

Agri-Commodity Derivative Market in India: A Thematic Review of Available Literature

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Abstract: Commodity Derivative Market have played a pivotal role in strengthening the agricultural and non-agricultural economy of the country. It has become an attractive investment vehicle for the investors as it acts as an hedging platform to the various players of the value chain. Across the world, commodity exchanges have been contributing significantly towards market efficiency, price discovery and risk management. As such, this paper aims to provide a gist of the available research focusing on market efficiency, price discovery and risk management of the Agri-Commodity Derivative Market in India

Keywords: Commodity Derivative Market, Agri-Commodities, Market Efficiency, Price Discovery, Risk Management

I. INTRODUCTION:

Commodities that have always been a part of our daily existence are also one of the worthy investment avenues available to us. Whether it is the food grains we consume or the metal that we use, the fuel that runs our vehicle etc. are all traded worldwide in the major exchanges. Commodities today have become an attractive investment vehicle for the investors with diverse investment portfolio to choose from. In relation to this, Commodities traded in the major exchanges are divided into two categories namely: Agriculture Commodities and Non-Agriculture Commodities.

Agri-Commodities are commodities typically grown that are animal or machine produced and or raised on farms or plantations. Barley, Chana, Maize, Wheat, Cotton, Guar, Sugar, Oil and Oil Seeds, and Spices are examples of agri-commodities that are mainly traded in the Indian commodity exchanges.

Non-Agri Commodities include commodities that are not considered agricultural produced and are mined from the ground or derived from other natural resources. Examples of non-agri commodities mostly traded in India include bullion, base metal and energy.

Over the years, the Commodity Future Market has developed significantly both in terms of network and volume. At present, Commodity Exchanges in India consist of a two-tier structure namely: Regional and Nation-Wide. Regional exchanges are permitted only to have a limited number of local membership contracts whereas Nation-Wide exchanges are the multi-commodity exchanges operating electronically. Apart from 16 regional commodity exchanges, India has 6 national commodity exchanges viz., Multi-Commodity Exchange (MCX), National Commodity and Derivative Exchange (NCDEX) and National Multi Commodity Exchange of India (NMCE), Indian Commodity Exchange (ICEX), ACE Derivatives Exchange (ACE) and Universal Commodity Exchange (UCX). However, currently there are only three of them operating successfully as briefly explained below:

- **MCX:** MCX is India's largest independent commodity derivative exchange. It offers options trading in gold and futures trading in metals and energy contracts and a number of agricultural commodities.
- **NCDEX:** NCDEX is a public limited company and is the only commodity exchange in India to be promoted by National Institutions and regulated by the Securities and Exchange Board of India. It is popular for trading in agricultural commodities and offers future trading in 31 agricultural and non-agricultural commodities.
- **NMCE:** In 2017, the NMCE merged with the Indian Commodity Exchange (ICEX) and became the third largest commodities market after MCX and NCDEX. It is popular for trading in spices and plantation crops.

Taking into account the three commodity exchanges and the various research carried out on the Agri-Commodity Market in India, this present study is an attempt by the researcher to provide a gist of the literatures focusing on market efficiency, price discovery and risk management that the research could access.

II. RESEARCH GAP

Commodity Market has shown tremendous growth and performance over the years. Numerous studies are being carried out by various researchers on different aspects of the Commodity Market. While going through the available literatures, the researcher has not come across any study providing up-to-date information of the existing literatures on Agri-Commodity Market. Hence, there is a need to present out a detailed thematic review of the available literatures in order to gain an understanding of the studies carried out till date so that the investors can analyse its investment prospects on one hand and the researchers can carry out further research avoiding duplicacy of work on the other. Moreover, since agriculture plays an important role in the Indian economy, the present study makes an overview of the Indian Agri-Commodity Derivative Market only and assembles the relevant literature on such.

III. OBJECTIVES OF THE STUDY

The present study aims to understand the status of Agri-Commodity Markets in India with special focus on Market Efficiency, Price Discovery and Risk Management.

