Price Spread among the Indian Agricultural Commodity Futures

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Abstract

The commodity futures market in India is in its developing phase and many researches have been undertaken in this upcoming area of finance. The significance of the study is an attempt to analyse the linkages among the various agricultural commodities and their cross-hedging possibility in India. The spreads available in the market give better investment opportunities for investors as well as hedgers, to make better hedging. The study is based on secondary data collected from National Commodity and Derivatives Exchange (NCDEX). Out of 30 agricultural commodities traded in NCDEX, only 12 agricultural commodities like barley, castor seed, chana, coriander, cotton seed oilcake, jeera, mustard seed, refined soy oil, soybean, sugar, turmeric and wheat whose data are available in the data source for five years on near-month contract basis from April 2009 to March 2014 are considered for analysis. The selected agricultural commodity futures price relationship is tested applying the error correction model (ECM) of Engle and Granger (1987). The stationarity of the time series is investigated with the Augmented Dickey-Fuller (ADF) test (1979). The result thus obtained reveals that there exists short-run and long-run equilibrium among the agricultural commodities futures in India based on micro-economic factors like supplementary, complementary, competitive harvest and competitive sowing periods. Thus, the study proves that there exists cross-hedging opportunities and spread opportunities among the Indian agricultural commodity futures during the study period.

Keywords:

Augmented Dickey-Fuller test, Commodity futures, Cross-hedging, Error Correction Model and Spread Opportunities.

JEL: Q02, Q14, C58, C32, C12.

Introduction

In India, government policy regarding the agricultural commodity futures market keeps changing according to the needs of public (food) policy and the observed inflation trends at any point of time. The price volatility threatens the farmers or agriculturists as it leads to decrease their income. Understanding the trading of commodity market is very

important to any investor to make best use to mitigate their risk. There has been a never ending effort to find best suitable way for investing in commodity market by analysing the market performance. Hence, there are four basic trading strategies to master, viz. *net position*, *hedging*, *options-on-futures* and *spread trading*.

The significance of the study is an attempt to analyse the linkages among the various agricultural commodities and their cross-hedging possibility in India. The efficiency of the market is very important for the market growth. In an efficient market, the investor will use all possible opportunities to make best use of their investment. The spreads available in the market give better investment opportunities for investors as well as hedgers, to make better hedging. Such analysis may be of great relevance from the point of view of the investors as the existing literature suggests that cross hedging opportunities provide the investors an option to make investment better. Further, the results of the study will be useful for deciding upon the inter-linkages present among the agricultural commodities and their cross hedging opportunity.

Conceptual Framework

The Indian experience in commodity futures market can be traced back to thousands of years. The words, Teji, Mandi, Gali and Phatak have been common parlance in Indian markets for centuries **(Niti Nandini Chatnani, 2011)**. The commodity derivative market has been functioning in India since 19th century with organized trading in cotton through the establishment of Bombay Cotton Trade Association in 1875. The Central Government committee under the Chairmanship of Shri *A.D. Shroff* framed rules and regulations for exchanges. A Bill, Forward Contacts (Regulation) Act Bill was drafted and passed by Parliament in December, 1952 out of which the Forward Markets Commission (***FMC***) was established in 1953 to regulate and develop commodity futures market in India.

As an act of government to control the prices of agricultural and essential commodities, future trading was banned in 1966. Subsequent to liberalisation of Indian economy in 1991, steps were taken to liberalise the commodity futures markets. A Government committee under the Chairmanship of *K.N. Kabra*, submitted a report in September 1994, which reintroduced the futures, that were banned in 1966, and expanded its coverage to agricultural commodities, along with silver.

At present there are six national commodity exchanges contributing 99.44% and 17 regional commodity exchanges contributing 0.56% to the total value of trade in the commodity futures market. The national commodity exchanges are Multi Commodity Exchange (***MCX***), Mumbai (78.25%), National Commodity and Derivatives Exchange (***NCDEX***), Mumbai (15.70%), National Multi Commodity Exchange (***NMCE***), Ahmedabad (2.38%), Indian Commodity Exchange Ltd. (***ICEX***), Mumbai (1.13%), Universal Commodity Exchange Ltd. (***UCX***), Navi Mumbai (1.34%) and Ace Derivatives and Commodity Exchange, Mumbai (0.63%) which regulate forward trading of 113 commodities as on 31st March, 2014 (***FMC* Bulletin, 2014**).

