2.1 Introduction

This chapter summarizes the major conclusions and propositions of previous research studies on commodity futures trading. The review of literature is of paramount important in any research as it offers an explanation for the necessity of the current research initiatives. The economic functions and benefits of commodity futures trading are debated in many academic literatures across the world. The review of literature helped the researcher to evaluate various studies relating to awareness about futures trading, benefit of futures trading, economic functions of the futures contract, hedging effectiveness, market microstructure, spread/basis, carrying cost, price stabilization/destabilization, speculation, amendment to FC (R) Act, types of forward contract, failure of futures contract, option trading, relationship between rubber price and crude oil price, rubber plantation management, volatility of the underlying asset price, price discovery. Majority of the Indian literature on futures trading originated after the introduction of futures trading on national level multi commodity exchanges in 2003.
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The review of literature is presented in two parts;

2.2 Studies on Futures Trading in Indian Context
2.3 Studies on Futures Trading in International Context

2.2 Studies on Futures Trading in Indian Context

Pavaskar, M.G., (1976), in his book “Economics of hedging” examined the hedging efficiency of cotton futures market for the period 1953 to 1963 and found that average degree of efficiency for all hedges for one-month and two-months were -0.77 and -0.72 respectively. The average efficiency of one-month hedges remained negative for all the six years, the degree of efficiency varying from -0.15 to – 3.01. In the case of two-month hedges average degree of hedging efficiency was positive during the years.

Somanathan (1993), in his thesis “Commodity and financial futures markets: An economic analysis”, analysed the price spreads, hedging efficiency, price stabilization efficiency and bias index for pepper and sacking for the period 1978 to 1985. He found that the pepper market exhibited a contango 78.5 per cent of the time, there was a decline in contango 60 per cent of all instances, 79.5 per cent of the hedges studied were effective, market exhibited a stabilizing influence 90.1 per cent of the time and for the period as whole the bias index had a value of + 0.76. In the case of sacking, market exhibited a contango 70.9 per cent of the time, there was a decline in contango 47.7 per cent of all instances, 75.3 per cent of the hedges studied were effective, market exhibited a stabilizing influence 72.9 per cent of the time and for the period as whole the bias index had a value of + 0.57.

Thomas, S., and Karande, K., (2001), in their paper ‘Price discovery across multiple spot and futures markets’, analyzed price discovery in India’s
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castor seed market, Ahemedabad and Bombay by using daily closing data on future and spot prices, which spans from May 1985 to December 1999. They found that out of four, three seasonal contracts in Bombay future prices lead the Ahemedabad future prices while the March contract in Ahemedabad future prices lead the former one. Despite having smaller volume, the Bombay dominates the future prices over the Ahemedabad prices for all contracts except the contracts maturing at the time of harvest. The reason is due to the fact that prices of castor seeds are largely driven by the export demand. Since the traders or exporters expose to the port in Bombay, the markets have a lead in getting information that drives prices in the June, September and December contracts. This study shows that markets that trade exactly the same asset, in the same time zone, do react differently to information and also small market may lead the large market.

Kiran Kumar, K., and Chiranjit Mukhopadyay (2002), in their paper “Equity Market Interlinkage: Transmission of volatility – A case study of US and India” an empirical investigation was done to find out the short run dynamic linkages between NSE Nifty in India and NASDAQ Composite in US during the recent 1999-2001 period using intra-daily data, which determine the daytime and overnight returns. They found that the granger causality results indicate unidirectional granger causality running from the US stock markets (both NASDAQ Composite and S & P 500 indices) to the Indian stock market, NSE Nifty index. The volatility spillover effects are significant only from NASDAQ Composite implying that the conditional volatility of Nifty overnight returns is imported from US. They also found that on an average the effect of NASDAQ daytime return volatility shocks on Nifty overnight return volatility is 9.5 per cent and that of Nifty daytime return is a mere 0.5 per cent.
Sahadevan, K.G., (2002), in his paper “Price discovery, return and market conditions: Evidence from commodity futures markets” a quantitative analysis of the relationship between price return, volume, market depth and volatility on a sample of twelve markets in six commodity items over a period of 38 months from January 1999 to August 2001. The result of the study shows that the market volume and depth are not significantly influenced by the return and volatility of futures as well as ready markets. The results also indicate that the futures and ready markets are not integrated. The price volatility in the ready markets does not have any impacts on the market conditions in futures markets. The exchange specific problems like low volume and market depth, lack of participation of trading members and irregular trading activities along with state intervention in many commodity markets are major ills retarding the growth of futures market.

