Chapter-6

Summary and Conclusions

6.1 Introduction

Commodity futures markets in India have a long history. Trading in commodity in India started with the establishment of the Bombay cotton trade association. A few commodities trading associations such as oil seeds (Bombay, 1900), jute (Calcutta, 1912) and bullion (Mumbai, 1920) were set up in at the beginning of twentieth century. Commodity futures trading have grown rapidly in India till late 1960’s but later because of shortage of supply of some essential goods; futures trading was banned in order to have control over the price. Based on the recommendations of the A.M. Khusro Committee (1980), futures trading were reintroduced in Gur (1982) and castor seed (1985). The turning point for commodity futures trading in the country was the setting up of the Kabra Committee in 1993, which recommended allowing futures trading in 17 commodities. The support for commodity futures market was articulated in the National Agricultural Policy of the Central Government in 2000, which was followed by removal of the ban on futures trading for all commodities in 2003. Commodity future markets in India are regulated by the Forward Markets Commission (FMC) set up in 1953 under the Forward Contracts (Regulation) Act, 1952.

The government intervened at every stage of the marketing of major agricultural commodities during last three decades. In order to protect farmers from risks and to
maintain price stability, every activity of marketing of essential commodities such as procurement, distribution control and administrated price mechanism is under Government control. Government regulation has declined after implementation economic reforms in 1991. In similar lines, to reduce support to agriculture sector under the Agreement on Agriculture (WTO), policies are shifted towards market oriented system. Because of all these policy implications, commodities price volatility has increased, to manage these price risks, the government has been encouraging commodity futures market.

In the light of this background, the present study seeks to identity some characteristics of futures markets. More specifically, an attempt is made to compare the basis risk with spot price risk since hedging is expected to reduce price risk. Besides providing hedging facilities, the futures market performs the functions of price discovery and price reference. Yet another important issue concerns the efficiency of the commodity futures markets. With these broad issues, the objectives of the study are to assess the basis risk with spot price risk for different contracts for selected agricultural commodities and base metals, to examine the lead – lag relationship between the futures and spot prices, to analyse the hedging effectiveness of commodity futures markets and finally to examine the market efficiency hypothesis of future markets.

The study is based on spices and base metals. The study covers the period December 2004 to November 2008. The time period varies based on availability of the data for each commodity. The data collected include daily closing prices of both futures and spot from
NCDEX for spices and MCX for base metals. The selection of contracts for different commodities is based on the availability of data with minimum volume of trade. A pooled price series is constructed with roll over process on three maturity periods. Three maturity periods are far month, nearby month and delivery month. The first day of nearby month of any given contract is considered as first day of second month from maturity and ends with the last day of second month. Similarly, the contracts are rolled over to next nearby months. The pooled series is used to test empirically for long run and short run dynamics.

This study mainly employs time series econometrics techniques. The basis risk and the spot price risk are compared by variances of the two series. If the variance of the basis is less than the variance of spot price, then a particular contract is able to reduce risk. Cointegration and Error correction models (ECM) is used for analysing the price discovery process in the futures market. While cointegration tests show whether long-run relationship exists between spot and futures prices, the ECM reveals the process of price discovery. Thus, the examination of price discovery process between spot and futures markets involves two steps. At first, the spot prices is regressed upon futures prices and get residuals from this equation, if these residuals confirms about stationary, it reveals that spot and futures markets are cointegrated. Once the series are tied together in the long run, it is possible that they might drift apart in the short run and turn back. The second step is to examine the short run dynamics is the second step; this can be done with estimation of error correction model. The error correction model is performed in such a manner that both spot price and futures price changes are regressed on the lagged values
of both the variables along with the disequilibrium term. The inference of causality can be assessed by examining the statistical significance and relative magnitudes of the error correction coefficients and coefficients on the lagged variables. Specifically, if error correction term included in spot market is found to be statistically significant, while that in the futures equation is insignificant, it indicates that spot market adjusts to the deviation from the long-run relationship and futures market is exogenous to the system. If the error correction term in both equations is found to be significant, it implies that directional causality exists between the markets.

