Chapter 2

REVIEW OF LITERATURE

2.1 Introduction

This chapter contains the review of past studies conducted in the field of commodity derivatives. The reviews are classified into three headings namely general studies, Price discovery, and Hedging. These studies are arranged in chronological order.

2.2 General Studies

According to Rubinstein (1992) derivative assets can be used to provide tailor-made patterns of returns, stitched from the fabric of their underlying assets, to suit the needs of particular investors. He points out that derivative asset analysis enjoys an unusual status of a relatively complex tool of economic analysis, faithful to the core of economic theory and widely used to make real-life decisions. For example, most traders on the floor of options exchange use arbitrage based option values, at least as benchmarks, in establishing market prices and in constructing replicating strategies to hedge their options position.

Kabra (1994) has recommended in his report to reintroduce futures, which were banned in 1960 and also to widen its coverage to many more agricultural commodities and silver.

Mark (1999) conducted numerous studies in the area of managed futures and showed that commodity futures are a valuable asset class for risk adverse investor.

Sahadevan (2001) who conducted a study on commodity futures, has proposed to enlarge the coverage of futures market to minimize the wide fluctuations in commodity prices and for hedging the risk arising from price fluctuations.

Allayannis and Weston (2001) found that hedging activity increases the value of the firm. Specifically, they used a sample of firms that faced currency risk.

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1 Who was appointed by the Government of India to study on Forward markets.
directly because of foreign sales or indirectly because of import competition. They found that firms with sales in foreign countries that hedged with currency derivatives had a 4.87 percent higher firm value (hedging premium) than similar firms that did not use derivatives. The study also found evidence that after the firms began hedging, their market value increased. Thus there is evidence that hedging increases the value of the firms and by implication, increases investment.

Hedge (2002) suggests that achieving hedging efficiency is the main reason to opt for futures contract. According, to him, the utility of a futures contract for hedging or risk management, presupposes parallel or near parallel relationship between the spot and futures price over time. In other words, the efficiency of a futures contract for hedging, essentially envisages that the prices in the physical and futures markets move in close unison, not only in the same direction, but also by the same magnitude, so that losses in one market are offset by gains in the other.

According to the report submitted by the Energy Information Administration, America (2002) under the direction of the secretary of Energy in October 2002, a study was conducted on the role of derivatives in managing some of the risks in the production and consumption of petroleum, natural gas and electricity. It was reported that business operating in the petroleum, natural gas and electricity industries are particularly susceptible to price risk, as a consequence of the extreme volatility of energy commodity prices.

Sahadevan (2002) described the difference between future and spot prices is the outcome of inefficient commodity futures market. The reasons for inefficient price risk management are the lack of participation of trading members, low market depth, lack of Government’s interference etc.

Srivatsava (2005) analysed the significance of trading in price spreads in commodity markets. He suggested that as the commodity markets in India are highly fragmented and since integration of spot and futures is at nascent stage, Indian commodity derivatives trading offer a wide scope for spread trading.
Nair (2005), in his study on commodity futures market in India, analyzed that the commodity futures trading in India, which was in a state of hibernation for four decades, due to the suspicion on the benefit of future trading has been replaced by policy, institutional and market activism in the last few years. According to him, this is partly a response to the predominant role being assigned to the market forces in price determination, and the consequent need for providing market based derisking tools. He is of the opinion that it is also the result of a growing awareness that derivative trading do perform substantial risk, mitigating functions to the stakeholders.

Gary and Greet (2005), who completed a paper on the topic “Facts and Fantasies about commodity Futures,” focused on the multi-trillion dollar futures markets. These involve contracts that commit the buyer and seller to trade a given volume of a commodity at a set price – the future price - on a specific date, typically within three months.

Devakula (2006), in his study, “The challenges and opportunities facing the Thailand Future market”- points out that the establishment of the Agricultural Futures Exchange of Thailand (AFET) in may 2004, was a major step which enabled to increase the daily average turnover for rubber to almost eight folds in two years. The future market aims to provide an efficient and effective mechanism for the management of price risks. By buying or selling futures contracts, individuals and businesses have access to insurance against adverse price changes in the future. Futures market, according to author, is a continuous auction market, whereby prices should reflects the latest information about supply and demand conditions. This price discovery mechanism allows producers to be better informed when making their production plans.