Review of Literature

Garbade and **Silber (1983)** tested the relationship between spot and futures prices of seven commodities namely, *wheat*, *corn*, *oats*, *frozen orange juice concentrates*, *copper*, *gold*, and *silver* and found that all markets are to be integrated over a month or two but there was a considerable slippage between cash and futures markets over the shorter time intervals, especially for grains (*corn*, *wheat* and *oats*). *Gold* and *silver*, on the contrary, were highly integrated even over one day. Thus, the study suggested that the degree of market price integration over short horizons is a function of the elasticity of supply of arbitrage services.

Malliaris and **Urrutia (1996)** analysed the substitutability and complementarity among the agricultural commodities futures prices of the six agricultural commodities – *corn*, *wheat*, *oats*, *soybean*, *soybean meal* and *soybean oil*. The study showed a strong, statistically significant, long-term relationship among the six commodity futures contracts but no short-term causality, which incorporated several possible factors such as substitutability, complementarity, weather and climatological factors, world agricultural demand and supply shocks, even herd trends. Thus, it implies existence of cross hedging and cross speculation among the commodities. **Booth, Brockman** and **Tse (1998)** attempted to investigate the relationship between ***US*** and Canadian wheat futures prices and the results showed that the two series were cointegrated in long run. **Booth** and **Ciner (2001)** made an attempt to further investigate the work done by **Malliaris** and **Urrutia (1996)** in reference to Tokyo and found that the agricultural commodity futures' long-run co-movements response was due to common economic fundamentals and not because of herding behaviour attributed to traders.

In India, a number of studies have analysed the commodity derivatives market. For instance, **Naik** and **Sudhir (2002)**, **Thomas (2003)**, **Nair (2004)**, **Bhattacharya (2007)**, and **Bose (2008)** are some of the studies of conceptual researches about the derivatives market carried out. Further, **Kaur** and **Rao (2010)** and **Ali** and **Gupta (2011)** are some of the empirical researches carried out on the efficiency of commodities market in India. Some of the studies, for instance **Parmod (2006)**, **Kumar** and **Pandey (2011)** and **Mukherjee (2011)** studied about various price spread prevailing in the commodity market in India. However,

there is no definite idea as to cross-hedging opportunity for agricultural commodities; very few studies only relate on determining the price spread among the agricultural commodity derivatives in India.

Research Methodology

Objectives of the Study

The study has two main objectives viz to test the independence of the futures prices of selected commodities traded in ***NCDEX***; to study whether there exists short-run and long-run equilibrium relationship among the futures prices of agricultural commodities dealt in ***NCDEX***.

Sampling Design

In order to address the stated objectives of the study, the study has chosen sample commodities from oil and oil seeds and cereals traded in ***NCDEX*** by use of *multi-stage non-random sampling* technique. The reason for choosing these commodities from ***NCDEX*** is due to the fact that ***NCDEX*** deals with high volume of agricultural commodities traded in India when compared to the other commodity exchanges operated in India as per ***FMC*, Annual Report 2012-13**. The study has selected commodities from oil and oil seeds and cereals as they exhibit complementary and supplementary factors more when compared to the other agricultural commodities traded in ***NCDEX***. For effective analysis, the commodities from oil and oil seeds and cereals are put in to further scrutiny on the assumption of selecting commodities possessing 2/3rd futures contracts in a year over the entire study period i.e., 8 futures contracts in a year.

Multi-stage non-random sampling technique is used to choose the sample commodities. Out of 39 agricultural commodities traded in all national commodity exchanges in India, 30 were traded in ***NCDEX*** as on 31st March 2013. Out of those 30 agricultural commodities only for 15 agricultural commodities full-fledged data for the study period were available. Based on minimum of eight contracts in a year out of 15 agricultural commodities, 12 agricultural commodities were selected. Hence, the selected sample of 12 agricultural commodities in India are *Barley, Castor seed, Chana, Coriander, Cotton seed oilcake, Jeera, Mustard seed, Refined Soy oil, Soybean, Sugar, Turmeric and Wheat*.

