Price Risk Mitigation in Wheat using Derivative Contracts on NCDEX (National Commodities and Derivatives Exchange)

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ABSTRACT

Future trading in India was first recorded around 1800s. In this regard, post-independence, the Forward Contracts (Regulation) Act, 1952 (FCRA, 1952) came into existence for regulating the market, wherein Forward Markets Commission (FMC) was set up in 1953 as the regulator. Commodity derivatives in India have witnessed turbulent history, where derivative trading was banned in the late 1960's but was revived again in the 1980’s. However, Government of India’s successful crusade of equity market reforms of the 1990’s, similar reforms for the commodity derivatives markets were also desired to be implemented. In this respect, the idea of replacing derivatives markets, as a price-hedging instrument, with Minimum Support Price (MSP) was propagated during 1999.

In view of the above, various commodity exchanges at National level were permitted to start operation. The aim of the study will be to identify the ability of the exchanges to act as platform for hedging the risk by various participants of the market.

Keywords: Commodity; Derivatives; Efficiency; Commodity Exchanges; Future and Spot price

INTRODUCTION

Pre-liberalisation period registered considerable amount of intervention by both state as well as central government in almost every stage of marketing for all the major agricultural commodities. This included but was not limited to storage, credit supply, transportation and international trading. Government use to announce Minimum support prices for around 21 commodities.

The current scenario of Commodities Derivatives started to formulate with limiting interferences of government, which was in tune to the liberalisation policy being implemented in India. However, the process received a major thrust upon the implementation of the Agreement on Agriculture under the World Trade Organization (WTO).

In view of the above, prices are increasingly now being determined by the market forces, which has resulted in higher exposure of Agri-commodities players towards risk associated with the commodities prices. As a result, revival of the Commodities Derivatives trading has been at the forefront for Central Government in order to manage the price risk.

Agri-Futures Market in India- Brief History

Prior to second world war, futures contracts for a number of commodities like castor seed, gold & silver along with Commodity Exchanges were present throughout the country. Moreover, markets registered high level of liquidity along with substantial turnover. However, the scenario changed with the perception that futures and other derivatives were fuelling speculation in prices of essential commodities and thus were not serving the interests of the farmers & consumers in the long term.
In light of the mass shortages in availability of essential commodities during the mid-1930’s, restrictions on commodity derivatives began to appear. However, after Second World War, the prohibitions on these commodities was modified under Essential Supplies Temporary Powers Act, 1946, as the Defence of India Act, 1935 had lapsed.

Post-independence, Forward Contracts (Regulation) Act, 1952, was introduced by the Government for setting up the Forward Markets Commission in 1953, which resulted in revival of futures trading in several commodities. However, the growth phase of commodities derivatives was once again halted by the ban on trading of futures during 1960’s, except in case of castor seed, pepper, turmeric and linseed.

The process of revival once again started with the recommendations of The Khusro Committee, which in turn helped in starting futures trading in potato and gur in the early 1980s and resumed castor seed futures in 1985 (Gopal Naik & Sudhir Kumar Jain, 2002).

Current status of Agri-Futures Market in India

Agricultural markets in its original form were the designated places where seller and buyer could meet for exchange of the commodities. In its current form, cash / spot market for agricultural commodities consists of wholesale markets where large quantities of the commodities are sold and bought. The marketplaces where this transaction takes place is known as ‘Mandi’ in parts of North and Western India. Generally, a Mandi consists of open sheds or yards for facilitating the transaction, however only a limited number of Mandi’s offer Warehouse facilities for safe storage of the commodities in question. In this regard, Central Government has been trying develop storage capacities, especially in rural areas, by implementing 'Grameen Bhandarn Yojana'.

As far as structure of a Mandi is concerned, it is typically dominated by two categories of participants:

1. Farmer - who is the actual seller of the Agricultural Commodity in the market
2. Trader – who generally is a middlemen intermediating between farmers and wholesale dealers or mill owners
3. Broker - who generally works as an agent for commission and does not buys / hold the commodity

Whenever, a commodity arrives in the Mandi, the concerned crop is identified, weighed and quantities are recorded. Accordingly, the seller is offered competitive price quotes from the traders for the purpose of striking a deal for spot delivery. It may be noted that in case of commodities that are subjected to the minimum support price (MSP) mechanism, if the market-determined price is below the relevant MSP, the traders pay the MSP and claim the difference from the government. All settlements in the Mandi take place on a T + 0 or T + 1 basis. In case of any dispute arising on account of crop quality, the Mandi inspector acts as the designated official for its resolution. The Mandi inspectors, at the end of the day, collect volume and price information from the traders. The traders are charged a fees, which is generally only a fraction of the value of the business conducted.