According to Gorton and Rouwenhorst, (2006) commodities are, in fact, not as risky as stocks, most important, commodities are “negatively correlated” to bonds and stock, meaning, their prices tend to rise when stock prices fall and vice versa. This is largely because the commodities tend to do well when inflation is high, while stocks and bonds do not. Hence, they recommended that commodities
portfolio is ideal for diversifying or spreading risk among various types of investments.

Ahuja (2006), in his study, points out why India can be promoted as a major center for trading of commodity derivatives. He also emphasizes the need for commodity derivatives and the role they can play in risk management. It is common knowledge that prices of commodities, metals, shares and currencies fluctuate over time. The possibility of adverse price changes in future create risk for businesses. Derivatives are used to reduce or eliminate price risk arising from unforeseen price changes.

Bhide (2006) conducted a study about the emerging opportunities in the commodities markets. The three main reasons for investing in the commodities market are; (1) they are budding markets, (2) its impacts on day-to-day lives of people and (3) prices in commodities markets do not swing as the quality markets do. He concludes that the exploitation of emerging opportunities will offer suitable products that are applicable at the best.

Ashuthosh (2006) investigated the market integration at two levels for wheat namely integration among spatially dispersed spot markets, and integration among wheat spot and futures markets, in pre and post national exchange era. The period of the study is from 1997 to 2006 based on the monthly prices of data, of six wheat growing and producing states of India. The conclusion of the study is that there is the evidence of price dissemination of wheat futures market. Especially when the markets (Consumption and production centres) are widespread and physical movement of commodity is not smooth (inter-state movement restrictions, poor transportation and storage infrastructure), futures trading helps significantly in improvement of the market risk. There is also the improvement in the inter-state market integration during the post national commodity exchange era. It confirms that common price dissemination across spot markets was better through futures trading and spot prices fixed at exchanges. Indian wheat market has been found spatially well integrated during the futures trading era and it suggests for reduction in government’s intervention related to pricing movement and trading.
Narender (2006) conducted a study about Indian commodity market after the establishment of national level commodity exchanges. He concluded that Indian commodity market has achieved enormous progress transparency and trading activity from the modern national and regional level commodity exchanges. The volume and value of commodity trade has increased considerably because of the role played by market forces and the active encouragement of Government. He suggested the removal of barriers in the futures trading and freedom of market forces to determine the price.

Himdari (2007) investigated about the risk return features of commodities. He concluded that the Indian futures market have improved in recent years and would result in fundamental changes in the existing isolated local markets particularly in case of agricultural commodities.

Kamal (2007) concluded a study about the commodity market in India. He concluded that the commodity futures market has achieved a substantial growth in volume of trade. He found various factors considered to make commodity market as an efficient instrument for price discovery and risk management and suggested that policy makers should consider specific, affairs related with production, processing, marketing and export of agricultural commodities.

Swami and Bhawana (2009) studied about the elimination of ban on commodity futures. They conclude that as India is the top producers of agricultural commodities there is a high potential for future growth of Indian commodity futures market. Indian commodity market proves to be the efficient market at the world level in terms of price risk management and price discovery.

Brajesh and Pandy (2013) examined the short and long run market efficiency of Indian commodity futures market. They had selected four agricultural and even non-agricultural commodities for market efficiency and unbiasedness. The conclusion is that commodity future prices are efficient in the long run and it is inefficient in short run.
2.3 Price Discovery

Garbage and Silber (1983) analysed seven Commodities (wheat, corn, oats, Orange juice, copper, gold and silver). They found that while futures market size and liquidity played a positive role in the price discovery function.

Ollermann and Farris (1985) investigated lead lag relation between change in futures and spot price of live beef cattle between 1966 and 1982. The futures price led spot price nearly every sub period analysed. The authors conclude that futures market was the centre of price discovery for live cattle.

Koch, Kawaller and Koch (1987) examined the intraday price relation between S&P 500 futures and the S&P index using minute data for the period 1984-85. Their results suggest the futures market is stronger and which leads the spot stock market.

Herbst, McCormact and West (1987) studied S&P index futures and Value Line Index (VLI) futures from February 1982 to September 1991 and found that futures price led the spot price. They also found some evidence of feedback. They conclude that the spot index adjusted quickly so that knowledge of the lead lag relation could not be used for profitable trading opportunity.