Methods of Data Collection

The study is of analytical nature and makes use of secondary data, which were collected from www.ncdex.com for the study period of five years from April 2009 to March 2014.

Research Tools

To analyse the data, appropriate research methods applied in the study such as, descriptive statistics (mean and standard deviation) are used to neutralize the fluctuations in the value of predictor and response variables. Karl Pearson's Correlation co-efficient is used to study one-to-one relationship between two selected variables. The stationarity of the time series is investigated with the Augmented **Dickey-Fuller** (***ADF***) test (**1979**). The error correction model (***ECM***) of **Engle** and **Granger (1987)** is used to analyse the long-run and short-run equilibrium relationship among the futures prices of the selected agricultural commodities.

$$X_t - X_{t-1} = \alpha_0 + \alpha_1 \hat{Z}_{t-1} + \sum_{i=1}^{m} c_i (Y_{t-i} - Y_{t-i-1}) + \sum_{j=1}^{m} d_j (X_{t-j} + X_{t-j-1}) + \varepsilon_t \quad ..(1)$$

The ***ECM*** represented by the equation (1) decomposes the dynamic adjustments of the response variable, X_t, to changes in the predictor variable, Y_t, into two components: first, a long-run component given by the cointegration term, $\alpha_1 \hat{Z}_{t-1}$, also known as the error-correction term; and, second, a short-run component given by the first summation term in the right-hand side of eq. (1). The ***ECM*** requires the variables to be at first differential. It explains long-run equilibrium relationship when the error correction term is negative and significant and explains short-run equilibrium relationship when the lagged values of the response and predictor variables are significant.

Research Hypotheses

To achieve the research objectives, the following hypotheses are developed:

$\mathbf{H_0^1}$ "The futures prices of the selected agricultural commodities dealt in ***NCDEX*** move independently".

$\mathbf{H_0^2}$ "There is no long-run equilibrium relationship among the futures prices of the selected agricultural commodities dealt in ***NCDEX***".

$\mathbf{H_0^3}$ "There is no short-run equilibrium relationship among the futures prices of the selected agricultural commodities dealt in ***NCDEX***".

Limitations and Scope for Further Studies

The study covered selected futures prices of agricultural commodities traded in ***NCDEX*** for the study period. The study is based on secondary data; therefore the quality of the study depends purely upon the accuracy, reliability and quality of the secondary data source. The findings of the study might differ if done considering the data from other commodity exchanges in India or elsewhere. Hence, studies considering commodities from other commodity exchanges can also be done by focusing on macro-economic factors. Other spread opportunities in India for different periods considering different commodities from other commodity exchanges in India can be taken for further study.

Analysis

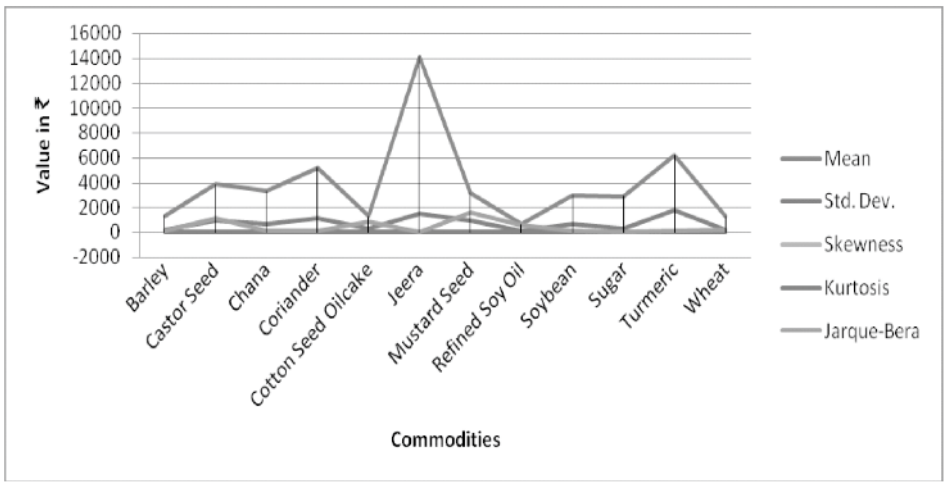
The analysis of the study has been divided into two parts. The first part of the analysis deals with the study of descriptive statistics of the selected agricultural commodities futures prices and the second part of the analysis gives focus on the ***ECM*** (i.e. short-run and long-run equilibrium).

