage of funds and price fluctuations, thereby further ensuring the stability of farmers' income from grain production.

10.1.4. Price Risk Management by Feed Mills in Vietnam for Soymeal [57]

Background

Vietnam has a population of over 90 million and the overall consumption for soymeal is estimated to be more than 6 million metric tons (MT). Consumption of soymeal is mostly in the form of animal feed for hogs (which is in fact the most famous meat consumed in this country), followed by poultry. The south-east Asian country also is one of the world's largest importers of soymeal. 78% of its total imports (in terms of import value) comes from Argentina, and the remaining from the U.S. (2.1%) and Brazil (18%). Since domestic soymeal production within Vietnam is very limited, the demand is mostly met by imports. The small- to medium-sized feed mills purchase and import most of the soymeal. Besides, the Sino-U.S. trade tariff disagreements, which kick-started in April 2018 have had an impact on the global soybean and soymeal trade resulting in the possibility of additional price fluctuations. Companies actively engaged in import operations of soymeal into Vietnam soon started to feel the need to consider an active hedging tool to guard against unforeseen price volatility.[58]

When a trader buys soymeal from overseas soybean crushers, the cargoes are usually sourced based on contracts where the soymeal prices are benchmarked against international index such as the CBOT Soybean Meal futures price. The international traders import soymeal in this manner typically to offset their price risk in the domestic market. The international traders then proceed to make a sale of soymeal to the local Vietnamese traders, who then supply soymeal to domestic feed mills either at a fixed price or at a basis to the Soybean Meal futures price.
The small and medium sized feed mills purchase soymeal from regional traders either at fixed prices or at a basis. In scenarios where mills buy at a basis, the primary price risk is that soymeal prices may see an increment between the time of the contract and actual delivery on the contract. For mills purchasing on fixed prices, their main concern is the opportunity cost that price may fall between the time of the contract and actual delivery on the contract.

Typical Case of a Medium-Sized Feed Mill in Vietnam

Let us consider that XYZ is a medium-sized feed mill based in Vietnam which undertakes procurement of soymeal from international and local traders. It purchases in relatively smaller lots of 2,000- 5,000 MT at a time. The firm's mode of purchase can be at fixed prices or at a basis to the CBOT Soybean Meal futures price.

During the month of March, XYZ established a purchase order with an international trader for 2,000 MT of soymeal for physical delivery in the month of June. This lot would be the part of a larger 50,000 MT cargo that will be loaded from the Puerto Parana port in Argentina for May shipment and will be delivered to the Phu My-Ba Ria Serece port off Ho Chi Minh City during the month of June.

During the time of establishment of purchase order (March), soymeal cash market price was trading at $380/ton in the Argentinian cash market for May shipment. XYZ opted to purchase at a fixed price of $390/ton payable upon actual delivery in June. However, owing to global economic fluctuations, by the time June arrived, Argentinian cash market soymeal prices plummeted by $60/ton. Other feed mills in Vietnam who were actively placing orders during the month of June were being offered soymeal at $320/ton, for August shipment. XYZ experienced a dilemma whether it should have been bought on a basis instead of at fixed prices.

Also, XYZ did not open a letter of credit at the time when it purchased the soymeal, so the firm may face some difficulty getting its cargo financed from financial institutions since they often refrain from financing cargoes if there is a risk in terms of loan repayment.

[57] Based on Primary Stakeholder Discussion with Japfa Comfeed Vietnam Representative
[58] CME Group Research Archives

The case study considers two alternative scenarios where XYZ purchases at fixed prices or purchases at basis and considers risk management strategies that it could have adopted to manage price risks that improves on the example above.

Scenario 1: Purchase at Fixed Prices

If XYZ buys soymeal at fixed prices, its primary risk is the opportunity cost if prices decline significantly. Therefore, XYZ decided to manage its risk via purchasing a put option on the 4th of July Soybean Meal futures contract. The following table illustrates potential outcomes where soymeal prices increase by $60 and declines by $60 compared to an unhedged position:

Table 51 Illustration of potential outcomes for soybean price increase

Price Per MT ($/MT)	Fell by $60	Rose by $60
March		
Soymeal Cash Price	380	
July Futures Price	385	
July Put Option at $380 strike	15	
June		
Soymeal Cash Price	320	440
July Put Option at $380 strike	60	0
Hedged with Put Option		
Put Option Premium paid in March	-15	+15
Cash flow for exercising put option	+60	0
Paid for soymeal June	-390	-390
Net cost of soymeal purchase	-345	-405
Unhedged case	-390	-390
June soymeal cash price	-320	-440

In other words, if the soymeal prices decline to $320, XYZ would have been able to partially capture the cost savings by exercising the put option and spend an effective price of $345 instead of the contracted fixed price of $390. In case of price rise, XYZ's cost would be fixed at $405 ($15 above the fixed contract price of $390 due to the cost of the put option). Since the firm couldn't count on certainty on price movements of soymeal, the fixed premium paid for the put option acted as an effective hedging tool against potentially disastrous price volatility (due to global conditions). In summary, when hedged, XYZ incurs a small amount more than the fixed contract amount if prices witness an increment but gets the space to leverage a lower effective price paid should prices decline.

Scenario 2: Purchases on Basis

If XYZ priced its soymeal parcel as a basis against the Soybean Meal futures price (on CBOT), the firm can offset its price risk with either a futures contract or a call option contract. Fundamentally, utilising a futures contract would enable XYZ to fix the cost of soymeal, whereas a call option would enable XYZ the ability to fix the cost of soymeal if soymeal prices increase above a predetermined price, but would also enable XYZ to capture a cost benefit if soymeal prices decline.

This is illustrated numerically in the table below, for the specific cases where soymeal prices increase by $60 or plummets by $60:

Table 52 Illustration for specific case of soybean price increase

Price Per MT ($/MT)	Fell by $60	Rose by $60
March		
Soymeal Cash Price	380	
July Futures Price	385	
July Put Option at $380 strike	15	
June		
Soymeal Cash Price	320	440
July Put Option at $380 strike	60	0
Hedged with Put Option		
Put Option Premium paid in March	-15	+15
Cash flow for exercising put option	+60	0
Paid for soymeal June	-390	-390

Net cost of soymeal purchase	-345	-405
Unhedged case	-390	-390
June soymeal cash price	-320	-440

In both cases, XYZ was likely better off using either Futures or Options to offset its physical exposure compared to leaving its physical trades unhedged. It showcases that a firm purchasing physical commodity on a basis contract can manage its buying price by purchasing futures contracts or can manage its purchase price risk by purchasing call options. A company purchasing physical commodity on a fixed price contract can manage its purchase price risk by purchasing put options.

Impact of Hedging on a Firm's Financials: Charoen Pokphand Foods Public Company Limited

Charoen Pokphand Foods Public Company Limited and subsidiaries or the Company operates an integrated agro-industrial and food businesses including feed production, animal breeding, animal husbandry, primary meat processing, food production and ready-to-eat food as well as meat and food retail outlets. In 1978, the Company started its businesses comprising livestock feed and livestock farms in Thailand. Its business
the chain was extended to primary meat processing, production of cooked and ready meal products, including meat and food retail outlets, resulting in the integrated agro-industrial and food businesses in the present. Presently, the Company has operations in 17 countries including Thailand, China, Vietnam, England, India, United States of America, Cambodia, Russia, Turkey, Philippines, Malaysia, Laos, Belgium, Sri Lanka, Poland (sorted by sales revenue size) and Canada. In 2019, the sales revenue breakdown is 67% from international operations, 27% from Thailand operations (Domestic) and 6% from Thailand operations (exports). The Company's businesses and revenue structures in Vietnam are as follows:

Table 53: Revenue Structure- Charoen Pokphand Foods Public Company Limited

	Revenue (Baht Million)	**% Share of total revenue**	**Revenue (Baht Million)**	**% Share of total revenue**	**Revenue (Baht Million)**	**% Share of total revenue**
	2017		**2018**		**2019**	
Thailand	178,408	34%	178,680	32%	175,966	32%
Vietnam	64,820	13%	81775	15%	85,390	16%
Feed	28,620	5%	27,639	5%	27,552	5%
Farm Processing	34,542	7%	51,834	9%	54,759	10%
Operating Margins (Vietnam Subsidiary)	3.8%		4.4%		7.1%	

The firm subsidiary in Vietnam has witnessed a sharp rise in operating margins during 2017 to 2019 by more than 86%. This trend has been attributed primarily to the firm's high effectiveness of the hedging strategy. Although the firm used to primarily invest in forward contracts and currency derivatives to hedge their price risk, the shift has transitioned towards hedging on futures and options (both on domestic exchange and international exchanges).

Impact on Agri and Allied Sectors in Vietnam:[59]

The participation of hedgers has increased by the introduction of the Mercantile Exchange of Vietnam (MXV) in August 2018. It remarked on the appearance of the nationally centralised commodities market in Vietnam. It was perceived as a very good sign for a growing maturity in the national financial market and Vietnamese commodity market. Besides, one of the major reasons for the spike in operating margins in feed business was stated to be cross border hedging on international exchanges like CBOT. With the onset of Decree 51 launched on 01 June 2018, Vietnamese traders/hedgers were already entitled to trade commodities through foreign commodity exchanges. Based on Decree 51 a Vietnamese can now connect with a foreign commodity exchange. According to Decree 158, an MXV member may trade on an offshore commodity exchange for its own account or for the account of its customers. Also, foreign investors can now contribute capital to establish a Commodity Exchange in Vietnam on the condition that the contribution does not exceed 49% of the -charter capital, purchase shares or stakes of the

[59] https://www.mondaq.com/finance-and-banking/106916/rules-on-participation-of-vietnamese-counterparties-in-trading-of-commodity-derivatives

Commodity Exchange on the condition that the contribution does not exceed 49% of the charter capital; or become a client, a member broker or trader of the commodity exchange without ownership restraint.

10.1.5. Proprietary forward contract (Min-Max) offered by ADM Inc.[60]

The Archer-Daniels-Midland Company, commonly known as ADM, is an American multinational food processing and commodities trading corporation founded in 1902 and headquartered in Chicago, Illinois It undertakes marketing, processing, and distribution of salt, cotton, sugar, grains, oilseeds, meat and other food products, petroleum trading, financial trading, futures broking, feed and fertiliser production activities. The company also offers technological support, risk management and marketing services. It has operations in the Asia Pacific, Americas, Europe, the Middle East and Africa.

In US, Canada and Latin American countries such as Brazil and Argentina, ADM Inc. provides proprietary forward contracts for their customers (who are usually large-scale grain producers). The guiding fundamentals in structuring such contracts are the basis for pricing, flexibility in timing the pricing, flexibility over timing the receivables, and the ability to participate in favourable commodity price movements. In this case study, we have discussed Min-Max Contract - offered by ADM Inc.