IV. RESEARCH METHODOLOGY

The present study is descriptive in nature and relates to agricultural commodity markets in India only. While carrying out the study, available literatures are being collected from secondary sources that the researcher could access. Moreover, literatures contributing to market efficiency, price discovery and risk management are only taken into consideration for achieving the objectives of the study.

V. THEMATIC REVIEW:

Market Efficiency

1) Efe-Omojevwe (2013), in his research *“A study of the Efficiencies of Maize and Wheat Futures Markets in India”* determines the efficiency of Indian future markets for maize and wheat. It was found that maize and wheat futures are a little more unstable than their spots. The instability or variability between the future and spot prices suggests that the maize and wheat futures markets were inefficient. It was also found that the volatility is not always the cause of inefficiency, because even though there was no significant volatility, the market was weakly inefficient due to normal fundamentals of demand and supply. On the basis of price discovery and risk management, the study advocates for more participation in the futures market and the formulation of policies that would enhance greater working efficiency of the futures markets.

2) R.Sendhil, Kar Amit and Jha Girish(2013)in their research paper, *“Testing the Efficiencies of Indian Wheat Futures”* analyses the efficiency of wheat futures in terms of price transmission, price discovery and extent of volatility in terms of 3 contract period. Cointegration analysis reveals long run equilibrium owing to price transmission between futures and spot markets. Analysis on price discovery indicates hedging only in one contract and the rest experience speculative prices. GARCH results exhibit persistence of price volatility. The above analyses point the inefficiency in wheat futures. This paper concludes that farmer participation through institutional intervention and innovation will improve its efficiency substantially.

3) Inoue Takeshi & Hamori Shigeyuki (2014)in their research paper, *“Market Efficiency of commodity futures in India”* analyses the market efficiency and long run equilibrium relationship of commodity futures. The full sample period of the study is from 2 January 2006 to 31 March 2011; which is divided into two sub-sample A (2 Jan 2006- 30 June 2009) sub-sample B (1 July 2009- 31 March 2011). Johansen co integration test was conducted by using multi-commodity futures and spot prices obtained from MCX; which indicated co integrating relationship between them thereby satisfying the necessary condition of market efficiency. Another test was conducted for unbiasedness of futures market using FMOLS and DOLS; the null hypothesis that the future price is the unbiased predictor of the spot prices is rejected implying that the commodity futures market is not efficient. Therefore, it was concluded that commodity future market has increased efficiently with increase trading volume since 2009.

4) Ali Jabir and Gupta K.B.(2011)in their paper entitled, *“Efficiency in agricultural commodity futures markets in India-Evidence from cointegration and causality tests”* indicates that cointegration exists significantly in futures and spot prices for all the selected commodities except for wheat and rice. This suggest there is a long term relationship between futures and spot prices for most of the agri-commodities like maize, chickpea, black lentil, pepper, castor seed, soybean and sugar. The analysis of short-term relationship by causality test indicates that future markets have stronger ability to predict subsequent prices for chickpea, castor seed, soybean, and sugar as compared to maize, black lentil and pepper, where bi-directional relationship exist in the short run.

5) Samal G.P., Swain A.K., Sahoo A and Soni Amit in his paper entitled, *“Market Efficiency of Agricultural Commodity Futures in India: A Case of Selected Commodity Derivatives Traded On Ncdex During 2013”* analyzes the efficiency of agri commodity markets by assessing the relationship between future prices and spot prices of 3 commodities namely; cotton, turmeric and castor seeds in India. Results show correlation exists significantly in future and spot prices for all agri-commodities. The analysis of short-term relationship by causality test indicates that futures markets have stronger ability to predict subsequent spot prices for cotton, turmeric and castor seeds.

