CHAPTER 1

INTRODUCTION

1.1 Introduction

Commodities are considered as a separate asset class in the domain of all assets. In order to attain the economic exposure associated with commodities by the use of commodity derivatives, futures contracts are considered as one of the most important hedging instruments. Among several functions performed by commodity futures market, risk transfer and price discovery are considered as the two most important contributions towards the economic activity (Garbade and Silber, 1983). The quintessence of price discovery is to create a competitive reference price from which the future spot price can be derived. An efficient futures market should not only have a close relation with the spot market and thereby helps hedging through a process of arbitrage between both the markets, but it should also acts as a forum whose prices should be taken as a ‘reference price’ for the future spot prices by the market functionaries. This service of ‘reference pricing’ is popularly known as ‘price discovery’. According to Working, 1948, price discovery means the entire mechanism by which markets integrate all available information to reach at the equilibrium price. Thus, futures markets serve as a mechanism to reduce the price risk associated with commodities by revealing the information about future spot market prices. In the literature, a pre-condition for identifying market efficiency is the convergence of both futures and spot prices across the market spectrum. It indicates how fast one market assimilates information compared to the other, and also shows the level of integration between the two markets as well as the efficiency of their functioning.
Generally, in a perfect frictionless and efficient market, there should be a concurrent movement of futures price 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 processes information faster than the 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. It indicates that futures market executes price discovery function and it is generally considered as the most important indicator for judging the efficiency of the futures market. The extent to which futures market performs this function well can be determined from the inter-temporal causal relationship among futures and spot markets. The price discovery and market efficiency are considered as the pillars of market microstructure design and having paramount significance to regulators, academicians and practitioners. In this context, the first focus of the present study is to examine the price discovery role of Indian commodity futures market.

A well organized and effective commodity futures market assists the price discovery and thus, facilitates in reducing the price risk associated with the seasonal fluctuations in the demand and supply of commodities. Commodity futures market has enormous potential for serving the economy as they alleviate the intensity of price variations, helps in multifaceted production decisions, bring a balance between demand and supply, and perform as a price barometer to the market participants besides encouraging competition. The main rationale of introducing futures instruments is to condense the spot price volatility through better price discovery (Stein, 1987). Even though, risk transfer and price discovery are generally considered as the imperative roles of
commodity futures market, several critics also opine that the excessive speculative trading activities in the commodity futures market influence spot market price volatility, especially for the agricultural commodities. The opponents of commodity futures market argue that with the arrival of any negative information in the commodity market, speculators have a tendency to corner the essential commodities in the futures market and thus artificially enhance the prices of the underlying commodity in the spot market. In India as well, the effect of excessive speculative futures trading on spot market prices is one of the most controversial issues among policymakers and researchers. Responding to the concerns expressed at various forums, Government of India appointed an Expert Committee under the Chairmanship of Prof. Abhijit Sen in March 2007, to inspect the impact of futures trading activity on the sudden increase in the prices of agricultural commodities. The committee submitted its report in April 2008, but failed to arrive at a unanimous conclusion. Given this context, the second focus of the present study is to revisit the question whether the excessive futures trading activity causes volatility in the spot market prices.

Understanding relationship among volatility, return, information and volume is considered as the central point to understand commodity market and its microstructure. It is widely acknowledged that the arrival of new information induces trading in assets markets and subsequent revisions of expectation by investors. When new information comes to the market, agents respond by trading until prices arrive at a revised and post-information equilibrium. The two popular well-accepted hypotheses explain information-volume-volatility relationships are ‘Mixture of Distribution Hypothesis’ (MDH) and the ‘Sequential Information Arrival Hypothesis’ (SIAH). According to MDH (Clark, 1973; Epps and Epps, 1976; and Tauchen and Pitts, 1983), returns series are produced by mixture of distribution in which the rate of information arrival is the general directing or mixing variable. Return series can be viewed as
stochastic process, conditional on the information inflow, with changing second moment reflecting the intensity of information arrival.

As a result, when new and unexpected information arrives, both volume and volatility change positively and contemporaneously to new information. Copeland’s (1976) SIAH proposes that new information is distributed sequentially to the market participants. Traders, who are not yet informed properly, cannot infer perfectly. Therefore, the sequential arrival of new information to the market creates both trading volume and price changes. In addition to trading volume, open interest is also an important indicator of trading activity and an imperative source of market information. Open interest explains the depth and confidence of the market. Both volume and open interest data indicates trading activity and distinguishing effects that are generated by market participants. Volume is suitable to capture the daily activity of a particular group of traders who are informed and trades with a short time frame; and can be used as the proxy for capturing the trading behavior of day traders/speculators. Open interest can be used as a proxy for measuring hedgers’ trading activities who are basically uninformed traders.

Samuelson (1965) postulates, volatility of futures price is a negative function of Time to Maturity (TTM). More specifically, as the futures contracts approaches maturity or the time left for maturity declines, the volatility of futures prices enhances. This proposition by Samuelson is commonly known as Samuelson Hypothesis or Maturity Effect. When the maturity date approaches, the same news affects futures price in a different way depending on the moment it becomes known. It is important to examine the behavior of the volatility of futures contract prices near the maturity date because it has important repercussions on the participants involved in the futures markets. On the basis of the relationship between volatility and maturity, hedgers can select futures contracts with a short or long TTM accordingly to reduce the price volatility.
Moreover, if the maturity effect holds, as larger volatility entails greater short term profit opportunities, then the speculators can trade in futures contracts those are close to expiry.

