PRICE DISCOVERY AND CAUSAL RELATIONSHIP BETWEEN SPOT AND FUTURES MARKETS OF MCX AGRI INDEX OF MULTI COMMODITY EXCHANGE IN INDIA

K. MUTHUKUMAR 1  Dr G SURESH 2

1 Assistant Professor, Faculty of Management, EBET Group of Institutions
2 Associate Professor, Faculty of Management, EBET Group of Institutions

Introduction
1.1 Multi Commodity Exchange of India Limited (MCX)

The Multi Commodity Exchange of India Limited (MCX), India’s first listed exchange, is a state-of-the-art, commodity futures exchange that facilitates online trading, and clearing and settlement of commodity futures transactions, thereby providing a platform for risk management. The Exchange, which started operations in November 2003, operates within the regulatory framework of the Forward Contracts (Regulation) Act, 1952. MCX offers trading in varied commodity futures contracts across segments including bullion, ferrous and non-ferrous metals, energy and agricultural commodities. The Exchange focuses on providing commodity value chain participants with neutral, secure and transparent trade mechanisms, and formulating quality parameters and trade regulations, in conformity with the regulatory framework. The Exchange has an extensive national reach, with 1782 members, operations through 487,671 trading terminals (including CTCL), spanning over 1809 cities and towns across India. MCX is India’s leading commodity futures exchange with a market share of 80.55 per cent in terms of the value of commodity futures contracts traded in first quarter of the financial year 2015-16.

With an aim to seamlessly integrate with the global commodities ecosystem, MCX has forged strategic alliances with leading international exchanges such as CME Group, London Metal Exchange (LME), The Baltic Exchange, Dalian Commodity Exchange (DCE) and Taiwan Futures Exchange (TAIFEX). The Exchange has also tied-up with various trade bodies, corporate, educational institutions and R&D centres across the country. These alliances enable the Exchange in improving trade practices, increasing awareness, and facilitating overall improvement of commodity futures market.

To ease participation, the Exchange offers facilities such as calendar-spread facility, as also EFP (Exchange of Futures for Physical) transactions which enables participants to swap their positions in the futures/ physical markets. The Exchange’s flagship index, the MCXCOMDEX, is a real-time composite commodity futures price index which gives information on market movements in key commodities. Other commodity indices developed by the exchange include MCXAGRI, MCXENERGY, and MCXMETAL.

According to Forward Markets Commission Report, MCX is a leading commodity exchange in India, with a market share of 84.06% (2014-15) in terms of the value of commodity futures contracts traded. The MCX commodity market is at a juncture where investment in education and research is important to sustain their growth. The MCX has been taking various initiatives to systematically develop markets through continuous innovation, education and research focused on spreading awareness of the modern trading mechanisms facilitated by commodity exchanges. The MCX, in association with the FMC, conducted 95 joint awareness programmes during January-October 2010 for physical market participants, especially farmers, who are the primary beneficiaries of this market, for hedging against price risk or for future price discovery. The price discovery, volatility and hedging effectiveness in futures market are areas that have received a good deal of attention from investors, academicians, regulators, and practitioners alike.
1.2 Theoretical background

Worldwide, the futures derivatives trading has grown rapidly since their introduction, because it has contributed to achieving economic functions such as price discovery, portfolio diversification, and hedging against the risk of adverse price movements. Movements of spot market price have been largely influenced by speculation, hedging, and arbitrage activity of futures markets. Thus, understanding the influence of one market on the other and the role of each market segment in price discovery is the central idea in market microstructure design. Price discovery is the process of revealing information about future spot prices through the futures markets. The essence of the price discovery function hinges on whether new information is reflected first in the changes of futures prices or changes of spot prices. Hence, there exists a lead-lag relationship between spot and futures markets by information dissemination. All the information available in the marketplace is immediately incorporated in the prices of assets in an efficient market. So, new information coming into the market should be reflected immediately in spot and futures prices simultaneously. This will lead to perfect positive contemporaneous comovement between the prices of those markets, and there will be no systematic lagged response, and therefore, no arbitrage opportunity. This prediction arises directly from the Cost of Carry (CoC) model of futures pricing, which postulates that:

\[ F_t = S_t e^{r(T-t)} \]  

