Dynamic Relationship between Future and Spot Prices – A case study of Gaur Seed

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Abstract

The study aims to find out the dynamic relationship between future and spot prices of Guar seed traded in NMCE from the period 01/01/2016 to 31/03/2018. Knowledge of price movement and price discovery process of commodities will help the producers and consumers appropriate investment decision. After confirming stationarity at first difference Johansen’s cointegration test is performed to analyse long run equilibrium relationship. After confirming cointegration, Vector Error Correction Model is applied to know the speed of adjustment towards equilibrium in case of disequilibrium in short run. The lead lag relationship between future and spot prices are analysed using Granger Causality test.

1. INTRODUCTION

Gaur seed also known as Cluster bean is cultivated in India for many years. The term Gaur is evolved from one the major uses of it as cattle feed “Gowaahaar” (Gow means cow and aahar which means feed). It is used as a vegetable, cattle feed and a green manure for crops of agriculture. Guar Gum is a derivative of guar seed is used extensively in food processing industries, oil and gas and textile industries. India is one of the major producers of Gaur, accounting to about 80% of global production. Gaur seed is a kharif crop sown just after monsoon during the month of July-August and harvested during the month of October-November. It has a shelf life of more than 3 years and it one of the crops that need least maintenance during the storage. It is cultivated in states of Rajasthan, Haryana, Punjab and Gujarat. Rajasthan is one the main cultivators of Guar seed which accounts for almost 70% of total production in India, followed by Gujarat and Haryana. The major markets of Gaur seed in India are Jodhpur, Bikaner, Ganganagar, Jaipur etc.

The guar seed and Guar gum futures prices witnessed an unusual movement during the period of 2011-12. The future prices of guar seed witnessed a 10 times rise during the year 2011-12 compared to the previous year. The future price return volatility also showed an increase ny about 80% during the year 2011-12. To curb the volatility and speculation, the then market regulator, FMC banned the future trading of Guar seed and Guar Gum in March 2012. Further, a committee was formed headed by FMC chairman
Ramesh Abhishek, which recommended the re listing of Guar seed futures as the prices of guar seed showed a steep fall and the guar farmers were stuck in debt cycle, who anticipated a rise in prices of guar seed and bought seeds and loans. Subsequently, trading of guar seed was re commenced from June 2013. As per the Department of Agriculture, Guar seed production in 2017-18 was estimated at 20.14 lakh tonnes as against in 18.96 lakh tonnes in 2016-17. The options trading in Guar seed has been started in September 2017.

2. REVIEW OF LITERATURE

(Kaur & Rao, 2010) studied correlation between future and spot market of four agricultural commodities like Channa, Pepper Malabar, Refined Soya Oil and Guar seed. The study has been done for a period of 13 months from July 2008 to July 2009. The study revealed that there is no significant volatility in the future and spot prices of the selected commodities. The study concluded that Pepper and Guar seed prices are not fairly priced and there exists arbitrage opportunities in these markets.

(Sharma & Gummagolmath, 2012) Studied the issues and strategies for reforming Gaur industry in India. The study found out that lack of technological knowledge and poor market linkages with farmers along with unstable trade policies as the main issues facing the guar industry. The study suggested an establishment of a Research and Development Centre which would disseminate information about the prices and also promote the usage of Guar and its derivatives along with the promotion of technology for processing according to changing demand and food safety concerns.

(Malhotra & Sharma, 2013) studied the efficiency of Guar seed futures traded in NCDEX during the period April 2004 to November 2011. The study revealed a long run co movement of futures and spot market indicating hedging opportunities for investors. The VECM results revealed that future market makes a quicker adjustment to short run disequilibrium. In short run, a unidirectional flow of information from future to spot market was revealed. Since the process of correction of disequilibrium is slow in both markets, it is concluded that the flow of information transmission is slow.

(Soni, 2013) studied the market efficiency and unbiasedness of Guar seed future contract traded in NCDEX using cointegration analysis and short term market efficiency using error correction term. The study revealed that the market is inefficient and biased both in short and long run. The study concluded that more powers should be given to FMC to curb over speculation, insider trading and market manipulation.

From the review of literature, it can be seen that not much studies have been done in the Gaur seed market after the re listing of the commodity in exchanges. In this context, the present study aims to analyse the dynamic relationship between future and spot prices of Guar seed during the period 01/01/2016 to 31/03/2018. The cointegration relationship and lead lag relationship has been analysed using various econometric tools.

3. OBJECTIVES OF THE STUDY

• To analyse the stationarity properties of Guar seed future and spot market
• To analyse the cointegrating relationship between future and spot prices of Guar seed
To analyse the lead lag relationship between future and spot prices of Guar seed.

4. RESEARCH METHODOLOGY

The study is based on secondary data. Secondary data of futures and spot price of Guar seed are collected from 01/01/2016 to 31/03/2018. The prices are converted into their logarithmic form to reduce the heteroskedastic nature of the data. All the data are obtained from NMCE Website. The study used Augmented Dickey Fuller test (ADF Test) to check the stationarity of data. Granger Causality test is used to find the nature and existence of causality and lead lag relationship between the variables. The long term relationship between futures and spot price is found out using cointegration technique.

