Final (I) report

Future Market for Agriculture Commodities in India

Brajesh Jha
Sangeeta Chakravarty

Research Assistance
Deepak Kumar and Shilpy Nagalia

Study Sponsored by

Ministry of Agriculture and Farmers Welfare
Government of India

Institute of Economic Growth
University of Delhi Enclave (North)
Delhi – 110007

June 2021

Preface and Acknowledgement

The study on the future market for agricultural commodities is a self-initiated study approved by the Research Advisory Committee (RAC) for the Agro-Economic Research Division of the Ministry of Agriculture and Farmers Welfare (GOI), New Delhi. The study was approved by RAC with some suggestions. The Committee (RAC) members were interested to know the feedback of stakeholders of the future market, and how the future market can help in reforming the price policy for agricultural commodities in India. After approval of the RAC, the study was resisted in "The AERC/Us Directors' Meeting on Coordination of studies" with an impression that the study was not important. However, the role of future trade can hardly be overemphasized in an open economy. It is an inescapable route to a market economy, and a study on Future Market from the network of Agro-Economic Research Centres and Units (AERC/Us) is all the more important.

It is all the more important as confusion about future trade in agricultural commodities prevails. It is often criticized to encourage speculative activities that cause inflation in commodities. Though there is evidence of other kinds too, there are reports of farmers (through Farmers' Producer Organisations (FPOs) participating in the trading platform of a multi-commodity exchange. The present study, therefore, attempts to look into different issues with the following specific objectives:

i. To ascertain the trade of agricultural commodities in future exchanges in India.
ii. To assess reasons for particular types of distribution of future trade of agricultural commodities.
iii. To understand the profile of stakeholders in the future market of agricultural commodities and constraints faced by them.
iv. To understand volatility in the price of agricultural commodities (wheat, gram, maize, soybean, rapeseed and groundnut) in the future market.
v. To assess efficiency in price discovery of some agricultural commodities in the future market.

This is an all-India study based primarily on secondary information obtained from important agriculture commodity exchanges such as Multi Commodity Exchanges (MCX), Mumbai; National Commodity Derivatives Exchanges (NCDEX), Delhi; National Multi-commodity Exchanges (NMCE) Ahmadabad. Most of the information is collected from the website of these exchanges. The secondary information on commodity exchanges was supplemented with information from Agricultural Statistics at a glance for the year 2018 and Forward Market Commission Reports of several years.

The third objective of the study is about the experience of stakeholders in future trade in agriculture. The completion of the same (objective) requires travel and meeting with stakeholders in the future market, however, it is still difficult with the present status of Covid-19 (as in May 2021). The present situation would hopefully improve with the increased vaccination. This may take time, however for closure of the study present version addressing the concerns of reviewers and others is being submitted as the final (interim) report. Subsequently, as the

situation improves a report (improvement of present version) that addresses the third objective of the study, will be submitted. The final report with answers to the third objective will be submitted following improvement in the covid-19 situation.

The present version of the study was facilitated by discussions with Sri Aleen Mukherjee, Vice President, National Commodities and Derivative Exchanges (NCDEX), New Delhi. He discussed the intricacies of data available on the website of future exchanges (like NCDEX). In addition to Sri Mukherjee, the study was also facilitated by several persons, though it is difficult to identify and name them at this juncture. The authors gratefully acknowledge their contributions to completion of the study.

The study would not have been completed without the help of the supporting research staff of the Institute of Economic Growth. They have constituted the research team in the present work. Mr. Deepak Kumar was involved from the beginning of work in the collection and analysis of a significant part of the work on future trade. Following his sudden exit, Ms. Shilpy Nagalia joined the study and helped in the completion of the present study. Such discontinuation of service of a Research Staff (Mr. Deepak Kumar) without consulting Investigators of the study has affected the work considerably. For instance, the fourth objective of the study on "Volatility" was compromised significantly in absence of a Research Assistant conversant with the statistical package for analyzing such data. Such abrupt change of research staff also affects the timeliness of the study, as new researchers often take time in understanding specific issues in the study.

In addition to the above, investigators of the study are grateful to the Director of the Institute of Economic Growth for providing the necessary infrastructure in preparing the present version of the study. The authors are also grateful to Agro-Economic Research Division in the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers' Welfare for continuous support during the study. The investigators are however responsible for flaws in the study.

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Sangeeta Chakravarty

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I. Introduction

The period following economic reforms of 1991 has witnessed an increasing withdrawal of the Indian state from its role of demand management, though some of these came back after 2004 with the incorporation of the human face in liberalization. Inspite of these initiatives, a decisive shift in favour of a market-driven economy continued across political regimes. The future market is an important institution for the market-driven economy. Nevertheless, with the opening up of trade (mid-1990s with the WTO), domestic prices of agricultural commodities were increasingly aligned with international prices, and this alignment has increased the price volatility of agricultural commodities in domestic markets (Jha 2009).

Against this backdrop of growing uncertainty in prices, farmers' resource allocation has hardly a firm signal. They need a forward-looking rather than the past years' price for allocation of their land. This highlights the importance of futures markets, as it increases price discovery and reduces price volatility. Accordingly, prohibition in the future market of many agricultural commodities was removed in the year 2003.

In India the futures commodity markets have a long history, the first organized futures market to trade in cotton derivatives was established in Bombay in 1875, this was followed by futures trade in oilseeds in 1900, raw jute and jute products in Calcutta in 1912, wheat in Uttar Pradesh in 1913 and bullion in Bombay in 1920 (Bhattacharya, 2007). The inter-war period saw the flourishing of futures markets throughout the country in many other commodities such as groundnut, groundnut oil, castor seed, rice, sugar, precious metals (gold and silver) etc. However, the Great Depression and the Second World War have led to fear of shortage of essential commodities and a virtual ban on futures trade in these commodities.

In the post-independence period, a legal framework for the recognition of Exchanges and regulation of forward contracts in commodities all over the country was provided by the enactment of central legislation called the Forward Contracts (Regulation) Act, 1952. The country however continues to ban future markets for a large number of commodities following the syndrome of shortage of essential commodities and the Essential Commodities Act, 1955. In the mid-1970s futures trade was allowed only in the selected few spices like commodities (pepper and turmeric). After decades of prohibition of future trade in most of the commodities, the first major push towards the re-introduction of futures trade in agricultural commodities came

with the recommendation of the Kabra Committee in 1993. This was followed by the National Agricultural Policy, 2000 which also expressed support for commodity futures.

A turning point in the history of the commodity futures market came in the year 2003 when prohibitions in future trade of many agricultural commodities including some essential commodities (wheat, rice, pulses, and sugar), were completely removed. Not surprisingly then, the period after 2003-04 has seen phenomenal growth in futures markets of agricultural commodities across the country; though it tapered off in subsequent years. The share of agricultural commodities in the total value of trade in the future market has declined consistently during the period.[1] (Sen 2008, FMC 2011,). Interestingly, Farmers' participation in future trade remains dismal.

Infact in subsequent years of the opening of futures, different kinds of restrictions on fear of speculation were frequently imposed on specific commodities. The future market in agriculture was criticized as an instrument for speculation activities. This is more in the case of agricultural commodities where future trade was not necessarily backed with the physical delivery of the commodity. Another discouraging issue in the future market is the low participation of farmers, though of late there have been reports of benefits of farmers' participation from the selected region of the country.[2] Therefore future market in agricultural commodities needs to be investigated for its allegiance.

For any investigation of the future market, it is necessary to know the structure of futures. The Commodity Exchanges in India is a two-tier structure: regional and national (countrywide). The regional exchanges are permitted to have only a limited number of contracts whose membership is local. The countrywide national exchanges are multi-commodity electronic exchanges with a demutualized ownership pattern. Currently, there are three such exchanges, MCX (Multi Commodity Exchange), NMCE (National Multi Commodity Exchange) and NCDEX (National Commodities and Derivatives Exchange).

[1] Agriculture in terms of its share in total value of commodities traded in future exchanges was the largest (68.2 per cent) in 2004-05; subsequently it declined and in 2019-20 it was mere 6.5 per cent.

[2] According to NCDEX, over 2500 small and marginal farmers from 13 Farmer Producer Organisations (FPOs) have hedged their crops successfully on its trading platform, in the past 10 months. In this regard, it was noted that Samriddhi Mahila Crop Production Co. Ltd., a Farmer Producer Organisation for women in Bundi district of Rajasthan with 2300 members, used the NCDEX exchange to sell their soybean and mustard crop at a price higher than the price in the wholesale markets. Many of these farmers have successfully mitigated price risks in a bumper harvest year. (NCDEX 2018).

The MCX (Multi Commodity Exchange) is the leading derivatives exchange with a market share of 91.6 percent in terms of the value of the commodity (futures contracts) traded in the financial year 2019. MCX started its operations in 2003 and operates under the regulatory framework of the Securities and Exchange Board of India (SEBI). The MCX has 700 registered members.

The NCDEX (National Commodities and Derivatives Exchange) is a public limited company incorporated in 2003 under the Companies Act, 1956. It started its operation in 2003. The NCDEX is regulated by the Securities and Exchange Board of India (SEBI). From March 31, 2018 onwards, the exchange offered trading in 23 commodity contracts, which has included 19 agricultural commodity contracts. (SEBI 2019)

The NMCE (National Multi Commodity Exchange) was launched in 2002 as India's first online, demutualized commodity exchange by a group of Indian commodity-based corporations and public agencies, and listed its first contracts on 24 commodities in 2002. From 2016, the NMCE listed future contracts on a total of 13 different commodities, ranging from oils and oilseeds, to rubber, sacking, raw jute, coffee, Isabgul seed, chana, pepper, and cardamom. India's commodities market space received a fourth exchange competitor named the Indian Commodity Exchange (ICEX) in 2009 but it closed its major operation in 2014. In 2017, NMCE and ICEX were merged, the combined exchange is India's third-largest commodities market (ranked after MCX and the NCDEX); this offers contracts on oils and oilseeds, coffee, rubber and spices.

The derivative market is governed by Central legislation, (Securities Contract Regulation Act, SCRA, 1956) and is regulated by the Stock Exchange Board of India (SEBI), following the merger of (erstwhile) Forward Market Commission (FMC) with it in September 2015. Currently, both futures and options are permitted in the Indian commodity derivative market. The price of derivative contracts of agricultural commodities is anchored on the domestic spot price, while the prices of non-agricultural commodities (except for gold and silver derivatives) are aligned with the global prices.

The functioning of the futures market for agricultural commodities depends on the spot market and its openness (kinds of restrictions), transparency, and efficiency. However, with restrictions of the Essential Commodities Act of 1954 and the Agricultural Produce and Market Committee (APMC) Act of 1963, the agricultural market has been restricted. Since the mid-nineties Union government has been trying to liberalize domestic markets for agricultural commodities. The

APMC Act was reincarnated in September 2003 as the Model APMC Act (State Agricultural Produce Marketing Development and Regulation Act, 2003). The model Act attempts to address many ills in the regulated market (due to APMC Act.). This includes the establishment of private markets and provides alternate options for farmers. Besides other advantages, this mandates for common registration of market functionaries to operate in one or more market areas and others.

All these would improve price discovery, transparency, and ease of marketing by providing alternate options to farmers. This would improve delivery in the future market for agricultural commodities. The extent of adoption of the model APMC Act, however, varies across the states and the idea of one nation and one market remains remote. The Union government in April 2016, has set up electronic platforms (eNAM) for farmers to sell their produce directly to distant consumers (market) using an electronic auction system. However, the e-NAM could not succeed with (the continuance of) different kinds of restrictions on market functionaries as per the APMC Act; therefore the Model APLMC (Agriculture Produce and Livestock Market Committee) Act, 2017 came into force. The APLMC Act was also not sufficient for a unitary market structure, and more recently (September 2020) farm laws have come into existence. These efforts for the opening of the spot market for agricultural commodities may slowly bring advantages to future markets also.

