Chapter-1

Background, Issues and Objectives of the study

1.1 Introduction

Price variability is the most important problem faced by farmers. Along with price variability, agricultural producers are prone to several risks such as high input prices, crop diseases, weather conditions which would bring negative effect to their incomes and adverse impact on farming community. Primary commodity prices and their markets are known to behave differently from those of manufactured goods. In case of agricultural commodities supply variability is high as production is affected by weather conditions. The need for futures trading is because of price variability either directly or indirectly. The price instability can be eliminated by introducing price and distribution control by the government, but all these measures become very costly and difficult to implement because of several reasons. With the lack of price controls, traders acquire considerable supply as per their commercial requirement. This makes discrepancy between demand and supply and leads to high price volatility and this type of situation makes the market imperfect competition like the existence of monopolies and oligopolies. One of the solutions to avoid these unwanted price risks and at the same time benefit farmers as well as consumers is to develop commodities derivatives trading. Of late, Government intervention declined especially after the implementation of Economic reforms in 1991. With these reforms, the Agreement on Agriculture under World Trade Organization
(WTO) was implemented. As a consequence, prices of commodities are essentially determined by market forces. Hence, fluctuations in demand and supply of agricultural commodities are expected to result in high price risk. In order to manage price risk, derivatives entered into commodity markets.

The twin functions of commodity futures market are price discovery and price risk management. Risk management can be done through hedging process. Hedging is the mechanism by which the participants in the cash markets can cover price risk by taking opposite position in the futures market. As the prices in futures markets and physical markets by and large move in close direction, the losses in physical market, arising from the adverse price movements are offset either wholly or substantially by the gaining in futures markets. So hedging in futures is the one of risk management techniques. The success of hedging can be possible by the involvements of considerable speculation in futures markets. The involvement of all types of traders and speculators for sale and purchase of derivative contracts enables hedges to buy and sell as and when they required. So future trading stabilizes price variation in two aspects, one is trading leads to greater competition in market and brings price in equilibrium under future trading than without it and secondly, this whole interest of different traders either to gain profits or to minimize loss, all this exercises make to them collect market information in dynamic situation of price discovery. In determining the futures price, market participants compare the current futures price with the spot price that is expected to prevail at the maturity of the futures contracts. (Black, 1976).The decisions of market participants leads to efficient price discovery in the market.
The benefits of future markets extend not only to price discovery and hedging, but also for other farmers and traders who are not involved in future trading directly, who use futures prices for the purpose of production and process decisions. One of the most important consequences of the futures market is that it enables an efficient redistribution of risks. It also facilitates storage activity to manage supply and demand shocks.

Trading in commodity futures in India started with the establishment of the Bombay Cotton Trade Association in 1875. After Independence, the Parliament passed Forward Contracts (Regulation) Act, 1952 which regulated forward contracts in the commodities all over India. By mid 1960s, the government imposed ban on futures trading in most of the commodities. In 1994, the Kabra Committee recommended opening up of futures trading in 17 commodities. In 2003 three National exchanges were recognized for futures trading. Commodity futures markets are governed by Forward Markets Commission (FMC) in respect of futures trading. The three most important exchanges in India are Multi Commodity Exchange of India Ltd (MCX), National Commodity and Derivatives Exchange Ltd (NCDEX) and National Multi Commodity Exchange of India Ltd (NMCE). The future trading is permissible in 95 commodities. The Agricultural commodities constitute the largest commodity group in the futures market till 2005-06(55.32%). From 2006-07 onwards, precious metals, energy and base metals have moved into the first position.
1.2 Issues of the present study

In the light of this background, the present study seeks to identify some characteristics of the Indian commodity futures market in order to examine whether contracts trade so far as to enable to reduce spot price risk. More specifically, an attempt is made to compare the basis risk with spot price risk since hedging is expected to reduce price risk when basis variability is less than spot price variability. Besides providing hedging facilities, the futures market performs the functions of price discovery and price reference. In the context of the two markets namely, futures and spot market trading similar commodities, it has been debated whether futures market leads the spot market or the other way round. The issue of the causal linkage between two markets provides a clear motivation for studying the lead–lag relationship between them. Yet another important issue concerns the efficiency of the commodity futures markets. This issue has not been examined in depth empirically. In Indian context there are very few studies on the performance of spices and base metals.

In the light of the issues mentioned above, the following research questions are raised

i) How effectively do futures markets perform the price discovery function? Does price formation in one market influence the same in the other market?
ii) To what extent the existing futures contracts are suitable for hedging? If so, is this hedging effective in minimizing spot price risk?

iii) Is the future price an unbiased predictor of future spot price as, for the futures price to be an unbiased predictor of future spot price, the futures price should lead the spot price?

1.3 Objectives

The main objectives of the study are set as follows:

1) To assess the basis risk with spot price risk for different contracts of Spices and base metals

2) To examine the lead – lag relations between the futures and spot prices

3) To analyse the hedging effectiveness of commodity futures markets.

4) To examine the market efficiency of commodity future markets.