Oellermann, Brorsen and Farris (1989) investigated dominance for feeder cattle using daily price data over an eight year period divided into two sub periods of four year each to account for structural change. The authors found that feeder cattle futures price led spot price in incorporating new pricing information indicating that the futures market serves as the centre of price discovery for feeder cattle. Using the Garbade Silber framework, the authors found that futures market exhibited strong dominance over Spot market in the first sub period and weak dominance in the second sub period.

Koontz, Garcia and Hudson (1990) Employed Granger Causality to examine dominance in live cattle market using weekly data. Their study divided the sample period in to three sub periods of four year each to examine the dynamic nature of dominance. Their results showed changing dominance pattern due to structural
change in the industry. Their main finding was that the price discovery process is
dynamic in nature and dependent on the structure of futures and spot market.

Stoll and Whaley (1990) investigated the time series properties of five minute
intra-day returns of stock index futures and stock index. They found that S&P 500
and Major Market Index (MMI) futures returns led stock market returns by 15 to
20 minutes, even after purging effect of infrequent trading. However, the lead lag
relation was not completely unidirectional, with lagged stock index returns having
a mild positive predictive impact on futures returns in the inception period of
futures trading.

Cheung (1990) studied S & P index futures using data over 15 minute interval
from April 1982 to June 1987. They found that futures led spot by 15 minutes with
weak evidence of spot leading futures.

Fortennbery and Zapata (1990-91) applied cointegration analysis to futures and
spot market for corn and soyabean. Evidence of cointegration was defeted for all
spot and futures market pairs considered. Their results suggest that where the cost
of maintaining inventory is high, a more appropriate specification of the relation
between spot and futures price is to include interest rate also as an explanatory
variable.

Khoury and Market (1991) studied the informational content of basis using barley,
oats and canola futures during 1980-88. They found that futures price led spot
price on a day - to - day basis. They also found that the feedback from spot to
futures was weak.

Chan, Chan and Karolyi (1991) studied S & P Index Futures and Major Market
Index (MMI) futures using data over five minute interval from August 1984 to
December 1989. They examined the intra-day pattern of lead lag relation using a
bi-variate GARCH framework and found strong intra market dependence between
stock index and stock index futures price change when the volatility of price
change was also considered.

Schwarz and Laatsch (1991) applied the Garbade and Silber framework to the
Major Market Index (MM1). Their results based on both daily and weekly data
showed that spot market dominated during the early period of futures trading, with futures market exhibiting increasing dominance in later years. Their investigation highlighted the temporal nature of dominance through the use of different sub periods.

Bessler and Covey (1991) applied cointegration analysis to the live cattle market and found slight evidence of cointegration between nearby futures and spot price but no evidence of cointegration when more distant futures contract was considered.

Schroeder and Goodwin (1991) examined short and long run price relation between Omaha spot and Chicago Mercantile Exchange (CME) futures daily price for live hogs. They found that the futures and spot series operated somewhat independently and the long term basis was generally non stationarity. They found that futures market dominated spot market for live hogs.

Chan (1992) investigated the stock index market on an intra-day basis using lead lag regression. He examined the effect of good and bad news, trading intensity and market’s wide price movement on dominance. The result showed weak dominance by features market and no compelling evidence that affected lead lag relation, Chan suggests that response to market wide movement was supportive of dominance by futures market.

Quan (1992) used monthly crude oil price in a two step procedure to study price discovery. The steps involved first establishing a long term relation between futures and spot price using co integration and then testing lead lag relation with Granger causality test. Quan found that spot price led futures price.

Wahab and Lashgari (1993) used cointegration analysis to examine the temporal casual link between stock index futures and stock index for both S&P 500 and FTSE 100 and found that futures and spot market is co integrated. They found that futures price exhibited a stronger response to disequilibrium. Although feedback existed between futures and spot market for both S&P 500 and FTSE 100, the spot to futures lead was more pronounced.
Fortenbery and Zapata (1993) applied cointegration analysis to futures and spot market for corn and soyabean. Evidence of cointegration was detected for all spot and futures market pairs considered. Their results suggest that where the cost of maintaining inventory is high, a more appropriate specification of the relation between spot and futures price is to include interest rate also as an explanatory variable.

Schwarz and Szakmary (1994) replicated Quan’s analysis with daily observations and found that futures market dominated spot market, a result opposite that of Quan but in conformity with other studies. They attribute Quan’s failure to find support for the price discovery function of futures market to inappropriate choice of data and time interval. They found the petroleum futures and spot market to be cointegrated.