Internationally, centralised marketing boards, which are often cooperatives owned by producers for purchasing / production from individual producers and selling it subsequently are prevalent. However, the market structure of agricultural commodities varies widely across countries, with participants ranging from small producers to large agribusiness firms. The objective of such boards is to achieve economies of scale and scope which is not available to individual producers.

Most of the agricultural markets are subject to a significant level of government regulation and intervention owing to importance of agricultural commodities in general, and food crops, in particular.

In general, Government intervention refers to the regulation of production, sale, market & financial control in order to influence the price of the commodities by various methods like price support, subsidies, etc.
The spot market in India is not only fragmented but is also plagued by disparity in the price, even in case of Mandis located in the same region. Some of the major reasons behind the same have been inefficiencies in the grading of the crop, different tax regimes prevalent in various areas / regions and inadequate storage facilities across the country. It was further aggravated by the poor infrastructure for dissemination of information. This fragmentation, even within a state, poses a major challenge for free movement of commodities from one market to other, which is essential for bringing parity in the prices of commodity across geographies and benefit farmers in the long run.

**Derivatives Market: Need & Benefits**

Any futures’ market broadly performs two functions:

a) Price discovery and  
b) Hedging

As per definition, Price discovery in futures market reveals information about the future of cash market prices at a particular point of time, which is based on the fact Consequently, a forecast of prices based on futures price of the contract on the Exchange outweighs other types of forecasts in terms of accuracy.

In view of the above, futures price serves an important economic function by facilitating market participants with respect to their decisions with respect to consumption and investment decisions. The importance of the futures can be gauged from the fact that any Farmer, who has the option of raising more than one crop on his land, can use the futures prices for delivery at the time of harvesting with respect to each option as an important consideration for arriving at the optimal decision regarding which crop(s) to raise. This aspect is becoming increasingly relevant in India with the emergence of multi-cropping across its various agro-climatic zones.

In order to mitigate the risk associated with the commodities market, many market participants trade futures as a substitute for cash market transactions. Accordingly, futures market is participants consists of hedgers, speculators or actual buyers. However, the benefits of futures markets is not limited to the later only and generally has farfetched impact, especially with respect to efficient redistribution of risks.

**Derivatives Trading in India: Policies**

During the post-independence phase, development of the Agricultural markets, especially derivatives trading has been adversely impacted by various policy initiatives like the Essential Commodities Act 1955, etc. undertaken by the Government. However, during the era of economic liberalization, a need to reorient the regulations and policies was felt. As a result, Khusrı Committee in 1980 recommended reintroduction of futures trading in most of the major commodities. This was followed by constitution of another committee by Government of India, which was headed by Professor K.N. Kabra, in June 1993 on Forward Markets. However, over the years various studies supported introduction of futures.

Hence, it may be argued that development of commodity derivatives in India has faced numerous hurdles on account of policy reversals. As a result, spot and futures markets’ integration has been established as one of the significant factor for development & growth of futures market in India.

**Regulatory Framework**

All the exchanges in India initially came under the ambit of Forward Markets Commission (FMC). However, after Financial Sector Legislative Reforms Commission (FSLRC) recommendations on creation of unified financial agency to subsume all non-banking regulators including the SEBI and the Forward Markets Commission (FMC), it was merged with SEBI. Subsequent to the historic event of merger of the two large regulators, which came into effect from September 28, 2015, SEBI took over as the regulator of the commodities market also. This watershed development in the Indian derivatives markets was expected to strengthen these markets and enable their further development. Consequently, FCRA was repealed with effect from 28 September 2015 and as per the amendment made in the Finance Act, 2015,
all existing recognised associations under FCRA were deemed to be recognised as stock exchanges under the SCRA.

Accordingly, all the existing recognised associations like National Commodity and Derivatives Exchange Limited (NCDEX), Universal Commodity Exchange Limited (UCX), Multi Commodity Exchange of India Limited (MCX) and Ace Derivatives and Commodity Exchange Limited (ACE) became approved stock exchanges under the SCRA. Currently, Commodity Derivatives Market Regulation Department (CDMRD) of SEBI is responsible for supervising the functioning and operations of Commodity Derivative Exchange.