Introduction: Min-Max contract

A min-max contract offers price stability for producers, especially in scenarios of growing agricultural input costs and uncertain volatility. Also referred to as a “floor-ceiling” or “collar” contract, a min-max contract can be obtained via an agreement with the grain elevator (such as ADM Inc.) in the cash market.

In min-max contracts, both floor and ceiling prices are clearly defined, which are the respective minimum and maximum prices that will be received at expiration. If the market settles somewhere between the floor and ceiling prices, the participant will get paid at the market price (often minus a few cents per bushel as commission paid to the elevator). Other essential parameters such as delivery location, date, and quality specifications are all fixed at the onset of the contract.

Via min-max contracts, market participants benefit with cautious but ultimately (at least slightly bullish) impact market sentiments. For market participants who are confident in the viability of their harvest and delivery timing, price stability carries much more weightage than catching waves of extreme price volatility. Additionally, the market participant can lock in profit margin in min-max contract if the floor price of the contract is greater than the cost of production. Also, min-max contracts do have exposure to a margin call when futures move past the call strike.

How does the Min-Max contract work?

The Min/Max contract allows the producer to capture market gains up to option expiration and can move his bushels now. This contract is suitable for those producers who consider a Minimum Price, but do not want to pay the higher investment costs for one.

The current cash market price is $6.65, and the producer selects the March 6.70/7.10 Min/Max strike prices, which have an investment cost of $0.16. The calculations are as follows:

Table 54 Calculation of Cash price: Min-Max Contract

Current Cash Price	$6.65
Min/Max Investment	-$0.16
Cash Price	$6.49

The producer will be paid $6.49 upon delivery of the grain, the March 6.70/7.10 Min/Max strike prices have an expiration date of 2/24; if at any time up to that date the March futures climb above $6.70 and up to $7.10, the producer can decide to execute the option and take limited gains.

[60] https://admadvantage.com/grain-contracts/price-max/
Based on stakeholder discussion with ADM India Representative

Here are a couple of different scenarios that could take place:

Table 55 Possible Scenarios: Min-Max Contract

	Scenario 1
Expiration Date	2/24
Min/Max range	6.70/7.10
The March futures are at or above $7.20 on 2/24; the farmer realizes a net profit of $0.40/ bushel; which is paid back on a separate check. The producer gains the difference between min and max.	
Scenario 2	
Expiration Date	2/24
Min/Max range	6.70/7.10
The March futures close at $7.00 on 2/24; the producer realizes a net profit of $0.30/bushel gain that will be paid on a separate check.	
Scenario 3	
Expiration Date	2/24
Min/Max range	6.70/7.10
The March futures are below $6.70 on 2/24. The option will expire worthless, and no additional gains will be paid out.	

Advantages:

- The Producer gets to set the quantity, floor price, ceiling price and pricing period.
- Ability to fix the final cash price at any given time (market may be open or closed).
- Opportunity to capture gains at any time before option expiration.

Disadvantages:

- The contract includes commission and service charges
- Limited upside potential.
- Possible loss of the fee the producer paid if the futures price decreases.

Agri Commodity Hedging Activity

The Company uses futures or options contracts to hedge the purchase price of anticipated volumes of corn to be purchased and processed in a future month. The objective of this hedging program is to reduce the variability of cash flows associated with the Company's forecasted purchases of corn. The Company's corn processing plants normally grind approximately 72 million bushels of corn per month. Due to the temporarily idled dry mill assets, the Company is currently grinding approximately 56 million bushels of corn per month. During the past 12 months, the Company hedged between 20% and 38% of its monthly grind. On December 31, 2020, the Company had designated hedges representing between 20% to 33% of its anticipated monthly grind of corn for the next 12 months.

The Company, from time to time, also uses futures, options, and swaps to hedge the sales price of certain ethanol sales contracts. The Company has established hedging programs for ethanol sales contracts that are indexed to unleaded gasoline prices and to various exchange-traded ethanol contracts. The objective of these hedging

programs is to reduce the variability of cash flows associated with the Company's sales of ethanol. During the past 12 months, the Company hedged between 0 and 28 million gallons of ethanol sales per month under these programs. On December 31, 2020, the Company had no hedges related to ethanol sales.

The Company uses futures and options contracts to hedge the purchase price of anticipated volumes of soybeans to be purchased and processed in a future month for certain of its U.S. soybean crush facilities. The Company also uses futures or options contracts to hedge the sales prices of anticipated soybean meal and soybean oil sales proportionate to the soybean crushing process at these facilities. During 2019-20, the Company hedged between 27% and 100% of the anticipated monthly soybean crush for soybean purchases and soybean meal and oil sales at the designated facilities. The Company has designated hedges representing between 0% and 100% of the anticipated monthly soybean crush for soybean purchases and soybean meal and oil sales at the designated facilities over the next 12 months.

Financial Implications on Hedging

The Company, from time to time, uses derivative contracts designated as cash flow hedges to hedge the purchase or sales price of anticipated volumes of commodities to be purchased and processed in a future month. Assuming normal market conditions, the change in the market value of such derivative contracts has historically been, and is expected to continue to be, highly effective at offsetting changes in price movements of the hedged item. Gains and losses arising from open and closed hedging transactions are deferred in accumulated other comprehensive income, net of applicable income taxes, and recognized as a component of cost of products sold and revenues in the statement of earnings when the hedged item is recognized in earnings. If it is determined that the derivative instruments used are no longer effective at offsetting changes in the price of the hedged item, then the changes in the market value of these exchange-traded futures and exchange-traded and over-the-counter option contracts would be recorded immediately in the statement of earnings as a component of revenues and/or cost of products sold.

The Company recognizes all its derivative instruments as either assets or liabilities at fair value in its consolidated balance sheet. Unrealized gains are reported as other current assets and unrealized losses are reported as accrued expenses and other payables. The accounting for changes in the fair value (i.e., gains or losses) of a derivative instrument depends on whether it has been designated and qualifies as part of a hedging relationship and on the type of hedging relationship. The majority of the Company's derivatives have not been designated as hedging instruments, and as such, changes in fair value of these derivatives are recognized in earnings immediately. For those derivative instruments that are designated and qualify as hedging instruments, the Company designates the hedging instrument, based upon the exposure being hedged, as a fair value hedge, a cash flow hedge, or a net investment hedge.

For derivative instruments that are designated and qualify as fair value hedges, changes in the fair value of the hedging instrument and changes in the fair value of the hedged item are recognized in the consolidated statement of earnings during the current period.

The majority of the Company's derivative instruments have not been designated as hedging instruments. The Company uses exchange-traded futures and exchange-traded and OTC options contracts to manage its net position of merchandisable agricultural product inventories and forward cash purchase and sales contracts to reduce price risk caused by market fluctuations in agricultural commodities and foreign currencies. The Company also uses exchange-traded futures and exchange-traded and OTC options contracts as components of merchandising strategies designed to enhance margins. The results of these strategies can be significantly impacted by factors such as the correlation between the value of exchange-traded commodities futures contracts and the value of the underlying commodities, counterparty contract defaults, and volatility of freight markets. Derivatives, including exchange traded contracts and physical purchase or sale contracts, and inventories of certain merchandisable agricultural products, which include amounts acquired under deferred pricing contracts, are stated at market value. Inventory is not a derivative and therefore fair values of and changes in fair values of inventories are not included in the tables below.

The following table sets forth the fair value of derivatives designated as hedging instruments as follows:

Table 56: Income Statement via hedging: ADM

Income State Classification (USD Millions)	Type of Derivative	Gain (Loss) Recognized in Income on Derivative Instruments (USD Millions)			
		2017	2018	2019	2020
Pre-tax gains (losses) on Commodity contracts- Cost of Goods Sold	Commodities	375	258	(113)	(11)
Net unrealized gains (losses) on derivatives contracts	Commodities	(15)	125	(123)	524

As it can be seen, the exponential increase in unrealized gains, derivatives contracts and Value of gains on COGS turning negative during 2017-2020 can be attributed to the firm's effective hedging strategy to manage agricultural commodities price risk.

10.2. Domestic Case Studies

10.2.1. ITC ABD: Hedging on Soybean and its derivatives Contract[61]

Background

The Agribusiness Division of ITC (ITC ABD) is one of the leading domestic firms and is India's second largest exporter of Agri-products. It currently focuses on exports and domestic trading of:

- Feed Ingredients - Soymeal
- Food Grains - Wheat & Wheat Flour, Rice, Pulses, Barley & Maize
- Marine Products - Shrimps and Prawns
- Processed Fruits - Fruit Purees/Concentrates, IQF/Frozen Fruits, Organic Fruit Products
- Coffee

Several decades of experience and competency in Agri-commodity supply chain along with robust infrastructural system and technology in-place shaped the firm as a prime example in the segment of commodity trade and commerce sector. Currently they are dealing domestically in India and over 60 markets across the globe. ITC-ABD are dealing in a wide spectrum of commodities, including for in-house processing and sold as branded consumer products, and some to external B2B customers within India or abroad. For example, wheat is utilised for Aashirvaad brand atta, Sunfeast biscuits, yippee noodles; leaf tobacco is used for their cigarette brands; potato for Bingo! brand snacks; processed fruit pulps for B Natural brand juices and so on.

The ITC Agri Business Division's foray into commodity hedging through exchanges primarily include soybean and soya oil price risk management. Although the firm undertakes sourcing operations of various commodities, they utilise domestic commodity exchanges (mainly NCDEX) for hedging the price risk of soybean and soya oil only.

Rationale of ITC for hedging only in Soybean and Soya Oil Futures?

To determine the suitability of commodity for Hedging operations on derivatives, ITC considers three critical factors:

- Extent of commodity price volatility/fluctuations in that commodity
- Degree of value addition
- Viability of exchanges in mitigating the risk

Even though wheat is one of the most important commodities of ITC ABD's portfolio, the need for price risk management and the scope to hedge wheat prices are limited. Following reasons were given in support of their statement:

- Volatility in wheat prices is lower as compared to other commodity categories such as oilseeds and pulses. The volatility is lower than the value addition that ITC can do through their vast established supply chains, processing, marketing and branding.
- High degree of Government interventions that influences the wheat prices-such as minimum support prices (MSP) to farmers, consumer prices through public distribution, and significant procurement operations by the state trading enterprises such as FCI.

However, ITC had started hedging wheat in domestic exchanges on an experimental basis back in around 2011.

On the other hand, ITC did not have a very high value-added offer in soyabean, and the price fluctuations are considerably high due to its strong integration with the global market. Soyabean is crushed to manufacture soymeal and soya oil. Soya oil is sold for domestic consumption while soymeal is exported, except for some domestic consumption by the animal feed industry. Since Soyabean and its derivatives is a large part of ITC ABD's portfolio, mitigating price risk of soya oil and soybean was deemed necessary for the company.