where, \( F_t \) is the futures price of the index at time \( t \), \( S_t \) is the spot price of the index at time \( t \), \( r \) is the interest rate foregone while carrying the underlying stocks, \( y \) is the dividend yield on the stocks and \( T - t \) is the remaining life of the futures contract. Equation (1.1) is justified by a “no-arbitrage” assumption, since \( F_t > S_t e^{r(T-t)} \) would enable investors to profit by selling futures and buying stocks, while \( S_t e^{r(T-t)} > F_t \) would allow profits by buying futures and short selling stocks. The assumptions that underlie these arguments are that future and spot markets are perfectly efficient, and that transaction costs are zero. This simple version of the model also assumes that the interest rate and dividend yield are constant over the life of the futures contract, although in practice they will vary, as will \( r - y \), the net cost of carry of the underlying stocks. Most importantly, in the real world, the existence of market frictions such as insurance, transaction costs, margin requirements, short-sale constraints, liquidity differences and non-synchronous trading effects may induces lead-lag relationship between the futures contract and its underlying spot market. In addition, if there are economic incentives for traders to use one market over the other, a price discovery process between the two markets is likely to happen (Zou and Pinfold, 2001). This implies that futures and spot market prices are complex in nature and can be traced under different market frictions through price discovery mechanism.

It’s a debatable issue regarding price discovery process that whether spot market or futures market plays an important role for transferring information. Sometimes, price discovery takes place in both the markets. Also, it is observed that both the markets are interrelated. Though, futures contracts will apply at the final delivery date of the contracts, the futures on spot prices can be predicted by taking the interrelation between both the markets.

1.3 Objectives

On the basis of the above outlined theoretical background and literature gap, the main objective of the research is:

- To investigate the price discovery and causal relationship between spot and futures markets of MCX Agri Index of Multi Commodity Exchange in India.
2. Data Analysis and Interpretation

Table 1 Results of Augmented Dickey-Fuller Test for Unit Root

<table>
<thead>
<tr>
<th>Name of the MCX Commodity Indices</th>
<th>Variables</th>
<th>Levels</th>
<th>First Difference</th>
<th>Inference on Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCXAGRI</td>
<td>AGRISPOT</td>
<td>-2.0331</td>
<td>-57.185*</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>AGRIFUTURES</td>
<td>-2.1404</td>
<td>-66.382*</td>
<td></td>
</tr>
</tbody>
</table>

Notes: * – indicates significance at one per cent level. Optimal lag length is determined by the Schwarz Information Criterion (SIC) for the Augmented Dickey-Fuller Test.

The ADF test statistics reject the hypothesis of a unit root at 1% level of significance in return series, implying the fact that the return series are stationary.

Table 2 Results of Johansen’s Cointegration Test for MCX Agri Index

<table>
<thead>
<tr>
<th>vector (r)</th>
<th>Trace test Statistics ($\lambda_{\text{trace}}$)</th>
<th>Maximal Eigen value ($\lambda_{\text{max}}$)</th>
<th>5% Critical value for Trace Statistics</th>
<th>5% Critical value for Max-Eigen Statistics</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>H$_0$: r = 0</td>
<td>39.99053**</td>
<td>34.53730**</td>
<td>25.87211</td>
<td>19.38704</td>
<td>Cointegrated</td>
</tr>
<tr>
<td>H$_1$: r $\geq$ 1</td>
<td>5.453231</td>
<td>5.453231</td>
<td>12.51798</td>
<td>12.51798</td>
<td></td>
</tr>
</tbody>
</table>

Notes: ** – indicates significance at five per cent level. The significant of the statistics is based on 5 per cent critical values obtained from Johansen and Juselius (1990). r is the number of co integrating vectors. H$_0$ represents the null hypothesis of presence of no co integrating vector and H$_1$ represents the alternative hypothesis of presence of co integrating vector.

The hypothesis of no cointegration vector (r=0) can be rejected for all the elected commodities, as the trace statistics are higher than the critical values at 5% level. Cointegration analysis measures the extent to which two markets have achieved long run equilibrium. Efficiency can be concluded because future prices and spot prices are cointegrated in all the selected commodities since cointegration is a necessary condition for market efficiency.

Cointegration relationship exists between spot and futures prices of respective MCX Agri commodity markets. We can, therefore, proceed with the estimation of a Vector Error Correction Model (VECM). It can be concluded that the spot and futures prices of respective MCX commodity markets lead in the long run.

Results of Variance Decomposition Analysis for AGRI Markets

The 24-period forecast error variance of MCXAGRI spot market explained by MCXAGRI futures market innovation is 53 percent. Besides, the variance of MCXAGRI futures market explained by MCXAGRI spot market innovation is 21 percent. This suggests that feedback relation exists between agri spot and futures markets of selected commodity markets.

3. Findings and Conclusion

The analysis shows that agri spot and futures markets are cointegrated and have feedback relationship exists. There is Bidirectional causality between the spot and futures, which have an important price discovery role.
Reference:


