A Review of an Empirical Study on Wheat Price Indexing with Reference to Indian Context

Arjun Kumar K.V[1,*], Praveen M.V[2], Vanishree Trupti Kulkarni[3], Akhila M[4]

[1] *Assistant Professor, Dayananda Sagar College of Arts, Science and Commerce, Bangalore-560111.*

[2] Assistant Professor, Dayananda Sagar College of Arts, Science and Commerce, Bangalore- 560111.
[3] Assistant Professor, Jyothy Institute of Commerce and Management, Bangalore-560082.
[4] Assistant Professor, MES College of Arts, Commerce & Science (Autonomous) Bangalore-560003.
*Corresponding Author: 007arjun.akk@gmail.com

Received: 25-Dec-2025 **Revised:** 27-Feb-2026 **Accepted:** 15-June-2026

Abstract

In general, there is disagreement in the empirical research about the effects of agricultural commodities derivatives. Dealing in spot markets. The present review aimed to experimentally investigate how derivative trading affects price of wheat in both the future and spot markets. It studies a long-term price discovery of assets between the future and spot markets. The presence of long-term equilibrium amidst the futures and spot markets are ascertained by the test of Johansen cointegration. The findings demonstrate that a long-term equilibrium connection in wheat. The findings showed that future markets were a major source of price signals for the current market. By supporting improved infrastructure features including cheap warehousing costs, receipts and electronic spot exchange, the government may encourage hedgers to participate in the future market and deepen the markets.

Keywords: - Derivatives, Spot Market, Agricultural Commodity, Wheat Price, Empirical Study

1. Introduction

The price of wheat that is exchanged on the mandi is subject to change. Wheat growers and dealers are at risk from unfavorable price fluctuations in the future. The purpose of derivative markets is to offer speculators an investment opportunity and hedge in reciprocation to unfavorable risk of price.

Risk in exchange against potential rewards. However, electronic derivative markets serve as a price barometer and a connecting mechanism for commodities of agricultural sort that have strewed across spot markets in the nation. Therefore, the agricultural derivative markets play a role in price discovery in addition to risk management and price stabilization. These marketplaces are designed to provide Indian farmers access to hedging tools, level the playing field, and price signals (Rajib, 2015). But for many years, futures trading have been charged with promoting speculative trading and causing spot markets to become unstable. Since wheat is one of the commodities used to calculate the wholesale price index (WPI) and consumer price index (CPI), the government has tightly regulated these marketplaces. Following the release of the 2000 Agriculture Policy Statement, the government changed its stance from one of protection to one of agricultural liberalization and privatization. Trade volumes in agricultural derivative markets experienced a massive increase in the years after 2017. Nonetheless, a number of basic commodities were prohibited in 2017, with the claimed justification being growing inflation brought on by futures trading.

This study, which focuses on Indian agricultural commodities, scrutinizes the contentious repercussions of futures trading on spot pricing based on the literature review. According to current research, the futures markets are more effectual than spot markets because these provide quick information transmission, reduce transaction costs, and improve market liquidity, depth and price discovery. Furthermore, these assist in shifting price jeopardy from hedgers to risk-takers, which may lower the risk premium in spot deals. These advantages, however, rely on the integration of the future and spot markets that means that over time, their prices move in tandem. This connection is commonly examined using the Vector Error Correction Model i.e. (VECM) and the Johansen cointegration test. There is the substantial empirical study gap on price discovery for Indian agricultural commodities, despite a fact that financial assets have been the subject of much effort. This work, which is divided into sections addressing data description, cointegration analysis, and conclusions, attempts to close that gap (Wadhwa, 2022).

2. Literature Review

Numerous, but contentious, empirical studies have examined how futures trading affects spot market volatility and how it influences price discovery. According to a substantial amount of research, the addition of futures markets improves how well the underlying spot markets operate. Advocates argue that futures trading enhances price discovery by making markets deeper and helping information spread faster (Figlewski, 1981, 1992). The structure of electronic futures markets itself supports greater market liquidity by giving participants better access to trade information (Schreiber, 1986). One of the key strengths of derivative markets lies in their ability to process information efficiently. Because futures markets generally have lower transaction costs than spot markets, they encourage traders to seek out more accurate information. This reduces information distortions and leads to more efficient pricing (Yang, 1999). While a significant amount of research has explored price discovery in financial assets, Wadhwa (2022) notes that there is still a lack of empirical work on agricultural commodities in developing countries like India. To address this gap, Wadhwa examines the Indian wheat market using data from 2020 to 2024. By applying the Johansen cointegration test, the study establishes a long-term equilibrium relationship between futures and spot prices—contradicting earlier findings by Roy (2008)—and underscores that market integration is essential for effective price discovery. The study comes to conclusion that wheat spot market price signals are mostly generated by futures markets, which has significant practical and policy ramifications (Wadhwa S., 2022).