With this background of the spot market, the unsatisfactory performance of the futures market is not unexpected, but future trade is an indispensable instrument for the privatized economy. Therefore future market in agricultural commodities has to succeed. The present study on futures markets for agricultural commodities is an effort. The study addresses many concerns with future trade for agricultural commodities. This analyzes the extent of penetration of futures exchanges for agricultural commodities and ascertains reasons for particular kinds of patterns in futures. It discusses further benefits of future trade for some commodities and finally analyses the experiences of stakeholders of the future market.

The subsequent chapter (Chapter 2) of the report reviews the existing literature on future and spot markets for agricultural commodities. Chapter 3 describes the pattern of futures trade in agricultural commodities in India. Chapter 4 contains data, approach, methodology, and empirical results related to volatility and efficiency of the market. This chapter also discusses the effect of the futures market on price inflation in the commodity. The report ends with the conclusion and policy implications in the last chapter.

II. Review of Literature

The futures trade in agricultural commodities has been the subject of discussion as this has broader implications for food prices, food availability, and poverty in the country. This has the potential to affect the lives of millions of producers and consumers, unlike the trade (future) in gold and silver. Therefore the opinions on the impact of futures trade in agricultural commodities are often divided.

The proponents of futures trade in agricultural commodities rationalize it, as the benefits of deepening such trade are large. Some of such benefits are, as it provides an additional tool for price discovery, and may enable farmers for a better price of their produce. This also helps participants in risk management, as they can hedge from uncertainty in the volatile spot price of the commodity. These benefits help participating farmers, for better decisions about crop production and marketing. The successful working of the futures market helps the transmission of information between futures and spot markets and strengthens the spot market for agricultural commodities.

On the contrary, some studies argue that future trade does not reduce price volatility as is claimed by the advocates of futures trade in agricultural commodities. Some other studies report that future trade is hardly a tool for farmers to benefit; it is more for the benefits of speculators. A few studies argue that future trade in agricultural commodities increases inflation when Indian consumers are highly sensitive to prices and agricultural commodities account for more than 70 percent of the average consumer's consumption basket.

The present chapter on review of literature attempts to contribute on the above discussions. The literature on the subject of future trade in agricultural commodities has been reviewed for the performance of future market which is discussed on the basis of price discovery, price volatility and risk management roles of futures markets in agricultural commodities.

Several studies have examined the price discovery role of futures markets in selected agricultural commodities. The role of the futures market in price formation in the spot market has been evaluated by the techniques of co-integration, the same has been used to establish a long-run (equilibrium) relationship between spot and futures prices of agricultural commodities. An equilibrium relationship is said to exist between spot and futures prices when the two price series are co-integrated.

Lokare, (2007) found that the causal relationship between futures and spot prices (futures price leads the spot prices or vice-versa) of commodities studied are mixed and inconclusive. He (Lokare) while exploring the relationship and co-movement between spot and futures price of commodity found evidence of co-integration in both spot and futures prices in most of the commodities (pepper, mustard, potato, sesame seed, etc.) that were traded in futures markets and for which data were available. This co-integration reflects the improved transmission of information in both spot and derivatives markets and enhances the operational efficiency of the future market for agricultural commodities.

Raveendaran et al (2009) in a study on Indian pepper analyze the lead-lag relationship between futures and spot prices of agricultural commodities. They used Johansen's vector error correction model (VECM) to test co-integration between futures and spot prices of pepper in the Cochin market during January 2004 and March 2007. They found that it is the futures prices of pepper that influence the spot prices and not vice-versa.

Another study by Ghosh, et al (2009) that examines the future market of wheat for volatility and price discovery found a weak correspondence between futures and spot prices of wheat. Their findings based on a co-integration analysis failed to confirm any binding relationship between the two price series. A Granger causality test at the first difference, finds some indication of the flow of information from futures to the spot market. However, the futures price did not seem to have led the market price, especially in its upward trajectory. Their results suggest that the spot price has influenced the futures price of wheat at least in few cases.

Besides price discovery, futures trade in agricultural commodities is also appreciated for its role in risk management. Hedging is generally considered as an instrument for risk management and the attractiveness of the same in futures depend on the basis risk of the commodity. The basis risk is the variance of the observed difference between spot and futures prices of the commodity (in every contract of the commodity) while price risk is the variance of spot prices in the commodity. Hedging can be used as an effective instrument of risk management (by those holding physical stocks of the commodity) if the basis risk is less than the price risk. Infact, hedging does not reduce business risk if the basis risk is as large as the price risk.

The effectiveness of hedging as a price risk management tool can be evaluated by analyzing the ratio of basis risk to the price risk of the commodity. These ratios are categorized

into three groups: greater than 1 (high risk), between 1 and 0.5 (moderate risk), and less than 0.5 (low risk). The ratio of less than 0.5 would encourage hedger to use the futures market for price risk management. (Naik and Jain, 2002).

Naik and Jain (2002), using time series data (for the period between 1990-2000) worked out the above indices for castor seed, pepper, turmeric, potato, guar, and also hessian. They found considerably high basis risk in all commodities except castor seed and pepper. Similarly, Lokare (2007) reports that the basis risk is higher than the price risk in cotton (S-06), gur, mustard, potato, rubber, safflower oil, and wheat in the majority of contracts analyzed. A high basis risk for these commodities suggests that hedging as an instrument for risk management has not been effective. However, in pepper and castor seed a low basis risk in the majority of the contracts suggests that hedging is an effective proposition for these commodities. At the same time, several other commodities such as rice, sesame oil, sesame seed, and sacking reported moderate risk involved in trading. These mixed results, (according to him), are indicative evidence of the developing state of the market.

Another study by the Indian Institute of Management, Bangalore (IIMB) commissioned by the Forward Markets Commission (FMC) to study the impact of Futures Trade in some important agricultural commodities arrived at somewhat similar results. The IIMB study found that basis risk was higher than spot risk especially in wheat and sugar for nearly 50 percent of the contracts. This indicates a high risk in the hedging of these essential commodities. Whereas in guar seed and pigeonpea (tur) the basis risks were small, and this was lower than the spot price risk. This reflected the attractiveness of futures trade for price risk management in these commodities (IIMB, 2008).

In 2008 Sen in a Government-commissioned study, about the inflationary role of the future on agricultural commodities, found that in tur and rice, futures trade has not led to a rise in spot prices. However, in the case of wheat and urad, it did find that inflation had increased after the introduction of futures trade in these commodities. They also cite the findings of other studies, wherein spot price in the post-exchange period has increased in most of the crops studied (except sugar) such as gram, guar seed, wheat, urad, and tur. However, the increase in spot prices of these commodities caused solely due to futures trade remains unclear. The upward pressure on prices may also be due to supply-side factors.

The above studies present mixed pieces of evidence on the risk management and price discovery roles of futures markets in agricultural commodities. Such results restrict us from drawing unconditional inference about the futures in agricultural commodities in India. This suggests further investigation into the characteristic of commodities for a futures trade. The investigations suggest that the penetration of futures in a commodity reflected with futures multiplier will help in drawing conditional inference about the role of futures.

Futures multiplier is the proportion of the volume of futures trade in the production of a commodity. A high futures multiplier is likely to widen the divergence between spot and futures markets and it tends to expose futures markets to "excessive speculation" (Sen, 2008; Sahadevan, 2014). This implies that futures markets have not been able to incorporate all the relevant information on future demand and supply of the commodity; therefore, it is giving distorted signals of price discovery of future spot prices due to excessive speculation. This also causes price inflation of the commodity. This undermines the ability of futures markets to act as an effective hedge against price risk in their spot markets.

If we look at the futures multiplier of some of the agricultural commodities in India and compare it with the internationally accepted benchmark (for future multiplier), we find that it is either too low or too high. For instance, the futures multiplier of wheat in 2010-11 was only 0.03 in India compared with the world market benchmark multiplier of 28. For the kind of government regulation, a low future ratio is not unexpected. In pepper, the future multiplier was reported high at 80, while the world benchmark multiplier was 20 for the commodity. Similarly, mentha oil, guar seed, and guar gum too recorded large trade volumes in the future market, relative to their (total) production in the country (Sahadevan, 2014). In other words, in commodities with high futures multipliers, the speculators, rather than hedgers dominate the future market, this leads to high volatility in the spot markets.

The efficiency of futures markets requires not only low basis risk relative to spot price risk and co-integration between spot and futures prices, but it also requires that variances of spot and futures prices are equal. Alternatively, a widely accepted index of volatility in the existing literature on the subject is given by the ratio of standard deviations of futures and spot prices. A ratio close to one indicates that futures price can incorporate information efficiently, while a ratio greater than one indicates speculative activity in the future market. The ratio of less than one

shows that markets are not being able to incorporate information fully and efficiently (Naik and Jain, 2002).

In sum, a review of past studies shows that the future market is an important tool for development. It helps farmers in managing price risk by hedging, but the potential of hedging varies across commodities which largely depend on future ratio. The related norms suggest that farmers gain by hedging if the basis risk is lower than the price risk. Previous studies that encompass different periods for analysis show that basis risk is higher than price risk in cotton, guar, mustard, potato, rubber, safflower oil, sugar, and wheat; while the basis risk is lower than price risk in castor seeds, guar seed, pepper, and tur (pigeonpea).

About the implication of future trade on inflation, previous studies suggest that chances of speculation in the future market increase, if the future multiplier of a commodity is high as in the case of pepper, mentha oil, guar gum, and guar seed. Evidence and experience suggest that future markets work properly if the future multiplier is around thirty, though it appears to vary across commodities and markets. The future market does not work properly, if Government regulation/interference persists in the domestic market, as is the case of wheat and sugar.

In addition to the above issues on the futures market, the present study also examines (market behavior) the lead-lag relationship between future and spot prices of commodities with Contango and Backwardation, and finally works out the efficiency of the futures market in the selected commodity (chana, soybean, wheat, maize kharif, and rabi). This also looks into the issue of farmers' participation in futures markets in India.

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III. Pattern of Futures Trade of Agricultural Commodities

The present chapter on the pattern of futures trade of agricultural commodities in India investigates, what are the commodities traded in different future exchanges of the country? Why certain commodities are traded but not others? These are examined through secondary information, and the chapter is divided into two sections. The first section discusses broad trends of trade (in agricultural commodities) in futures exchanges. It examines the composition of such trade in the value and volume of futures trade in agricultural commodities over time. The second section tries to understand the reasons for particular types of distribution of future trade of agricultural commodities. In so doing, it explores the plausible reasons for certain kinds of trends in agricultural commodities.

Section 3.1: Future Trade in Agricultural Commodities

The turning point in the history of the commodity futures market came in the year 2003 when most of the prohibitions on futures trading that had hitherto been imposed, for some essential and sensitive commodities (wheat, rice, pulses, and sugar), were removed. Not surprisingly then, the period immediately after 2003-04 has seen phenomenal growth in both the volume and value of commodities traded in futures markets across the country. The commodity group-wise value of trade in futures in all the Indian exchanges (taken together) since 2004-05 is displayed in Table 3.1.

Table 3.1: Commodity Group-wise Value of Trade (Rs. Lakh Crore)

Commodity Groups	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2010-11**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Bullion n Other Metals	1.8	7.79	21.29	26.24	81.82	34.6	35.96	37.94	34.78	40.94	45.34
Agriculture	**3.9**	**11.92**	**13.17**	**9.41**	**14.56**	**10.29**	**11.63**	**7.73**	**7.4**	**6.5**	**5.85**
Energy	0.02	1.82	2.31	5	23.11	16.46	19.37	19.32	17.93	24.51	38.15
Total	**5.72**	**21.55**	**36.77**	**40.65**	**119.49**	**61.35**	**66.96**	**64.99**	**60.12**	**71.97**	**89.33**

Source: SEBI (Stock Exchange Board of India) Annual Reports for various years for the recent data. Forward Markets Commission Annual Report (2010-11) for corresponding year and Sen (2008) for the data of earlier years (2004-08).

