Chapter 8
Summary and Conclusion

8.1 Introduction

Mean reversion phenomena is complex topic to test and model but the most interesting aspect of this is once modeled it can really bring in insights to the study. Association of spot and futures prices and seasonal patterns and mean reversion are often intuitive on observing the backwardation and contango situation in futures market.

Indian commodity market experienced bottle necks in the market microstructure issues like banning the commodity futures trade due to high speculation by the participants, restrictions on free movement of goods, existence of market imperfections like Minimum Support Price (MSP) for essential commodities, unnecessary political interference and infrastructure issues related to inadequate warehousing facilities to name a few.

The strengthening of Forward Market Commission (FMC) and entrance multiple exchanges both on futures and spot exchange has brought in more depth and width to the market resulting in better price discovery in Indian commodities market. FMC are taking various initiatives in close association with the exchanges to bring in more farmers to the streamlined trading platform eliminating middle man. There is also lot of private initiatives like ITC’s e-Choupal in eliminating middlemen. This is win-win situation for ITC and the farmers, where the company gets uninterrupted quality supply of commodities both for their domestic operations and for their exports, the farmer is benefited as majority of the middlemen’s margin can be shared by the farmer and ITC.
8.2 Research Gap and Objective of the study

Review of literature clearly indicate that research in the developed markets have addressed lot of issues in the commodity price dynamics. This can be attributed to the existence of uninterrupted trade and the data can be traced to almost 100 years for example Chicago Mercantile exchange, Chicago Board of Trade or London Metal exchange. The futures trade started in the same time period in India but banning of futures trade resulted in lack of availability of data which has kept Indian research at a nascent stage. The study of commodity price behavior can be holistic only if the inventory positions along with short term and long term price behavior is studied. Availability of storage information is very difficult hence this is forms one of the limitations of the present study.

In order to fill this gap, there is a need for further research in this direction and this has motivated this current research work. There was a need to first test for inter-temporal association with spot and futures market thus forming the first objective

Major objectives put forward for the present study are:

1. To examine for relationship between futures and spot commodity prices in India.

2. To test for mean reversion in Indian commodity market

3. To test for seasonality in commodity futures market.

4. To model and forecast commodity prices in Indian commodity market.
8.3 Methodology

A descriptive analysis of present commodity market in India and structural and policy issues pertaining to the market is addressed in the third chapter in length providing the background to research. Moreover a detailed review of literature provides guideline for selecting the empirical methodology.

First the associations of spot and futures relationship are assessed using error correction in order to draw inference about causality. Cointegration test using Johansen Methodology is used in understanding the long-run economic relationship between two variables spot and futures prices. The results exhibit a long-run equilibrium between spot and future prices of nine commodities considered under study. This exercise provides information about disequilibrium error, speed of adjustment towards equilibrium, short run changes and long-run multiplier in the relationship between spot and future prices of the commodities.

The second objective is to determine the presence of mean reversion in Indian commodities markets for this the Long Horizon Regression framework was used to test mean reversion. These regressions have improved power in predicting prices compared to alternative specifications. The beta coefficients are significantly different from zero. The results indicate mean reversion in both spot and future prices of these nine commodities. Test for stationary is done using Augmented Dickey Fuller (ADF) test this also shows that the data for nine commodities are stationary at 1% significance level this confirms that the series are mean reverting. The study use Hodrick-Prescott filter for estimating trend (long-run mean).

The third objective was to test presence of seasonality in spot and futures commodity prices in Indian commodity market. The cost of carry model assumes that seasonal variation in demand can generate seasonal variation in inventories. Similarly seasonal variation is expected in convenience yield also. So we can explore the presence of seasonality based on the relationship between basis, interest, storage cost and convenience yield. The estimated results show the occurrence of seasonality in the cases of four commodities out of nine. Gold,
barley, guar and jeera show the presence of seasonal variation. For aluminum, copper, lead, crude, and pepper the F values are not significant which indicates that the regression models are not valid in their cases.

The last objective of the present study is forecasting of commodity prices in Indian commodity market. Modeling commodity prices using a state-space specification and estimating it using Kalman Filter algorithm is an effective method in the literature. The state space model for 9 commodities produce efficient forecasts. While considering the forecasting performance most of the predicted values fall very close to the actual values. The standard errors for the estimated values are very small for all the commodities other than lead.

8.3 Summary

Present study tries to explore various developments in the Indian commodity market. The relationship between spot and future prices are addressed in detail the study come out with long-run equilibrium relationship between them. The disequilibrium between spot and future prices and the speed of adjustment towards the equilibrium explore the dynamics between the prices. Further the study try to explore the existence of mean reversion in the Indian commodity market and seasonal behavior. While the nine commodities considered under the study shows the presence of mean reversion only few commodities have the seasonal variations. Occurrence of seasonality is observed in all the agriculture commodities also in gold spot and futures prices. Seasonality is not observable in commodities like metal, crude and pepper prices. Finally, all commodity prices have been modeled using state-space specification. The forecasts are mostly efficient for most of the commodities considered under the study. It shows that state-space specification and Kalman filter algorithm is an ideal method for modeling and forecasting commodity prices in the Indian market.