Research Methodology and Research Design

The long-term price link between India's wheat futures and spot markets is examined in present research paper using a rigorous, multi-stage econometric technique, which is necessary for efficient price discovery. The study's quantitative, ex-post facto approach, which uses past data to test for statistical associations without intervention, is what makes it unique.

Data Interpretation and Discussion

Wheat futures and daily closing spot prices make up the data. The regular closing future prices of mid-month contracts for all commodities were used to build the future price series. The price data for the future and spot have been assembled from National Commodity and the reporting period for Derivative Exchange Limited (NCDEX) was January 1, 2020, through December 31, 2024. Trading increased and data became available only after 2003, when the Indian government permitted the reintroduction of commodity futures.

Wheat Profiling as Product It is among the most significant cereal grains that people worldwide eat. Breads, bakery goods, and a variety of other food products are made using it. In addition, it is a significant source of animal feed. It needs a warmer environment to dry up and cooler temperatures for earlier plantations. The harvest spell lasts from April - May, and is grown as Rabi crop in October. With an annual production of 75–80 million tons, India ranks third globally in terms of wheat production. Delhi, Kanpur, and Kota are the delivery centers for upcoming contracts. Every month, there is a contract launch. Additionally, 10 metric tons is the delivery unit for commerce.

Statistical Inferences from Descriptive Statistics Constructs from Source - NCDEX

Chart 1 presents the future and spot return series descriptive data. Future returns have higher average prices than spot returns. The pattern demonstrates a market condition called the Contango, in which traders are net long for practically all commodities and future prices will decline throughout the course of the contract. The futures markets for wheat are more volatile than the spot market, according to a standard deviation study of return volatility. The distribution of the return series is asymmetrical, with a larger left tail, negative skewness, and a majority of the data on the right. Given the clustering around the mean and the likelihood of a big variation with fat tails, return series shows an array of modest changes which would occur less often.

Future and Spot Series Reported				
Return Series	*Mean*	*Std. Dev.*	*Skewness*	*kurtosis*
Wheat Spot Returns	0.000339	0.010776	-1.22503	17.67058
Wheat Futures Returns	0.000413	0.010958	-1.50971	21.90145

Chart 1.

Long-Term Market Equilibrium amidst the Futures and Spot

The first form difference must be integrated of order 1 or higher in order to perform the Johansen Cointegration test. Augmented Dickey Fuller test 1 is used to analyze the order of integration of the spot price (In Pst) and future price (In Pft) series. It is evident that for wheat, the future series (In Pft/Pft-1) and the spot series (In Pst/Pst-1) are stationary at the first form difference, whereas the future and spot price series are non-stationary at the level form. The series are all integrated of order 1, or I(1) processes, according to this conclusion, and the Johansen test for long-term equilibrium relationships may be used. Chart 2 displays the stationarity test result.

ADF Test Result for FUTURE and SPOT Series in Level form and first form difference				
	Level Form		*1st Form Difference*	
	t-statistics	p-value		
Wheat Future Returns	-1.03258	0.7435	39.5627	0
Wheat Spot Returns	-1.81971	0.3711	-14.2009	0

Chart 2.

The Engle-Granger (1987) method of bivariate cointegration has been used in previous studies to evaluate market integration. There were two or more non-stationary series involved, yet a linear combination of them was stationary. More contemporary methods are Johansen's (1988) and In order to ascertain the cointegrating linkages, Johansen and Juselius (1990, 1992). Assuming that □ is a (n×1) vector of a non-stationary I(1) variable, the Vector Auto Regression (VAR) of □□ up to k delays may be expressed as follows:

□□ = □ + S

□□, of t=1, 2 ....T

where M is a (n×1) vector of constants, □ is an equally and independently distributed n- dimensional vector of residuals, and each of □ N□□-1 □ + □□ is a (n×n) matrix of parameters. First difference notation may be used to describe equation (1.1) above, and the error correction representation of □ in □□ can be written as follows: Δ□□ = G 1 Δy t-1 □

Where G □ + □ + G k-1 Δy = (□ - Π - □ - Π t-k+1 □ + Π t-1 + u t) G □); □ = 1,2, □ □ - 1, Π = -(1 – Π) S is a (n×) coefficient matrix for the variables in □, and Δy,i=1,2,...k-1 is a (n×n) coefficient matrix for them. t-1, t-1, t-1, □ □ is a column vector of disturbance terms that is (n×1). The aforementioned formula provides details on the short-term and long-term adaptations to alterations through G and, respectively. The cointegration analysis, which essentially entails looking at the impact matrix, provides the information about the long-term connection.

Two likelihood ratio test statistics were developed by Johansen (1988) to determine the number of cointegrating vectors. The lambda-trace statistics, which are provided by:, are used to test the null hypothesis of r cointegrating vectors versus the alternative of more than r cointegrating vectors. □~t□□□□ = -□∑ □=□+1 In (1 - □^ i However, the lambda-max is adopted to test the null hypothesis of r cointegrating vectors versus the alternative of (r+1) cointegrating vectors. Statistics are calculated as follows: □□□□ = -□∑ □=□+1 In (1 - □ˆ r+1) whereas T is the quantity of useful information and □'s are the predicted Eigen values (characteristic roots).

Two non-stationary variables have been subjected to the highest eigenvalue test and the lambda-trace test: spot price (In Pst) and the bivariate framework's future price (In Pft) of 08 agricultural commodities. Exhibit 3 reports greatest eigenvalue and the Johansen trace test findings. Only one of the eight commodities, Kapas, accepts the null hypothesis which the futures and spot markets aren't cointegrated since, at 5% level of significance, neither statistic, □

, exceeds the crucial value. The lack of a long-term link indicates which the spot and derivatives markets are not integrated. One cointegrating equation, suggesting single route of conjunction towards equilibrium, is indicated by wheat commodity.

Johnson Cointegration Test

The first hypothesis, H 0, is the numeral of cointegrating equations. Johansen Cointegration Test Panel A: Cointegration Rank (Trace) Test = 0 versus H1: There are more cointegrating equations than 0 and the second hypothesis H 0: There are no more than one cointegrating equations, whereas H 1: There are more than one cointegrating equations.

Johnson Cointegration Test					
Commodity	Hypothesized no of CE(s)	□~t□□□□	Critical Value (5%)	Probability Value	Decision
Wheat	None	35.95096	15.49471	0	Indicates one Cointegrating Equation
	At most one	2.682034	3.841466	0.1015	

Chart 3.

Review of Wheat Price Indexing in India

This study provides an insightful empirical analysis of price discovery in India's wheat market, establishing a long-term relationship between futures and spot prices. The findings highlight that futures markets primarily guide spot market pricing. While the study is methodologically sound and clearly structured, it could be strengthened by exploring the effects of major market events and short-term price movements in greater detail. Nevertheless, it makes a valuable contribution to existing research and offers practical policy recommendations aimed at improving market participation and infrastructure.

Suggestions from the Review

The research confirms that the Indian wheat futures market is closely linked to the spot market over time and plays a pivotal role in the price discovery process. Three key recommendations emerge from this analysis.

First, policymakers and regulators should focus on enhancing market efficiency by promoting greater participation from hedgers, developing critical infrastructure such as warehouse receipt systems and electronic spot exchanges, and introducing farmer-centric tools like commodity options. Additionally, the study indicates that futures prices can serve as a reliable source of information for agricultural policymaking.

Second, the findings highlight a significant gap in the literature on agricultural commodities in India, emphasizing the need for further empirical work. Future research should employ advanced econometric models, revisit earlier studies in light of evolving market conditions, and assess the effects of major policy reforms on market integration and efficiency.

Finally, for market participants such as farmers and traders, the key takeaway is the importance of using futures prices as a guide for making informed production and marketing decisions, while remaining mindful of the higher volatility typically observed in futures markets compared to spot markets.

3. Conclusion

This research addresses the gap in literature concerning price discovery in India's wheat markets. Using Johansen cointegration analysis on NCDEX data from 2020–2024, the study identifies a long-run equilibrium relationship between futures and spot prices—contradicting earlier findings by Roy (2008)—and confirms the leading role of futures in the price discovery process. The results underscore the need for government initiatives to foster stronger market integration. Key policy recommendations include boosting hedger participation, improving infrastructure such as warehouse receipt systems and electronic spot exchanges, and introducing commodity options to better support farmers and promote overall market growth.

Bibliography

Figlewski, B. a. (1981,1992). Future Trading and Volatility in GNMA Market. *The Journal of Finance*, 445-456.

Rajib, P. (2015). Indian agricultural commodity derivatives market. *IIMB Management Review*, 118-128. doi:https://doi.org/10.1016/j.iimb.2015.02.002

Schreiber, P. S. (1986). Price discovery in securities markets. *The Journal of Portfolio Management, 12*(4), 43-48.

Wadhwa, D. S. (2022). A STUDY ON PRICE DISCOVERY IN THE INDIAN WHEAT MARKET. *International Journal of Innovations & Research Analysis (IJIRA)*, 205-210.

Wadhwa, S. (2022). A study on price discovery in the Indian wheat market. *International Journal of Innovations & Research Analysis (IJIRA), 02*(03), 205-210.

Yang, J. &.(1999). Price discovery in wheat futures markets. *Journal of Agricultural and Applied Economics, 31*(2), 359-370.