The aggregate value of trade in commodity futures had increased sharply by nearly 21 times, (from 5.7 to 119.5 lakh crores) between 2004-05 and 2010-11. Subsequently it declined to nearly half of the value (of 2010-11), to 61 lakh crores, by 2017-18. It registers further decline of agricultural trade. Incidentally, total annual turnover during the period (2017-18 and 2019-20) has increased by 49 percent (from 60 to 89 lakh crores). Taking the entire period of reference (between 2004-05 and 2019-20), the aggregate value of trade in futures commodities rose by nearly 16 times (from 5.72 to 89.33 lakh crores).

While the total value of trade in all the commodity groups (taken together) rose by nearly 16 times (between 2004-05 and 2019-20), the value of trade in agricultural commodities alone increased by merely 1.5 times (from 3.9 to 5.85 lakh crores) during the period. The future trade for agricultural commodities increased by around four times (from 3.9 to 14.6 lakh crores) by 2010-11, subsequently, it fell to nearly half its level by 2017-18. A declining trend in future trade-in agriculture continued thereafter (till 2019-20).

More importantly, the share of agricultural commodities in the total value of future trade during the reference period has been declining consistently (Table 3.2). It has declined from being the largest contributor in terms of its share in the total value of commodities at 68.2 per cent in 2004-05 to a mere 12.2 per cent in 2010-11. Though it registered an increase of more than five per cent from 12.2 to 17.4 per cent between 2010-11 and 2015-16, the share of agricultural commodities in the total value of trade has been declining and the same was reduced to a mere 6.5 per cent by 2019-20. The Bullion and other metals' constitute the single largest group of commodity, followed by "Energy". The share of energy has increased consistently during the reference period.

Table 3. 2: Commodity Group-wise Shares (%) in Total Value of Trade

Commodity Groups	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2010-11**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Bullion n Other Metals	31.5	36.1	57.9	64.6	68.5	56.4	53.7	58.4	57.9	56.9	50.8
Agriculture	68.2	55.3	35.8	23.1	12.2	16.8	17.4	11.9	12.3	9.0	6.5
Energy	0.3	8.4	6.3	12.3	19.3	26.8	28.9	29.7	29.8	34.1	42.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: SEBI (Stock Exchange Board of India) Annual Reports, Forward Markets Commission Annual Report (2010-11) and GOI (2008) Report.

If we look at the distribution of the value of agricultural commodities traded across various exchanges in India, we find that NCDEX, accounts for a disproportionately large share of the trade in the value of agricultural commodities. It is the single largest national exchange for trade in agricultural commodities (Table 3.3). As much as 86 per cent of the total value of agricultural commodities was traded in NCDEX alone; while its share in the total value of trade in all commodity groups was around 15 per cent in 2015-16. Even though the share of NCDEX in both the total and agricultural value of trade has declined over the last five years, more than three-fourths of the total value of trade in agricultural commodities is still (in 2019-20) accounted for by NCDEX.

In sharp contrast, another national exchange, *viz*., MCX, has the largest share in the total value of trade in commodity futures, it ranges between 84 and 94 per cent over the last six years between 2014-15 and 2019-20. However, its share in the value of trade in agricultural commodities was relatively low at 10.7 per cent in 2014-15 but has steadily increased over time to 17.3 per cent by 2019-20.

Table 3.3: Shares of Various Exchanges in Agriculture and Total Value of Trade (%)

	Share of agriculture to total value of trade traded in							
	MCX		**NCDEX**		**NMCE**		**Others**	
Year	**Agriculture**	Total	**Agriculture**	Total	**Agriculture**	Total	**Agriculture**	Total
2014-15	**10.7**	84.5	**84.6**	14.7	**3.5**	0.6	**1.1**	0.2
2015-16	**10.5**	84.1	**85.9**	15.2	**2.5**	0.4	**1.1**	0.2
2016-17	**18.0**	90.2	**77.2**	9.2	**3.7**	0.4	**1.1**	0.1
2017-18	**15.4**	89.5	**79.5**	9.8	**4.7**	0.6	**0.4**	0.1
2018-19	**15.5**	91.6	**81.5**	7.4	**2.1**	0.2	**0.9**	0.8
2019-20	**17.3**	94.0	**75.6**	4.9	**0.0**	0.0	**7.1**	1.0

Source: SEBI Annual Report, Various issues

The two biggest national exchanges of India, NCDEX and MCX, together accounted for as much as 99 per cent of total value of trade in commodity futures and 93 per cent agricultural value of trade in commodity futures in the year 2019-20. An examination of the NCDEX and MCX data on the value and volume of agricultural commodities traded reveals that some of the top agricultural commodities traded in India have been traded in these exchanges. While several agricultural commodities (cereals, pulses, oilseeds, spices, commercial crops, and fibres) were

approved for trading in future (national and regional) exchanges, a careful study of the data shows that actual trade happens in a limited number of commodities only. For instance, in 2015-16, though futures trade in agricultural commodities was permitted in 43 agricultural commodities, future trade activity took place in only 28 of those permitted at various exchanges of India (SEBI 2016). The broad categories of agricultural commodities are the unprocessed farm produce (wheat, soyabean, corn, rice, spices), processed farm produce (oils, oil meals, sugar), livestock and forestry (dairy, marine, plantations).

Table 3.4 shows important agricultural commodities that have been traded in futures exchanges over the years. It is based on the share of the commodity in the annual turnover of agricultural commodities of all exchanges. Some of these commodities include guar seed and guar gum, soyabean and soy oil, gram/chana, castor seed, rapeseed/mustard seed, crude palm oil, mentha oil and spices (jeera and pepper). For instance, the share of guar seed in total agricultural turnover of all the exchanges over the last two years (for which data is available) is the highest at 18 per cent, while that of soyabean has been around 9-10 per cent. The contribution of castor seed has fluctuated between 6-11 per cent while that of gram has remained consistent at around eight per cent of the total value of trade in agricultural commodities.

Table 3.4: Top Agricultural Commodities Traded at Futures Exchanges

Sl. No.	Commodity	Share in total Agriculture turnover of all future exchanges (%)				
		2018-19	2017-18	2016-17	2015-16	2010-11
1	**Guar seed**	18	18.1	11.8	9.9	17.5
2	Castor seed	10.9	6.2	..	..	..
3	**Soybean**	9	10.3	..	..	..
4	**Guargum**	8	8.7	..	..	3.4
5	**Chana/Gram**	8	7.6	..	13.8	8.7
6	**Soy Oil**	..	10	16.6	12.3	23.7
7	Rapeseed/Mustardseed	..	5.7	11.8	0.6	..
8	Crude Palm Oil (CPO)	..	5.7	7.6	3.8	..
9	Cotton	..	5.6	..	..	..
10	Jeera (Cumin seed)	..	4.4	..	..	4.2
11	**Mentha Oil**	..	4	..	..	4.2
12	Pepper	..	0.02	..	..	5.8
	Total	53.9	86.32	47.8	40.4	67.5

Source: SEBI Annual Report, Various issues

Furthermore, a closer inspection of NCDEX and MCX data on the volume and value of agricultural commodities traded over time reveals that while some of the cereals such as barley and maize continue to be traded in futures markets, similar other commodities such as jowar and bajra were largely excluded from such trading. On a similar line, the oilseeds such as soybean, rape and mustard seed, and castor seed are traded regularly in the future market, while other oilseeds such as groundnut are not. Against this backdrop, it will be interesting to know the pattern of trade of agricultural commodities in the futures markets of India. Are there any specific reasons behind such trade? The next section seeks to explore factors that might account for a particular type of distribution of agricultural commodities.

Section: 3.2 Possible Reasons for Future Trade

The discussion above suggests that future trade is allowed in many agricultural commodities but actually, it is being practiced (consistently) in some (commodities only). For the trade of commodities in the future market, the commodity must be homogeneous and storable. It is also necessary that the commodities are not very important in an average consumer's basket; alternately, there must be close substitutes of the commodity in the consumers' basket. The demand-supply condition referred to as marketable surplus is large for the commodity. The production or distribution (or both) of a commodity is highly concentrated and future trade helps in price discovery. The commodity should be relatively free from government regulation. Many of the above characteristics may result in volatility in the price of the commodities that would require future market (trade) to hedge. In addition to these, the futures market for agricultural commodities in India is crucially shaped by shifts in trajectories of global growth, changes in domestic, trade and tariffs policies, commodity-specific factors and weather conditions.

The commodities such as rice and wheat, which have implications for a nation's food security and whose trade is regulated by the government, make them unsuitable for trading in futures exchanges. The concentration in the production of a commodity in the present study is reflected in the state-wise distribution in aggregate production of the commodity. The concentration in distribution of a commodity is reflected here with its use, for industrial purposes or trade (export or import).

Table 3.5 provides the concentration in the production of some agricultural commodities which are important in the future trade (market). This is based on the average production of the commodity in important states for the years 2016-17 and 2017-18. A cursory glance at Table 3.5 shows that the production of most of the frequently traded agricultural commodities is heavily concentrated (among states). This is particularly true of guar seed, castor seed, soybean, crude palm oil (CPO), pepper, jute and mesta. Though production of maize appears distributed across states, it is the particular variety of maize (rabi maize) that is used for poultry feed manufacture.

Table 3.5: Concentration in Production of some important Agricultural Commodities traded in future.

State	% Share in Total Production										
	Guar seed	**Castor Seed**	**Soybean**	**Gram**	**RM Seed**	**CPO**	**Cotton**	**Pepper**	**Jute & Mesta**	**Barley**	**Maize**
Andhra Pradesh		1.3		4.7		**88.6**	5.3				7.2
Assam					2.3			4.1	7.9		
Bihar					1.3				14.3		9.4
Chattisgarh				3.3							
Gujarat	3.5	**83.4**		2.7	4.6		**31.5**				
Haryana	14.9				12.7		5.4			4.0	
Jharkhand				2.6	2.6						
Karnataka			1.9	6.4			3.3	32.6			12.6
Kerala						2.3		**59.7**			
Madhya Pradesh			**49.6**	**39.5**	11.7		5.8			15.6	12.6
Maharashtra			35.1	17.0			25.4				**12.8**
Punjab							3.4				
Rajasthan	**81**	12.2	9.1	14.9	**43.4**		4.9			**48.7**	5.5
Tamil Nadu											6.6
Telangana		1.8	2.4			7.5	12.1				9.6
Uttar Pradesh				5.9	11.1					24.5	5.5
West Bengal					7.5				**75.8**		3.4
Others	0.6	1.3	1.9	3.0	2.8	1.6	2.9	3.6	2.0	7.2	14.9
All-India	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100	100.0

Source: Concentration in production is worked out from production data available in Agricultural Statistics at a glance, for some commodities data from Indiastat.com has also been used.

The guar seed, an important constituent of the future market for agricultural commodities, 81 per cent of production is concentrated in just one state of Rajasthan. Similarly, more than 90 per cent of castor seed is produced in just two states, viz., Gujarat and Rajasthan, with Gujarat

accounting for as much as 83.4 per cent of the total production in the country. The soybean is yet another important commodity traded in futures markets, production is heavily concentrated in the three states (Madhya Pradesh, MP 50%, Maharashtra 35% and Rajasthan 9%). The same is true of other important commodities such as Crude Palm Oil (88.6% produced in Andhra Pradesh, AP), pepper (59.7% in Kerala and 32.6% in Karnataka) and Jute & Mesta (75.8% in West Bengal). Mentha oil, though not shown in the above Table (3.5) due to paucity of data, production is heavily concentrated in the state of Uttar Pradesh. In other words, a careful analysis of the data at hand does suggest that concentration of agricultural production is an important factor affecting the futures trade of agricultural commodities in India.