Does ITC-ABD hedge Soybean and its derivatives contracts on International Exchanges?

There used to be a time when ITC-ABD utilised the CBOT to hedge soya oil and soybean price risks. The US is the world's largest producer of soyabean, and CBOT offers the most liquid market for soya oil complexes. Besides, CBOT also has crush spread contracts which combine the hedging needs for soya oil complex at one go. However,

[61] Based on Stakeholder Discussion with an ITC ABD Representative

trading at CBOT entailed other risks such as basis risk and currency exchange rate risks. Being an Indian firm, ITC-ABD was exposed to foreign exchange risks since contracts are traded and settled in US dollars. Hedging the forex risk often entails additional transaction costs in that market. Besides, the basis risk was significant because of various factors such as difference in crop cycles between US and India, seasonality, supply, and demand factors, high degree of divergence of spot price in India and CBOT futures price. Therefore, on account of such a scenario, ITC had to be very careful in deciding when and how much to hedge on CBOT (Hedge Ratio). However, as the liquidity in soy oil and soybean futures contracts in domestic exchanges improved, ITC chose to hedge on NCDEX. According to the company, liquidity in soybean and soya oil contracts used to be good in domestic exchanges, though soya meal was perceived to have comparatively less trading interest.

How ITC used its Futures Contract for Hedging Price Risks?

ITC utilized the short hedge facility to offset the risk of the unsold inventory, and at the same time use long hedge strategy to protect their sale commitments. They utilised the physical delivery facility of the exchanges whenever they felt that there is a significant divergence between futures prices and spot market prices.

Let's consider a given day when ITC purchased 1000 tons of soybean from producers at the prevailing spot market price. However, the company is yet to identify buyers for say 500 tons.

- Considering the volatility of soyabean and soya oil prices as well as the prevailing crush margin, the company hedged the price risk associated with the 500 tons of unsold or unpriced soyabean inventory by entering short futures contracts on soyabean.
- If ITC had unsold soya oil inventory, it used to take short futures positions on soya oil. Once the company identified suitable buyers for their unsold soyabean or soya oil inventory, they hedged by reversing the position taken in the futures market.
- If ITC had sales commitment and were yet to source that commodity, the firm would take a long futures position.
- Once the commodity is sourced, the firm un-winded the long futures position taken earlier. Purchasing soyabean, crushing and producing soya oil and soya meal are ongoing activities at ITC-ABD. Similarly, sale operations in the domestic market or exporting them are considered as ongoing activities. The hedging decisions are finalized after taking into consideration the soyabean stock at warehouses, soya oil and soya meal stock at the crushing units, and the committed sales volumes for these three commodities (Soyabean, Soya Oil and Soya meal)

Broad hedging principle followed at ITC-ABD

ITC-ABD sets a yearly plan for each commodity with sales as well as profit targets. They designed a broad principle of risk limit in terms of value and quantity for each commodity. The risk limit guides them about the maximum amount of unpriced or unsourced commodity for sale commitments/obligations that they would like to have at any given point of time in both value as well as in quantity terms.

ITC regularly examines the underlying market fundamentals in terms of global supply and demand scenarios, international prices and domestic prices of soybean and soya oil as well as the price trends of substitutes such as mustard and palm oil, crush margin, stock-in-hand at processing points, committed sales volume, and so on.

Broadly, hedging operations have assisted the firm in shielding themselves from the price volatility of the unsold or unsourced commodity. However, at times, existence of factors such as limited depth of the futures market, high costs, and scanty facility of physical deliveries (through exchange platform) led to mismatch between the physical and futures market. As a large hedger, ITC had always preferred mature futures markets with adequate liquidity and realised that considerable threat of physical delivery should be allowed to adequately align the markets with actual ground conditions. According to the firm, this would go a long way in attracting more and more hedgers /Value chain participants and improve the overall risk management practices and price discovery efficiency for the market.

Overall, ITC also closely monitored their purchasing, sale, processing operations, and hedging activities for each commodity, with an independent profit and loss (P&L) account. Daily, the firm draws the P&L of their commodity books. Except for a few agricultural commodities whose prices are significantly influenced by government interventions, prices of most of the agricultural commodities in India have been quite volatile. Therefore, monitoring of inventory on a daily basis, purchase and sale operations, logistics, open positions in futures contracts and risk limits is essential for firms to deliver the desired return on investment (ROI).

Typically, ITC did not have any pre-fixed hedge ratio as a fixed percentage of their physical position. It used to vary from time to time, depending on the market conditions, liquidity, and price fluctuations. However, as a matter of policy they refrained from practising over-hedging.

Financial Implications due to hedging activities

The soya business is a key contributor to ITC's overall revenue and profit. In 2022, the business accounted for 4% of the company's total gross revenue and 2% of its total profit. The following table showcases ITC's gross revenue and profit in soya business during 2018 and 2022:

ITC ABD (Soya Business)	Year				
Key Financial parameters	**2018**	**2019**	**2020**	**2021**	**2022**
Gross Revenue (INR Crores)	1600	1800	1950	2230	2700
Operating Income (INR Crores)	156	173	202	229	268
Operating Margin (%)	9.75%	9.61%	10.36%	10.27%	9.93%

It can be observed that ITC has maintained consistent operating margins during 2017 to 2022 within the range of 9-10%. This is attributed primarily to the firm's high effectiveness of the hedging strategy. Although the firm currently uses forward contracts and currency derivatives to hedge their price risk, hedging on futures (on NCDEX) in soya derivatives used to be significant until December 2020, on account of ban on derivatives trading by SEBI.

10.2.2. Case study of an FPO affiliated with Samunnati Financial Intermediation and Services: Use of Options as a Hedging Tool[62]

Background

In July 2020, SEBI had approved the launch of 'Options in Goods' in the commodity derivatives segment through Exchanges. The main objective behind the initiative was to benefit the farmers for realising better prices for their crops with minimal risk. In the backdrop of this, NCDEX had launched options trading in commodities such as Mustard Seed, Wheat, Chana and Maize (Feed and industrial grade) based on spot prices. The availability of such option contracts provided the space for an FPO or farmer to sell his/her crops on a particular future date at a particular price, by paying a small premium amount.

The "Options in Goods" was perceived as a better tool for FPOs/Farmers for managing their price risk. In the Options market, buyers of the option contract have the right but are not obliged to buy or sell an asset at a fixed price on or before a given date. On the expiry day, depending on the strike price and prevailing spot price, the decision is left to farmers / FPO for them to exercise the option or not. In case the commodity price fades higher than the determined price in future, the farmer will still be able to make a sale at market price by opting out of the option, only at the loss of a small premium. For an FPO/farmer, this was considered a highly flexible alternative hedging tool for managing price risk

Samunnati operates with an aim to make markets viable for small and marginal farmers by enabling the value chains to operate at a higher equilibrium and efficiency. In line with their mission objective, Samunnati also started facilitating the execution of the first "Options" trade in Soybean at NCDEX along with Kamatan (now acquired by Samunnati) and Madhya Bharat Consortium of FPC.

How does the scheme work?

In this case, Minimum Support Price (MSP) for Soybean is assumed to be RS 3880/ quintal and the prevailing spot market price is RS 3950/quintal as of 1st October. During the peak harvest time (around 20th November), a significant increase in the supply of soybeans would often lead to plummet of spot market price from RS 3950. If the FPO had commodity in their stock during 1st October, they would have fetched RS 3950/ quintal (Rs 70 above the MSP). However, in scenarios where the FPO does not have goods in hand and want to secure RS 3950/quintal for 20th November (peak harvest time), then options contracts are a useful hedging mechanism.

[62] Based on Stakeholder Discussion with Samunnati Representative

Consider the scenario where an option has been purchased by the FPO. As defined earlier, an option offers the FPO the right (not obligation) to sell at a particular price on a particular day. The FPO purchased a Put option on 20th July with a strike price of Rs 1750 on 20th Oct Expiry. Now it has gained the right to sell Maize at RS 1750/ Quintal on 20th November. In case the maize spot market price falls from Rs 1750/ quintal to Rs 1400/quintal on 20th November, the FPO can still make a sale of RS 1750, as it is the option holder. Exercising the option would benefit the FPO with an additional profit of RS 350/ quintal compared to prevailing spot market price during 20th November. However, if the spot market price increases from Rs 1750 to, say, RS 1900, the FPO can choose not to exercise the option and instead sell it in local spot market at price of Rs 1900. In such cases, the only loss incurred by the FPO would be the premium it paid to purchase the option contract.

Table 57 Profit and loss scenario for maize: FPO Level

Rate of Price insurance fixed on 20th July	Cost to grow maize (Per Quintal)	Premium Paid for Price Guarantee (Per Quintal)	Total Cost (per quintal)	Price trend	Maize Price Scenario on 20th October	Profit/Loss with Options	Profit/Loss without Options
Rs 1750	Rs 1100	Rs 100	Rs 1200	(- Rs350 per Quintal)	Rs 1400	Rs 550	Rs 300
Rs 1750	Rs 1100	Rs 100	Rs 1200	(- Rs150 per Quintal)	Rs 1600	Rs 550	Rs 500
Rs 1750	Rs 1100	Rs 100	Rs 1200	(+Rs 350 per Quintal)	Rs 1900	Rs 700	Rs 800
Rs 1750	Rs 1100	Rs 100	Rs 1200	(+ Rs 150 per Quintal)	Rs 2100	Rs 900	Rs 1000

Options v/s Futures

For hedging purposes, a farmer/FPO can utilise both the derivative tools- Futures and Options. An FPO can also sell futures instead of options. However, there is a difference in terms of structure of benefits realised by FPO. An FPO can sell Soybean futures (assuming 20th November Expiry) @Rs.4100/quintal (prevailing price of futures) for a quantity of 10 Tons. To purchase the futures for 10 tons the farmer must pay a margin of Rs 4100*100*10% =Rs.41000 (assuming 10% margin). If the soyabean spot market witnesses a reduction in price from Rs 4100 to 3900, then the FPO would realise a gain of Rs.20,000 on market price for 10 tons on 20th November. But spending Rs.41,000 initially as margin is a limitation for a typical FPO (due to working capital constraints). And in case of spot market price increment from Rs 4,100 to Rs 4,300, the FPO would incur a loss of Rs.20,000 as it is obliged to sell at Rs 4,100 only, even though the market price is Rs 4,300, as it had sold futures. Options would solve this problem.