The hedge ratio and hedging effectiveness are analysed by using ordinary least squares (OLS) method and ECM method. In OLS method spot return series is regressed up on futures return series, the regression coefficient is the hedge ratio and coefficient of determination ($R^2$) value implies hedging effectiveness. In ECM method, errors are considered from spot and futures returns equations. Hedge ratio can be found out by the ratio of covariance of spot and futures return error terms to the variance of futures returns error terms. Hedging effectiveness is assessed by ratio of difference between unhedged position and hedged position to unhedged position. Futures ‘market efficiency hypothesis’ is tested by analysing three necessary conditions. The first necessary condition is that there should be a cointegration between two price series. Serial independence of error terms from cointegrated equation is the second necessary condition for market to be efficient. According to Hakkio and Rush (1989), the short run efficiency of futures market has to be tested once the above two conditions are satisfied. The restrictions test on coefficients in the ECM equation constitutes the third condition for
efficiency. If these three conditions are met, then futures market is efficient and futures price is an unbiased estimate of future spot prices, both in the long run and short run.

6. 2 Main Findings

Major findings of the study are as follows.

i) First objective is to assess the basis risk with spot price risk. In futures markets, the main purpose of hedging is to minimise possible revenue loss associated with spot price changes. Hedging will reduce price risk when basic variability is less than the cash price variability. The results of the study show that for agricultural commodities only 40% of the contracts have basis variability less than spot price risk. In case of chilly commodity out of 21 contracts, only 9 are suitable for hedging. For jeera commodity, out of 42 contracts, only 21, for pepper, out of 53 contracts, 29 are able to reduce risk. Turmeric futures markets are able to reduce risk only for 15 contracts out of 32. In case of Cardamom commodity basis is higher than spot price risk for most of the contracts with the exception of 9 contracts. The reason for this high basis variability is because of the liquidity problem, seasonal variations and high speculation.

Four base metals are considered for the basis risk analyses are copper, lead, nickel and zinc. For copper, active trading is considered between August’ 05 to November’ 08; out of 18 contracts, almost contracts show a ratio which is less than one. When it comes to lead, the total 18 contracts basis risk is less than one, In case of nickel, total 23 contracts are taken between the trading period of January’ 07 to November’ 08. All contracts basis
risk is less than spot price risk, among base metals zinc is one of the active futures markets. 32 contracts are selected between the active trading period of April’ 06 to November’ 08. It is observed that for all contracts, basis risk is less than spot price risk. Finally, it implies that trading in metals is relatively less risky than others.

ii) The lead-lag relationship between futures and spot prices are analysed by Cointegration Technique and Error Correction Mechanism (ECM). In case of agricultural commodities, Chilly market has bidirectional causality, but spot market responds more in order to establish equilibrium in the next period. In Jeera market, futures market leads the spot market, In case of nearby and far month contract periods, the spot market also leads the futures markets. In Pepper market there is bidirectional causality between futures and spot markets. When it comes to the Turmeric markets the futures market leads to the spot market in case of maturity and nearby futures contracts. In case of far month there is no cointegration relationship between spot and futures markets. There is an information flow from futures to spot market in case of maturity and nearby maturity contracts for Cardamom commodity. There is no long term relationship between spot and futures markets in case of far month futures because of low volume of trade.

An analysis of price discovery for base metals is also carried out. In case of Copper market for all time periods, the futures market leads the spot market. In Lead futures there is an information flow form futures to spot in case of maturity and nearby maturity periods. There is bidirectional causality between spot and futures markets in case of far
month maturity. In Nickel market for all periods there is a bidirectional information flow between the markets. However, spot responds to the deviations from previous period’s equilibrium. This indicates that price discovery takes place in futures markets. In Zinc market price discovery takes place in futures market, but in case of maturity and nearby futures maturity periods, the spot market also leads the futures markets.

iii) The hedging performance of agricultural commodities and base metals are analysed as the third objective of this study. In agricultural commodities, especially in the case of red chilly, hedge ratios and hedging effectiveness are high compared to other spice commodities like jeera, pepper, and turmeric. In case of turmeric, hedge ratio and hedging effectiveness are high in nearby and far month maturity periods. Hedging effectiveness of jeera in nearby maturity is better than Pepper and Cardamom. Pepper commodity has similar estimates of hedge ratio and hedging effectiveness for the entire time period. Hedging performance of Cardamom is very poor because of high speculation and other fundamental factors. There is no significant difference in hedging performance among different time periods. Also there is no difference in the estimates of hedging effectiveness of OLS and Error correction method.

Hedging efficiency of base metals is high as compared to agricultural commodity futures. It is because of the fact that the underlying nature of both the commodities is entirely different. Copper futures market hedge ratio is high in maturity period and in the remaining two periods it is low, but there is no significant difference in hedging effectiveness among all periods. In case of the three base metals (lead, nickel, zinc)
hedge ratio and hedging effectiveness are moderate and also hedging effectiveness increases in case of nearby and far month maturity periods. There is also difference in the estimates of OLS and ECM

iv) The Fourth objective of the study is to test the market efficiency without relaying on the assumption that risk premium does not exist. The results suggest that the cointegration relationship between the spot and futures markets confirmed the first necessary condition of market efficiency. The futures market is not efficient both in long run and short run according to the results of restrictive tests to short run dynamics for different time maturity periods. This indicates that future markets are inefficient and future price is not an unbiased estimate of future spot price in the case of both agricultural and base metals commodities. Finally the study concludes that the futures prices do not matter alone while forecasting future spot prices.

6.3 Concluding Remarks

The above observations clearly reveal that utilisation of futures price information is not efficient in spices, but in case of metals most of information in futures prices is efficiently used. Most of the contracts in spices showing high basis risk, it reveals that contracts are not suitable for hedging. In case of metals basis risk is less than spot price risk, so all most all contracts are able to reduce spot price risk. Even though all contracts of base metals are suitable for hedging, their hedging effectiveness is low. In case of spices,
though some of the contracts show high basis risk, their hedging effectiveness is moderate in case of chilly and turmeric as compared to other spices and base metals. Spices and base metals show long-run relation between spot and futures prices for all maturity periods except in far month cases of cardamom and turmeric. There exists bidirectional causality between spot and futures markets in case of spices. In metals, futures price leads spot price in copper and zinc. Lead and nickel markets are showing bidirectional causality between spot and futures markets. Market efficiency of futures markets is examined for all commodities. Though in long-run markets are integrated, but overall spice and base metal futures markets are inefficient, so futures prices of theses markets are not unbiased predictors of futures spot prices.

6.4 Policy Implications

1. It is observed that commodity futures and physical markets are not integrated. There is an important need to establish electronic spot exchange in the country. Any futures market will be efficient only when spot market is efficient. So, the development of spot markets should be given top priority.

2. The warehouse receipt system should be developed in such a way that it will benefit small and marginal farmers. The working group recommends that a system needs to be evolved by which Warehouse receipts become freely transferable between holders as it would reduce transaction costs and increase usage.
3. The structure of markets, contracts design, margin requirements and other measures should be favourable to all categories of farmers to participate in these markets.

4. It is observed that most of the contracts in spices are showing high basis risk that it reveals futures markets ability to provide instruments of risk management is quite poor. This is because of dominance of speculators and also some other fundamental factors like supply variability. This issue needs to be addressed both by exchanges and regulator.

5. Strong effects have to be considered to bring different participants to the market in order to achieve minimum liquidity and depth of the market.

6. The government should continue its efforts to strengthen the commodity exchanges and implementation of awareness programmes among farmers and other market players for increasing participation in futures markets.

7. The farmers are likely to find it difficult to take positions in futures market of their own, so enhancing the capacity building of farmers’ organizations through groups, Co-operative societies are vital and there is a need for intervention for facilitating active participation in futures markets.

8. The Forward Contracts (Regulation) Act, 1952 may be suitably amended and FMC may evolve a suitable framework for options trading in agricultural and non-agricultural commodities in India.