6) Parasuraman N.R., and Rao Ullas (2014) in his paper titled, *“An Empirical Examination of the Efficiency of Commodity Markets in India”* investigate the postulate surrounding market efficiency commodity markets using an empirical cost-of-carry model to the equity markets. Both single hypothesis and joint hypothesis tests reject the cost-of-carry model implying that in the absence of market efficiency, arbitrageurs should be in a position to exploit the price differentials existing across futures and spot prices in both commodity as well as equity markets in order to earn abnormal returns.

7) Kaur,G.,and Rao,D.N.,*“Efficiency of Indian Commodities Market: A Study of Agricultural Commodity Derivatives Traded on NCDEX”* examines the market efficiency of four agri-commodities namely- Pepper Malabar, Refined Soya oil, Guar seed and Chana with the help of Autocorrelation test and Run test. The empirical results of the study indicate that t-values of the autocorrelation corresponding to future and spot price for three commodities Guar seed, Chana and Pepper the autocorrelation are significantly different from zero and corresponding t value is greater than 1.96. The results lead to rejection of null hypothesis and acceptance of alternate hypothesis that the commodity markets are weak form efficient. The Non parametric run test for the full sample period indicated that both future and spot price for all select agricultural commodities are efficient in weak form.

8) Haq Irfan, Rao K.C. (2014)in his paper titled, *“Efficiency of Commodity Markets: A Study of Indian Agricultural Commodities”* examines the efficiency in agri-commodity futures markets in India. Long run and short run relationship is analysed using cointegration and error correction models. The commodities include; Barley, Channa, Chilli, Guar Gum, Guar Seeds, Jeera, Pepper, Refined Soy Oil, Soy Bean and Turmeric. Depending upon the availability of futures contract different data periods were used for different commodities. For Channa, Chilli, Guar Gum, Guar Seeds, Jeera, Refined Soy Oil, Soy Bean and pepper the data set used is from March 2006 to Dec 2011, Barley from Mach 2007 to Dec 2011 and for turmeric the data used is from March 2009

to Dec 2011. It was found that the markets for all the ten commodities included in the study are efficient in long run. However, short run inefficiencies and pricing biases exist, which can be attributed to dynamic lag structure and slow adjustment to long run equilibrium.

9) Raghavendra RH*, Velmurugan P.S. and Saravanan. A.(2016) in his research paper, ***“Relationship between Spot and Futures Markets of Selected Agricultural Commodities in India: An Efficiency and Causation Analysis”*** assesses the relationship between spot and future prices of agricultural commodities such as Soya bean, Chana, Maize, Jeera and Turmeric for a period from January 2010 to March 2015 traded in NCDEX. Johansen’s Cointegration and Regression model were employed to examine the lead-lag relationship between spot and futures markets of the selected agricultural commodities. Augmented Dickey-Fuller and Phillips-Perron tests were employed to verify the stationarity of the data series. Further, the necessary lag length of the data series was selected on the basis of Schwarz Information Criterion (SC). Johansen’s Cointegration test is employed to examine long-run relationship among the variables after they are integrated in an identical order. Empirical results suggest the existence of long-run equilibrium relationships between futures and spot prices of the above commodities. The relationship direction of future price and spot price are in general, where there is one-way causal linkage from future market to spot market prices for two agricultural commodities, viz., Soya bean and Chana. Further, it also confirms the presence of bidirectional relationship between commodity futures and spot market for three selected agricultural commodities viz., Maize, Jeera and Turmeric

10) Gupta S, Choudhary H and Aggarwal D.R.(2016)in their study entitled ***“Efficiency of Indian Commodity Market: A Survey of Brokers’ Perception”*** documents the finding of a survey of brokers’ perception pertaining to the recently introduced commodity derivatives market in India. Results show that high net worth individuals and proprietary trading are contributing to the major proportion of trading volume in commodity futures. Interestingly, retail investors are also emerged as the significant contributor in total turnover of brokers. Survey results exhibit that price discovery and hedging effectiveness functions are well performed by all the commodity futures except the energy commodities futures. Energy commodities, being the most volatile commodities, are perceived as having less hedging effectiveness as compared to others. Brokers are assenting on the high to moderate impact of open interest, volume and time to maturity on the volatility of the commodity futures derivatives.