LITERATURE REVIEW

In case of an efficient market, it has been argued that there should be a concurrent movement of futures rate and spot price with no lead-lag in the movements of prices (Quan, 1992). However, due to institutional factors associated with futures market like lower transaction costs, high liquidity, and inherent leverage etc. futures market tends to absorb the information at faster rate as against underlying spot market. This leads to an empirical lead-lag relationship among price changes in the spot and futures markets. If the price change is occurring first in the futures price due to new information arrival in the market and it is reflected subsequently in spot price, futures price is considered as leading the spot price.

Kellard, Newbold, Rayner and Ennew (1999) in line with Garbade and Silber (1983) had inferred that futures markets for live cattle, soybeans and live hogs were efficient in the long run, however inefficiencies were observed in the short-run.

Yang, Bessler and David (2001) performed cointegration procedures and vector error correction models (VECM) on storable and non-storable commodities & found that longevity of commodity did not affect the price discovery process. Also, it was concluded that in case of both storable as well as non-storable commodities, futures markets were leading the spot markets.

Similar results were reported by Wang and Ke (2005). However, Beck (1994) with the of Cointegration and Error Correction Model concluded that no market was inefficient in the long run in case of hogs, corn, cattle, cocoa, soybean, orange juice and copper.

As far as research in India is concerned, any major literature on spot prices and agricultural commodity futures tends to be limited

Kumar (2004) investigated the price discovery in six Indian commodity exchanges for five agricultural commodities, wherein it was concluded that the Indian agricultural commodities futures markets are still immature and inefficient.

Iyer and Pillai (2010) examined dominant role of futures market in the price discovery process by superimposing a two-regime TVAR model and found evidence for price discovery process in five out of a total of six commodities. However, it was also found that convergence of information was relatively slow, especially in case periods of non-expiration weeks.

On the contrary, Joseph, Tiwari and Sisodia (2014) in case of selected commodities established strong unidirectional relationship from future to spot price. In a similar study, Sanjay, Namita and Rajeev found a bi-directional Granger lead relationships between spot and futures in case of certain agricultural commodities with an exception to turmeric, wherein no causality was found.
DATA, METHODOLOGY AND MODEL

In order to analyze the current state of Future rate and Spot price relationship, we will consider Wheat Delhi market. Futures contract for the same has been available on NCDEX platform with Ticker Symbol “WHEAT”.

In respect of the study, we have considered daily closing Future rate and Spot price of WHEAT for a period of three years from 02/03/2015 to 20/03/2018, resulting in a dataset of 747 observations.

Thereafter, following process has been followed in order to understand the underlying relation between Future rate and Spot price:

a) Determining the stationarity properties of the individual price series (both conventional unit root tests and unit root test with structural breaks will be taken into account)

b) Co-integration test will be performed so as to establish relationship between spot rate and futures price

c) Finally, causality relationship between spot rate and futures price for the period identified will be found (Granger causality test in case series is I(0) and Toda & Yamamoto (1995) causality test case of non stationary series).

UNIT ROOT TEST

Prior to proceeding towards the Co-integration and Causality analysis, Stationarity of the variables has been determined. In this respect, Perron (1989) has showed that the ability to reject a unit root decreases when the stationary alternative is true and an existing structural break is ignored. Hence, Augmented Dickey Fuller and Phillips Perron unit root test has been applied in order to test the variables for unit root.

### Intercept

<table>
<thead>
<tr>
<th>UNIT VARIABLES</th>
<th>LEVEL</th>
<th>FIRST DIFFERENCE</th>
<th>SECOND DIFFERENCE</th>
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<td></td>
<td>ADF</td>
<td>PP</td>
<td>ADF</td>
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<td>Future Price</td>
<td>-2.229420</td>
<td>-2.004266</td>
<td>-29.39551*</td>
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<tr>
<td>Spot Price</td>
<td>-1.907986</td>
<td>-1.593546</td>
<td>-19.60348*</td>
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</table>

<table>
<thead>
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<th>UNIT VARIABLES</th>
<th>LEVEL</th>
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<tr>
<td>Future Price</td>
<td>-2.489838</td>
<td>-2.267285</td>
<td>-29.37564*</td>
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<tr>
<td>Spot Price</td>
<td>-2.427335</td>
<td>-2.062829</td>
<td>-19.59163*</td>
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With Trend & Intercept
Without Trend & Intercept

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<tr>
<th></th>
<th>ADF</th>
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<th>ADF</th>
<th>PP</th>
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<th>PP</th>
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<tr>
<td>Future Price</td>
<td>-0.351753</td>
<td>-0.357790</td>
<td>-29.41411*</td>
<td>-29.74490*</td>
<td>-14.96095*</td>
<td>-339.4391*</td>
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<tr>
<td>Spot Price</td>
<td>-0.364116</td>
<td>-0.383273</td>
<td>-19.61512*</td>
<td>-19.06379*</td>
<td>-16.48361*</td>
<td>-164.8210*</td>
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</tbody>
</table>

*Significant at 1% level

After performing Unit Root analysis, both the variables were found to be of order I (1).