Hasbrouck (1995) studied price discovery for the 30 Dow stocks traded on the New York Stock Exchange (NYSE) as well as on other regional exchanges. The results suggest that price discovery is concentrated at the NYSE. Interestingly, the study found that for most stocks price discovery occurs predominantly on the NYSE even though trading volume for these stocks is lower on NYSE as compared to other Exchanges. Significantly the author also found that price discovery takes place primarily in the medium sized trades. It is these trades that convey more information.

Harrris et. al (1995) studied price discovery for IBM stock on New York, Midwest and pacific Exchanges. They found that all three markets react to independent information reflected in each exchanges price. They found that though price discovery occurs primarily on NYSE, the two smaller Exchanges also play a significant role in the price discovery process.

Zapata and Fortenbery (1996) introduced interest as an argument in the cointegration model and found that it is important in describing the price discovery relation between futures and spot market for storable commodities.

with no evidence of feedback. They also found that the contemporaneous relation between the S&P 500 futures and S&P 500 index has grown stronger over time and feedback from futures to spot market has almost disappeared. The authors suggest that this is a sign of increased integration flow of index futures and the stock market.

Shyy, Vijayraghavan and Scott-Quinn (1996) find reverse causality from spot to futures for the CAC index (France). They suggest that previous results indicating futures market leading the spot market are primarily due to market asynchronous trading and difference in trading mechanisms used in futures or spot market.

Fortenbery and Zapata (1997) examined whether futures and spot market for cheese have established a long run equilibrium relation in terms of pricing behaviour and whether one market dominated as the center for price discovery. Based on cointegration test they found no evidence of a stable long run relation between futures and spot market.

Pizzi, Economopolous and O’Neill (1996) examined price discovery in the S&P 500 index and its three month and six month index futures using intra-day minute by minute data. Using cointegration analysis several error correction models were developed using the Engle Granger two step procedure, the authors found that both the spot index and three month futures and the spot index and six month futures are cointegrated, indicating market efficiency and stability. Their results indicate that the futures market led spot market by 20 minutes while the spot market led futures market by 3 minutes. They found that while the futures market had a stranger lead effect, there was causation from spot in futures as well.

Abhyankar (1998) studied price discovery in the FTSE 100 index futures market using intra-day minute by minute data. Employing the technique or linear and non-linear Granger causality the author found that FTSE 100 index futures led the spot index by 5 to 15 minutes. The author also found that, in contrast to the linear test, if non-linear effect is accounted for, neither market leads or lags the other.

Silvapulie and Moosa (1999) examined the lead lag relation between futures and spot crude oil price using both linear and non-linear causality lasts. Their study
concludes that though the futures market plays a bigger role in the price discovery process, the spot market also plays a role in this regard.

Min and Najand (1999) investigated the lead lag relationship in returns between the newly established futures and spot market in Korea. They found that the futures market leads spot market by 30 minutes.

Pizzi et. al (1999) examined price discovery in the S&P 500 spot index and its three and six month stock Index futures using intraday minute by minute data. Using cointegration analysis the results show that both the three and six months futures markets lead the spot market by at least twenty minutes. There is bidirectional causality but the futures market does tend to have a stronger lead effect.

Booth (1999) studied intraday price discovery process among stock index, index futures and index options in Germany using DAX Index security and intraday transactions data. They find that spot index and index futures have substantially larger information shares than index options.

Yang and Leatham (1999) examined the price discovery function of three US wheat futures market. The conclusion of the study is that the three futures markets are co-integrated but there is no co-integration in the cash market respectively.

Roope (2002) made a comparison of the information efficiencies between the Singapore Exchange and the Taiwan Futures Exchange for Taiwan Index Futures listed in both markets. The results provide strong evidence to suggest that price discovery primarily originates from the Singapore Futures Market.

Karande (2006) investigated the basis risk, price discovery and spot price volatility of castor seed futures market in India, from May 1985 to August 1999. They studied price discovery within Mumbai and Ahmedabad markets and price discovery across the two markets. He used Root mean Squared Error (RMSE), Ashley F- test, Henrikson – Merton (H-M) timing test and Johansen’s cointegration tests. He concludes that the castor seed futures market at Mumbai and Ahmedabad performs the price discovery function.
Sah and Kumar (2006) conducted a study on the price discovery of S&P Nifty and Nifty futures for five years. They summarised that the long run relationship and feedback mechanism between spot and futures prices.