Table-1 Descriptive Statistics of Futures Prices of the Selected Indian Agricultural Commodities

Selected Commodities	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
Barley	1331.038	186.231	-0.407	3.654	75.996	0.000
Castor Seed	3863.889	930.608	-1.171	6.250	1118.062	0.000
Chana	3319.358	675.340	0.115	2.115	58.291	0.000
Coriander	5213.246	1107.384	0.535	2.056	141.775	0.000
Cotton Seed Oilcake	1278.906	245.334	-1.393	5.098	847.319	0.000
Jeera	14118.720	1521.051	-0.049	2.738	5.473	**0.065**
Mustard Seed	3178.442	904.665	-1.801	6.166	1601.692	0.000
Refined Soy Oil	668.157	75.334	-1.180	4.772	606.580	0.000
Soybean	2989.432	633.061	0.480	2.217	106.835	0.000
Sugar	2907.219	236.877	0.189	3.037	10.064	0.007
Turmeric	6239.574	1779.053	0.492	2.468	87.078	0.000
Wheat	1288.905	144.197	0.840	2.466	216.580	0.000

Source: *Computed results based on compiled data collected from NCDEX*

Figure-1 Descriptive Statistics of Futures Prices of the Selected Indian Agricultural Commodities



Source: *Computed results based on compiled data collected from NCDEX.*

The mean futures prices of each selected agricultural commodity over the study period (April 2009 – March 2014) shows that *jeera* has the highest mean value (₹14,118.72) and *refined soy oil* has the lowest mean value (₹668.16), which means that there is a high price differential among the futures prices of the selected agricultural commodities. The standard deviation measuring the deviation of futures prices from the mean futures prices shows that *refined soy oil* has lowest standard deviation (75.33) and *turmeric* has highest standard deviation (1779.05). *Jarque-Bera* statistics and its probability show that all the futures prices of the selected agricultural commodities except for *jeera* are not normally distributed (vide Table-1 and Figure-1).

Table-2 Correlation among the Futures Prices of the Selected Indian Agricultural Commodities

Selected Commodities	Barley	Castor Seed	Chana	Coriander	Cotton Seed Oilcake	Jeera	Mustard Seed	Refined Soy Oil	Soybean	Sugar	Turmeric	Wheat
Barley	1	0.278	0.513	0.139	0.677	0.080	0.774		0.446	0.422		0.361
Castor Seed	0.278	1	-0.150	0.161	0.374	0.806	0.312	0.227	-0.299	0.079	0.568	-0.066
Chana	0.513	-0.150	1	-0.056	0.583	-0.034	0.796			0.647	-0.673	0.397
Coriander	0.139	0.161	-0.056	1	0.531	0.092	0.131			0.393	0.329	0.625
Cotton Seed Oilcake	0.677	0.374	0.583	0.531	1	0.340	0.864	0.791	0.638	0.722	-0.063	0.686
Jeera	0.080	0.806	-0.034	0.092	0.340	1	0.292			0.190	0.527	-0.053
Mustard Seed	0.774	0.312	0.796	0.131	0.864	0.292	1	0.945	0.615	0.675	-0.321	0.488
Refined Soy Oil		0.227			0.791		0.945	1	0.666	0.566		
Soybean	0.446	-0.299			0.638		0.615	0.666	1	0.630	-0.405	
Sugar	0.422	0.079	0.647	0.393	0.722	0.190	0.675	0.566	0.630	1	-0.123	0.729
Turmeric		0.568	-0.673	0.329	-0.063	0.527	-0.321		-0.405	-0.123	1	-0.058
Wheat	0.361	-0.066	0.397	0.625	0.686	-0.053	0.488			0.729	-0.058	1

Source: Computed results based on compiled data collected from NCDEX.