A careful look at agricultural commodities traded in NCDEX and MCX in the last decade shows that futures trade is happening in some of those commodities where trade (export and import) has been important. This is particularly true of commodities such as guar gum, castor, jute, and cotton among others. A plausible reason could be that traders (exporters or importers) are possibly big players who enter into a contract in future exchange to hedge the price risk of commodities in world trade especially exporters. Not surprisingly, guar gum, castor, and cotton are among the top 10 agricultural commodities that are being traded consistently at futures markets. The charts below highlight the trends in India's export of these commodities during 2001-02 to 2017-18.

Figure 3.1: Guar gum Meal Exports

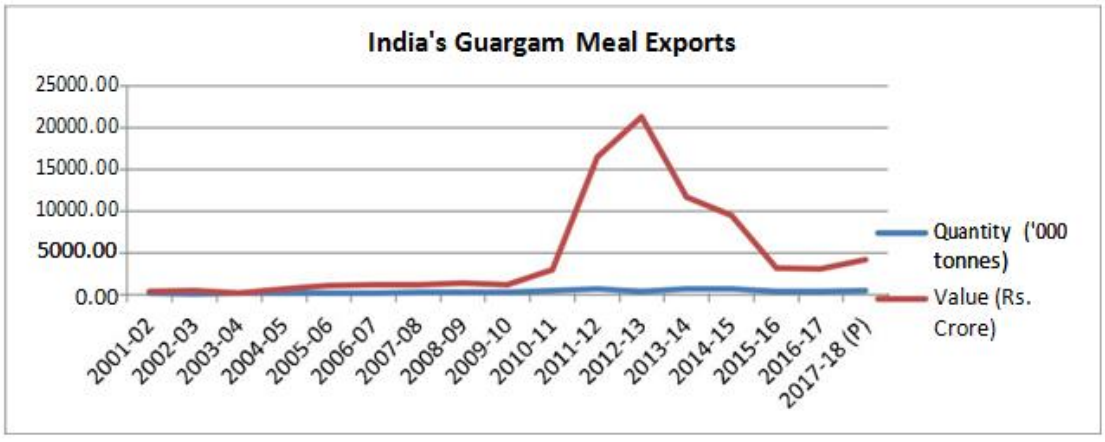


Figure 3.2: Castor Oil Exports

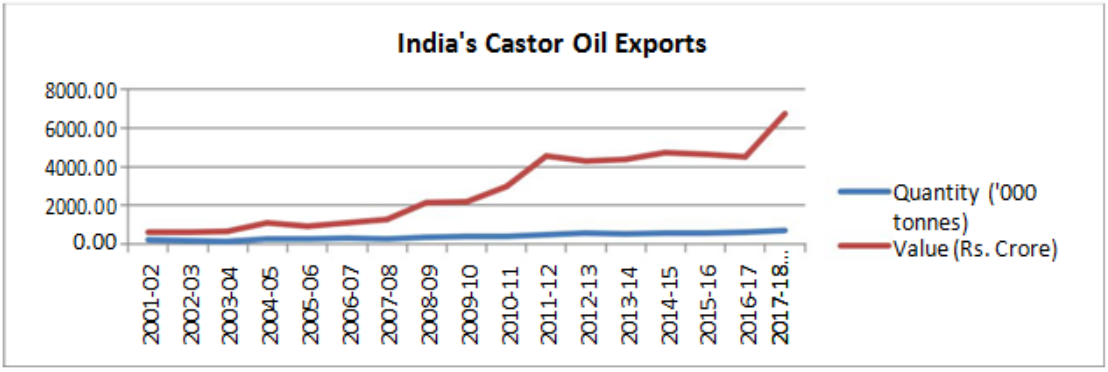


Figure 3.3: Cotton (raw including waste) Exports

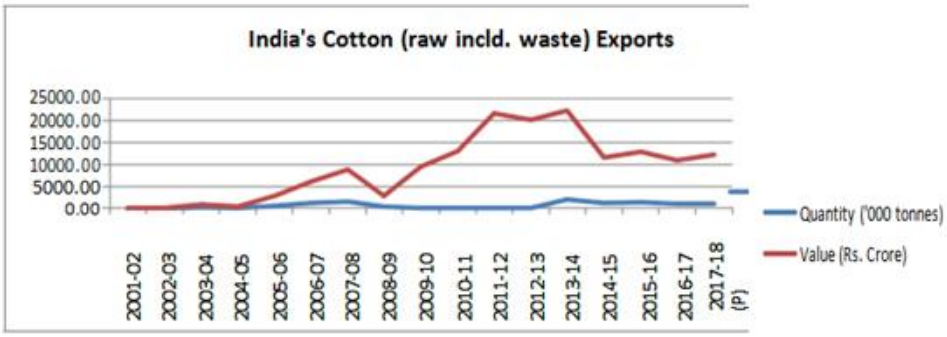
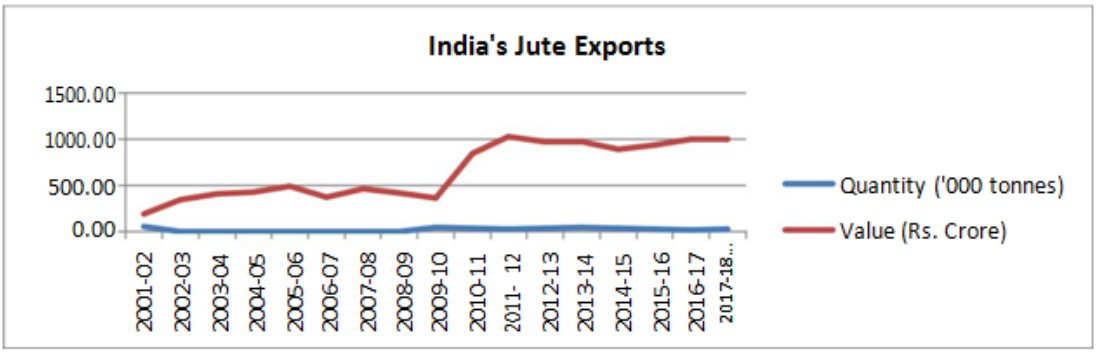


Figure 3.4: Jute Exports



Source: DGCIS (Directorate General of Commercial Intelligence and Statistics) for all trade related statistics.

While international trade could be an explanatory factor behind the dominance of some commodities in the futures market. Similar commodity-specific factors are possible reasons for

future trade. Barley and maize are examples of coarse cereals that are used for industrial purposes. While barley is used in the production of alcoholic beverages (in particular beer), maize is mainly used as animal feed in the poultry industry, though maize is also used in the manufacture of corn ethanol. Their use for industrial purposes makes them desirable for bulk purchase of the said commodity, and purchasers want to reduce risk by participating in the futures markets.

The above discussion on the pattern of future trade in agricultural commodities suggests that the share of agriculture in the future market has increased significantly in the initial years after allowing future trade of agricultural commodities (2003). This has tapered over the years and agriculture now accounts for less than 10 percent of the future trade of commodities in India. Though future trade is allowed in many commodities, in reality, it is practiced significantly for a limited number of commodities only. Even in those commodities, consistency has been a problem. The production and distribution of many of these commodities are highly concentrated and the futures market provides a platform for price discovery. The international trade and industrial use of the commodity are some important determinants of futures trade in agricultural commodities. These factors drive their trade at futures exchanges.

IV. Benefits of Future Trade with some Agricultural Commodities

The future trade in agriculture is an essential step of liberalization in agriculture. Since participating traders' stakes are involved in the future markets, they are supposed to have better information on future demand and supply of commodities, and this may help in the price discovery of commodities. This is also supposed to reduce volatility in the prices of the commodity. Such benefits are assessed with future trade in certain commodities: chana (gram), soyabean, wheat, maize rabi, and kharif crops. The subsequent section discusses data, commodity-specific period of analyses, and major methodologies used to ascertain benefits in terms of volatility and efficiency in prices of commodities. The final section presents the empirical result of the study, concerning the benefits of the futures market for agricultural commodities.

4.1 Data, Choice of Crops and Analytical Methods

The study is based on the secondary data which is collected from National Commodities and Derivative Exchanges (NCDEX) for channa, (variety of gram but not Bengal gram), soyabean, wheat, maize rabi, and maize kharif. The future and spot prices of these commodities were extracted from NCDEX Website, as per the availability of data. The data for the study consists of the daily closing price of spot and future market of commodities, and the same is available for the following period:

Table 4.1: List of selected commodities and their period for analysis

Commodities	From	To
Channa	14 July 2017	16 October 2018
Soyabean	1 January 2014	20 April 2018
Wheat	1 January 2014	12 March 2018
Maize Rabi	1 July 2013	28 March 2018
Maize Kharif	2 January 2014	20June 2017

Source: NCDEX (web site) Statistics.

The above order of commodities in Table 4.1 is based on the quantum of data available in the future market. Future price is not reported on holidays, so the immediate previous price reported is assumed to continue till a new one is declared. Similarly, multiple prices if reported within a day are averaged to generate the daily price of the commodity. This study uses closing

price as an indicative future price. The future price further, relates to individual contracts overlap but do not run concurrently. For analytical convenience, we have considered the contract with the nearest maturity at each point in time. Thus the future prices do not relate to a single contract, but rather to transit from the first contract to the latest through a series of intervening contracts.

To explore the efficiency of futures markets in reducing the price risks faced by farmers in agriculture, this study focuses on the following five crops: wheat, chana, soybean, maize kharif and rabi. The choices of these crops are based on the availability of data. The chana and soybean, exhibit price volatility, thereby making them particularly suitable for the present analysis; these two crops are also among the top few agricultural commodities consistently traded at futures exchanges. These crops also encompass a wide range of commodities from cereals (wheat and maize) to pulses (chana) and oilseeds (soybean).

The wheat and maize constitute a disproportionately large share in total production of food grains (cereals and pulses) in the country. Table 4.2, based on All-India average production for 2014-15 to 2018-19, shows that wheat and maize together account for nearly 45 per cent of total cereal production. Though the percentage share of chana in total food grains is low (3.4%), its share in total pulses is high at 43.2 per cent. Similarly, soybean accounts for as much as 39 per cent of the total oilseeds production during the reference period (2014-15 to 2018-19). In other words, the high contribution of these crops in total production makes the choice suitable and imperative.

Table 4.2: Average All-India Production (in million tonne) of 2014-15 to 2018-19

	Wheat	**Maize (Kharif)**	**Maize (Rabi)**	**Chana**	**Soybean**
Average Production of 2014-15 to 2018-19	95.9 (35.5)	17.9 (6.6)	7.3 (2.7)	9.1 (3.4) (43.2)	11.4 (38.6)

Source: Agricultural Statistics at a Glance, 2019.

Note: 1. The Average Production of Maize (Kharif) and Maize (Rabi) refer to the years 2013-14 to 2017-18.

2. The figures in parenthesis represent percent of wheat to total foodgrain production, similarly maize (kharif), maize (rabi), chana and soybean are percent to total cereals, pulses and oilseeds production respectively in the country.