Gupta and Singh (2007) investigated about the price discovery and efficiency of Indian equity futures market. They used the near month nifty index futures and 24 stock futures. They conclude that Indian equity futures market is useful price discovery vehicle and there is a bilateral causality between spot and futures prices.

Bharat and Singh (2007) concluded that the growth of commodity spot market depends upon the growth of commodity futures market in developing countries. The certified warehouses, centralised spot prices and effective margin system were found as the important institutional factors for successful commodity futures market.

Gupta and Singh (2007) investigated about the efficiency of Indian equity futures market. They used the near month Nifty index futures and 24 stock futures. They conclude that Indian equity futures market is a useful price discovery vehicle and there is a bilateral causality between spot and futures prices.

Kedarnath (2008) explained the significance of price discovery and risk management by commodity futures for the development of commodity spot market in India. The result of interdependence between commodity futures and port market in agricultural commodities also supported the relevance of commodity future trading in Indian commodity market.

Mahalik, Acharya and Babu (2009) analyzed the price discovery and validity spillovers in futures and spot commodity market of India. They selected the spot and futures prices of agricultural, energy base metal and aggregate commodity index for this study. These market s effectively serve the price discovery function and bivariate GARCH model indicates that the innovations in one market can predict the volatility in other market.

Ranajit and Asima (2010) conducted a study about the efficiency of Indian commodity market. They used the cointegration analysis and GARCH model and concluded that there is cointegration between agricultural commodity spot and
future prices and the new information available in the market act as the base of future value of commodities.

Chhajed and Mehta (2010) conducted a study on the market behavior and price discovery in Indian agricultural commodity market. They studied average monthly spot and futures prices of nine agricultural commodities namely wheat, chana, soyabean oil, jute, menthe oil, rubber, potato, crude palm oil, and cardamom traded on MCX and NCDEX during 2009-10. They conclude that the price discovery mechanism is quite different for different commodities and they show a bidirectional causality between spot and futures prices.

Shankar and Jaiswal (2011) investigated the price discovery function among the futures, option and cash market on daily data from National Stock Exchange. They conclude that the futures market is a useful price discovery vehicle because of the lower cost of transaction and huge trading volume. The spot and option markets are influenced by the price movements in the futures market.

Kumar and Arora (2011) examined the relationship between spot and future prices of silver. Closing spot and near month futures price have been studied for a period of five and a half years. They conclude that the spot and futures prices are correlated and there is a unidirectional causality from futures to spot market.

Barua and Mahanta (2012) conducted a study about the Indian commodity derivatives market and price inflation of gold, soyabean oil, wheat and rubber. The monthly average price of commodities were analysed by using ADF and linear regression techniques. The tests conducted on gold, wheat and rubber reveals that variation in future prices do have a significant impact on the spot price, and soyabean oil was found to have no significant effect on their spot prices.

Choudhary and Bajaj (2012) investigated the price discovery and the role of spot and futures market in the assimilation of information. They used five minutes interval data of 31 securities from April 2-010 to March 2011.They used the Johansen’s co integration test, Engel and Granger’s residual based approach, Granger causality and Vector Error Correction models for testing the direction of causality and the leading market .The results of the study indicate that the futures
market is leading the spot market in case of 12 securities whereas 19 securities are being led by the spot market.

Sehgal, Rajput and Desting (2013) examined the price discovery and volatility spillover in Indian commodity markets. They selected agricultural, metal, energy and commodity indices for the study. They conclude that the Indian commodities market is encouraging price discovery and less efficient risk transfer system.

Raghavendra and Velmurugan (2013) conducted a study on the causal relationship between Great Britian Pound and Indian National Rupee currency traded in India. The result of the study is that the futures return causes the spot return unidirectionally.

Rajput, Kakkar, Batra and Gupta (2013) analysed the relationship between the spot and futures market of S&P CNX Nifty during 2003 to 2011. They used the cointegration tests, vector error correction model, variance de-composition analysis and granger causality to ascertain the long and short term dynamics of the selected spot and futures market. They conclude that the futures price series had a greater speed of adjustment to the previous deviations and hence the price discovery was achieved first in the spot market.