1.4 Nature and Sources of Data

This research work has considered two samples i.e., spices (chilly, jeera, pepper, turmeric and cardamom) and base metals (copper, lead, nickel, zinc) from the different groups of Indian commodity futures markets. The data for the present study are collected from official websites of National Commodities & Derivations Exchange Ltd (NCDEX) and Multi Commodity Exchange (MCX). The daily closing prices of different futures
contracts and spot prices for select commodities are considered from both exchanges. Spices (red chilly, jeera, pepper, and turmeric) data is collected from NCDEX. Cardamom and base metals (copper, lead, nickel, zinc) data is collected from MCX.

Red chilly data for the contracts is considered from March’06 to October ’08 (20 contracts). In case of jeera, the data for the contracts from March ’05 to October ’08 (41 contracts) is used. The data for turmeric is taken from December ’04 to October ’08 (34 contracts). For pepper commodity the data from June 04 to October -08 (49 contracts) is considered from NCDEX. The cardamom data from March ’06 to October ’08 is collected from MCX. In case of copper the data for 17 contracts from August ’05 to November ’08 is used. For the data for lead metal, 16 contracts from August ’07 to November ’08 are considered. For nickel, data for 23 contracts from January 07 to November 08 is taken. In case of zinc the data for 32 contracts from April ’06 to November ’08 are used. The reason for different time periods for selected commodities is based on the availability of spot and futures prices data.

A pooled price series is constructed with roll over process for two months before maturity (Fd) (that is, far month futures), one month before maturity (Fn) (that is, nearby month futures) and maturity month futures (Fm) for all contracts months. The first day of nearby 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 contracts. As such, the data do not overlap and avoid methodological problems associated with overlapping of data. The procedure is the same for maturity period and
far month maturity periods. The pooled series is used to test empirically for long run and short run dynamics.

1.5 Methodology

This study mainly employs time series econometrics techniques. Price volatility analysis is examined by considering the variance of futures and spot price series in order to conclude about efficient utilisation of information in futures market. The basis risk and the spot price risk are compared by variances of the two series. Basis is defined as the difference between spot price and futures price. If the variance of the basis is less than the variance of spot price, then a particular contract is able to reduce risk. The lead lag relation between futures prices and spot prices is examined by using cointegration and error correction models (ECM). The time series data of futures and spot prices is tested for stationary by the Augmented Dickey Fuller (ADF) test. The long run equilibrium relationship between the two markets is examined by the cointegration technique. In order to test this, spot price is regressed upon futures price and the estimated residuals are tested for stationary. If these residuals are found to be stationary, it is concluded that the two series are cointegrated of order one. Once the series are tied together in the long term, it is possible that they might drift apart in the short run and then turn back. To examine the short run dynamics, the error connection mechanism (ECM) is used. When time series are cointegrated there must be at least one Granger causal flow in the system. The error correction variable is the lagged residual series estimated from the cointegrating equation. 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 variable.

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 ratio of covariance of spot and futures return error terms to the variance of futures returns error terms and hedging effectives is assessed by ratio the 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 conditions 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.
1.6 Justification of the study

The present study may be justified based on the following grounds: First, India is the World’s largest producer, consumer, and exporter of Spices (Red Chilly, Cumin seed, Pepper, Turmeric and Cardamom). All these commodities have well established spot markets. It is known that there should be an efficient commodity futures market to support a well established spot market. So, in the light of this observation, this study tests about market efficiency hypothesis of futures markets for the selected commodities.

The agricultural commodities are facing the problem of price uncertainty because of several reasons. There are no empirical studies available in the literature about how these price risks are minimised especially after the establishment of National Commodity Exchanges. Since the main functions of futures markets are price discovery and risk management, it is essential to confirm these functions empirically. Accordingly, this study empirically tests the lead-lag relationship between futures and spot prices and hedging effectiveness of these markets.

Since 2006 – 07, there has been tremendous change in volume of trade in the base metals futures along with precious metals and energy futures, with a growing market share of 72%. Multi Commodity Exchange is number one in turn over. But there are no empirical studies so far on base metals Futures for the above said functions. In this context it is important to study the base metals price behavior and hedging effectiveness.
1.7 Scope and Limitations of the study

The study is confirmed to spices and base metal futures. The study uses constant hedge ratio models. It would have been better had the analysis based on time varying hedge ratio models. Finally, this study has opened some interesting research questions. First further study could explore the relationship between futures returns and volume of trade for in each month of different contracts. The hedge ratio and hedging effectiveness can be analysed by using time varying hedge ratio techniques. The role of time varying risk premium in the model of the unbiasedness of futures prices constitutes an interesting questions for further research.

1.8 Organization of the Thesis

The present thesis is organized into six chapters. The first chapter introduces the necessary back ground of the study, research problems, objectives and methodology. The second chapter provides history of commodity futures markets and performance analysis of selected contracts using price volatility and basis risk analysis. The third chapter deals with price discovery along with methodological issues and findings. The fourth chapter provides an analysis of hedge ratio and hedging effectiveness. The fifth chapter examines futures market efficiency for different maturity periods. Sixth chapter provides the summary, concluding remarks and policy implications.