If the FPO purchases a put option contract instead of a futures contract (for the same price and same date), the requirement of margin payment would no longer be necessary at Rs. 41,000 per 10 tons. However, the FPO must pay only Options premium (for example Rs.5000 for 10 Tons. Hence, if spot market price reduces on 20th November from Rs 4100 to Rs 3900, the FPO would realise a gain Rs.20,000 on 5000 premium which it had spent, thus resulting in net profit of Rs 15,000. However, in case, the spot market price witnesses an increment from Rs 4100 to Rs 4300, the FPO has the right of not exercising the option and its loss would only be limited to Rs. 5000 premium which it had to spend for purchasing the option contract and then sell the Soybean at the market price of RS 4300/quintal. This would lead to a net profit of 15,000 rupees (Rs 200*100 = 20000 Rupees – Loss of 5000 premium) for the FPO.

In below table Farmer A sells futures contract at Rs.4100/quintal and Farmer B buys Put option for strike price Rs.4100/quintal.

Table 58 P&L Scenarios

P & L for Farmer A	Market Price on Expiry Date	P & L for Farmer B
Loss – Rs 20,000 (Rs 200/Quintal)	Rs. 4300	Loss- Rs 5000 (Premium Lost)
Loss – Rs 10,000 (Rs 100/Quintal)	Rs. 4200	Loss- Rs 5000 (Premium Lost)
Rs 0	Rs. 4100	Loss- Rs 5000 (Premium Lost)
Profit – Rs 10,000 (Rs 100/Quintal)	Rs. 4000	Profit- Rs 5000 (Rs 10,000 Profit- Rs 5000 Premium Paid)
Profit – Rs 20,000 (Rs 200/Quintal)	Rs. 3900	Profit- Rs 15,000 (Rs 20,000 Profit- Rs 5000 Premium Paid)

Going Forward

Samunnati facilitated the participation of FPOs to hedge their price risk through a newly launched Options contract. Samunnati is planning to engage with multiple FPOs for price risk management through Options in different commodities. Samunnati used to be involved in key activities like educating and spreading awareness to FPOs about "Options in Goods", benefits to trade in options over futures. Samunnati also used to hold key position to suggest strike prices and expiry dates to stakeholders (Based on an extensive internal study on harvest season peaks and MSP by the government).

Financial Implications due to hedging activities

The following table showcases the FPO's gross revenue and profit in business during 2017-2019:

Key Financial parameters	Year		
	2018	**2019**	**2020**
Gross Revenue (INR Crores)	12	10.5	11.5
Operating Income (INR Crores)	1.5	1.4	1.7
Operating Margin (%)	12.5%	12.8%	14.7%

It can be observed that the FPO's operating margin has increased from 12.5% to 13% between 2018 and 2020. Besides growth in market bargaining power and aggregation cost optimization, hedging in options during FY 2019-20 played a key role in significant growth of operating margin by almost 2 percentiles.

10.2.3. Cross Border Hedging in Soya Oil by an Indian Commodity Trading Firm to manage price risk[63]

Background

Around 2012, an Indian commodity trading firm expressed their desirability to hedge their soya oil price risk in the US Futures market instead of Indian market. In the US, the soya oil futures were traded on the Chicago Board of Trade (CBOT). The contract size of soya oil derivatives on CBOT was 60,000 pounds (approx. 27 metric Tons) and the price was quoted in US cents per pound. In India, refined soya oil futures were traded at National Commodity and Derivatives Exchange Limited (NCDEX). The contract size at NCDEX was 10 MT and the price was quoted in INR (Indian rupees) per 10 Kg.

Based on the Preliminary assessment by the firm, trading in CBOT could be potentially advantageous to firm for key reasons:

- While NCDEX offered futures contracts with a maturity of only 6 months, CBOT futures contract were available with maturities of more than 3 years

[63] Based on Stakeholder Discussion with Prof Jayanth R. Varma, IIM Ahmedabad

- NCDEX futures were found to be more liquid for the near month and the mid-month, but liquidity plummeted quite sharply after that. CBOT futures were more liquid even in the near month and there was considerable liquidity for several months
- CBOT traded in both futures and options while NCDEX trading was limited to futures (at least in case of refined soya oil)
- NCDEX enforced a position limit of 25,000 MT at client level with a narrower limit of 6,000 MTs in near month contracts. The position limit enforced by CBOT was 8000 contracts (over 2,00,000 MTs) with a position limit in spot month of 540 contracts (about 14,700 MTs). Additionally, bona fide hedging transactions could (under certain circumstances) receive exemptions from position limits.

However, at the same time it was also reckoned by the firm that there could be significant basis risk in using CBOT futures if Soya oil prices in India diverged significantly from that in the US.

In-Depth Analysis by the Firm

The firm carried out a detailed assessment by carrying out the following analysis:

a) Economic Analysis of Relationship between CBOT and NCDEX Soya Oil Futures Prices

It was found that India was a large importer of soya oil while the major producers and exporters were the US, Brazil, and Argentina. Since imports represented about 1/3rd of India's overall soya oil consumption, prices in India should largely reflect the landed cost of imported soya oil. Economic theory predicted a stable relationship between NCDEX and CBOT prices. However, it was understood that high correlation between the two prices was not enough to decide hedging suitability, as small deviations may accumulate over a period and cause prices to diverge in the long run.

Besides, statistical analysis confirmed this prediction that there was indeed a stable relationship between NCDEX and CBOT prices. Co-integration analysis was performed on time series of daily data from January 2010 to November 2012 for:

- Near month soya oil futures price at CBOT converted to rupees per 10 Kg (US cents were converted to INR at daily exchange rate) and
- Near month soya oil futures price at NCDEX in rupees per 10 Kg.

The long run relationship estimated from the data was:

NCDEX = 1.1609 CBOT (the R-square of this regression was found to be 0.9449)

However, it was also found that there were short run deviations in this long run relationship. It implied that the basis risk was quite significant in the short term.

b) Analysis of Potential Risk Reduction through CBOT Soya Oil Futures Hedge

The degree of basis risk in short run was statistically examined by calculating the standard deviation, mean absolute deviation and range for the two prices (NCDEX and CBOT) and for the basis (NCDEX = 1.1609 CBOT).

Table 59 Analysis if Potential Risk Reduction through CBOT

Price	Mean	Std. Dev	Mean Abs Dev	Minimum	Maximum	Range
NCDEX	616.75	108.76	122.31	438.00	816.00	378.00
CBOT	531.36	90.26	60.79	367.00	706.00	339.00
Basis	0.16	25.55	30.19	68.73	57.87	126.59

The standard deviation of NCDEX (108.76) was an indication of unhedged risk while the standard of the basis (25.56) represented the basis risk when hedged using CBOT. This showed that 75% of the risk was eliminated by CBOT hedge even in the short term. Similar conclusions can be drawn using mean absolute deviation and range instead of standard deviation as a measure of risk.

c) Accounting and Regulatory issues assessment

(i) **Regulatory Aspect:** Encouraged by previous findings, the firm assessed the accounting and regulatory issues involved in hedging at CBOT. Besides, the firm has easy access to CBOT via its Singapore affiliate. Therefore, the Indian exchange control regulations were of secondary concern.

(ii) **Accounting Aspect:** It was understood that hedge accounting was critical for most companies. This was because accounting standards required futures, options, and other derivatives to be recorded in the books of account at fair value (usually current market value). But the underlying exposure was not fair valued in books. For example, if soya oil inventory was hedged by selling soya oil futures and then soya oil price rose, there would be a loss on the futures contract offset by a gain in the value of the inventory. But the inventory would be shown at its historical costs while futures would be shown at the current market value. The result would be that there would be an accounting loss on the futures, but no accounting gain in the inventory. The unrealized appreciation in the value of the inventory would be recognized for accounting purposes only when the inventory was sold. In the meantime, there would be a hedging loss in the quarterly income statements of the company.

However, hedge accounting would solve this problem- fair value changes in the hedge and the hedge item would be allowed to offset each other. However, there were several preconditions for the use of hedge accounting, and the one that the firm focused on was the hedge effectiveness requirement.

d) Hedge Effective Analysis for CBOT Soya Oil Futures Hedge

Although hedge accounting did not require perfect hedge, it required high hedge effectiveness. It required that the value change of the hedge should lie in between 80% and 125% of that of the hedged exposure. The accounting department had to determine whether the basis risk identified in previous analysis was small enough to meet this requirement. To test the hedge effectiveness, it was checked whether CBOT price changes were between 80% and 125% of NCDEX price changes. The test was carried out on daily, monthly and quarterly time horizons. However, in all the cases, most of the observations were found to be outside 80%-125% range. Therefore, it was determined that CBOT futures would be a very ineffective hedge from accounting perspective.

10.2.4. ABC Ltd: Hedging wheat in physical commodity market[64]

Background

ABC LTD is one of the leading agribusiness firms in India and exporter of several agricultural commodities such as wheat, rice, oil seeds, pulses, spices etc. Robust infrastructural system and technology in-place coupled with decades of experience and competency has made the firm the trendsetter in commodity trade and commerce sector. Currently they are dealing domestically in India and over 60 markets across the globe.

Even though ABC LTD is one of the largest traders and processors of wheat in the world, it is not involved with wheat trading in derivative markets (futures and options). ABC has been able to utilise the Indian market conditions successfully by dealing strictly in the physical market to retain their spot above other competitors. Through their experience, they were able to identify and capitalise on the existing market gaps and develop a robust system to sustain their slot at the pinnacle of the wheat trade over all its competitors.

Wheat trading in physical market

ABC LTD trades wheat in the physical market via two types of contracts i.e., export related contract and domestic consumption related contract. The physical trade is mostly done on the spot rate price of the general market, however, in exceptional cases, they also refer to the forward contract prices for next month (inclusive of the premium). They get the rate list from 3-4 markets including warehousing and interest cost and the price is locked

[64] Based on Stakeholder Discussion with the company representative (who requested to be kept anonymous)

on the day itself. As a part of wheat commodity sourcing services, the company purchases wheat from the suppliers at the present market rates. The contractual terms are very clearly established, for example, delivery contract for rake (2700 MT) is 15 days. If not done within 15 days, the company must take a decision on its delivery based on the existing market conditions. If the market is still favourable for the commodity, then the contract will be continued, and extension of delivery time will be provided. However, in case of a lack of market proposition for the variety, the contract will be cancelled.