Thenmozhi, M., (2002), in her paper “Futures Trading, Information and Spot Price Volatility of NSE-50 Index Futures Contract” examined the volatility of spot market before and after introduction of the stock index futures. She also examined the lead-lag relationship between stock index futures and spot index returns. In order to estimate the impact of futures trading on the volatility of Nifty, daily closing price returns of NSE-50 Index is considered for the period 15th June 1998 to 26th July 2002. The returns series comprises 1037 observations, of which 503 observations relate to the period prior to the introduction of futures trading and the remaining 534 observations to the period after the introduction of futures trading. In her study, volatility has been measured by computing the standard deviation of the daily returns. The study shows that inception of futures trading has reduced the volatility of spot index returns. She also examined the lead-lag relationship...
between stock index futures and spot index returns. The result shows that futures market leads the spot market.

Raju, M.T., and Karande, K., (2003), “Price Discovery and Volatility on NSE Futures Market”, examined the price discovery between the S & P CNX Nifty and its corresponding futures. Cointegration technique and Error correction model has been employed for examining the objectives. Daily closing values of index futures and BSE 100 index were comprised for June 2000 through October 2002. All the required data information’s were collected from website of NSE. The analysis revealed that the futures market (and not the spot market) responds the deviation from equilibrium and price discovery occurs in the both futures and the spot market.

Shenbagaraman, P., (2003), in her paper “Do Futures and Options trading increase stock market volatility?” investigated the impact of the introduction of derivative trading on cash market volatility using data on stock index futures and options contracts traded on the S & P CNX Nifty (India). The results suggest that futures and options trading have not led to a change in the volatility of the underlying stock index, but the nature of volatility seems to have changed post-futures. She also examined whether greater futures trading activity (volume and open interest) is associated with greater spot market volatility. She couldn’t find any link between trading activity variables in the futures market and spot market volatility.

Kumar, S., and Sunil, B., (2004), in their paper ‘Price discovery and market efficiency: evidence from agricultural future commodities’, investigated the price discovery in six Indian commodity exchanges for five commodities. For their study they have used the daily futures and comparable ready price and also
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engaged the ratio of standard deviations of spot and future rates for empirical testing of ability of futures markets to incorporate information efficiently. Besides, the study has empirically analyzed the efficiency of spot and future markets by employing the Johansen cointegration technique. They found that inability of future market to fully incorporate information and confirmed inefficiency of future market. However, the authors concluded that the Indian agricultural commodities future markets are not yet mature and efficient.

Sudarsanan Pillai, P., (2004), in his book “Plantation Management-A Study of Rubber Plantation Industry in India and Malaysia” describes in detail the different aspect of the management practices in Rubber Plantation Industry in India. The book also describes the organizational set-up, functional areas of management such as production, personnel, industrial relations, marketing and finally a profile of Rubber Small holding and their problems. It also contains a discussion on the structure and management of rubber plantation in Malaysia, the number one producer of natural rubber in the world.

Ahuja Narender, L., (2006), in his paper “Commodity Derivatives Market in India: Development, Regulation and Future Prospects” emphasized that pricing and price risk management should be left to the market forces rather than trying to achieve these through administered price mechanisms. Promotion of free trade and removal of trade barriers are essential for the development of market.

Gupta, K., and Belwinder, S., (2006), in their paper “Price discovery and causality in spot and future markets in India”, examined the price discovery mechanism in the NSE spot and future market. The study used the daily closing values of index future S&P CNX Nifty, from June 2002 to February 2005. By using the techniques like Johansen and VECM, it was empirically
found that there was bilateral causality between the Nifty index and futures. Besides, it was also found that there exists stronger casual relation from Nifty futures to Nifty index as compared to the vice-versa.