There is a high correlation between the futures prices of *barley* with the futures prices of *mustard seed* (0.77), which are competitive in terms of sowing period crops and are grown in the same state in India. It reveals that the futures prices of *barley* are affected by the futures prices of *mustard seed*; the futures prices of *chana* are highly correlated with the futures prices of *mustard seed* (0.80); the futures prices of *coriander* are highly correlated with the futures prices of *wheat* (0.63); the futures prices of *castor seed* are highly correlated with the futures prices of *jeera* (0.81), which is competitive during the yield period in the same states in India and are less correlated with the futures prices of *soybean* (-0.23), which is one of the oil and oilseed components but are grown in different states of India; the futures prices of *jeera* are highly correlated with the futures prices of *castor seed* (0.81); the futures price of *sugar* are highly correlated with the futures prices of *wheat* (0.73); the futures prices of *turmeric* are highly correlated with the futures prices of *castor seed* (0.57); and the futures prices of *wheat* are highly correlated with the futures prices of *sugar* (0.73). The futures prices of *cotton seed oilcake* are highly correlated with the futures prices of *mustard seed* (0.86), it being a supplementary product of the *oil and oilseed* components. In the same way, the futures prices of *mustard seed* is highly correlated with the futures prices of *refined soy oil* (0.95). The futures prices of *soybean* are highly correlated with the futures prices of *refined soy oil* (0.67), it being its supplementary product (vide Table-2).

Thus the $\mathbf{H_0}^1$ "the futures prices of the selected agricultural commodities dealt in ***NCDEX*** move independently" is rejected as all the selected agricultural commodities futures prices are influenced by micro economic factors.

The ***ADF*** test shows that the futures prices of the selected agricultural commodities are non-stationary at level and stationary at first difference, hence the ***ECM*** can be performed to check the long-run and short-run equilibrium relationship among the agricultural commodities in India.

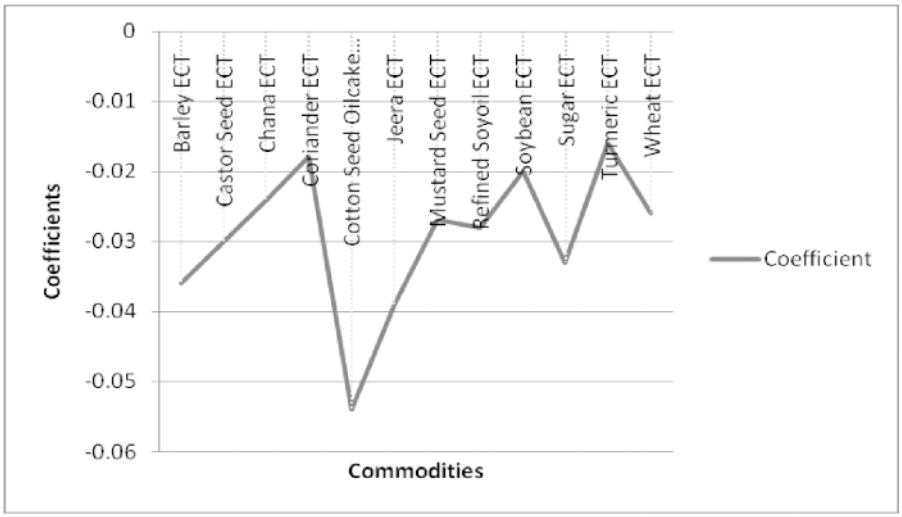
The ***ECM*** shows that the error correction terms (***ECT***) are negative and significant, which explain long-run equilibrium relationship among the response and predictor variables thereby rejecting the $\mathbf{H}_0^2$, i.e., "there is no long-run equilibrium relationship among the futures prices of the selected agricultural commodities dealt in ***NCDEX***" (vide Table-3 and Figure-2).

Table-3 Error Correction Term of *ECM* of Long-run Equilibrium Relationship

Variable	Coefficient	Prob.
Barley *ECT*	-0.036	0.000
Castor Seed *ECT*	-0.030	0.000
Chana *ECT*	-0.024	0.000
Coriander *ECT*	-0.018	0.000
Cotton Seed Oilcake *ECT*	-0.054	0.000
Jeera *ECT*	-0.039	0.000
Mustard Seed *ECT*	-0.027	0.000
Refined Soyoil *ECT*	-0.028	0.000
Soybean *ECT*	-0.020	0.000
Sugar *ECT*	-0.033	0.000
Turmeric *ECT*	-0.016	0.000
Wheat *ECT*	-0.026	0.000

Source: Computed results based on compiled data collected from NCDEX

Figure-2 Error Correction Term of *ECM* of Long-run Equilibrium Relationship



Source: Computed results based on compiled data collected from NCDEX.