4.1 AUGMENTED Dickey FULLER TEST

An Augmented Dickey Fuller Test is used to test for the presence of unit root in a time series.

The testing procedure for the ADF test is the same as for the Dickey–Fuller test but it is applied to the model

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t,$$

where $\alpha$ is a constant, $\beta$ the coefficient on a time trend and $p$ the lag order of the autoregressive process. Imposing the constraints $\alpha = 0$ and $\beta = 0$ corresponds to modelling a random walk and using the constraint $\beta = 0$ corresponds to modeling a random walk with a drift.

4.2 JOHANSEN'S COINTEGRATION TEST

In statistics, the Johansen test, named after Søren Johansen, is a procedure for testing cointegration of several, say $k$, I(1) time series. The null hypothesis for the trace test is that the number of cointegration vectors is $r=r^*<k$, vs. the alternative that $r=k$.

4.3 GRANGER CAUSALITY TEST

The granger causality test is a statistical hypothesis test that is used to find out whether one time series is useful to forecast the other. Ordinarily, regressions reflect "mere" correlations, but Clive Granger argued that causality in economics could be tested for by measuring the ability to predict the future values of a time series using prior values of another time series. When time series $X$ Granger-causes time series $Y$, the patterns in $X$ are approximately repeated in $Y$ after some time lag. Thus, past values of $X$ can be used for the prediction of future values of $Y$.

5. RESULTS AND DISCUSSION

The results of the tests using various econometric tools have been presented below:
5.1 Findings from Augmented Dickey Fuller Test

The stationarity of the variables are checked using Augmented Dickey Fuller tests. The results are presented in the Table no: 1 below:

Table No: 1 Results of Augmented Dickey Fuller Tests.

<table>
<thead>
<tr>
<th>ADF test statistic</th>
<th>Spot at level</th>
<th>Spot at 1st differencing</th>
<th>Futures at level</th>
<th>Futures at 1st differencing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.446</td>
<td>-24.171</td>
<td>-1.483</td>
<td>-21.228</td>
</tr>
<tr>
<td>P Value</td>
<td>0.560</td>
<td>0.000</td>
<td>0.542</td>
<td>0.000</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Non Stationary</td>
<td>Stationary</td>
<td>Non Stationary</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

From the above table it can be seen that both future and spot prices are Non stationary at their level form. But when they are converted into their first difference, they are found to be stationary. So it can be concluded that the mean, variance and auto correlation of both the series are constant over a period of time.

5.2 Findings from Johansen’s Cointegration Test

The long run equilibrium relationship between spot and future market of Guar seed has been analysed using Johansen’s Cointegration test. The results are presented in the table below:

Table No: 2 Results of Johansen’s Cointegration Test

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigen value</th>
<th>Trace Statistic</th>
<th>Critical Value</th>
<th>Prob.**</th>
<th>Max-Eigen Statistic</th>
<th>Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>0.0316</td>
<td>20.5689</td>
<td>15.4947</td>
<td>0.0078</td>
<td>17.9914</td>
<td>14.2646</td>
<td>0.0122</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.0046</td>
<td>2.5774</td>
<td>3.8414</td>
<td>0.1083</td>
<td>2.5774</td>
<td>3.8414</td>
<td>0.1083</td>
</tr>
</tbody>
</table>

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

From the table above, it can be seen that there is at most 1 cointegrating equation between spot and future prices of Guar seed. So it can be concluded that in long run there is an equilibrium relationship between future and spot prices of Guar seed.
5.3 Findings from Granger Causality Test

The lead lag relationship between future and spot prices are analysed using Granger Causality Tests. The results of the test are presented in the table no: 3 below:

Table No: 3 Results of Granger Causality Tests

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Spot does not Granger Cause Log Future</td>
<td>562</td>
<td>4.902</td>
<td>0.007</td>
</tr>
<tr>
<td>Log Future does not Granger Cause Log Spot</td>
<td>20.197</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

From the above table it can be seen that there is a bi directional lead lag relationship between future and spot prices of Guar seed. Since, the magnitude of coefficient is high in future equation, it can be concluded that the future prices of Guar seed leads and spot prices lags.

6. CONCLUSION

Johansen’s Cointegration technique along with Granger Causality test is employed to analyse the dynamic relationship between future and spot prices of Gaur seed for a period 01/01/2016 to 31/03/2018. The empirical analysis was done on the daily time series during the period. Using ADF test, it was found that all the variables are stationary at their first difference. Johansen’s Cointegration test revealed there is a long run equilibrium relationship between the futures and spot prices. The causality is further confirmed by granger causality test, where bi directional leads lag relationship with a stronger relationship from future to spot prices of Gaur seed.

REFERENCES

- www.businessline.com
- www.nmce.com