Price Discovery and Risk Management

1) Agarwal Niddhi, Jain Saram, Thomas Susan(2014), in their study ***“Do futures markets help in price discovery and risk management for commodities in India?”*** examines price discovery and hedging efficiency of commodity futures markets. It was found that price discovery and hedging effectiveness of the commodity derivatives markets, play a role in price discovery consistently across most of the eight commodities(i.e.castorseed, pepper, rubber, soyaoil, wheat, crude oil and gold)analysed. But it was also found that the hedging effectiveness is lower, and has wider variation across the commodities, particularly agricultural due to some of the issues like include a low credibility of warehouse receipts, a lack of standardisation of underlying commodities and mismatch between grades available and grades to be delivered. Along with this, the state exerts significant control on the inventory of the commodity held by traders, as well as the supply of deliverable commodity in the market and suspension of trading in the futures contracts that cause disruptions in either the spot price or the futures price or both, in such a way that the hedging benefits to using the futures is significantly reduced.

2) Chhajed Isha and Mehta Sameer (2013), in their research entitled ***“Market Behavior and Price Discovery in Indian Agriculture Commodity Market”*** study considered average monthly spot and future prices of nine agricultural commodities viz.wheat, chana, soyabean, oil, jute, menthe oil, rubber, potato, crude palm oil and cardamom trading on MCX and NCDEX during 2009-10. The market behaviour was studied with the help of backwardation and contango whereas Granger causality test have been used to test the price discovery of the above commodities. The result of the study says that the price discovery mechanism is quite different for different commodities but it suggests that causality can be used in forecasting spot and futures prices. Most of the commodities showed bi-directional causality between spot and future prices. Furthermore, it was found that the contango and backwardation helps in identifying the hedging opportunities in the market.

3) Kumar Raushan,(2014) in his paper titled ***“Price discovery in some agricultural commodity markets in India”*** examines the lead-lag relationship between spot and futures markets; and thereby the interdependence of future prices of various crops traded on NCEX namely: wheat, barley, maize, gram, mustard castorseed, soyabean, zeera, chilli, coriander, pepper, cotton seed oilcake and sugar. Using daily data on spot and future prices, linear Granger causality results suggest that futures markets dominate the spot markets for all crops, so that price changes in future markets lead price changes in spot markets for these crops. In case of wheat, zeera and barley, there are bi-directional flows between the spot and futures markets. The movement of futures agricultural commodity prices are interdependent because the agricultural commodity prices are linked through substitutability and complementarity in demand and supply. Thus, the basic finding of this study is that the futures market performs the role of price discovery.

4) Kumar Vivek (2015),examines in his paper titled ***“Futures Market of Pepper in India: An Empirical Study”*** the performance and efficiency of pepper futures market for its role of price discovery and risk management functions. Using the econometrics techniques such as cointegration, VECM, Granger causality, impulse response and variance decomposition, the study indicates that pepper has not done well as performance and efficiency are concern. Looking at the result it can be said that, hedgers find futures market useful to manage price risk and can be very useful in risk management functions.

5) Chopra Aviral, Bessler David (2005) explores the incidence of price discovery for black pepper in the spot market and distant futures markets in his research entitled ***“Price Discovery in the Black Pepper Market in Kerala, India”*** taking into account daily closing price of black pepper and future prices of nearby and first distant futures month from the period Oct 2001 to February 2003. Modern time series methods of cointegration and directed acyclic graphs show that price information is discovered in the future market; however evidence is ambiguous as to whether that discovery is in the nearby(the month closest to delivery) or distant contract (delivery between one month into the future).