Aggarwal, Jain and Thromy (2014) conducted a study about the price discovery and risk management for commodities in India. The commodities in India. The commodity futures market perform the role of price discovery function but it is reducing the hedging effectiveness of various commodities.

Samna (2014) analysed the price discovery aspect of cardamom, pepper and rubber. The study concluded that the futures market is efficient in price discovery and there is unidirectional causality from futures to spot market.

2.4 Risk Management

Powers (1970) conducted a study of cattle and pork belies using variate difference method to isolate the noise component of the price series produced evidence of the stabilising influence of futures trading.
Taylor (1974) conducted a study of live cattle futures compared the variance of price between a period with and without futures trading and found that the spot price was more stable when futures market was in existence.

Cox (1976) investigated the effect of organized futures trading on information in the spot market. Empirical evidence showed that futures trading increased traders information about underlying supply and demand conditions. Cox concluded that the spot market operated more efficiently in the presence of futures trading.

Froewiss (1978) in one of the earliest studies on financial futures, he concluded that futures trading did not adversely affect the variability of spot price for the US Government National Mortgage Association (GNMA) pass through certificates. Froewiss investigated the GNMA market using uni-variate Box Jenkins analysis for futures sub samples were modeled using Box-Jenkins technique and tests conducted for significant paramount change between the two periods. Results indicated no significant parameter change, suggesting that spot price volatility had not been influenced by futures trading.

Figlewski (1981) examined the effect of futures trading on the GNMA spot market. The author contends that GNMA futures price is determined largely by new traders who have less information than experienced GNMA spot market debaters. Figlewski suggests that spot price volatility increases when the additional noise in futures price is transmitted to the GNMA spot market.

Simpson and Ireland (1982) investigated the effect of futures trading on GNMA certificates. The study used first difference of both daily and weekly average price. As a preliminary search into the effect of difference of both daily and weekly average price. As a preliminary search into the effects of derivate trading the authors specified a regression model with a proxy variable to remove extraneous influence, a dummy for the onset of futures trading and an interaction term. The regression model was constructed for both pre futures and post futures sub samples for daily and weekly volatility measure. Tests were carried out for significant change in model parameter for the two periods. As there is no significant change was recorded, the authors concluded that there was no increase in spot price volatility since the advent of derivatives trading.
Corgal and Gay (1984) investigated the effect of GNMA derivative trading on spot price using Box-Tiao intervention analysis which is designed to model the impact of events on time series data. The results confirm the general finding that derivative trading did not have a destabilising effect on spot price instead a long run stabilising effect was found.

Moriarty and Tosini (1985) replicated Figlewskis study and found that GNMA spot market volatility. They attribute Figlewskis results to his choice of study period and conclude that the study period considered may alter results.

Simpson and Ireland (1985) conducted a study of Treasury bills, and they found that futures trading led to a decrease in volatility initially, but the effect disappeared when futures trading volume became large resulting in increased volatility in the spot market.

Bhaltacharya et al. (1986) also replicated Figlewski’s study using his measure to calculate weekly volatility series for spot and futures price for GNMA. Using Granger Casualty tests their results suggest no change in spot price volatility since the introduction of futures trading in GNMA securities.

Edwards (1988) compares spot price volatility before and after the introduction of stock index futures and finds that the long term volatility of the S&P 500 index was greater before futures trading. His analysis of the 1972-87 period did not indicate that futures trading was associated with increased stock market volatility. He finds that volatility decreased post futures for the S&P 500 but finds no significant difference for the Value Line Index (VLI). He argues that causality tests cannot enter whether futures trading has stabilised or established the spot market. The perception of futures volatility could be explained by futures market reacting more quickly to information which will have a similar effect on volatility. Using variance ratio test of daily returns from 1973 to 1987, Edwards concludes that the introduction of futures trading in interest rate and stock index has not established the underlying spot market.

Brorsen, Oellermann and Farris (1989) present both theoretical and empirical models which suggest that a successful futures market for cattle improves spot
market efficiency; however short run spot price risk also increases. The fact that volatility that increased (though only in the short run) could be an important factor in understanding why cattle producers perceive the futures market as adversely affecting spot price.