4.1.1 Methods for Assessing Price Efficiency in Future Market

This section studies behavior of prices in the future and spot market. Behaviour in prices is also assessed with backwardation and contango (of prices) in these markets. Efficiency requires that future and spot markets are related, and both markets have similar volatility of prices. The study uses historical (time series) data for analyzing the relationship between these prices. Volatility is assessed with the ratio of the standard deviation of future and spot price in the commodity. The relations between these prices are also assessed with time-series data. In analyzing the same, stationarity is first checked, it is done with the Augmented Dickey-Fuller tests. Subsequently, it uses Johansson's co-integration test to check the long-run relationship between the variables. The study also uses the granger causality test to check (causal) relation between future and spot prices for each commodity. The behaviour of future and spot prices is also studied by contango and backwardation in price data.

Augmented Dickey Fuller test (ADF)

To study the dynamic relationship between prices in future and spot markets, stationarity in time series data was tested by the Augmented Dickey Fuller test (ADF). All the price variables are in log form, price series are non-stationary at level-I(0), but their first differences I(1)are found to be stationary.

Johansen's Co-integration Test

If the two-time series are non-stationary at the level and stationary at the first difference, then they are said to be integrated of order, I (1). A set of non-stationary time series variables are said to be co-integrated if, the linear combination of the two is stationary. This study has assessed the long-run relationship between the spot price and future price by using the co-integration test developed by Johansen (1991). The test is based on trace and maximum Eigenvalue test.

Granger causality Test

This test is used to investigate the direction of causation between the two variables, spot price (Sp) and future price (Fp) where Sp and Fp are the spots and future price of the selected commodities.

Granger's (1969) approach is used to see whether x causes y, that is, to what extent the current value of y can be explained by past values of y? The addition of the lagged values of x can improve the explanation. The variable y is said to be Granger caused by x if the coefficients of the lagged *x's* are statistically significant. The two-way causation is x Granger causes y
The two-way causation is

x Granger causes y
y Granger causes x

For a pair (x, y) series, the bivariate regression is of the form

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \ldots + \alpha_l y_{t-l} + \beta_1 x_{t-1} + \ldots + \beta_l x_{t-1} + u_t - \quad (4.1)$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \ldots + \alpha_l x_{t-l} + \beta_1 y_{t-1} + \ldots + \beta_l y_{t-1} + u_t - \quad (4.2)$$

The joint null hypothesis for testing is

$$H_0 : \beta_1 = \beta_2 = \ldots\ldots = \beta_l = 0$$

The reported F statistics are used to test the joint hypothesis for each equation.

4.2.1 Graphical Presentation of Spot and Future Prices of some commodities

The following graphs show movements of spot and futures prices for the selected commodities: wheat, maize (kharif and rabi), gram (chana) and soyabean during the sample period. The period of the analysis is based on the availability of data from the NCDEX website.

Figure 4.1 illustrates the daily spot and future price of chana for the period of study from July 2017 to October 2018. The daily data for the reference period shows that both future and spot prices of chana declined during the reference period, though it increased during a certain period (July to August 2017, July 2018). The future and spot price of chana moved together, though it rose above the future price during December 2017. In highly traded commodity like channa future trade were suspended frequently. Previously it was suspended in 2008, more recently in July 2016, such suspension of future trade is the reason behind the lack of periodic data for the study. In commodities like chana future trade was suspended when the price of the commodity increased beyond a certain range, the market regulator (SEBI) however, lifted the ban on future trade following good production of the commodity in crop year (2016-17.

In Figure 4.2, the spot and futures prices of soyabean during the reference period (January 2014 to April 2018), was observed to have hiked around five times; the latest hike was observed in February 2018, the highest recorded hike was during May 2014. A similar scenario was observed in May 2015, October 2015 and April 2016. The period of May 2017 was an exception where the future price fell to an all-time low given the overall period of the study. It has also been observed that spot prices were often higher than the future price when both of them were gradually decreasing.

As per the record, the GOI has restricted future trade in wheat from March 2007 to May 2009 to tame inflation in the commodity. It was being argued that the restriction on future trade in wheat should not be revoked as spot market of wheat was highly influenced by government regulations, as a result, future market for wheat was not effective. The future prices of wheat were consistently below the spot prices during the later reference period (for commodity). A good production of a commodity during that period is possibly the reason behind it (Jha and Mohapatra 2003).

Figure 4.3 presents the spot and future price of wheat for the period between January 2014 and March 2018. The highest recorded future and spot price was observed in December 2016. During the period between October 2015 and March 2016, the spot prices were fairly constant while the future prices were fluctuating. Again the significant difference between the spot and futures prices were observed, from January 2017 to March 2018, when the spot price was comparatively higher than the future price. In 2018, there were periods when prices tend to converge. The above graph also, shows that prices (future and spot) were increasing during the sowing season (October, November, December) while it was decreasing during the harvest season (March, April, May).

Figures 4.4 presents the behaviour of the spot and future price of maize rabi for the period between July 2013 to March 2018. In rabi maize, there were multiple events of decoupling of future and spot prices during the reference period. The first scenario was observed in September 2013 when the spot price was increasing gradually, while the future price has been decreasing, they converged in May 2014 after the harvest of rabi maize. Similar situations happened during January to April 2015 and 2016, October 2016 to April 2017 and August 2017 to February 2018.

Figure 4.5 presents the spot and future price of maize kharif during the period between January 2014 and June 2017. Unlike rabi maize, in kharif maize the future and the spot price were comparatively in alignment except for few brief periods. A significant divergence between future and spot prices was observed in the third quarter of 2016.

It can be summarised that the above presentation of future and spot prices for commodities show varying trends across commodity groups. In chana, there was hardly any significant difference between these prices, each of the two was following each other. In soyabean also no significant difference between these prices was observed. This difference in behaviour of spot and future price became conspicuous in other referred commodities. The difference between these prices to the extent of divergence emerged in maize, especially the rabi maize. Interestingly, in maize rabi volatility in terms of the range of prices (maximum and minimum) was less in future price. This price behaviour was possibly true for many referred commodities, therefore the future market is generally considered as a tool for reducing volatility in prices.

Figure 4. 1: Black gram (*Chana*) Spot and Future price

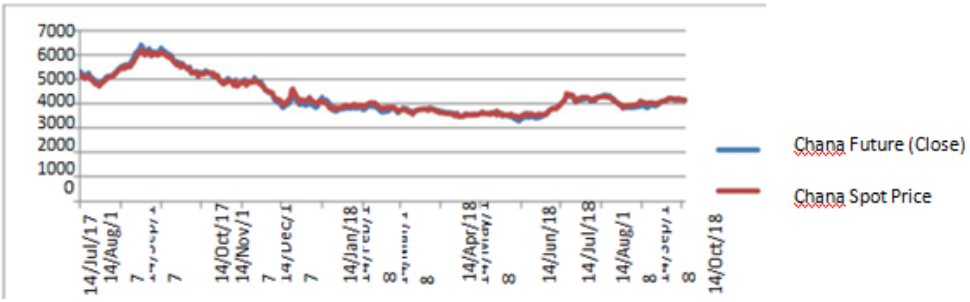


Figure4.2: Soyabean Spot and Future price

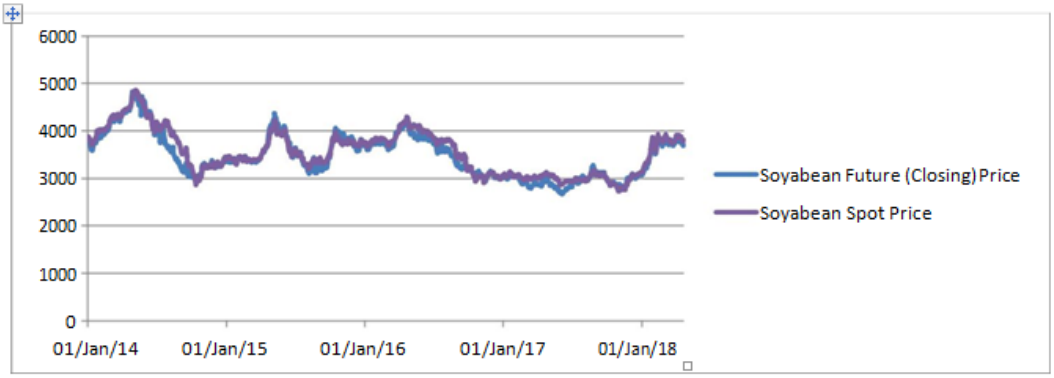


Figure 4.3: Wheat Spot and Future price

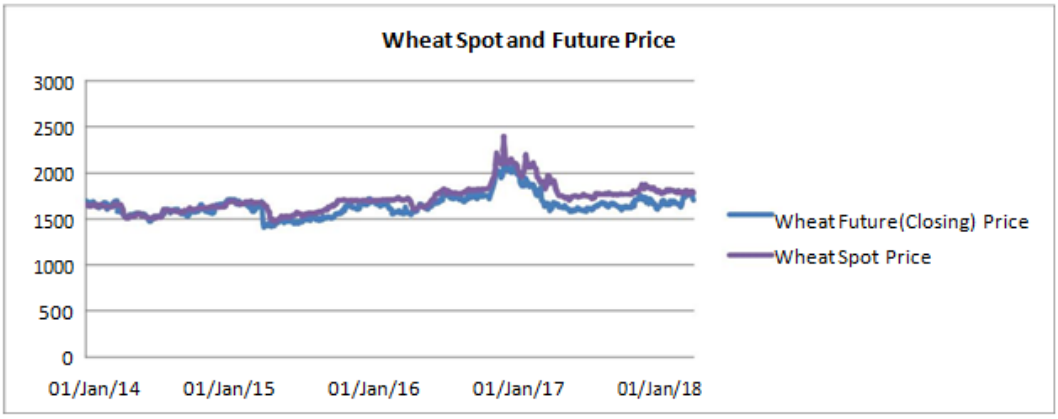


Figure 4.4: Maize Rabi Spot and Future price

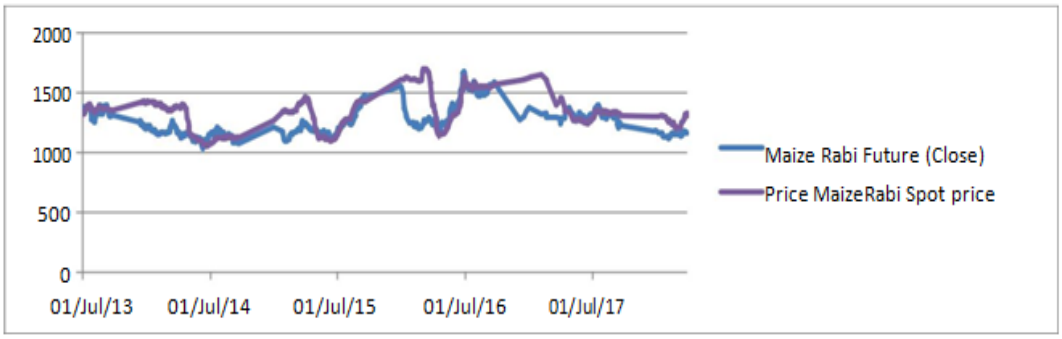
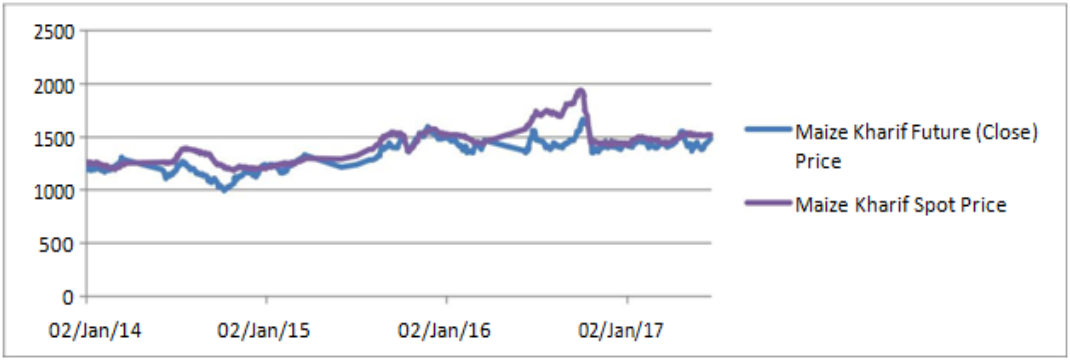


Figure 4.5: Maize Kharif Spot and Future price



4.2.2 Behavior of Future and Spot Prices

The price behaviour is also studied with contango and backwardation. It is generally assumed that on the date of expiry of the contract, future and spot prices are almost the same. The lead and lag of spot and future price play an important hiding role throughout the contract. This gives birth to the contango and backwardation. If the future price (Fp) is higher than the current spot price (Sp), that is, (Fp>Sp) then contango happens, and it (contango) is normal for a market.