LAG LENGTH CRITERIA

Before proceeding towards Johansen Cointegration test, lag length criteria has been used in order to identify the Lag Length, which is to be used while performing Johansen Cointegration test. Result of the same has been given below:

VAR Lag Order Selection Criteria
Endogenous variables: FUTURE SPOT
Exogenous variables: C
Date: 09/28/18  Time: 13:01
Sample: 1 749
Included observations: 705

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<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
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<td>0</td>
<td>-8364.731</td>
<td>NA</td>
<td>69695940</td>
<td>23.73541</td>
<td>23.74834</td>
<td>23.74040</td>
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<tr>
<td>1</td>
<td>-6060.375</td>
<td>4589.101</td>
<td>102111.4</td>
<td>17.20957</td>
<td>17.24837</td>
<td>17.22456</td>
</tr>
<tr>
<td>2</td>
<td>-6009.097</td>
<td>101.8286</td>
<td>89294.74*</td>
<td>17.07545*</td>
<td>17.14011*</td>
<td>17.10044*</td>
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<tr>
<td>3</td>
<td>-6007.666</td>
<td>2.833475</td>
<td>89947.98</td>
<td>17.08274</td>
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<td>13.71078</td>
<td>89871.91</td>
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<td>17.22413</td>
<td>17.13686</td>
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<td>7</td>
<td>-5996.066</td>
<td>2.686071</td>
<td>91079.01</td>
<td>17.09522</td>
<td>17.28919</td>
<td>17.17018</td>
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<tr>
<td>8</td>
<td>-5985.098</td>
<td>21.40714*</td>
<td>89296.81</td>
<td>17.07546</td>
<td>17.29528</td>
<td>17.16040</td>
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<tr>
<td>9</td>
<td>-5982.033</td>
<td>5.966225</td>
<td>89534.46</td>
<td>17.07811</td>
<td>17.32380</td>
<td>17.17305</td>
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<tr>
<td>10</td>
<td>-5977.541</td>
<td>8.715715</td>
<td>89410.48</td>
<td>17.07671</td>
<td>17.34826</td>
<td>17.18165</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

From the result obtained, it was found that optimum Lag Length for the variables was 2 according to Final prediction error, Akaike information criterion, Schwarz information criterion and Hannan-Quinn information criterion (each test at 5% level).
JOHANSEN COINTEGRATION TEST

Since, both the variables were found to be integrated at order I (1), Johansen Cointegration test was performed on the same in order to establish relationship between the two. The results obtained have been given below:

Unrestricted Cointegration Rank Test (Trace)

<table>
<thead>
<tr>
<th>Hypothesized No. of CE (s)</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.039695</td>
<td>32.41357</td>
<td>15.49471</td>
<td>0.0001*</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.003769</td>
<td>2.764048</td>
<td>3.841466</td>
<td>0.0964</td>
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</tbody>
</table>

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

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<tr>
<th>Hypothesized No. of CE (s)</th>
<th>Eigenvalue</th>
<th>Max-Eigen Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
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</thead>
<tbody>
<tr>
<td>None*</td>
<td>0.039695</td>
<td>29.64952</td>
<td>14.26460</td>
<td>0.0001</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.003769</td>
<td>2.764048</td>
<td>3.841466</td>
<td>0.0964</td>
</tr>
</tbody>
</table>

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

On performing the test it has been found that there exists co-integration between the two variables and that they move together during the period under consideration.

CONCLUSION

This study is limited to Wheat Futures contract being traded on NCDEX for Delhi location. Further, period taken into consideration for analysis is around 3 years i.e, from 02/03/2015 to 20/03/2018. On empirical investigation, it has been found that there is a relationship between Future rate and Spot price for Wheat (Delhi) in the medium term.

The finding of the study are consistent with the findings of Garbade and Silber, wherein they concluded that cash and futures market are integrated for the seven storable commodities.

In general, futures markets dominate and lead cash market price changes. The same was established by Iyer and Pillai, who concluded that futures market play a dominant role in the price discovery for six commodities under consideration.

At last, price risk mitigation using futures contract being traded on NCDEX platform is possible for market participants, especially traders. However, further scope of study exists as far as length of contracts and other major commodities like Oilseed Complex, Pulses, etc. are concerned.
REFERENCES


13. Module Commodities, NCFM.