Harris (1989) compares daily return volatility pre futures (1975-82) and post futures (1982-87) between the S&P 500 stocks and a non S&P group of stocks. Controlling for difference in firm attributes (beta, price level, size and trading frequency), Harris finds that in the post futures period individual stock returns in the S&P group were more volatile than the non S&P stock returns. He concludes that the marginal increase could be due to factors other than derivatives trading because the increased volatility was more noticeable in daily returns than in returns measured over a longer interval. He believes that other index funds could account for the change. However, he approaches of comparing S&P 500 stocks to other stocks underestimates the effect of futures market since price of non S&P 500 stocks is influenced by movement in the S&P 500 index.

Weaver and Banerjee (1990) investigated whether futures trading of cattle and other related commodities destabilises spot price. Despite the finding of an apparent role for external information in determining cattle price, their results support the conclusion that futures trading for cattle and other related commodities did not lead to dynamic instability of cattle price during the study period.

Brorsen (1991) tested for homogeneity of variance in the S&P 500 index for time periods before and after futures trading and finds that while the variance of daily price change increased significantly, the variance of five day and twenty day price change remained the same. Brorsen suggests that short run volatility can be decreased by any measure that increases friction such as raising futures margins or increasing transaction cost for arbitrageurs.

Baldauf and Santoni (1991) used ARCH analysis to test for increased volatility in the S&P 500 index since the introduction of futures trading and growth of program trading. Spot price was modeled for periods before and after futures trading and the model specification tested for significant change. The study found no evidence of a shift in the model parameters suggesting no effect of derivative trading volatility.
Lee and Ohk (1992) find that following the introduction of index futures, the volatility of stock returns in Japan, UK and USA rose significantly but not in Australia and Hong Kong. Their results show that although stock index futures exert a volatility increasing influence on daily stock price behaviour, it makes the stock market relatively more efficient of volatility stocks are disseminated more quickly.

Antoniou and Foster (1992) studied the effect of futures trading on spot price volatility for Brent Crude Oil in UK using GARCH analysis. They find no evidence to suggest that there has been a spillover of volatility from futures to spot market.

Bessembinder and Seguin (1992-93) examined whether greater futures trading activity (volume and open interest) is associated with greater equity volatility. They partitioned each trading activity series into expected and unexpected components. The authors found that while equity volatility is associated positively with unexpected futures trading volume, it is negatively related to forecastable futures trading activity. Their results support the view that an active futures market enhances liquidity and depth of the underlying equity market by way of arbitrage.

Kamara, Miller and Seigel (1992) investigated the effect of futures trading in S&P 500 on stability of the underlying index. Both parametric and non parametric tests suggest that the volatility of daily returns in the post futures period (1982-89) was higher than in pre futures period (1976-82), but the volatility remains unchanged. They find that the distribution of daily return is frequently (and non event induced) changing. Consequently the authors conclude that the significant increase in volatility of daily returns. After the inception of futures trading is not futures induced.

Antoniou and Holmes (1995) find that stock return volatility in the UK increased following the introduction of index futures. They examine the impact of trading in FTSE 100 stock index futures on volatility in the underlying spot market. To examine the relation between information and volatility they use the GARCH family of techniques. Their results suggest that futures trading has led to increased volatility, but the nature of volatility has not changed post futures. Their findings
of price change being integrated pre futures but being stationary post futures, implies that the introduction of futures trading has improved the speed and quality of information flowing into the spot market. Their results suggest that there was an increase in spot price volatility on a daily basis, but this was due to increased information flow in the market and not speculator having an adverse destabilising effects. The increased volatility is the result of futures trading expanding the routes over which information can be conveyed to the spot market.

Darrat and Rahman (1995) examined whether futures trading activity has contributed to jump volatility in the stock market. Their results suggest that futures trading activity is not a cause for episodes of jump volatility.

Holmes (1996) examines the impact of futures trading price volatility in the underlying spot market for FTSE Euro track in which trading was thin and consequently suspended. Evidence presented demonstrates that despite low futures trading volume the existence of futures market improved the rate at which information was assimilated into the spot price and reduced persistence. The results suggest that futures trading brings beneficial effect to the associated spot market even if trading is thin.

Pericli and Koutmos (1997) examined the impact of S&P 500 Index Futures and options on volatility in the spot markets. They found that for weekly returns the unconditional variance decreased in the post futures period, though the reduction was not introduction of index futures and index options produced no structural change in either the conditional or unconditional variance.