Table-4 Error Correction Model for Short-run Equilibrium Relationship

Selected Commodities	Barley	Castor Seed	Chana	Coriander	Cotton Seed Oilcake	Jeera	Mustard Seed	Refined Soy Oil	Soybean	Sugar	Turmeric	Wheat
Barley		0.046***	-0.084***	0.034***		-0.024***	0.166***			0.062***		0.115***
Castor Seed	0.386***			0.104***	0.204**	0.054***		1.796***	-0.062*	0.538***		
Chana	-0.256***					0.033***	0.302***			0.139***	-0.041***	
Coriander	0.430***	0.193***			0.866***	0.114***				0.156*	0.164***	
Cotton Seed Oilcake		0.014**		0.030***		0.015***	0.096***	0.521***	0.018**	0.064***	0.011***	
Jeera	-1.304***	0.330***	0.566***	0.442***	1.620***		0.434***			1.252***	0.474***	0.923***
Mustard Seed	0.358***		0.201***	-0.037***	0.382***	0.022***		5.428***	-0.125***		0.041***	-0.242***
Refined Soy Oil		0.007***			0.026***		0.078***		0.042***	-0.027***		
Soybean		-0.036**			0.162**		-0.246***	5.977***				
Sugar	0.055**	0.067***	0.044***	0.016**	0.146***	0.026***		-0.756***			0.017***	-0.088***
Turmeric			-0.308***	0.261***	0.366**	0.199***	0.129**		-0.206***	0.433***		0.404**
Wheat	0.043**				0.042**	0.007***	-0.016**			-0.042***		

*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Source: Computed results based on compiled data collected from NCDEX.

The ***ECM*** explains short-run equilibrium relationship when the lagged values of the response and predictor variables are significant thereby rejecting the $\mathbf{H}_0^3$, i.e., "there is no short-run equilibrium relationship among the futures prices of the selected agricultural commodities dealt in ***NCDEX***" (vide Table-4).

The futures prices of *Barley* shows long-run as well as short-run equilibrium relationship with the futures prices of *castor seed*, *chana*, *jeera*, *mustard seed* and *wheat* and short-run equilibrium relationship with the futures prices of *coriander* and *sugar* however, with the futures prices of *cotton seed oilcake* and *soybean*, it shows no significant relationship. The futures prices of *castor seed* shows long-run as well as short-run equilibrium relationship with the futures prices of *barley*, *coriander*, *cotton seed oilcake*, *jeera*, *refined soy oil*, *soybean*, *sugar* and long-run equilibrium relationship with the futures prices of *mustard seed*, *turmeric* and *wheat*, however, with the futures prices of *chana*, it shows no relationship.

The futures prices of *chana* shows long-run as well as short-run equilibrium relationship with the futures prices of *barley*, *jeera*, *mustard seed*, *sugar* and *turmeric* and long-run equilibrium relationship with the futures prices of *castor seed*, *coriander*, *cotton seed oilcake* and *wheat*. The futures prices of *coriander* shows long-run as well as short-run equilibrium relationship with the futures prices of *barley*, *castor seed*, *cotton seed oilcake*, *jeera*, *sugar* and *turmeric* and long-run equilibrium relationship with the futures prices of *chana*, *mustard seed* and *wheat*.

The futures prices of *cotton seed oilcake* shows long-run as well as short-run equilibrium relationship with the futures prices of *castor seed*, *coriander*, *jeera*, *mustard seed*, *soybean*, *sugar* and *turmeric* and long-run equilibrium relationship with the futures prices of *chana* and *wheat* and short-run equilibrium relationship with the futures prices of *refined soy oil* however, with the futures prices of *barley*, it shows no relationship. The futures prices of *jeera* shows long-run as well as short-run equilibrium relationship with the futures prices of *barley*, *castor seed*, *chana*, *coriander*, *cotton seed oilcake*, *sugar*, *turmeric* and *wheat* and short-run equilibrium relationship with the futures prices of *mustard seed*.