Hedging measures taken by the company

Trading wheat in India comes with its own set of challenges. Targeting different varieties from different parts of the country also adds to this challenge. However, with time, ABC LTD has developed its own risk mitigation and management mechanism:

- Usage of Forward contracts: ABC executes following types of forward contracts in wheat-
    - Fixed price contract: A fixed price (or flat price) contract is the most common type of contract used by ABC. In a fixed-price forward contract, the trader is bound to deliver wheat at an agreed time for specific quality and quantity. The trader is only paid on delivery. In a few cases, premiums and discounts may be established for the product that does not match specified quality standards. However, the trader carries the opportunity risk of losing potential gains when market prices rise.
    - Deferred pricing contract: In this arrangement, farmer/supplier delivers the commodity and transfers ownership on the agreed date as mentioned on contract but maintains control over when it is priced. This contract enables the farmer/supplier to separate the pricing decision from the delivery decision. By transferring the ownership, the storage risks are passed to the buyer during delivery time and the contract might also be utilised as a substitute for storage when unavailable. While this gives the farmer/supplier the opportunity to benefit from price increment, he also carries the market risk that prices will decline between the time the contract is entered and the date on which the sales price is determined. However, this contracting arrangement is currently being used on a very small scale on an experimental basis by ABC for small scale farmers, especially where there is an established level of confidence in the buyer (ABC).
- In case of the premium varieties of wheat used to make products like maida, which are not available throughout the year, ABC procures via their commodity warehousing and procurement strategy wherein they procure wheat as per their availability and keeps them in their warehouses for a minimum lock in period of 2 months. Customers such as maida processors pay 10% premium with interest and are left to decide their need to use the saved variety only after 2 months of their storage. These customers get guaranteed sourcing variety, whereas ABC gets interest and premium charged for these varieties for the given duration.
- Based upon the market requirements, they also do arbitrage. For example, in a scenario of low production and supply of wheat in the areas of Uttar Pradesh and Bihar, the sourcing for the consumption in Northeast India is then done from other parts such as Madhya Pradesh as it becomes more cost effective under certain circumstances. Besides, ABC is also involved in varietal arbitrage, where they identify and develop varieties which are cheaper in price but are with similar qualities like that of the premium varieties of wheat (For example, Sharbati variety etc.)
- Though ABC does not hedge in wheat commodity derivatives, they hedge their financial risks through the currency derivatives. The company books their finances in dollars and hedges in domestic and international exchanges. This helps them to avoid the price risk management of agricultural commodity trade. The foreign commodities shield the underlying trade risks through effective hedging.
- Price Risk management in ABC is further solidified by legal and contractual terms and measures. Legal strength in the terms of tools such as contracts make it very difficult for the supplier to challenge the company legally. Also, through the years, ABC has earned a reputation of fulfilling their contracts i.e., they would rather pay 20-25 rupees higher than to back out of the signed contract terms. For example, during the Ukraine Russia war, the strong contractual agreements between ABC and the suppliers made it easier for the traders to provide the wheat for their customers. Even though farmers started holding stocks with a vision for selling at inflated prices, the contractual power of the company ensured that the supply channels are maintained, and hence eliminated any kind of risks.

All these practices enable ABC to protect their trade and mitigate any external risks associate in the process

Hedging Exposure of the Company

With respect to commodities, the company's extended material supply chain has successfully sailed through the major structural tax reforms instituted by the Government in the last couple of years. In line with SEBI's circular dated November 15, 2018, the Company has framed a Risk Management Policy with respect to Commodities including through hedging, in line with the Listing Regulations.

The Company is subject to market risk with respect to commodity price fluctuations in a wide range of materials which are drawn from agricultural supply chains, petroleum value chains and imports. Such exposure is hedged through a mix of long-term procurement contracts and strategic buying from time to time. The company has a robust Governance framework /mechanism in place to ensure that the company is effectively safeguarded from market volatility in terms of price. Risks arising out of constrained availability of various materials are addressed through a mix of measures including higher inventory holding and internal storage of some items and intermediates and long-term strategic contracts with key Suppliers in case of seasonal items.

The Exposure of the Company to various commodities during 2018 to 2021 is as follows:

Table 60: Hedging Exposure of ABC Ltd.

Commodity Name	**Exposure in Quantity terms towards the commodity (Metric tons)**			**% Of such exposure hedged through commodity derivatives**	
	2018-19	**2019-20**	**2020-21**	**Domestic**	**International**
Raw Honey	22,661	21,231	29,553	Nil	Nil
Raw Coconut Oil	7,999	8,603	8,927	Nil	Nil
Sugar	27,090	29,477	35,196	Nil	Nil
Mustard oil	11,305	11,037	8,868	Nil	Nil
Wheat	14,041	15,684	15,995	Nil	Nil
Total Exposure of Firm to all Commodities (INR Crore)	1239	1247	1503		

As it can be seen, the overall exposure of the firm to all commodities and agricultural commodities has grown by 21% and 10.67% respectively during 2018-2021. The exposure of key Agri commodities such as wheat has also witnessed slight increase during the same period. However, the firm hedges most of its exposure via forward contracts and currency derivatives. The operating margins and revenue from operations of the firm during 2018-2021 are as follows:

Table 61: Revenue and Operating Margins- ABC Ltd

Financial years	2018-19	2019-20	2020-21
Revenue (in INR Crores)	7,748	8,533	8,704
Operating Margins (%)	20.9%	20.4%	20.6%

The firm revenue witnessed an increase of 12.33% between 2018-2021. As far as hedge effectiveness on financials are concerned, the firm has been able to keep stable operating margins at nearly 21% during the last four years (2018-2021) despite negative macro conditions such as COVID and geopolitical tensions such as Russia-Ukraine War. The stable operating margins can be attributed to an effective hedging strategy via various derivative instruments.

As regards foreign exchange risks, keeping in view the position of rupee in the market vis-a-vis foreign currency, the company has been taking forward cover for foreign currency exports and imports from time to time and with reference to foreign currency borrowings, the loans are fully hedged at the time of inception itself as per the Forex policy framework of the company

10.2.5. Rama Gum Industries Ltd: Inter Commodity Spread strategy for Guar and its derivatives[65]

Background

Rama Gum Industries is the largest manufacturer and exporter of Guar Gum Powder & Derivatives, Guar Gum Splits and Guar meal Based in Gujarat, India. It is primarily a guar gum company with fully integrated operations from guar seed to guar gum in end use form; The company offers assistance to the farming community to promote the guar farming, have a program of solidarity sourcing and direct guar seeds procurement from the farmers/FPOs, manufacturing of guar seed into guar gum refined splits and guar meal and finally processing of guar splits into Guar Gum powder for various end use applications ranging from Food, Pharma, Textiles, mining, Hydraulic Fracing and virtually everything of native guar.

Since Guar Gum and Guar seeds constitute an integral portfolio for the firm's core line of business, it adopted Inter-commodity spread hedging strategy for guar gum and guar seeds futures contracts on Multi Commodity Exchange Ltd. (MCX). An inter commodity spread is made up of a long position in one commodity and a short position in a different but economically related commodity.

Multi Commodity Exchange of India (MCX) initiated futures trading in guar seed and guar gum contracts in 2013. Approval had been given by the regulatory body for trading in guar seed and guar gum June, July, October and November contracts to facilitate price discovery and price risk management in the guar complex.

The trading unit of the guar seed and guar gum was defined to be1 MT each and price quote for the contracts is ex-warehouse Jodhpur, inclusive of sales tax/VAT. The basic delivery centre for both the contracts is Jodhpur and additional delivery centres include Bikaner, Nokha, Sri Ganganagar, Hanumangarh and Barmer in Rajasthan, Deesa in Gujarat, and Adampur and Sirsa in Haryana.

Inter Commodity Spread Hedging Strategy

An inter commodity spread consists of a long position in one commodity and a short position in a different but economically related commodity. This strategy involves purchasing and selling different but economically related commodities by executing long and short positions in the commodities simultaneously for the same calendar month. The company is expecting a decline in the spread between guar seed and guar gum in the near month and therefore implements the short sell position in spread by using the following strategy:

- **Step 1:** The company purchases June guar seed futures and sells guar gum June futures on June 1. This creates a short sell position in spread as narrowing spread will result in a gain to the trader.
- **Step 2:** The company holds the contract and keeps an eye on the spread movements and finds out that the spread reduces on June 16. On June 16, he squared off both his legs. In other words, the company purchases to square off his short-sold position in spread.
- **Step 3:** The company squares off its position and closes out both the futures contracts.

Profit realised from this strategy is illustrated below:

Table 62 Price Realisation for Guar Gum Contracts

Contract	June Guar Seed Futures	June Guar Gum Futures	Spread
June 1	Buy at Rs 6010	Sell at Rs 11120	5110
June 16	Sell at Rs 6075	Buy at 11050	4975
Profit/Loss	+65	+70	-135
Net Profit	+135		

[65] Based on Stakeholder Discussion with Chimique India Ltd. Representative

The Guar Complex spread enables the firm to hedge their price risks, while also looking at the spread to capitalise on potential profit opportunities. One of the attractions of spread trading is the relatively lower risk versus outright futures positions, and the subsequent lower margins.

Financial Implications due to Hedging

Impact on Rating

As per CRISIL rating rationale for the firm, the firm has strong risk management practices to mitigate the volatility and foreign exchange risks, reflected in stable operating margin. The key positive factors which were identified by CRISIL are:

- Increase in revenue and stable profitability, leading to cash accrual above Rs 8 crore
- Sustenance of the working capital cycle, and improvement in the financial risk profile

Key Financial indicators of the company are shown as below:

Table 63: Impact of Hedging on Credit Ratings: Rama Gum Industries Ltd.

Financial Year	2021	2020	2019
Ratings	CRISIL BB+ /Stable / CRISIL A4+	CRISIL BBB-/Stable / CRISIL A3	N/A
Operating Margins (%)	3.0	2.7	2.6

The increase in operating margin of 15.38% reflects high hedging effectiveness in Guar seed and guar complexes via both forwards and futures market. Consequently, the ratings have also improved from BBB- to BB+ accordingly.