Farmers always want to hedge their price risk and enter into the commodity market where price, quantity and delivery date are fixed. Farmers' face price risk in a commodity if it has less demand and they cannot sell at a predetermined price of the product. This may lead to distress sell in the spot market.

The backwardation occurs when the spot price is greater than the future price (Sp>Fp). In this case, farmers act as speculators as well as hedgers, and in this situation, he can hedge his price risk and also speculate the future price in comparison to the current price. Backwardation normally happens when there is a shortage of supply of the commodity. The commodity is either seasonal or off-seasonal. For an off seasonal commodity, the farmer tries to find a stable market where he can get a good price, and the future market becomes volatile. In this situation, farmers prefer spot cash transactions rather than the future market.

The objective of this sub-section is to explore the contango and backwardation in the commodity market of chana (not Bengal gram), soyabean, wheat, maize kharif and rabi crops. Table 4.3 suggests that soyabean has a highly prevalent pattern of backwardation (72%) with spot prices significantly higher than the future price. A similar pattern is observed in wheat, maize rabi and maize kharif. In maize also backwardation dominates in all the years, but in maize rabi, contango is also significant (36%). Chana shows a mixed pattern with the approximately equal incidence of backwardation and contango. In Chana, it is inconclusive as the percentage of backwardation (50.2%) and contango (49.8%) is similar.

In brief, the pattern of contango and backwardation provides a good signal to policymakers, as an indicator for supply and demand imbalances for a commodity. In wheat and maize kharif backwardation that is spot price greater than future price prevails. Backwardation dominates in maize rabi and soya, however, contango remains significant. The gram (chana) is

an exception of the above trend, where it is inconclusive, as backwardation and contango have the similar frequency. An active future market that can provide information for imbalances (if any) is therefore desired for the benefit of farmers and similar stakeholders.

Table 4.3: Backwardation and Contango.

Name of the Commodities	Backwardation (%)	Contango (%)
Channa	150 (50.2)	149 (49.8)
Soyabean	754 (71.9)	295(28.1)
Wheat	823 (82.1)	180 (17.9)
Maize Rabi	471 (63.8)	267 (36.2)
Maize Kharif	453 (86)	74 (14)

Source: Computed

4.2.3 Volatility in Future and Spot Prices

The variability or fluctuation in both spot and futures prices should be the same in an efficient market. A market that reacts faster is highly volatile. In an efficient spot market, variation of price in the future market must be quickly incorporated. Therefore, in an efficient market, the degree of variation of prices in both markets should be the same.

By the efficiency of the spot market, the ability of the future market to incorporate the information efficiently can be analyzed by the ratio of the standard deviation of future and spot price referred to as R and this ratio (R) can show the variability in the derivative market.

If $R > 1$, the indication of speculative activity

$R < 1$, the market is not able to incorporate the information fully and efficiently.

$R = 1$, market is efficient means that the market is incorporating the information efficiently.

For interpretation of the value of R, a subjective cut-off from 0.90 to 1.10 has been considered as the lower and upper bound of the ratio to indicate variability in the spot and futures price. This follows the work of Naik and Jain (2002) and Lokare (2007) and is referred subsequently as liquidity ratio.

Table 4.4 : Ratio of Standard Deviation of Future Price to Spot Price.

Name of the Commodities	Standard Deviation (Sp)	Standard Deviation (Fp)	R(Fp/Sp)
Channa	738.11	787.60	1.07
Soyabean	463.02	460.53	0.99
Wheat	146.32	119.16	0.81
Maize Rabi	148.98	125.02	0.84
Maize Kharif	173.45	143.13	0.82

Source: Computed

As apparent from Table 4.4, the volatility ratio (R) is less than one for most of the referred commodities except gram (*chana)* where it is marginally higher than one that indicates volatility higher in the future than the spot market of the commodity. Since it is marginally higher than one any inference about speculation in the gram future market during the period will be long drawn. The ratio of the other three commodities: wheat, maize rabi and maize kharif are in the eighties (0.80), (significantly less than one) implying that the future market is not able to incorporate information from the spot market efficiently (in these commodities). However, in the case of soybean, the ratio is 0.99, approximately equal to 1, this means that the variability in future price is approximately the same as the spot price, and the market is efficient in the commodity.

The above example in brief establishes the fact that there is hardly any speculation in essential commodities considered in the present analysis. The liquidity ratio is almost one for chana and soyabean, suggesting benefits to farmers and similar stakeholders. The volatility in future market is significantly less (than one) for some commodities (wheat, maize kharif and rabi). This is not the desired option as it is construed as a situation where the future market has not been able to incorporate information from the spot market.

4.3 Efficiency of Future Market for Agriculture Commodity

This section presents the results of analysis related to volatility and efficiency in the price of the selected agricultural commodities. The section starts with the presentation of basic statistics of prices of commodities for the referred period. Table 4.5 presents summary statistics of future and spot prices of the commodities (channa, soybean, wheat, maize rabi and maize kharif).

The result shows that the mean of future prices is lower than the mean of spot prices for most of the commodities, except soybean. Another interesting finding from summary statistics is the low standard deviation in the future (market) as compared to spot prices for most of the referred commodities except chana. Similar results are also obtained from the estimate of the coefficient of variation. The estimates again show that Channa has the most variability amongst all the commodities. The Jarque-Bera statistics show that the distributions are not normal. The skewness of prices (at average) in most of commodities is positive; the maize kharif is an exception. The kurtosis value for wheat, both future and spot price, is higher than three (5.4 and 4.7), that is, leptokurtic; whereas for other referred commodities it is around three or less than three suggesting meso- and platy-kurtosis.

Table 4.5: Summary statistics of Future and Spot Prices of the selected commodities

Name of the Commodities	Mean	Standard Deviation	Skewness	Kurtosis	Minimum	Maximum	Probablity (Jarque-Bera)	CV (%)
	Future Price							
Channa	4326.66	787.62	0.96	2.82	3286.00	6393.00	45.84 (0.0)	18.2
Soyabean	3485.88	460.53	0.43	2.50	2666.00	4834.50	43.18 (0.9)	13.2
Wheat	1644.69	119.16	1.19	5.42	1412.00	2118.00	481.35 (0.0)	7.2
Maize Rabi	1258.69	125.02	0.95	3.36	1032.00	1674.00	114.85 (0.0)	9.9
Maize Kharif	1337.28	143.13	-0.27	2.08	992.00	1664.00	25.27 (0.0)	10.7
	Spot Price							
Channa	4335.47	738.11	0.91	2.76	3400.00	6195.00	41.54 (0.0)	17.0
Soybean	3549.96	463.02	0.33	2.32	2729.00	4863.00	38.91 (0.0)	13.0
Wheat	1716.59	146.32	1.13	4.74	1464.85	2391.65	337.62 (0.0)	8.5
Maize (Rabi)	1330.74	148.98	0.19	2.59	1055.80	1699.25	9.52 (.01)	11.2
Maize (Kharif)	1427.68	173.45	0.64	3.06	1188.65	1938.75	12.1	12.1

Source: Computed from data as obtained from NCDEX web site.

The efficiency expects that prices of the commodity in both markets are related. The study to check the causal relation between future and spot prices of the commodity (gram, soyabean, wheat, maize-kharif and rabi) uses the granger causality test. To analyse the same, data were first checked for its stationary behavior, and the same was done with Augmented Dickey-Fuller (ADF) tests. The estimates for ADF test at the level and the first difference for future and spot prices of some commodities are presented in Table 4.6. The estimates show that all the variables are non-stationary at levels, while they are stationary at the first difference.

Table 4.6: Augmented Dickey-Fuller Test Results.

Commodity	**Prices**	**At Level**		**At First Difference**	
		With intercept and trend	**P Value**	**With intercept and trend**	**P Value**
Channa	Future	-1.068	0.931	-14.707	0.00
	Spot	-1.287	0.881	-8.488	0.00
Soyabean	Future	-1.161	0.788	-25.399	0.00
	Spot	-1.914	0.646	-28.933	0.00
Wheat	Future	-2.872	0.173	-31.599	0.00
	Spot	-2.579	0.289	-23.656	0.00
Maize Kharif	Future	-2.706	0.235	-20.319	0.00
	Spot	-2.254	0.458	-9.931	0.00
Maize Rabi	Future	-2.488	0.334	-26.871	0.00
	Spot	-3.101	0.107	-8.139	0.00

Test at critical value of 5%: -3.44

Source: Computed

Long-run relationship

After the check of stationarity of data, the study uses Johansson's co-integration test, to check the long-run relationship among the variables (future and spot prices of some commodities). There are two statistics Trace and Maximum Eigenvalue in Table 4.7. These statistics suggest that the null hypothesis of (relationship) no co-integration is rejected in all the cases, at a 5 per cent level. The null hypothesis of one co-integration is accepted in all the cases. Thus, there

exists a long-run relationship among prices, which further implies that the condition of market efficiency is satisfied in the commodities.

Table 4.7: Johansson's Co-Integration Test Status.

Commodity	Hypothesized No. of CE(s)	Eigen Value	Trace statistic	Maximum Eigen statistic	0.05% Critical value
Channa	None	0.5363	17.97	16.21	14.76
	At most	0.0060	1.76	1.76	3.84
Soyabean	None	0.0212	25.84	22.36	14.76
	At most	0.0033	3.48	3.49	3.84
Wheat	None	0.0258	28.98	26.10	14.76
	At most	0.0029	2.87	2.87	3.84
Maize Rabi	None	0.0195	19.76	14.43	14.76
	At most	0.0072	5.33	5.33	3.84
Maize Kharif	None	0.0189	13.26	9.95	14.76
	At most	0.0063	3.32	3.32	3.84

Source: Computed

The causal relationship between spot and future price

The present analysis after testing the long-run relationship between spot and future price ascertains the causal relationship among the prices. The spot and futures markets are supposed to move together and help in price discovery. Many research studies have found a causal relationship where one market leads the other market. To estimate the lead-lag relationship between spot and futures markets, the Granger causality test is used. This assumes that if the future price ganger causes the spot price, then the future price leads the spot price and vice versa.

Alternatively, the lead-lag relationship between spot and futures prices of agricultural commodities, suggests that if future price leads the spot price then the participant farmers will be benefited. The participating farmers will not be benefited if the spot price leads the future price of the commodity. The latter situation shows an inefficient future market where the volume of transactions is low or the future market is not functioning properly. In the case of

the bidirectional relationship between future and spot prices, the market (future) for the (agricultural) commodity in question is believed to be highly developed.

The granger causality results in Table 4.8 suggest that for channa future price granger causes spot price, but spot price does not cause future price. This implies that the movement in spot price does not provide (incorporate) any information to future market; however future price leads the spot market, and information is being transmitted from future to spot market. Many research studies suggest that when there is causality running from the future return to spot return the market is efficient. Thus, the future market of channa is price efficient. Similarly, in the case of Soyabean, future price granger causes the prices in the spot market, but spot price does not granger causes price in the future market. Hence, the future market for soybean is also price efficient.