IIMB (2006), FMC had commissioned a study by the Indian Institute of Management, Bangalore (IIMB) to study the impact of Futures Trading in some important agricultural commodities. In their paper “Performance of Futures Market and their Impact on Farmers of Wheat, Chana, Sugar, Guar seed, Urad and Tur” IIMB study with regard to gram, sugar, guar-seed, wheat, urad, and tur states that these commodities witnessed higher price increase in the post-exchange period as compared with the pre-exchange period. By and large, it concludes that changes in the fundamentals (mainly supply side) were important in causing the higher post-futures price rise, with government policies also contributing. Therefore, the role of futures trading remains unclear. The IIMB study also found that spot price volatility increased after introduction of futures in case of wheat and urad. However, it does not find any major change in volatility for gram, excepting an abnormal rise in FY 2006-07, or for tur and sugar. In case of guar seed, volatility was in fact found lower after introduction of futures trade. In an interesting extension to this, the study found evidence that increased spot price volatility especially for wheat but also of gram was associated with an increase in seasonality of prices. In case of sugar also, volatility of spot wholesale prices did not increase with introduction of futures. IIMB also conducted a primary survey of farmers, traders, processors to find out extent of awareness of futures trading, use of spot price information, sources of price information, participation in the futures trading and perception on futures market. They conducted the survey taking a sample of 781 Wheat farmers (UP, Gujarat, Haryana, MP, Maharashtra, Punjab,
and Rajasthan), Chana 424 farmers (UP, Maharashtra, MP, and Rajasthan), 384 Tur farmers (Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh), 384 Urad farmers (Andhra Pradesh, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh), 466 Sugarcane farmers (UP, Maharashtra, AP, Punjab, Haryana, Tamil Nadu) and 275 Guar farmers (Gujarat, Haryana, Punjab, Rajasthan). Number of farmers aware of futures trading about Wheat, Chana, Tur, Urad, Sugarcane and Guar are 11(1.4 per cent), 5(1.8 per cent), 6(1.6 per cent), 5(1.3 per cent), 10(2.1 per cent) and 0(0 per cent) respectively. Taking a sample of 30, 57, 47, 45, 30 and 30 for Wheat, Chana, Tur, Urad, Sugarcane and Guar respectively among traders to know the awareness of futures trading and found that 100 per cent wheat traders, 100 per cent Chana traders, 57 per cent Tur traders, 80 per cent Urad traders, 100 per cent Sugarcane traders and 100 per cent Guar traders were aware of it. They also found that 77 per cent Chana traders, 46 per cent Tur traders, 42 per cent Urad traders, 70 per cent Sugarcane traders and 100 per cent Guar were aware of futures trading.

Kedarnath Mukherjee and R. K. Mishra (2006), in their paper “Lead-Lag Relationship between Equities and Stock Index Futures Market and its Variation around Information Release: Empirical Evidence from India” an attempt has been made to investigate the possible lead-lag relationship, both in terms of return and volatility, among the NIFTY spot index and index futures market in India and also to explore the possible changes (if any) in such relationship around the release of different types of information by using intraday data from April to September 2004. Results suggests that though there is a strong contemporaneous and bi-directional relationship among the returns in the spot and futures market, the spot market has been found to play comparatively stronger leading role in disseminating information available to
the market, and therefore said to be more efficient. Apart from this, there is also interdependence (in both direction) and therefore more or less symmetric spillovers among the stock return volatility in the spot and futures market. The results relating to the informational effect on the lead-lag relationship exhibit that though the leading role of the futures market wouldn’t strengthen even for major market-wide information releases, the role of the futures market in the matter of price discovery tends to weakens and sometime disappear after the release of major firm-specific announcements.

Mukherjee and Mishra (2006), in their empirical study “Lead-Lag Relationship Between Equities and Stock Index Futures Market and It’s Variation Around Information Release: Empirical Evidence from India” examined the cointegration, causality and lead-lag relationship between Indian NIFTY and 5 Stock Futures for the period April to Sept. 2004. They found that markets were cointegrated, causality was bidirectional and cash market leads futures market.