Appendix A. - List of Stakeholders

Based on our previous experience and industry connections, we have connected with the following stakeholders from across 4 categories of stakeholders – Private Institutional Players (which includes Food processing Firms and Agri-trading firms), Financial Institutions and State Trading Enterprises. The stakeholder's list is as follows:

S. No	Category	Organisation	Survey Contact	Designation
1	Food Processing Firm	Britannia Industries Ltd.	Mukesh Yadav	Senior Purchase Manager
2	Food Processing Firm	ITC FBD Ltd.	Unnikrishnan Vijayan	Senior Manager- Purchase
3	Food Processing Firm	MTR Foods	Vignesh P	Senior Purchase Manager
4	Food Processing Firm	Kellogg's India	Atul Chavan	Director- Indirect Procurement Asia, Pacific, Middle East, and Africa
5	Food Processing Firm	Nestle India	Ashish Bhatnagar	Senior Procurement Manager-Nestle
6	Food Processing Firm	Reliance Retail	Aman Thakur	Regional Manager-Commodities and Trade
7	Food Processing Firm	MARS India	Pallav Vibhu	Senior Commercial Operations Manager
8	Food Processing Firm	Unilever	Ravi Prakash Singh	Senior Procurement Manager-Europe
9	Food Processing Firm	Drools	Shashank Sinha	Chief Executive Officer
10	Food Processing Firm	Perfetti Van Melle	Rishabh Hasija	Manager-Global Procurement Services
11	Food Processing Firm	Hindustan Coca-Cola Beverages Pvt. Ltd	Vijay Singh	National Manager- Direct Procurement
12	Food Processing Firm	Dabur India	Naresh Venkatachalam	DGM-Purchase
13	Food Processing Firm	ITC ABD Ltd	Gaurav Middha	Senior Trading Manager
14	Food Processing Firm	Suguna foods Pvt ltd,	Sandeep Sharma	Senior Manager- Purchase
15	Food Processing Firm	Skylark feeds Pvt. Ltd	Jitender Deswal	Director- Purchase
16	Food Processing Firm	Noveltech Feeds Pvt. Ltd	Dr. Romesh Jha	SBU-Head
17	Food Processing Firm	Patanjali Foods (Ruchi Soya)	Chirag Badala	HOD-Risk Management
18	Food Processing Firm	Keventer Agro Pvt. Ltd	Sashank Shah	Managing Director- Procurement
19	Food Processing Firm	Emami Agro Ltd	Ashok Dalmia	Director- Procurement
20	Food Processing Firm	OP Cotton and Oil Mill, Haryana	Sunil Kumar	Owner
21	Food Processing Firm	Jindal Industries, Haryana	Sandeep Jindal	Owner
22	Food Processing Firm	Jain Overseas, Haryana	Pritam Jain	Owner
23	Food Processing Firm	Mukesh Ginning Mill, Haryana	Parveen	Owner
24	Food Processing Firm	KN Resources, MP	Ashok Sanchiti	GM
25	Food Processing Firm	Itarci Oils, MP	Totla Ji	GM
26	Food Processing Firm	Krishna Edible Oil, MP	Nishant	Owner
27	Food Processing Firm	Shree ji Corporation, MP	Ravi Shah	Owner

28	Food Processing Firm	Kamadgiri Trading Company, MP	Sachin	Owner
29	Food Processing Firm	Rudra Foods Pvt Ltd, UP	Anshuman	Owner
30	Food Processing Firm	Sudarshan Foods Pvt Ltd, UP	Rajesh	General Manager
31	Agri-Trading Firms	Agrocorp International	Brajesh Panda	Senior Trading Manager
32	Agri-Trading Firms	Seaboard Special Crops	Somnath Bera	Director and Country manager
33	Agri-Trading Firms	Olam India	Hari Krishnan Menon	Country Manager
34	Agri-Trading Firms	Dehaat	Pranay Kumar	AVP-Institutional Purchase
35	Agri-Trading Firms	Cargill India	Bhamini Pandey	Senior Commodity Analyst
36	Agri-Trading Firms	Arise IIP	Anupam Sinha	Director-Agri Value Chain
37	Agri-Trading Firms	Export Trading Group (ETG)	Prasenjit Gorai	Regional Head- East India, N-E India and Bangladesh
38	Agri-Trading Firms	Paradigm Commodity advisors	Jagdeep Grewal	Trade Research and Advisory Associate
39	Agri-Trading Firms	Star Agri Warehousing	Pradeep Srivastava	Former VP Procurement
40	Agri-Trading Firms	Origo Commodities	Sunoor Kaul	Co-founder
41	Agri-Trading Firms	Sohan Lal Commodity Management Pvt. Ltd	Divanshu Bhadani	Chief Risk Officer
42	Agri-Trading Firms	Arya Collateral Warehousing Services	Shenoy Mathews	General Manager
43	Agri-Trading Firms	NBHC	Ramesh Dorai Swamy	Managing Director
44	Agri-Trading Firms	Bunge India Pvt. Ltd	Digpal Singh	Vice President
45	Agri-Trading Firms	Nurture.Farm	Anand Gawande	Lead Commodity Trade
46	Agri-Trading Firms	Olam India	KK Dubey	Head-Agribusiness
47	Agri-Trading Firms	Archer Daniels Midland Company	Sonakshi Pande Tripathi	Manager- Commodity trading
48	Agri-Trading Firms	Tolaram Group	Namrata	Commodity Trading Analyst
49	Agri-Trading Firms	Adani Wilmar	Nitin Jain	Global Business manager
50	Agri-Trading Firms	Kewalram Chanrai Group	Ashok Meena	National Sales and Procurement Manager
51	Agri-Trading Firms	Kunvar Ji Group	Bhavin Mehta	Director
52	Agri-Trading Firms	Go Green Warehouses Pvt. Ltd	Santosh Sahu	Director, CEO and Co-founder
53	Agri-Trading Firms	Tirupati Refineries Pvt Ltd	Ajit Dubey	Commercial Head
54	Agri-Trading Firms	ILA commodities India Pvt Ltd	Harish Galipelli	Director
55	Agri-Trading Firms	Krishi Setu (NBHC)	Raghavasimhan PV	Product Head
56	Agri-Trading Firms	Origo Commodities	Devendra Solanki	Business Head – MP, CG & MH
57	Agri-Trading Firms	Cargill	Ashish Joshi	Senior commodity analyst
58	Agri-Trading Firms	Louis Dreyfus Company	Vipin Gupta	CEO
59	Agri-Trading Firms	Goodhope Group	Samir Desai	COO, Director & CEO India
60	Agri-Trading Firms	COFCO India	Simmarpal Singh	CEO
61	Financial Institutions	IDBI	Joseph Daniel	Head Agri
62	Financial Institutions	SBI	Moyya Krishna Rao	DGM
63	Financial Institutions	Bank Of Baroda	Bhawani Shankar Parida	Head Agri
64	Financial Institutions	Kotak Mahindra	Mendu Srinivas	Agri Finance Specialist

65	Financial Institutions	ICICI	Pramod Dubey	Head Rural and Agri products
66	Financial Institutions	Axis	Saurabh Raheja	Product Head Commodity finance
67	Financial Institutions	HDFC	Gajendra Eache	Head Commodity finance
68	Financial Institutions	Yes Bank Ltd	Krishna Mohan Singh	Vice President
69	Financial Institutions	Kotak Bank	Rakesh Gupta	Product head
70	Financial Institutions	Samunnati Financial Intermediation and Services Private Limited	Anil Kumar SG	Founder and CEO
71	Financial Institutions	Bajaj Finance	Amit Maheswari	Risk and operations head
72	Financial Institutions	Edelweiss	Santosh Dadheech	CEO
73	Financial Institutions	Punarvasu Finance	Suraj Sharma	CEO
74	Financial Institutions	ESAF Bank	K Paul Thomas	CEO
75	Financial Institutions	Rabo Bank Foundation	Mr Arindom Datta	Executive Director Rural Banking
76	State Trading Enterprises	Food Corporation of India (FCI)	Kumar Anshumant	Manager
77	State Trading Enterprises	NAFED	Rituraj Singh	Assistant General Manager- Bulk Staples
78	State Trading Enterprises	Central Warehouse Corporation (CWC)	Amar Chand Yadav	Manager
79	State Trading Enterprises	Cotton Corporation of India (CCI)	Rakesh Ranjan Naik	Assistant General Manager
80	State Trading Enterprises	Rajasthan State Warehousing Corporation (RSWC)	Ruchi Shekhawat	Deputy Director

Appendix B. - Appendix B: A Brief History of Indian Derivatives Market

History of commodities trading in India dates to several centuries. Forward trading in animal, agricultural produce and metals are believed to have existed in ancient India and references to such markets appear in Kautilya's 'Arthasastra'. Terms relating to commerce such as 'Teji', 'Mandi', 'Gali' and 'Phatak' have been coined and freely used as early as 320 B.C. However, organised trading in commodity derivatives started in India in 1875 by the Bombay Cotton Trade Association Limited with cotton as the underlying commodity. A few years later, Gujrati Vyapari Mandali was set up, which started trading in castor seed, groundnuts and cotton. In the year 1919, the Calcutta Hessian Exchange was set up which started trading in raw jute and jute goods. Subsequently, many other commodity derivatives trading centres emerged across the country in places such as Hapur, Amritsar, Bhatinda, Rajkot, Jaipur, Delhi, etc. Due to reasons such as speculation, hoarding, wars and natural disasters, several controls were placed on trading of certain commodities from time to time. In 1919, the Government of Bombay passed the Bombay Contract Control (War Provision) Act and set up the Cotton Contracts Board. With an aim to restrict speculative activity in the cotton market, the Government of Bombay issued an Ordinance in September 1939 prohibiting options trading in cotton which was later replaced by the Bombay Options in Cotton Prohibition Act, 1939. In 1943, the Defence of India Act was passed for the purpose of prohibiting forward trading in some commodities (spices, vegetable oils, sugar, cloth, etc.) and regulating such trading in others on all India bases. These orders were retained with necessary modifications in the Essential Supplies Temporary Powers Act 1946, after the Defence of India Act had lapsed.