The futures prices of *mustard seed* shows long-run as well as short-run equilibrium relationship with the futures prices of *barley*, *chana*, *coriander*, *cotton seed oilcake*, *refined soy oil*, *soybean*, *turmeric* and *wheat* and long-run equilibrium relationship with the futures prices of *castor seed* and short-run equilibrium relationship with the futures prices of *jeera* however, with the futures prices of *sugar*, it shows no relationship. The futures prices of *refined soy oil* shows long-run as well as short-run equilibrium relationship with the futures prices of *castor seed*, *cotton seed oilcake*, *mustard seed*, *soybean* and *sugar*.

The futures prices of *soybean* shows long-run as well as short-run equilibrium relationship with the futures prices of *castor seed*, *cotton seed oilcake*, *mustard seed*, *refined soy oil*, *sugar* and *turmeric* and long-run equilibrium relationship with the futures prices of *barley*. The futures prices of *sugar* shows long-run as well as short-run equilibrium relationship with the futures prices of *castor seed*, *chana*, *cotton seed oilcake*, *jeera*, *turmeric* and *wheat* and long-run equilibrium relationship with the futures prices of *soybean* and short-run equilibrium relationship with the futures prices of *barley*, *coriander* and *refined soy oil* however, with the futures prices of *mustard seed*, it shows no significant relationship.

The futures prices of *turmeric* shows long-run as well as short-run equilibrium relationship with the futures prices of *chana*, *coriander*, *cotton seed oilcake*, *jeera*, *soybean* and *sugar* and long-run equilibrium relationship with the futures prices of *castor seed* and short-run equilibrium relationship with the futures prices of *mustard seed* and *wheat*. The futures prices of *wheat* shows long-run as well as short-run equilibrium relationship with the futures prices of *barley*, *cotton seed oilcake*, *jeera*, *mustard seed* and *sugar* and long-run equilibrium relationship with the futures prices of *castor seed*, *chana*, *coriander* and *turmeric*.

Conclusion

Agricultural commodity market is the emerging one in India. Identifying the hedging opportunities is an important task for a hedger in the market. A stable rationale market provides a stable hedging however, in reality the market participants are irrational and there exists a speculative and arbitrage opportunities. The agricultural commodities are traded less when compared to the metal commodities; hence, analysing the commodity market only is not enough. Thus, against with this background, the study made an attempt to analyse the influence of one agricultural commodity futures price upon the other agricultural commodity futures prices.

The study has been carried out on 12 agricultural commodities by empirically analysing the relationship and studying the impact of inter-commodity futures price spread among the agricultural commodities in India over the period of five years from April 2009 to March 2014 constituting around 20,064 futures prices. The relevant data required for the study are collected from ***NCDEX*** on 18th April 2014. Karl Pearson's correlation co-efficient is used to determine the one-to-one relationship between the selected variables. The ***ECM*** is used to determine the relationship among the selected agricultural commodities futures prices.

Analysis made with the help of the research methods brought some concrete inferences regarding the inter-commodity futures price spread among the selected agricultural commodities in India. It has been summed up that the futures prices of the selected agricultural commodities are related with the micro economic factors. The futures prices of agricultural commodities belonging to same categories like oil and oil seeds, cereals and spices show a strong and significant relationship within the futures prices of the selected commodities of that category. Agricultural land is limited and so crop sowing becomes a competitive factor. The study shows that the futures prices of the selected agricultural commodities, which are grown in same area and same season, have strong relationship with the futures prices of other selected agricultural commodities.

Hedging continues to be a research area because of the fast and constant development in the commodity markets and economic policies in India. The study summarized the key factors impacting the futures prices of the selected agricultural commodities by the futures prices of the other

agricultural commodities, resulting in to a cross-hedging opportunity. The study may be used as a ready reference for future researchers on the area under discussion. Further, for the hedgers of agricultural commodities in India, the study may prove to be valuable for re-drafting for their hedging decision keeping in view the outcome of the study.

Based on the findings of the study the futures prices of the selected agricultural commodities showed a strong relationship within its category, so the hedgers can use the futures contract of one commodity to hedge against the other commodity belonging to the same category. Even the seasonal price falls of one commodity can be overcome using related commodities futures contract, providing a cross-hedging opportunity between the commodities. Some commodities, which reveal only short-run or long-run equilibrium among themselves, can be used as strategic hedging opportunities in short-run and long-run respectively.

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