Antoniou, Holmes and Priestley (1998) examined the impact of futures trading on stock volatility for six countries (Germany, Japan, Spain, Switzerland, UK and USA). Their results suggest that although futures trading had a limited impact on the level of stock market volatility over a three year period, it had a major effect on the dynamics

Chang, Cheng and Vinegar (1999) propose new tests to examine the influence of index futures on Nikkei stock price volatility. The tests decompose spot portfolio

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Jump volatility refers to the occasional extreme change in stock price.
volatility into the expected cross-sectional dispersion and the average volatility of returns on the portfolio’s constituent securities. Their results indicate that futures trading increased spot portfolio volatility but the volatility impact did not spill over to stocks against which futures were not traded. They find that most of the variation in spot market volatility is attributable to disturbance in broad market factors. The increase in volatility induced by futures trading can only be detected when tests properly control for these factors.

Gulen (2000) examined stock market volatility before and after the introduction of equity index futures trading in 25 countries. They find that except for USA and Japan, introduction of futures market had a significantly negative impact in seventeen countries and no effect in the remaining six countries on the underlying spot market volatility.

Shong (2001) using a switching GARCH model examined the impact of index futures on volatility in the spot market. He found that volatility increased in USA, France, Japan, and Australia but not in UK and Hong Kong.

McKenzie, Brails, Ford and Faff (2001) examined individual share futures in Australia using a threshold ARCH model and found mixed evidence concerning impact of futures on conditional volatility in the spot market. Their results demonstrate that different institutional settings or different sample periods are not the reason for different findings. The authors suggest that trading conditions associated with individual markets (such as liquidity) are the more likely reason for different findings. Their results indicate that markets behave differently depending on the surrounding circumstances. They contend that futures and volatility are unlikely to have a direct link.

Rahman (2001) examined the impact of trading in Dow Jones Industrial Average(DJIA) index futures and options on the conditional volatility of component stocks. He finds that the introduction of index futures and options on the DJIA produced no structural change in the conditional volatility of component stocks.
Singh (2004) analysed the hedging performance of agricultural commodity futures market in terms of price discovery and risk management. He selected six agricultural commodities from among castor seed and pepper futures markets were efficient in risk management. The reasons for the poor hedging in other commodities are low volume of trade, low participation, inadequate warehouse facilities and deficient information system of commodity exchanges.

Singh (2007) investigated the price linkages and hedging efficiency of Soya Oil at three domestic and one international exchange. He used the data from December 2003 to April 2007, and analysed by applying ADF test, PP test, and cointegration between NBOT, NCDEX and MCX. The conclusion of the study is that the arbitrage takes place among three commodity exchanges in India and also the futures price are cointegrated. So arbitrage across commodity exchanges could be responsible for cointegrating relationship among futures prices for soya oil contracts. The domestic exchanges provide relatively less hedging efficiency compared to international exchange CBOT (37-51 percentage & 89 percentage).

Pandey and Kumar (2008) examined the hedging efficiencies of 4 agricultural and 7 non agricultural futures contracts in India. They used the VECM and CCC MGARCH model to estimate the constant and dynamic hedge ratios respectively. They found that the agricultural futures contract provide higher hedge effectiveness(30-70 percentage) as compared to non agricultural futures (20 percentage) and the near month futures provide higher hedging effectiveness the next to near month futures.

Kumar, Singh and Pandey (2008) analysed the hedging effectiveness of Indian stock and commodity futures market. They used dynamic and constant hedge ratio techniques for the study. They conclude that Indian commodity and stock market provide useful risk management instrument (90 percentage) for hedging and for portfolio diversification and it provides a reasonably high level of hedging effectiveness.

Gurbandani and Rao (2009) investigated the relationship between spot and future prices and the volatility among agricultural commodities. They found that the
spot and future prices are closely related and there is no significant volatility in the spot and future prices of these agricultural commodities.

Pravakar and Rajiv (2009) observed that commodity derivative trading provides better risk management and price discovery and the *futures* market do not lead to higher inflation.

Muralidhar and Sailaja (2012) conducted a comparative study on the hedging performance of stock index *futures* and single stock *futures*. They selected five individual stock *futures* of infrastructure and petrochemical industry and three top index *futures* were taken. They conclude that the index derivatives are better than single stock derivatives in managing risk.

Peter (2014) Conducted a study on hedging effectiveness and price discovery of rubber and found that the price discovery is possible and there is bidirectional causality. He conclude that the hedging is efficient (70 percentage) but he does not used the econometrics techniques.