- 6) R.Salvadi Easwaran and P.Ramasundaram(2008) investigates the role of agri-commodity future markets in price discovery in their study entitled **“Whether Commodity Futures Market in Agriculture is Efficient in Price Discovery ?- An Econometric Analysis”**. The study include statistical data analysis on price discovery of four agri-commodities namely castor, cotton, pepper and soya. The Wald chi-square test statistics indicated that futures markets were inefficient in forecasting the future spot prices which implied absence of price discovery in the futures market. This result further emphasized the fact that the future contracts were not perfect hedge against the variations in the spot prices.
- 7) Nath, G.C. and Lingareddy, T. (2008), in their draft entitled **“Commodity Derivative Market and its Impact on Spot Market”** studies the impact of future trading on spot prices in 3 commodities viz. urad, wheat and gram. Using dummy variables, the result indicates introduction of future trading in these commodities had let to increases in prices of urad but the same is not statistically true for other commodities. However, this on the other hand, have not helped in reducing seasonal/cyclical fluctuations in prices of the selected commodities. It was also found that the introduction of futures have significantly increased the volatilities in the spot market of the selected commodities.
- 8) Kumar, V.(2015), in his study titled **“Futures Market of Pepper in India: An Empirical Study”** examines the performance and efficiency of pepper futures markets in price discovery and risk management functions. The performance assessment methods indicate future market has not done well as performance is concerned. In terms of efficiency, it was found that the pepper future prices cointegrate with the spot prices, hedgers find futures market useful to manage price risk and can be very useful in risk management functions.
- 9) Mukherjee, K.N.(2011) in his research titled, **“Impact of Futures Trading on Indian Agricultural Commodity Market”** attempts to re-validate the impact of futures trading on 9 major agri-commodities(Chana, Wheat, Chilli, Jeera and Pepper, Mustard Seed, Castor Seed, Soya Oil and Mentha Oil) in India. The present study exhibits that even though the inflationary pressure on agri-commodity prices have gone up sharply, the destabilizing effect of the futures contract is casual in nature and tends to vary over a long period of time. The empirical findings significantly shows that comparative advantage of futures market in disseminating information leads to significant price discovery and risk management thereby developing the underlying commodity market in india.
- 10) Goswami, B.and Mukherjee, I.(2015), **“Risk-Return Analysis of Different Commodity Futures in Indian Derivative Market”** provides a comparative analysis of risk-return on 10 most actively traded agricultural commodities as Chana, Jute, Kapas, Pepper, Wheat, Rice, Potato, Yellow peas, Sugar and Urad. The results show agricultural commodity occupy a modest position with respect to both risk and return. This paper confirms that high returns are generally associated with high risk, which is in conformity with the general theory of risk-return.

VI. FINDINGS AND CONCLUSION

The commodity future market has increased efficiently with increase trading volume since 2009. High net worth individuals and proprietary trading are contributing to the major proportion of trading volume in commodity futures. Interestingly, retail investors have also emerged as the significant contributor in total turnover of brokers. The analysis of short-term relationship by causality test indicates that futures markets have stronger ability to predict subsequent spot prices. However some study indicates absence of market efficiency caused due to normal fundamentals of demand and supply. It is expected that in the absence of such market efficiency, arbitrageurs should be in a position to exploit the price differentials existing across futures and spot prices in both commodity as well as equity markets in order to earn abnormal returns. The movement of futures agricultural commodity prices are also found to be interdependent because the agricultural commodity prices are linked through substitutability and complementarily in demand and supply. It was found that hedgers find futures market useful to manage price risk and can be very useful in risk management functions. On the basis of price discovery and risk management, the study advocates for more participation in the futures market and the formulation of policies that would enhance greater working efficiency of the futures markets. It could be seen that efficient working of the commodity markets will contribute to price stability and better economic development of the country. Also, farmer participation through institutional intervention and innovation will improve its efficiency substantially. The thematic review of available literature on agri-commodity derivative market in India makes it clear that it has a pivotal role to play in market efficiency, price discovery and risk management of various agricultural commodities traded in the commodity exchanges.

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