Table 4.8: Grangers Causality between Future Price and Spot Price

Commodity	Null Hypothesis	F Statistics	P Value
Channa	Spot does not granger cause future	0.693	0.500
	Future does not granger cause spot	10.911	0.00
Soyabean	Spot does not granger cause future	0.572	0.564
	Future does not granger cause spot	66.882	0.00
Wheat	Spot does not granger cause future	14.695	0.00
	Future does not granger cause spot	4.341	0.013
Maize Rabi	Spot does not granger cause future	6.665	0.001
	Future does not granger cause spot	0.111	0.895
Maize Kharif	Spot does not granger cause future	5.400	0.005
	Future does not granger cause spot	4.727	0.009

Source: Computed

The future price for maize rabi does (not) cause spot price, and therefore, it may not be said to be efficient. However, in the case of wheat and maize Kharif, there is bi-directional causation, that is, both future price and spot price cause (influence) each other. Hence, the

market for these two crops may be inferred as developed. In maize rabi future price does not granger causes spot prices, therefore it may not be considered efficient.

The casual relationship with granger shows that in chana and soyabean, future market is efficient as future price influences spot price significantly. In maize rabi future market is not price efficient as spot price significantly influences future price. In wheat and maize kharif there is a bidirectional relationship between these prices, though it is weak.

4.4 Future Market and Inflation

Inspite of the opening of future for agricultural commodities, future trades of certain commodities are frequently banned. For instance, the Government of India has imposed a ban on future trade of certain agricultural commodities like wheat, rice, pigeon pea (tur) and urad in 2006-07. The imposition of a ban has been on the suspicion that future trade in these commodities had caused a rise in the spot prices of these commodities. Similarly, future trade-in gram (chana) and soya oil was banned in 2008 to control the price rise in these commodities and control the rate of inflation in essential commodities. This causes uncertainty in the futures of the commodity and debate on the speculative role of the future in agriculture commodities continue. The increase in the spot price of a commodity caused solely due to futures trade remains unclear as the upward pressure on prices can also be caused by supply-side factors.

Sen (2008) in tur and rice, found no evidence that futures trade had led to a rise in spot prices. However, in wheat and urad, it did find that inflation had increased after the introduction of futures trade in these commodities. In many commodities (gram, sugar, guar seed, wheat, urad and tur) spot price has increased in the post-exchange period compared to the pre-exchange period. Sahadevan 2014 found that in those commodities wherein the future ratio is high speculation activities increases. Therefore, the inflationary impact of futures trade on the price of the commodity varies across commodities. The present study carries out the Granger causality test between trading volume in futures market and spot price of these commodities for the period mentioned earlier (in the analysis). This was primarily to ascertain the role of future trade on the rise in spot prices of commodities.

Table 4.9: Granger Causality between Volume of Trade in Future Market and Spot Price of the commodity

Commodity	Null Hypothesis	F Statistics	P Value
Channa	Volume does not granger cause Spot price	1.3483	0.261
	Spot does not granger cause Volume	0.455	0.635
Soyabeen	Volume does not granger cause Spot price	0.411	0.663
	Spot does not granger cause Volume	0.398	0.672
Wheat	Volume does not granger cause Spot price	2.589	0.176
	Spot does not granger cause Volume	0.636	0.529
Maize Rabi	Volume does not granger cause Spot price	1.046	0.352
	Spot does not granger cause Volume	1.534	0.216
Maize Kharif	Volume does not granger cause Spot price	8.288	0.000
	Spot does not granger cause Volume	1.868	0.155

Source: Computed

If the traded volume leads the spot price then, one can say that future trade causes prices to rise in the spot market. It can be seen from Table 4.9 that in maize kharif only, causality runs from volume traded to spot price. In wheat, alternative hypothesis is significant, though it is weak. This period of analysis for wheat weakly supports the periodic (government) restrictions in future trade of essential commodities like wheat. In other referred commodities, the p-values are more than 0.1 or 0.01 (significance at 1 and 10%) and the Null hypothesis in each of the commodities is accepted. In other words, the causality does not exist between the volume of trade in the future market to spot prices for other referred commodities (gram, soyabean, maize rabi) in the present analysis. The findings thus support that future trade does not lead to rise in the spot market for the majority of referred commodities (with exception of maize kharif, and wheat).

One can infer from the above analysis that frequent restrictions on future trade of (agricultural) commodities on the apprehension of inflation are not just. Though estimates for maize kharif are different. In very essential commodities where commodities have less substitute

and supply of commodities are just sufficient future trade may not be allowed altogether. In fact frequent restrictions on future trade introduce uncertainty in the future market.

The chapter discusses the benefits of the future market with certain commodities: chana (gram), soyabean, wheat, maize kharif and maize rabi. In the future market analysis is often constrained by the availability of continuous series of future prices on account of frequent restrictions of future trade in the commodity. The behaviour of future and spot prices is first assessed with contango and backwardation of prices. Analysis shows that in the majority of the referred commodities baring gram, future price follows prices in spot market. The results to large extent refute the argument that future price influences the price of the respective commodity in the spot market. The volatility in the future and spot market is assessed with the ratio of the coefficient of variation in these prices. The ratio suggests that there is the complete transmission of information between future and spot market in soyabean and chana (gram); though this was not the case for wheat and different varieties of maize.

The price efficiency of the future market in referred commodities is assessed by ascertaining the relationship between prices in both the markets (future and spot). The Johansen co-integration test shows the long-run relationship between future and spot prices for most of the referred commodities. In gram and soya, future price granger causes spot price of the commodity. While in rabi maize price efficiency in the future market is not observed, as future prices are granger caused by spot price. The Granger causality test for the volume of trade in future markets and prices in the spot market has also been performed to examine whether future market trade in certain commodities causes inflation in the spot price. The findings suggest that trade volume has not affected spot price in most of the referred commodities; the case of maize kharif and also wheat are exceptions.

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V. Conclusions and Policy Implications

The future trade in India has largely been for non-agricultural commodities (bullion and energy). In many agricultural commodities, future trade was started in2003; subsequently, future trade in agriculture has increased but the consistency of trade has been a problem. The future trade is allowed for many agricultural commodities, but it is practiced for some commodities only.

The benefits of the future market are assessed with the detailed analysis of chana (gram), soyabean, wheat, maize kharif, and rabi. The contango and backwardation as an indicator for supply and demand imbalances for a commodity show that in a very essential commodity like wheat and also in maize kharif, backwardation that is spot price greater than future price prevails. Backwardation dominates in maize rabi and soya, but contango also remains significant in these commodities. In gram (chana) it is inconclusive as backwardation and contango have a similar frequency. The information on (supply-demand) imbalances is desired for the benefit of policymakers and other stakeholders. The estimates on volatility in prices (future and spot) of the commodities suggest that volatility in the spot market are higher than the future market in the majority of commodities (wheat, maize rabi and maize kharif) analyzed.

Prices are supposed to be discovered in future markets as this improves the transmission of information. The efficiency of the future market requires that prices in these markets are related and price-based information transmits from future to spot market. The co-integration results establish the long-run relation between prices of commodities. The relationship is bidirectional in wheat and maize kharif that suggests transmission of information between both the markets. The co-movement between spot and futures prices of commodities suggests that markets are efficient for gram (chana), and soyabean, but it is not efficient for maize rabi. Some reasons for inefficient functioning of future market (in maize rabi) are lack of enough and effective participation of trading members, irregular trading, low market depth, and thin volume of trade for commodity.

The effect of future trade on inflation is often cited as the reason for imposing restrictions on the future activity of a specific commodity (in India). However, the Granger causality test between the quantity of future trade and spot price in four out of five commodities (chana, soyabean, maize rabi, wheat) did not find any evidence to support the argument (future trade leads to inflation). The findings of previous studies suggest that future trade not indiscriminately

causes inflation in these commodities. The speculative activity in a commodity increases if the future ratio is high.

Therefore one can infer that future trade not necessarily causes inflation in a commodity. However, suspension of future activities on the apprehension of speculation introduces uncertainty in the future market for agricultural commodities and affects its development. The uncertainty in the future market is an important reason for the weak participation of stakeholders including farmers. To reduce such uncertainty, the future market in agriculture should be started initially for a limited number of commodities, wherein the future market can emerge as an important instrument of price discovery. The price in the future market can provide a signal to stakeholders and also farmers for their land allocation; all these without any government help

The data suggest that future market has better performance in those commodities where government's interference is less, commodities are important for external trade, and some of those (commodities) is the raw material for further processing. The future market for such agricultural commodities needs to be strengthened to make it an important tool for price policy. For example, the state purchase price of palm fruits in Andhra Pradesh is determined by international price (Jha 2018) and the future market can provide a forward-looking option for farmers and similar stakeholders.

The strengthening of future trade for agricultural commodities requires sufficient research on the assessment of future trade for agricultural commodities. The researchers of the present study however find difficulties in accessing quality data from public resources. Transparency of future prices is important for its reliability. The reliability of the future market in agricultural commodities requires it to be certain. Therefore uncertainty associated with the future market has to go. The future trade should happen more frequently with mandatory delivery of the commodity.

The participation of farmers in the future market can be improved by educating farmers on different kinds of benefits of the future market. The participation in the future may increase with the expansion of infrastructure facilities like storage and warehouse, and creation of a favourable institutional framework that would link spot markets together and finally connects spot and future market for commodities. Considering benefits of future market Government must undertake desired reform to strengthen the future market of agricultural commodities.

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Response to Reviewer's Comments on Draft Report

Title of the draft report examined: Future Market for Agricultural Commodities in India

Date of sending of Draft Report: September 2020

Date of receipt of Comments: April 2021

Comments: The draft report after around five months of sending draft report to the Ministry and Institute for Social and Economic Change (ISEC) has received a response from ISEC on 23rd March 2021. There were no comments on the draft report but it was edited in the track change mode. The draft report sends to ISEC in September 2020 was thoroughly revised by the Investigators of the study taking note of revisions of Reviewers in the draft report. I do believe that the existing report Final (Interim) will have a minimum of editing problems.

Since there were no significant comments on the draft report, the final interim report was finalized by the investigators of the study.

Executive Summary

Future Market for Agriculture Commodities in India

Brajesh Jha and Sangeeta Chakravarty
Institute of Economic Growth
Delhi – 110007

The future market is an essential element of a liberalized economy. A well-functioning future market in agricultural commodities has the potential to guide farmers about their resource allocation. This guidance unlike the one based on the historical trend in prices will be forwards looking based on the current situation and likely events in the future.

With such expectation, the future market for many agriculture commodities was initiated in 2003; subsequently, future trade in agriculture has increased. However, it is often suspended on the apprehension of speculation. This uncertainty restricts the future market for agriculture to emerge as an effective instrument to provide multiple benefits to stakeholders.

The present study, therefore, analyses the future trade of agricultural commodities in historical years and assesses reasons for specific kinds of distribution. Subsequently, it analyses some of the benefits that it (future market) can provide with the case of wheat, gram, soybean, maize kharif, and rabbi. The benefits are analyzed in terms of volatility, the transmission of information, and price integration in both markets. Finally, it addresses the inflationary role of the futures market.

This has been an all-India study based on secondary information from important national (not regional) commodity exchanges of India namely Multi Commodity Exchanges (MCX), Mumbai; National Commodity Derivatives Exchanges (NCDEX), Delhi; National Multi-commodity Exchanges (NMCE), Ahmadabad. The data from different secondary sources suggest that future trade in agricultural commodities, has increased in the initial years after 2003, but after man ups and down, this now accounts for less than 10 percent of future trade in India.