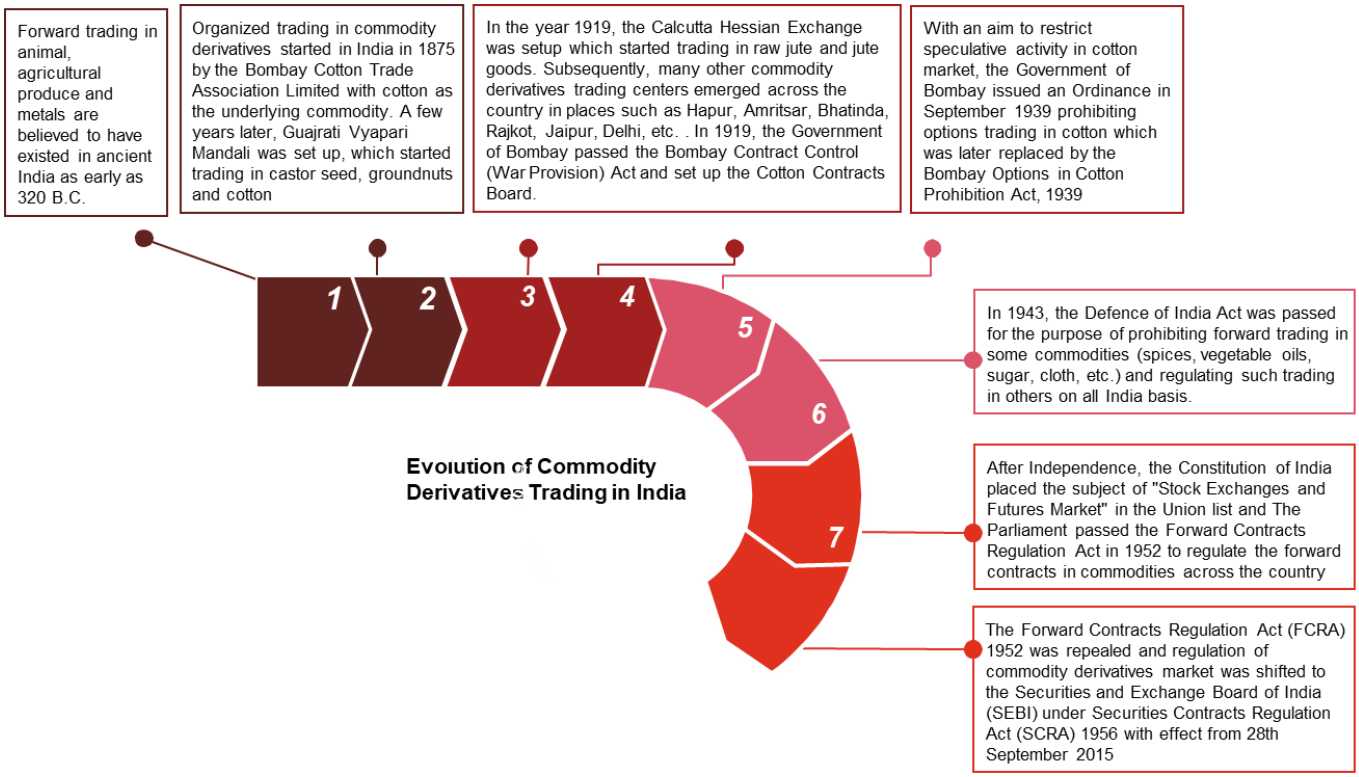


Figure : Evolution of Commodity Derivatives Market in India

Appendix C. - A Brief History of The U.S. Derivatives Market

The food systems of the USA have witnessed several changes since the establishment of the United States Department of Agriculture (USDA) in 1862. Prior to its establishment, the USA was an agrarian nation which used to have a smaller population living within dispersed rural areas. In the 1800s, agricultural commodities such as grains were brought from the farms in mid-western part of the country to Chicago, after which they were transported to the eastern coast of the country. During their storage in Chicago, the perishable grains used to influence the market price leading to price fluctuations. This led to the formation of the first Agricultural Future Contract[66].

As Chicago became popular in the country for futures contracts, the Chicago Board of Trade (CBOT) was set up in 1848 as the first American exchange. For over 100 years since then, agricultural products remained the primary traded goods as futures and other commodities such as soybean, cotton and lard were also added to the list. A new trading medium "Option" was launched by CBOT in 1982. Furthermore, CBOT came up with electronic trading system in 1994 to facilitate a smooth transaction process [67].

Following the CBOT model of operation, several other exchanges rose across the USA by the 20th century. Farm population and acreage increased in the 19th century whereas technological interventions and farm size grew in the 20th century. This led to a steady drop in farm number and hired labour in the country. The growth in farm size was due to the "great agricultural transition" wherein farming was abandoned as a household livelihood strategy. Currently, the number of people involved in agriculture in the country is less than 1% of the total population of the USA. Even within that, only 10-20% of full-time farmers now produce 80-90% of the US agricultural goods. These educated and well-run businesses report sales above 350 thousand dollars (US threshold for large commercial farms). The governing agricultural policies in the country are coined as the farm policies which are 5-year policies making the major changes in agriculture and related areas such as the commodity programs, insurance options, conservation programs, expansion of existing programs, price, and income support to the farmers. The price and income support are provided to the farmers through elaborate set of subsidized insurance programs which has eliminated issues such as controversial payments to farmers directly[68].

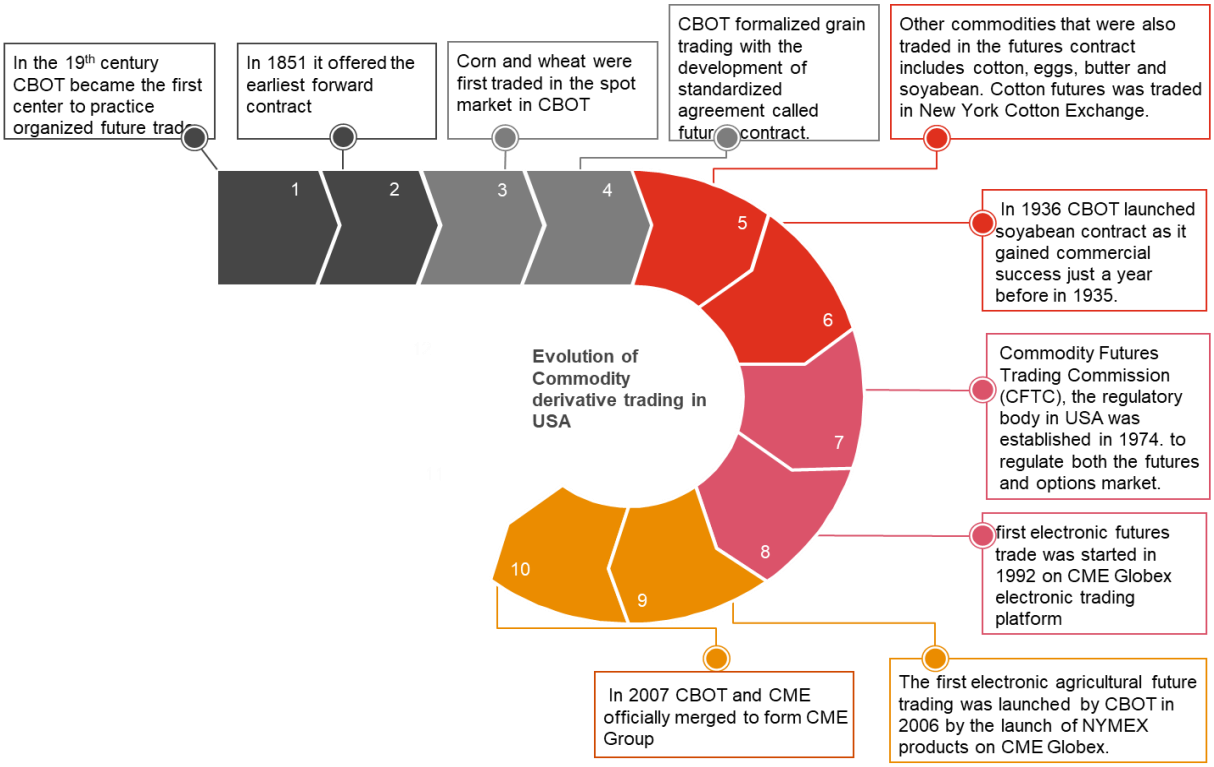
The major events in the evolution of agricultural commodity trade in CME Group has been illustrated below:

[66] USDA

[67] Factors Contributing to Changes in Agricultural Commodity Prices and Trade for the United States & World, USDA 2020

[68] The evolution of Commodity Markets over the past century, World Bank Document

Figure: Emergence of CBOT;



Commodity Futures Trading Commission

Established in 1974 by the Government of US under the enactment of the Commodity Futures Trading Commission Act, The Commodity Futures Trading Commission (CFTC) is responsible for regulating commodity markets in the country. Its main objective is to protect the relevant stakeholders from fraud, manipulation and other malpractices related to derivatives and other products subjected to the Commodity Exchange Act (CEA). They conduct investigation and prosecution for commodity frauds and work with federal and state agencies to maintain regulations in the commodity market[69].

Any firm looking towards participating in the commodity markets in the US needs to register with the CFTC. The agency promotes commodity trading in the nation and ensures a level playing field for all its stakeholders.

The office of CFTC organisation consists of the offices of Chairman and other 4 commissioners appointed by the president of the United States. It further includes 13 other divisions namely:

- Clearing and Risk (DCR)
- Enforcement (DOE)
- Market Oversight (DMO)
- Market Participants Division (MPD)
- Division of Data (DOD)
- Division of Administration (DA)
- Office of the Chief Economist (OCE)
- Office of the General Counsel (OGC)
- Office of International Affairs (OIA)

[69] https://www.cftc.gov/About/AboutTheCommission

- Office of Public Affairs (OPA)
- Office of Legislative and Intergovernmental Affairs (OLIA)
- Office of Minority and Women Inclusion (OMWI)
- Office of Technology Innovation (OTI)

Appendix D. - A Brief History of Chinese Derivatives Market

China currently trades the largest number of agricultural futures contracts in the world. Unlike the USA and India, the origin of the Chinese derivative market is recent. Organised futures trading started in China only in 1993. A unique feature of the development of Chinese commodity futures trade is that it was a deliberate but cautious attempt and was extensively based on pilot projects and experimentation.

China Zhengzhou Grain Commodity Exchange (CZCE) was set up in 1990, first as a wholesale market. Organized futures trading started in CZCE later in 1993. This was followed by the setting up of Dalian Commodity Exchange (DCE) in 1993 and Shanghai Commodity Exchange (SCE) in 1996. The first commodities introduced for trade in China were mung beans, wheat, corn, soybean and sesame (Zhao, 2015). In the initial years, futures trade was looked at as a means of making fast profits in China. This led to formation of numerous exchanges around the country and introduction of several new contracts. According to some studies, more than 33 exchanges developed around this time in China (Peck, 2001). However, lack of proper understanding of the market and weak regulatory framework resulted in massive speculation and non-standard trading practices. These chaotic tendencies were curbed through state induced reforms in 1993 and 1998 referred to as 'the first rectification' and 'the second rectification' respectively. These reforms were aimed to reduce the number of exchanges in China so that manipulative tendencies could be controlled. The State administration announced new regulations in these reforms to govern the disordered markets leading to shut down of most of the exchanges and suspension of most of the products. The regulatory body, China Securities Regulatory Commission (CSRC) was set up in 1992 to regulate and clean up the futures market. Currently, there are four commodity trading exchanges in China - China Zhengzhou grain Commodity Exchange (CZCE), Dalian Commodity Exchange (DCE), Shanghai Commodity Exchange (SCE) and China Financial Futures Exchange (CFFE).

An interesting feature of the Chinese Agri-futures market which might have aided in its development is participation of State Trading Enterprises for example China National Cereals, Oils and Foodstuffs Corporation (COFCO) Futures Group in China. It has two shareholders, COFCO which owns 65 percent of total shares and China Life which has 35 percent share. COFCO, founded in 1952 is state owned food processing holding company and is the largest food processor, manufacturer and trader in China. It is directly administered by China's state council and is the sole agricultural products importer and exporter operating under direct control of the central Government. COFCO Futures was formed in 1996 and has full membership of all domestic futures exchanges. Their services include futures brokerage, investment consulting, overseas futures business among many others. COFCO's volume traded has increased over the years and they trade in agricultural commodities like soybean oil and meal, palm oil, cotton, sugar, etc in the last ten years. Participation of state enterprises like COFCO in the futures market instils positive sentiments and reliability among other players in the market. Another interesting aspect of the Chinese futures markets is that contracts are compulsory delivery-based contracts. All Agri-commodities traded in the Dalian Commodity exchange, viz. soybean complex, corn, corn starch, eggs, palm oil are compulsory delivery based. This helps control the level of speculation in the market and makes policymakers and the regulator comfortable with the functioning of the market. Both state participation and the assurance of delivery are features which we believe makes the state comfortable by controlling speculation and encouraging hedgers in the market.