Normally, commodity futures returns exhibit stylized facts like volatility persistence and clustering, which have been well researched and accepted (Antoniou and Foster, 1992; and Gulen and Mayhew, 2000). Examining volatility persistence and clustering would help to understand the connection between information transmission and volatility explicitly, since any change in the rate of information arrival to the market will change the volatility. At the same time, negative shock raises volatility more than positive shock of the same magnitude in the market (Nelson, 1991; Wu, 2001; Thomakos et al., 2008), which is known as ‘leverage or volatility feedback effect’. An empirical investigation of leverage effect would helps to draw insight about asymmetric impact of good news (positive shock) and bad news (negative shock) on volatility. In this context, the third main focus of the current study is on the volatility dynamics of Indian commodity futures market by giving more emphasis on volatility clustering, persistence and leverage effect, which the earlier studies in the Indian commodity market segment had ignored.

1.2 Motivation for the study

A number of steps were taken to liberalize the Indian commodity markets immediately after the liberalization of Indian economy in 1991. The Kabra Committee (1994) suggested starting of futures trading in 17 commodities. The year 2003 is having remarkable significance in the history of Indian commodity futures trading because 54 commodities were unlocked for futures trading. In 2003 itself, three new national level exchanges has been recognized and established by Government of India with on-line trading platform and professional management. Currently, we have six national level and 16 regional level commodity exchanges functioning in
India and the total number of commodities entitled for futures trading is more than 113 on 22 recognized exchanges. The total value of commodity futures trade rose from Rs 5.71trillion in 2004-05 to Rs 291.84 trillion in 2014-15\(^1\). The Multi Commodity Exchange (MCX) and National Commodity and Derivatives Exchange (NCDEX) are the two prominent national level commodity exchanges which are propelling the tremendous growth in volume of trade. These two commodity exchanges account for more than 90 percentage of the overall turnover on all the commodity exchanges in India.

Even though, the development of Indian commodity futures markets has considerably increased with regard to number of products, turnover, number of players, volume of trade and spatial distribution; there have been contentions that unexpected futures trading activity (excessive speculation) is the major source of spot market price volatility, especially for the agricultural commodities. Several allegations arose pointing that commodity futures market encourages excessive speculation and which leads to the commodity price escalation in the spot market. This notion of excessive speculation in the commodity futures market and its consequence on spot market has always been there among policymakers, it has become more severe in the first quarter of 2007 due to consistent rise in the price of agricultural commodities.

Responding to the concerns expressed at various forums, Government of India appointed an Expert Committee under the Chairmanship of Prof. Abhijit Sen in March 2007, to inspect the impact of futures trading activity on the sudden increase in the prices of agricultural commodities. The Committee examined the issue exclusively and submitted its report in April, 2008. The report concludes-

“Even if the agricultural price inflation is accelerated during the post futures period, the same cannot be attributed only to the trading of futures contract in essential agricultural

\(^1\) Forward Market Commission (FMC)- Annual Report 2012-2013
commodities. A part of the price acceleration of agricultural commodities in the post futures period may be due to rebound or recovery of the past trend of relatively low agricultural prices observed during the pre-futures era. At the same time, the period during which futures trading have been in operation in India is too short to discriminate adequately between the effect of initiating futures trading and a normal cyclical adjustment.²

The Abhijit Sen Committee failed to arrive at a unanimous conclusion. The majority of the committee members expressed their views that futures trading activity is not leading to excessive increase of price in the spot markets. However, Prof. Sen highlighted the fact that the available data was insufficient to draw any significant inference. In this context, the main motive of present study is to revisit whether Indian commodity futures market is acting as a dominant player in the price discovery and the consequence of futures trading activity on cash price volatility of the underlying commodity, where the Abhijit Sen Expert Committee failed to arrive at a unanimous conclusion, with relevant and adequate time period spanning from 2008-09 to 2013-14. The study plans to analyze the effect of futures trading activity on cash price volatility by giving more emphasis on unexpected futures trading activity for separately identifying the effect excessive speculation on cash price volatility, where the earlier studies in the Indian commodity market segment had ignored.

Prior studies analyze the temporal relationship among cash and futures markets to identify the presence of causal relationship among the two markets. This causal relationship entails prices in the cash and futures markets are logically interconnected in the short and long run. In order to identify this causal relationship, several models have been employed in the previous studies however, these models provide a one-shot measure of short or long run relationship which is generally apply across all periodicities only with one result and do not

provide a complete inter-frequency characterization. However, the extent, direction and strength of causal relationship may differ among frequency bands and in a purely competitive market, the information about the strength, extent and direction of such temporal relationship is very crucial for the market participants for an effective financial risk management through arbitraging and hedging. The next main motive of the study is to overcome this predicament by using a tool which can provide an intact inter-frequency characterization of the causal relationship among cash and futures prices. For this purpose, the present study employs frequency domain analysis to study the causal relationship among cash and futures prices, which the earlier works in the Indian context had ignored.

1.3 Organization of the Thesis

The entire thesis is organized into five chapters. Chapter 2 discusses a detailed and critical literature review of price discovery role of commodity futures markets, effect of futures trading activity on cash price volatility and factors affecting the dynamics of commodity futures volatility. The gaps in literature also discussed in the Chapter 2. Chapter 3 deals with the research methodology part. Chapter 4 is devoted to data analysis and detailed discussion of empirical results. Finally, chapter 5 summarizes the major findings of the study and concludes the thesis.