The future trade in agriculture is happening primarily in NCDEX, and this is followed by MCX and NMCE. The exchanges other than the above three account for a minuscule proportion of future trade in agriculture. Another important feature of the future market for agricultural commodities is the low participation of farmers in future trade.

The future trade is allowed for many agricultural commodities, but in actual it is happening regularly for some selected commodities (guar, castor, gram, crude palm oil, soya complexes, and menthe oil). These commodities account for a significant proportion of future trade, for example, guar, castor oil, and soya complexes together accounted for more than one-fourth of the future trade of agricultural commodities in certain years.

An investigation into likely factors for the above pattern of future trade shows that these commodities are not very important in the average consumer's basket. The production and distribution are highly concentrated in many commodities, and the futures market provides a platform for price discovery. Some of the commodities (castor oil, guar seed, soya, and similar oil complexes, cotton, barley) traded are intermediate and have industrial use. In many commodities, the country has been an important trader (exporter or importer). Most commodities are free from government regulation in the domestic market.

Table 1: Top Agricultural Commodities Traded at Futures Exchanges

Sl. No.	**Commodity**	Share in total agri. turnover of all exchanges (%)				
		2018-19	2017-18	2016-17	2015-16	2010-11
1	**Guar seed**	18	18.1	11.8	9.9	17.5
2	Castor seed	10.9	6.2	..	..	..
3	**Soybean**	9	10.3	..	..	..
4	**Guargum**	8	8.7	..	..	3.4
5	**Chana/Gram**	8	7.6	..	13.8	8.7
6	**Soy Oil**	..	10	16.6	12.3	23.7
7	Rapeseed/Mustardseed	..	5.7	11.8	0.6	..
8	Crude Palm Oil (CPO)	..	5.7	7.6	3.8	..
9	Cotton	..	5.6	..	..	..
10	Jeera (Cumin seed)	..	4.4	..	..	4.2
11	**Mentha Oil**	..	4	..	..	4.2
12	Pepper	..	0.02	..	..	5.8
	Total	53.9	86.32	47.8	40.4	67.5

Source: compiled from websites of future exchanges.

The commodities specifically studied for assessing the benefits of the future market are chana (gram), wheat, soybean, maize kharif, and rabi. The selection of commodities is based on the diversity of government policies and also the availability of desired information for the commodities. The information for the above commodities is from the website of National

Commodities and Derivative Exchanges (NCDEX). Their future and spot prices were extracted from the Website. The data for present analysis consists of the daily closing (spot and future) price of a commodity, and the price is assumed to continue till a new one is declared. If multiple prices are reported within a day, the prices are averaged to generate the daily price for the analysis. The study for analytical convenience has considered the contract with the nearest maturity at each point of time. Thus, the future prices do not relate to a single contract, but it is a transit from the first contract to the latest through a series of intervening contracts. The present analysis considers data for the following periods.

Box 1: List of selected commodities and their specific period for analysis

Commodities	**From**	**To**
Chana / gram	14 July 2017	16 October 2018
Soyabean	1 January 2014	20 April 2018
Wheat	1 January 2014	12 March 2018
Maize Rabi	1 July 2013	28 March 2018
Maize Kharif	2 January 2014	20 June 2017

The commodity-specific benefits of the future market were analyzed for the volatility in future and spot markets of the commodity. The volatility is the ratio of the standard deviation of prices in both the markets of a commodity. A ratio of more than one suggests that instability in the future market is higher than that of the spot market. As is apparent from results, volatility in the future market is higher than the spot market in the gram (*chana*) only; in other commodities volatility in the future market is lower than the spot market. Accordingly, the ratio is less than one for the majority of commodities; it is significantly less than one (around 0.80) in wheat, maize rabi, and kharif crops. The present findings thus refute the general impression that the future market for agricultural commodities is more volatile because of speculation kind of activities.

Table 2: Ratio of Standard Deviation of Future to Spot Price of the commodities

Name of the Commodities	Standard Deviation (Sp)	Standard Deviation (Fp)	R
Channa	738.11	787.60	1.07
Soyabean	463.02	460.53	0.99
Wheat	146.32	119.16	0.81
Maize Rabi	148.98	125.02	0.84
Maize Kharif	173.45	143.13	0.82

Source: computed

An active future market can provide a signal for the scarcity of the commodity. The same is studied with the comparison of future and spot prices for particular dates as contango and backwardation in a commodity. Findings suggest that backwardation, that is spot price greater than future price dominates in wheat, soya, maize kharif, and rabi crops. The exception to the above is gram (chana), where it is inconclusive, as the frequency of backwardation and contango are similar. The prevalent pattern suggests that demand in the spot market is higher than the supply of majority commodities (wheat, soya, and maize); it is not the otherwise.

Table 3: Backwardation and Contango of Commodities

Name of the Commodities	Backwardation (%)	Contango (%)
Gram / chana	150 (50.2)	149 (49.8)
Soyabean	754 (71.9)	295(28.1)
Wheat	823 (82.1)	180 (17.9)
Maize Rabi	471 (63.8)	267 (36.2)
Maize Kharif	453 (86)	74 (14)

Source: computed

The efficiency in futures markets requires that variances in both markets (spot and futures) are equal, and both the prices are co-integrated. The present study assesses price efficiency in future markets by ascertaining the co-integration of prices in both the markets of a commodity. Since the analysis is based on historical data, the Augmentd Dicky Fuller (ADF) test was performed to check the stationery of data. The study found that price series was non-stationary at the level, but it was stationary at the first difference.

The long-run relationship between future and spot prices was assessed by the Johansen cointegration test, which was based on trace statistics and eigenvalue. The estimates suggest the existence of a long-run relationship between future and spot prices of most of the referred commodities.

The direction of causation between the spot and future price was assessed with the granger casualty test. The prices are assumed efficient if the future price granger causes the spot price of a commodity. The estimates show that in gram (chana) and soya, future price granger causes spot price. Whereas, in rabi maize future price does not granger causes spot price significantly. The relationship between future and spot price is bidirectional in wheat and maize kharif. The analyses thus suggest that the future market is efficient in gram, soya, wheat, and maize kharif, but it is not so in maize rabi.

Inspite of the above benefits, the futures markets for specific agricultural commodities are suspended frequently on the apprehension of speculative activities. The review suggests that the chances of speculation in future trade of a commodity increase if the future multiplier is high. The future multiplier is the proportion of a commodity traded through the futures market, and this has been more than 80 percent for some commodities (pepper, mentha oil, guar gum and guar seed). The pieces of evidence suggest that instances of speculation do not arise if the future multiplier is less (20-30 percent). Therefore speculation is more a case of chosen few commodities where future multiplier has been high.

The role of the future on inflation is being carried out with the Granger causality test between trading volume in futures and the spot price of the commodity. The analysis shows that in maize kharif only, causality runs from volume traded to spot price; that is, future trade has a positive effect on the rise in spot prices of the commodity. Though this is not the case of other commodities (gram, soyabean, wheat, and maize rabi), and suspension of future trade (in a commodity) on the apprehension of inflation, infact introduces uncertainty in future trade.

Table 4: Grangers Causality between Future Trade and Spot Price of commodity

Commodity	Null Hypothesis	F Statistics	P Value
Channa / gram	Spot does not granger cause future	0.693	0.500
	Future does not granger cause spot	10.911	0.00
Soyabean	Spot does not granger cause future	0.572	0.564
	Future does not granger cause spot	66.882	0.00
Wheat	Spot does not granger cause future	14.695	0.00
	Future does not granger cause spot	4.341	0.013
Maize Rabi	Spot does not granger cause future	6.665	0.001
	Future does not granger cause spot	0.111	0.895
Maize Kharif	Spot does not granger cause future	5.400	0.005
	Future does not granger cause spot	4.727	0.009

Source: computed

The above analysis shows that the volatility of prices in the future market is less than the spot market for the majority of commodities. The prices in the spot market are greater than the future market on the majority of dates. The future and spot prices are co-integrated and future trade has not caused inflation in the spot market of a majority of commodities analysed. The future market helps in the price discovery of the commodity, especially when the production and distribution of the commodity are highly concentrated. The commodities are intermediate, and are traded (exporter or importer) heavily but not regulated in the country.

Considering the benefits and efficiency of the future market, it must be strengthened as an important institution for development. The strengthening requires certainty in government policies towards future trade. The uncertainty in futures is not only on account of suspension of future trade in specific commodities, it is also because of changes in different kinds of regulations in the domestic market for example alteration in the future margin of the commodity. The uncertainties in future markets constrain the development of the future as a reliable and serious institution. It also affects the participation of stakeholders including farmers in the future market.

The above analysis shows that speculation is not a general but specific case of the agricultural commodities, and suspension of future trade on the apprehension of speculation is

not right. To reduce the uncertainty of future trade for agricultural commodities, future trade, in the beginning, maybe initiated for a limited number of commodities, which is less sensitive for an average consumer. The reliability and seriousness of the future may improve with some measures like mandatory delivery of future trade, participation of government parastatals (state trading enterprises) in future trade of agricultural commodities.

The state of the spot market marked with the poor infrastructure (storage and warehouse facilities), inadequate assaying facilities, and lack of coordination between different markets and market functionaries, constrain future trade in agricultural commodities. The governments must try to improve the same. The effort for e-market, and recent farm laws are just examples.

Research Proposal

Future Market for Agricultural Commodities in India

Sangeeta Chakravarty and Brajesh Jha
Institute of Economic Growth, Delhi - 110007

With liberalization of trade in agriculture, volatility in the price of commodities seems to have increased. Considering the sensitivity of consumers and farmers to the volatile price of agricultural commodities, a stable price is desired and the future market is often suggested as an institution for stable price. It is widely believed that in the future market, traders have an informal system for assessing production, stock, and demand for commodities relevant to them. This assimilates information and predicts the movement of the price of a product efficiently. The price in the future market can provide a signal for stakeholders of the commodity. This has immense potential in mitigating price risk in agriculture. The future market can also help in arriving at an estimate for returns that producers can earn. Theoretical advantages of the future market need to be appreciated. With such expectation, Indian commodity derivative market was rationalized in 2003. Subsequently, future trade (in terms of volume and value of commodities) has increased many times (Forward Market Commission FWC, 2013). But there are reports that only a small proportion of farmers are trading directly in the future market. In this backdrop present study is undertaken with the following specific objectives.

1. To ascertain the trade of agricultural commodities in future exchanges in India.
2. To assess reasons for a particular type of distribution of trade of agricultural commodities in the future market.
3. To understand the profile of stakeholders in the future market of agricultural commodities and constraints faced by them in the future market.
4. To understand volatility in the price of agricultural commodities (wheat, gram, maize, soybean, rapeseed and groundnut).
5. To assess the efficiency of price discovery in the future market for some agri-commodities.

Coverage: This will be an all-India study based on secondary information obtained from all-important agriculture commodity exchanges in India such as Multi Commodity Exchanges (MCX), Mumbai; National Commodity Derivatives Exchanges (NCDEX), Delhi; National Multi-commodity Exchanges (NMCE) in India. The commodities likely to be studied are wheat, gram, maize, soybean, rapeseed, and groundnut. The required information is collected from these exchanges for an adequate period.

Importance of the study: This is one of the maiden efforts by AERU/Cs system to study the future market for agricultural commodities in India. The study will be able to answer as to what is the penetration of the future market for agricultural commodities in India? Is the future market efficient for the trade of agricultural commodities in India? Are these location and commodity-specific? Who are participating in the future market of agricultural commodities? What are constraints in the inclusion of farmers in future markets? How far future markets have helped in reducing volatility in prices of certain commodities? Can this be considered an important tool for market intelligence?

RAC Questions on Future Study

How future market will help in price policy reform?

The study should have provisions for feedback from market participants.