China witnessed a transition from its large communal farm-based farming system into a market economy in late 1970s through the introduction of its economic reforms. A gradual increase in the agricultural procurement prices towards market price along with a reduction in the procurement quota was witnessed through these reforms. China introduced a second stage price and market reforms in 1984-1985 with the aim to limit the scope of government intervention in price determination and enlarging the role of market allocation[70].

The reformers then began to eliminate planned procurement for all commodities other than wheat, maize, rice, and cotton. Even though government commercial departments still functioned, they could only buy and sell at the market. Incentives were introduced for grains through the reduction of the quota volume and increasing price of procurement. Coming years saw provision of incentivizing farmers to increase productivity and sales to the

[70] China's emergence in global commodity markets, Treasury.gov (Australia)

government and thereby increasing the quota procurement price over time along with a separate mandatory procurement of wheat, rice, maize, soybean, oil crops and cotton.

Marketing reforms were relaunched in the early 2000s which further led to removal of marketing restrictions. There were significant efforts undertaken to commercialise grain bureau such as removal of government interventions in grain prices (levied to farmers of certain regions). Efforts were made in a direction to push the policy environment towards being more market oriented. Slowly but gradually, China's policy environment condoned the market and sought to influence production through the market price generated projections.

The market reform of China has been fuelled by entry-based competitions. The entry here came from both the commercialization of the country as well as the growth of the trading sector. China pulled in millions of people in commodity trade through this revolution. On one end it has led to the rise in integration and fall in transactions costs, however, on the other end it has reduced the power of state to control markets with their orthodox methods of command and control[71].

The gradual trade evolution in these two major exchanges (DCE and ZCE) has been illustrated below:

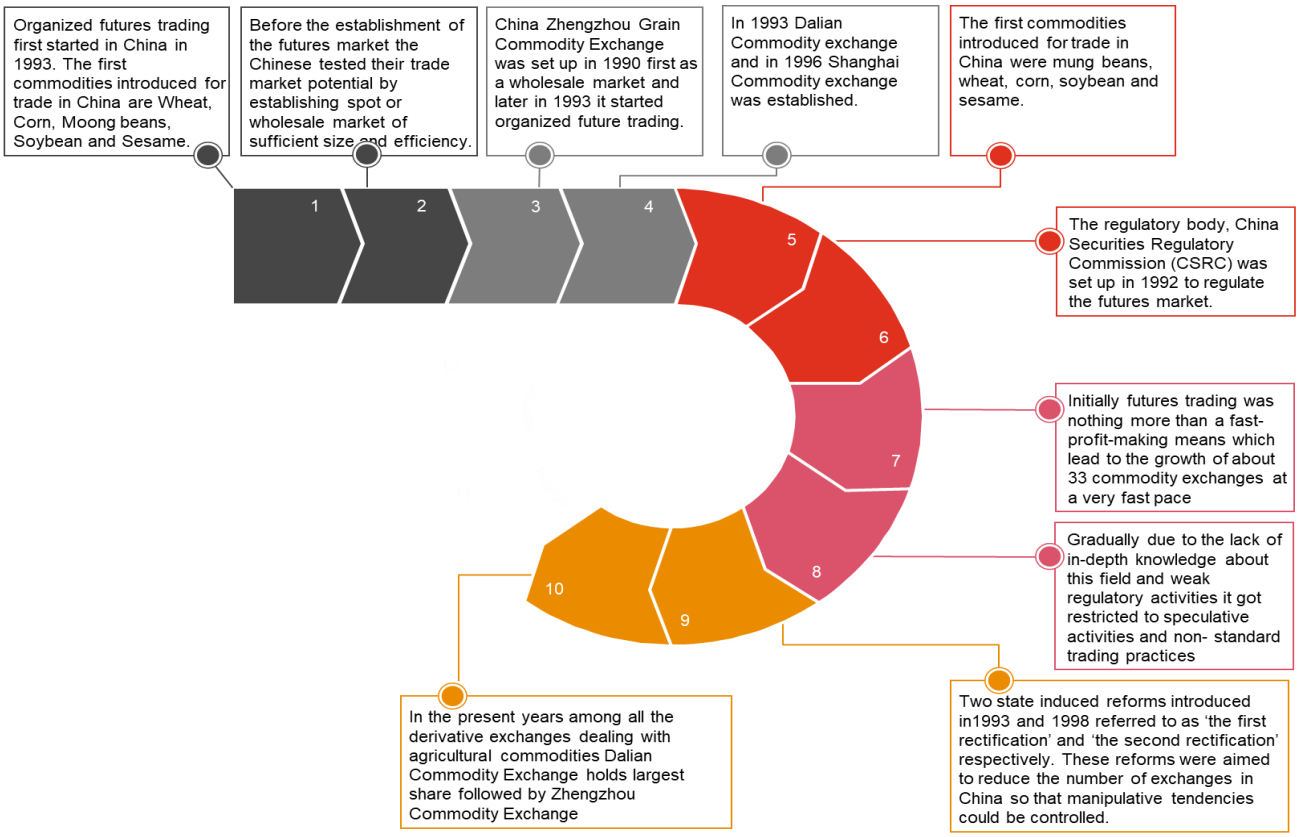


Figure: Evolution of Commodity Derivatives Market in China

Regulations in China

China's Security exchanges are regulated by five bodies under a single unit. All the derivative exchanges including Dalian Commodity Exchange (DCE) and Zhengzhou Commodity Exchange (ZCE) are controlled by the Five bodies as shown below:

[71] The emergence of agricultural commodity markets in China, China Economic Review (2006)

Figure 18 Security Exchanges Regulation body in China; CSRC

01 China Securities Regulatory Commission(CSRC)
It performs coordination, supervision and administration of National securities and Futures markets in accordance with laws, regulations and authorization of the state council of People's Republic of China

02 China Future Association(CFA)
It is a national self disciplinary non profit organization of Chinese future market that promotes and develops Chinese future industry, provides certification and registrations to future professionals and imparts market education.

03 China Futures market Monitoring Centre(CFMMC)
It is also a non profit organization established by the State Council and China Securities Regulatory Commission. Its main function include futures market operation, integrating futures investor account opening, providing investor trading /settlement information lookup etc.

04 Futures Exchange
It facilitates centralized trading of futures, supervises future trading and implements self regulatory management

05 Security Regulatory Bureau
It is a subsidiary of CSRC. It assists CSRC in regulating China futures market in unified and centralized manner.

Appendix E. - A Brief History of Tanzanian Derivatives Market

Tanzania Mercantile Exchange (TMX): The establishment of Tanzania Mercantile Exchange (TMX) was the idea of the president Jakaya Kikwete as he got influenced by the Ethiopia commodity exchange and wanted to replicate a similar model in Tanzania. The exchange was incorporated on 25th August 2014 to perform the business of commodity exchange in Tanzania. Subsequently the major events that occurred in TMX are represented in the schematic below:

Figure: Evolution of Tanzania Mercantile Exchange (TMX)

Tanzania Mercantile Exchange (TMX) is an organized marketplace, providing a platform for farmers to access the domestic and global market better and receive a fair price in selling their produce. The exchange has been established as a public private partnership company. The first four shareholders are the Treasury Registrar, TIB Development Bank, Public Service Pension Fund (PSPF) and the Tanzania Federation of Cooperatives (TFC).

Table 19 List of Agri commodities traded in TMX

Agri commodities traded in TMX			
Sesame seeds	Green Grams	Chickpea	Raw Cashew Nuts

Source: Tanzania Mercantile Exchange Wikipedia

However, Information on trading volumes is not present on public domain.

Appendix F. - Estimating the market potential/demand of warehousing receipt finance in India

▪ Methodology followed for estimating the demand

- ***Production analysis:*** We started with analysing the total production (at district level) of all non-perishable crops over the Rabi and Kharif season (MoAFW - Area and Production Statistics).
  - ❖ For eg: The total production of Wheat in the year 2018-19 for Khandwa district was 5.2 Lakh MT (A).
- ***Deriving marketable surplus:*** From the total production volume of a crop in each district, we derived the marketable surplus (market sales volume after removing the volume for self-consumption).
  - ❖ For arriving at the marketable Surplus, we multiplied the crop production (A) to the Marketable Surplus ratio (B) to arrive at crop wise quantity in state which is available for storage or trading.
  - ❖ Marketable Surplus ratios are taken from Ministry of agriculture and farmers welfare statistics.
  - ❖ For eg: Taking a Marketable Surplus ratio of 73.58% (B), the volume of the Wheat remaining for storage or trading comes down to 3.8 Lakh MT (C)
- ***Estimating government procurement*:** The remaining volume available for storage and trading was then adjusted for the government procurement of selected crops. To ensure MSP to the farmers and availability of food grains to the weaker sections at affordable prices, the government procures 22 crops.
  - ❖ We estimated the volume procured by Food Corporation of India (FCI) for all eligible crops and subtracted it from the marketable surplus volume (C) to arrive at the volume now available for storage or trading.
  - ❖ For eg: Assuming 36% (D) of Marketable Surplus of Wheat is procured by the government, the actual volume available for storage and trading remains 2.45 Lakh MT (E)
- ***Calculating value of the produce available in the market for storage/trading:*** We also collected the average mandi prices of all crops from a market to estimate the value of the produce available in the market for storage/trading.
  - ❖ For e.g.: Taking the average mandi prices for Wheat as INR 18,500/MT (F), then the total value of Wheat available for storage or trading is ~INR 454,57,60,305 or INR 454 Crores (G) [G=E*F].
  - ❖ Total Value of the produce available in the market for Storage/Trading= [(Total Production*Marketable Surplus Ratio) - (Volume of Produce Procured by Government)] *Average Price of the product.
- ***Estimating the warehouse capacity and availability of each district***
- ***Total Demand of Warehouse Receipt Finance Market in India***

<u>Calculation steps followed for estimation:</u>

1. Volume of the produce as per the data obtained from Ministry of agriculture and farmers welfare website (Area and Production Statistics) = A
2. Marketable Surplus Ratio (%) = B
3. Volume of the produce available after removing the volume retained by farmer for own consumption (C)=A*B
4. Percentage of Marketable Surplus procured by the government (%) = D
5. Volume of the produce available after removing volume procured by government (E)= [E=C-(C*D)]
6. Value of the produce available for storage/trading(G)=E*F This value will be further adjusted with the warehouse capacity and availability of each district.

Once we estimated the total value of the produce available in the market for storage or trading, we identified the crops that account for 90% of this value and shortlisted them for our study. The crops considered for analysis are: