# AGRI COMMODITY PRICES AND INFLATIONARY DYNAMICS – A CAUSAL STUDY

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**Abstract**

The objective of this study is to conduct an empirical and analytical investigation of the link between 'commodity prices and inflationary dynamics'. This study shall provide evidence on causal dynamics between the two variables (commodity price and inflation). The sharp increase in international commodity prices had increased the empirical focus on studying the impact of commodity futures trading on Inflation. In India, there are studies which support the argument that 'Futures trading is the cause of increased Inflation', and there are some studies which are inconclusive about it and some vehemently denied the role of futures trading in inflation of the commodity prices. Hence, the present study tried to find if agri-futures trading is causing inflation in India, by taking 'WPI'(Inflation Index) as a proxy for inflation in India and 'AGRIDEX'(NCDEX Index) as an indicator of futures trading in agricultural commodities. The present study is dedicated to examine analytically if there is any causation or impact of agri-futures trading on inflation.

## INTRODUCTION

Inflation can be defined as a sustained augment in the general level of prices for services and goods and is measured as an increase in annual percentage. It occurs due to an imbalance between supply and demand of money, increase in taxes on products, changes in production and

distribution cost etc. When an economy experiences inflation, the value of currency diminishes. This means that each unit of currency buys fewer services and goods. Consumers are the one who are worse affected by inflation. Consumers find it difficult to afford the basic commodities because of the increased prices of day-to-day goods. Hence, the government tries to keep inflation under control.

## FORMULA FOR INFLATION

Inflation can be defined as "The percentage change in the value of the Wholesale Price Index (WPI) on a year-on year basis. It effectively measures the change in the prices of a basket of goods and services in a year." In India, inflation is calculated by taking the WPI as base.

$$\frac{(WPI\ in\ the\ month\ of\ current\ year - WPI\ in\ the\ same\ month\ of\ the\ previous\ year)}{WPI\ in\ same\ month\ of\ the\ previous\ year} \times 100$$

WPI is an indicator of changes in prices of goods traded in the **wholesale market**. It measures the changes in the prices of the commodities charged by whole sellers and manufacturers and the changes are measured at selected stages before goods could reach to the retailers and WPI is released on a weekly basis in India.

## AGRIDEX

It is a "Value Weighted Index, computed in real time using the prices of the ten most liquid commodity futures traded on the NCDEX platform." It is an agriculture index of NCDEX and contributes about seventy five percent of futures trading in agriculture on the exchange's platform. It's components have been selected from various sub-sectors such as grains, spices, oil seeds and other crops of national importance to ensure proper diversification. It is a reliable benchmark based upon a transparent, simple and easy to understand methodology for the NCDEX traded agri-commodities. Every three months, the weightage and components of the index gets revised based on the trade liquidity, crop season, and production size on the NCDEX.

It is a rolling index and is computed using the near month (closest expiry) prices of futures contracts. The NCDEX AGRIDEX serves as a benchmark and one can replicate the performance of the underlying commodities.

## 10.2 LITERATURE REVIEW

Forward Markets Commission, the then regulatory authority for Commodity Futures in India had banned futures trading from time to time in the agri commodities to stem the soaring inflation.

Against the backdrop of growing realization that unscrupulous activity was causing distortion in the futures market and stoking inflation, in 2007 an Expert Committee on Futures Trading was constituted by the Government of India, to study the effects of futures trading on prices of agricultural commodities. Prof. Abhijit Sen was appointed as the chairman of the expert panel. The panel did not find any correlation between futures trading and inflation and did not recommend a ban on futures trading, but wanted the existing temporary suspension to continue for some more time, also suggested the strengthening of commodity exchanges and FMC in order to facilitate perfect functioning of futures trading in a translucent manner. The panel further elaborated that there was no perfect model statistically to find the linkage between increase in prices of essential commodities and futures trading.

Futures trading in the aforementioned commodities had been suspended based on the perception that the price volatility in the spot market had increased because of the futures trading which lead to higher inflation. Several studies supported this argument but did not find any conclusive empirical evidence. **(Nath and Lingareddy; Pavaskar and Ghosh; Sen).**
According to the **IMF**, perceptions are often driven by observation of correlation rather than assessment of causality. The IMF's assessment based on causality suggested "…little support for the hypothesis that speculative activity (as measured by net long non-commercial positions) affects either price levels over the long run or price swings in the short run. In contrast, there is evidence (both across commodities and over time) that speculative positions follow price movements." **Raizada and Sahi** studied the efficiency of commodity futures market in India and have analysed it's effect on inflation and social welfare in the economy. They made use of Johansen's co- integration approach on futures of wheat from different forecasting horizons

ranging from one week to three months, they found that wheat futures were not efficient even in the short run and also "…. the growth in volumes of commodity futures markets was causing a significant impact on the inflation." **Sahi** also observed that spot price volatility of raw jute and wheat was impacted by a weak destabilizing impact of futures trading. **Chopra** asserts that traders buy out the commodities cheaply through future contracts and create false scarcity by raising the prices artificially.

**Bose** did not agree that futures market caused the price increase in the commodities. She emphasized that "There is a need to not only analyze the supply and demand side factors leading to sustained high levels of inflation, but also to understand the role participants can possibly play in the market, rather than associate higher levels of futures activity directly with mispricing in the futures markets." **UNCTAD** argued that commodity futures market is the major cause of increase in price because of "Financialization of Commodity Markets" i.e., increasing interest in commodities as an asset class. **RBI** studied the impact of futures trading in banned commodities on their spot prices. The empirical analysis using Granger causality did not provide any conclusive evidence in support of the relationship between futures and prices. It was stated in the report that "Commodity prices in India seem to be influenced more by other drivers of price changes, particularly demand supply gap in specific commodities, the degree of dependence on imports and international price movements in these commodities".

**Barua and Mahanta**, study results revealed that the "effect of futures prices on spot prices for different commodities differs which implies that there is no uniform impact of commodity derivatives trading on the spot prices of the wide assortment of commodities that are traded. This actual unfolding of events vindicates the position that inflationary pressures stems from a number of factors." These factors could be supply side constraints, the diversion of land for bio-fuel production, the global rise in prices of food and oil, the adoption of an expansionary fiscal policy and loose monetary policy in emerging economies. Hence, they concluded that the policy of across-the-board restriction of futures trading in agricultural commodities appears to be inequitable, unjustifiable, and counter-productive.

Internationally, **Ciner** had used the consumer price index (CPI) to measure inflation and the Thomson Reuter/Jeffries CRB commodity futures index to represent commodity prices. Data (Total of 327 observations) was collected from a Bloomberg terminal, the frequency of the series was monthly, he conducted a nonlinear analysis utilizing the frequency dependent regression approach which detected no significant relation between commodity prices and inflation, but the frequency decomposition analysis showed that there was actually a positive and significant link between the long term commodity price shocks and rate of inflation. He also examined Granger causality relations, which was conducted within the context of vector auto regression models and examined both short term and long term causality and the results showed that, similar to the regression results, causality from commodities to inflation was obtained only in the long term as no causality was detected at high frequencies(short term).

## EMPIRICAL ANALYSIS

To examine empirically the impact of agri futures trading on inflation, the present study had tried to investigate the long run relationship between the two using ARDL Models and if there exist long run relationship, and then is there any causation between them? WPI have been chosen as inflation index and AGRIDEX as representative index for agri futures because it is based on ten most liquid agri futures contracts, the weightage of 'Non-Food Articles' in WPI is 0.877 and the weightage of AGRIDEX traded commodities is 0.705 and, the weightage of 'Manufactured Articles' like edible oils, sugar etc., in WPI is 3.042 and the weightage of AGRIDEX traded commodities is 0.78(See Appendix Table )

## Descriptives

The AGRIDEX and WPI indices both are platykurtic i.e., the kurtosis is less than 3, AGRIDEX is positively skewed whereas WPI is negatively skewed. The standard deviation for AGRIDEX index is high whereas for WPI it is comparatively low.

**Table: Descriptives**

| Name of the Index | Skewness | Kurtosis | Jarque Bera | Standard Deviation |
|---|---|---|---|---|
| **AGRIDEX** | 0.255 | 1.300 | 13.77(0.001) | 814.04 |

| | | | | |
|---|---|---|---|---|
| **WPI** | -0.0793 | 1.5253 | 9.623(0.008) | 23.97 |

**Stationarity(Using Break Point Unit Root Test)**

Both the indices are checked for stationarity using Break Point Unit Root test suspecting any structural breaks in the indices. AGRIDEX is stationary at level at 1% level of significance. The WPI index is also tested for stationarity using Break Point Unit Root Test. The series is not stationary at level but is stationary at first difference.

To check whether AGRIDEX is causing WPI, both the series should be tested for causality. Granger Causality test is used to check the same. The causality sometimes may be spurious if there is no strong long run relationship between the two series. Therefore, both the indices were checked for long run relationship or co-integration. ARDL Bound test was chosen for testing the co-integration between the two aforementioned series as both the series are of not same order, AGRIDEX is I(0) whereas WPI is I(1). ARDL is superior to Johansen Cointegration and for ARDL it does not matter whether the series are of same order or stationary.

**Data**

Monthly observations of AGRIDEX and WPI indices were collected. There are total 105 observations that are collected. The historical data of AGRIDEX was downloaded from the official website of NCDEX and the WPI data was downloaded from official website of RBI.

**Result**

The ARDL model was estimated using EViews. ARDL (8, 6) was selected (see criteria graph in Appendix) and the R-square value of the selected model is 0.998(see Appendix). The diagnostics confirmed that the model is free of serial correlation, and is stable.

The ARDL (8, 6) model after the diagnostics is tested for long run relationship using ARDL Bound Test. The test result are displayed in the below given table.

**Table: ARDL Bounds Test**

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|---|---|---|
| | | |

| F-statistic | 1.410070 | 1 |
|---|---|---|

Critical Value Bounds

| Significance | I0 Bound | I1 Bound |
|---|---|---|
| 10% | 2.44 | 3.28 |
| 5% | 3.15 | 4.11 |
| 2.5% | 3.88 | 4.92 |
| 1% | 4.81 | 6.02 |

As, clearly evident from the above table the F-statistic value of 1.410 did not cross the upper bound even at 10% level of significance. The ARDL model was again estimated using Rest.Linear Trend as fixed regressor(Trend Specification). The selected model was ARDL (2, 10) with the least AIC value (See Criteria Graph in Appendix). The R-square value is 0.998 for the estimated model.(see Appendix ).  The ARDL (2, 10) model estimated using Rest.Linear as fixed regressor, is free of serial correlation, and is stable. This model is tested for long run relationship using Bound Test

### Table: ARDL Bounds Test
Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|---|---|---|
| F-statistic | 2.288800 | 1 |

Critical Value Bounds

| Significance | I0 Bound | I1 Bound |
|---|---|---|
| 10% | 4.05 | 4.49 |
| 5% | 4.68 | 5.15 |
| 2.5% | 5.3 | 5.83 |
| 1% | 6.1 | 6.73 |

As, clearly evident from the above table the F-statistic value of 2.28 did not cross the upper bound even at 10% level of significance. Hence, it is evident that there exist no long run relationship between the AGRIDEX and WPI.

The ARDL model estimated using Unrest. Constant as fixed regressor is ARDL(2,10) with lowest AIC value(See Criteria Graph). The R-square value of the model is 0.998(see Appendix)

and is free of serial correlation, and is stable. ARDL(2,10) was tested for long run relationship using ARDL Bounds test. The result is displayed in the given table.

**Table: ARDL Bounds Test**

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|---|---|---|
| F-statistic | 3.086813 | 1 |

Critical Value Bounds

| Significance | I0 Bound | I1 Bound |
|---|---|---|
| 10% | 4.04 | 4.78 |
| 5% | 4.94 | 5.73 |
| 2.5% | 5.77 | 6.68 |
| 1% | 6.84 | 7.84 |

The F-statistic value of 3.086 did not exceed the upper bound even at 10% significance accepting the Null of 'No Long Run Relationship'. Further, the ARDL was estimated using Rest.Constant as Fixed Regressor for max lag as twelve. Out of the 156 estimated models the model (2, 10) was chosen with the least AIC value(See Criteria Graph in Appendix).  The R-Square value is 0.998 for the selected model(see Appendix), The diagnostics displayed below confirmed that model is free of serial correlation, and is stable.ARDL (2, 10) was checked for long run relationship using ARDL Bound Test. The result is displayed in the below given table. The F-statistic value did not cross the upper bound even at 10% level of significance, indicating there is no long run relationship between the two series of AGRIDEX and WPI.

**Table: ARDL Bounds Test**

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|---|---|---|
| F-statistic | 3.046582 | 1 |

Critical Value Bounds

| Significance | I0 Bound | I1 Bound |
|---|---|---|
| 10% | 3.02 | 3.51 |
| 5% | 3.62 | 4.16 |
| 2.5% | 4.18 | 4.79 |

| 1% | 4.94 | 5.58 |
|---|---|---|

All the selected models did not exhibit long run relationship between the two variables AGRIDEX and WPI. As, there was no co-integration established between the two variables, it was tested for causality under unrestricted Vector AutoRegression. Lag six was selected based on AIC criteria, and the result of VAR Granger Causality test is displayed below in the table:

**Table: VAR Granger Causality/Block Exogeneity Wald Tests**

Included observations: 98

Dependent variable: LOGRETURNWPI

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| AGRIDEX | 12.98802 | 6 | 0.0432 |
| All | 12.98802 | 6 | 0.0432 |

Dependent variable: AGRIDEX

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| LOGRETURN WPI | 5.989972 | 6 | 0.4243 |
| All | 5.989972 | 6 | 0.4243 |

As, it can be seen from the table there is causality between dependent variable WPI and AGRIDEX, i.e., AGRIDEX is causing WPI at 5% level of significance.

## CONCLUSION

The ARDL models estimated and selected using different Fixed Regressors (Trend Specification) are displayed in the below given table.

**Table: Summary**

| ARDL MODEL | Selected Model(AIC) | Residual Diagnostics of Selected Model | Bound Test Result |
|---|---|---|---|

| | | Serial Correlation | Stability | | |
|---|---|---|---|---|---|
| Rest. Constant as Fixed Regressor | ARDL(2,10) | Absent | Absent | Stable | No Cointegration |
| UnRest.Constant | ARDL(2,10) | Absent | Absent | Stable | No Cointegration |
| Rest. Linear Trend | ARDL(2,10) | Absent | Absent | Stable | No Cointegration |
| None | ARDL(8,6) | Absent | Absent | Stable | No Cointegration |

The observations of both the indices were taken and tested for co-integration and causality. It is established that there is no long run relationship between the two indices, AGRIDEX and WPI. Granger causality under VAR showed that AGRIDEX is causing WPI at 5% level of significance, suggesting commodities futures are signaling changes in inflation.

### *REFERENCES*

1) Ali, J., & Gupta, K.B. (2011). Efficiency in agricultural commodity futures markets in India: Evidence from cointegration and causality tests. Agricultural Finance Review, 71(2), 162-178.
2) Bryant, H.L., David, A.B. and Michael, S.H. (2006). Causality in futures markets. *J. Fut. Mkts.*, 26(11): 1039-1057.
3) Ciner, C. (2011). Commodity prices and inflation: Testing in the frequency domain. *Research in International Business and Finance*, *25*(3), 229-237.

4) Glynn, J, Perera, N and Verma, R, Unit root tests and structural breaks: a survey with applications, Revista de Métodos Cuantitativos para la Economía y la Empresa = Journal of Quantitative Methods for Economics and Business Administration, 3(1), 2007, 63-79.

5) Golaka C. Nath & Tulsi Lingareddy. (2008). Impact of Futures Trading on Commodity Prices. *Economic and Political Weekly*, 43, (3), 18-23.
6) Granger, C. W. (1969). "Investigating causal relations by econometric models and cross-spectral methods", *Econometrica: Journal of the Econometric Society*, 424-438.

7) Hair Jr, J. F. (2006). Black, WC/Babin, BJ/Anderson, RE & Tatham, RL (2006): Multivariate Data Analysis. *Auflage, Upper Saddle River*.

8) IMF (2008): 'Is Inflation Back? Commodity Prices and Inflation', World Economic Outlook, Chapter 3, pp.- 83-18. 45 Nath, G. C. and Lingareddy, T. (2008): 'Impact of Futures Trading on Commodity Prices', *Economic & Political Weekly*, Vol. XLIII, pp. 18-23. 46
9) Sahi, G. S. (2007). "Influence of Commodity Derivatives on Volatility of Underlying Asset", ICFAI *Journal of Derivatives Markets*, *4*(3).

10) Sahi, G. S., & Raizada, G. (2006). Commodity futures market efficiency in India and effect on inflation.