Praveen, D.G., and Sudhakara, A., (2006), in their paper “Price discovery and causality in the Indian derivative market”, an attempt has made to study a comparison of price discovery between stock market and the commodity future market. They have taken Nifty future traded on National Stock Exchange (NSE) and gold future on Multi Commodity of India (MCX). The result empirically showed that the one month Nifty future did not have any influence on the spot Nifty, but influenced by future Nifty itself. The casual relationship test in the commodity market showed that gold future price influenced the spot gold price, but not the contrary. So this implies that information is first disseminated in the future market and then later reflected in the spot market. Their study on spot prices of gold during the period of April 2002 to
June 2005 showed that the Indian gold prices volatility is relatively higher than global market and Indian stock market has declined during their study period. It was found that the stock market has well developed spot market due to its presence of national wide stock exchange, which provides the stock market a perfect platform for price discovery while the spot commodity market is far away from this platform because spot gold is not confined to one place.

Sah and Kumar (2006), in their study “Price Discovery in Cash and Futures Market: The Case of S&P Nifty and Nifty Futures” examined the cointegration, causality and lead lag relationship between Indian Nifty Futures and Nifty Index for the period June 2000 to March 2005. They found that markets were cointegrated, causality was bidirectional and cash market leads futures market.

Thomas (2006), in her research “Interdependence and Dynamic Linkages Between S&P CNX Nifty Futures and Spot Market: with Specific Reference to Volatility, Expiration Effects and Price Discovery Mechanism” examined cointegration, causality and lead lag relationship between Indian Nifty Futures and Nifty Index for the period June 2000 to April 2005. She found that markets were cointegrated, causality was bidirectional and cash market leads futures market.

Bhatia (2007), in the paper “Do the S&P CNX Nifty Index and Nifty Futures Really Lead/Lag? Error Correction Model: A Cointegration Approach” examined cointegration and causality of Indian Nifty Futures and Nifty Index taking the price series from April 2005 to March 2006. The result shows that there is long run relationship between Nifty Futures and Nifty Index. It is further found that causality is bidirectional and futures market leads cash market.
Bose (2007), in the paper “Contribution of Indian Index Futures to Price Formation in the Stock Market” examined cointegration and lead and lag relationship between Indian Nifty Futures and Nifty Index for the period March 2002 to Sept. 2006. The study indicated that there is long run relationship between Nifty Futures and Nifty Index. It also found that Nifty Futures Causes Nifty and Futures Market Leads Cash Market.

IIM-LR and MCX (2007), in their report “Potatoes, Mentha Oil, Cardamom Commodity Futures Markets, an Assessment” it is mentioned that farmers are receiving better prices for potatoes, menthe oil, and cardamom since MCX launched futures contracts for these three products. The price transparency that the MCX contracts offer has reduced exploitive practices by brokers and middlemen and eliminated numerous markups in the commodity supply chains.

Kaul, Sanjay (2007), in their study “Commodity Futures Trading in India: Myths and Misconceptions’, conducted an in house study on wheat, maize, sugar, urad and chana to determine the impact of futures trading on price volatility for the commodities in the pre- and post- futures period were compared. It concludes that price volatility in case of these commodities has declined with the advent of futures trading and this is due to increased price discovery. They further found that from empirical study that the introduction of derivatives does not destabilize the underlying market; either there is no effect or there is a decline in volatility. Further, the literature strongly suggests that the introduction of derivatives tends to improve liquidity and information of markets.

Ramaswami Bharat and Jatinder Bir Singh (2007), in their paper “Hedging and the Emergence of Commodity Futures: The Soya Oil Exchange
in India” mentioned that the soya oil futures exchange National Board of Trade (NBOT) at Indore exercise a significant impact on the basis and provide enough short-term volatility to make the contract attractive to both hedgers and speculators.

Sahadevan K.G. (2007), in his study “Advantages of commodity futures trading through electronic trading platform for farmers of Uttar Pradesh: A study of Potato and Mentha” conducted an empirical study choosing three districts each for potato and metha. Three leading potato producing pockets in UP are located in these identified districts. They are Fatehgarh in Farrukhabad district, Sambhal in Moradabad district and Bakshi-ka-Talab and surrounding areas in Lucknow district. Similarly, three major mentha farming entres are identified which are Sambhal in Moradabad district, Sadar in Rampur district and Fatehpur in Barabanki district. The criteria used for selection of sample farmers are the volume of annual production and area under cultivation. He found that the supply and demand for these commodities are large enough to attract many potential futures markets players. As India is a leading producer of both the commodities they have the potential to attract international trading interests in the futures markets. These commodities are well standardized and storable. While mentha oil is high value and low volume commodity which is storable without any special and expensive infrastructure requirements, a large chain of cold storages network in UP is taking care of the storage of potatoes. Private and free markets forces operate in both commodities without monopolistic or government control. The most important among other conditions is their seasonal supply and large price variation between crop season and off season creating large price risks to producers and consumers alike.
Brajesh Kumar, Priyanka Singh and Ajay Pandey (2008), in their paper “Hedging Effectiveness of Constant and Time Varying Hedge Ratio in Indian Stock and Commodity Futures Markets” examined hedging effectiveness of futures contract on a financial asset and commodities in Indian markets. They estimated dynamic and constant hedge ratio for S&P CNX Nifty index futures, Gold futures and Soyabean futures. Various models (OLS, VAR, and VECM) are used to estimate constant hedge ratio. To estimate dynamic hedge ratios, they used VAR-MGARCH. They compared in-sample and out-of-sample performance of these models in reducing portfolio risk. It is found that in most of the cases, VAR-MGARCH model estimates of time varying hedge ratio provide highest variance reduction as compared to hedges based on constant hedge ratio.

Cardinal edge Management Services (2008), in their paper “Enabling farmers to leverage commodity exchanges” conducted a study among 67 member farmers, 23 physical market traders and 60 non-member farmers. By comparing the focus group and control group the following results were obtained. The average price realization of focus group farmers was ₹2541/quintal which is around 3.1 per cent more than the average price realization of ₹2460/quintal of control group farmers. The average price realization of focus group farmers for the year 2007 was ₹2531/quintal which is around 5.9 per cent more than their price realization of ₹2399/quintal in 2006. Around 38 per cent of the overall cotton produce of focus group farmers was sold after the month of November as compared to 27 per cent of the overall cotton produce of control group farmers. Around 38 per cent of the overall cotton produces of focus group farmers in 2007 sold after the month of November as compared to 29 per cent of their overall cotton produce in 2006.
One of the major benefits expressed by the focus group farmers was their better bargaining power with traders due to higher awareness of futures prices and cotton market development. They also found the following benefits of futures market. Market Information Access: The price information displayed by exchange provided a good reference point to assess the spot prices and negotiate with traders/agents. In addition, it created awareness among the farmers to track the market and form an outlook on prices based on the available information. Price discovery process provided them an idea about price movements. The price movement signals assisted them in planning their spot operations effectively. Positions on Exchange: This introduced awareness about new market system among farmers along with a mechanism for locking-in their desired prices. In addition, it provided an essential feature of price signal that assisted them in taking decisions about operations in spot market. During the pilot farmers benefited from price signals from futures market and decided to store their produce for the longer period in the expectation of better realization from spot market. Spot Market Operations: Information access and positions on exchange has assisted farmers in deciding about their physical market operations and store their produce for longer period in the expectation of better price realization. In absence of futures market, farmers try to manage their risk by collecting the information from local mandis and accordingly planning their process. Though, the need of cash, lack of storage options and vagaries of weather may force them to sell their produce without utilizing the benefit of price signals.

Gupta (2008), in his research “Testing the Efficiency of Indian Equity Futures Market” investigated efficiency of Indian Equity Futures Market taking Nifty Futures and 84 Individual Stocks for the period Jan. 2003 to Dec.
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2006. He found that futures and cash markets are cointegrated, causality is bidirectional and cash market leads futures market.

Madhoo Pavaskar (2008), in his article “Demand for Commodity Futures Trading” states that the demand for commodity futures trading is essentially a derived demand – derived from two sets of demand: demand for hedging or risk management on the one hand, and demand for speculation, which implies profiting from accepting price risks, on the other. Both these types of demand emanate from a common source of price risks. Price risks arise from price fluctuations in commodities and their products. Price risks are positively related to price variability. Higher the price variability, higher is the price risks; and conversely, lower are the price variability lower are the price risks. Both hedging and speculative demand are also directly related to price variability in commodities and their products.

Madhoo Pavaskar (2008), in his article “Option Trading in Commodities” mentioned that Options were first traded in Holland through the 16th century by the traders in tulips. In India Cotton was the first commodity to attract option (teji mandi) contract. The Government of Bombay issued an ordinance in September 1939 prohibiting options in cotton. Government of India banned options in other commodities from 1943. Options functions like insurance by paying a premium, buyers can protect themselves against the risks of deteriorating prices, while still remaining able to benefit from improving prices. Options would appear particularly useful for farmers, farmers’ associations, and state trading companies. They are also attractive to speculators, since they provide the possibility of a theoretically unlimited gain for the payment of only a relatively small premium. Options may reduce the pressure on the underlying futures and lower the price volatility in them, resulting in better price discovery in the process.
Ministry of Consumer Affairs, food and Public Distribution Government of India (2008), the Expert Committee to study the impact of futures trading on agro-commodity prices (hereafter called Abhijit Sen Committee) “Report of the Expert Committee to Study the Impact of Futures Trading on Agricultural Commodity Prices” analysed the trend growth of WPI and its volatility for pre-and post - futures period for 21 agro-commodities, both weekly and monthly and being annualized. Both sets of data show that the annual trend growth rate in prices was higher in the post – futures period in 14 commodities (Chana, Pepper, Jeera, Urad, Chillies, Wheat, Sugar, Tur, Raw Cotton, Rubber, Cardamom, Maize, Raw Jute and Rice). All sensitive commodities (food grains and sugar) showed some acceleration in inflation after the start of the futures trading. The remaining 7 commodities (Soy oil, Soy bean, Rape seed / Mustard seed, Potato, Turmeric, Castor seed, and Gur) posted a fall in prices in the post- futures trading. Therefore the impact is adverse in the case of an increase or decrease in prices if there were no corresponding changes in the fundamental factors. The committee observes that inflation in certain sensitive commodities increased after the introduction of futures trading. However, it notes that it does not follow that introduction of futures trading was the cause. A comparative study of daily volatility analysis was conducted for 19 commodities. It was found that volatility was lower in 15 commodities (Potatoes, Turmeric, Chilly, Jeera, Wheat, RM seed, Maize, Urad, Soya bean, Pepper, Guar seed, Soya bean oil, Gur, Rubber, Sugar) during the post-futures period, higher in 3 commodities (Chana, Castor seed, Raw Jute) and remained same for Guar gum. Weekly and monthly price volatility increased in 10 commodities after introduction of futures trading, remained unchanged in two, and declined in 9. Given these conflicting results from daily as against weekly and monthly data,
no strong conclusion can be drawn on whether introduction of futures trade is associated with decrease or increase in spot price volatility.

Ministry of Consumer Affairs, food and Public Distribution Government of India (2008), in their study “Report of the Expert Committee to Study the Impact of Futures Trading on Agricultural Commodity Prices” found that there are cartels in different commodities such as pulses in Akola and Mumbai, gur in Muzaffarnagar and Hapur menthol in Chandausi, guar-seed in Jodhpur, pepper in Kochi; jeera in Unjha, chillies in Guntur and Nizamabad, turmeric in Nizamabad and Sangli, and soya oil in Indore. Traders in these centres command significant control on price determination of these commodities. This segment thrives on benefit from the fragmentation of the spot market and information asymmetry between producers and well-organized traders. Futures trading has eliminated the undue advantage enjoyed by a trading cartel in a fragmented market and make the trading process open.

Naresh V. Deshpande (2008), in his article “Amendment to the Forward Contracts (Regulation) Act, 1952: An Assessment” states that the salient features of the amendments to the FC(R) Act, 1952 are change in the definition of specific delivery contracts, increase in the period of delivery of goods in ready delivery contracts, insertion of a definition of “Futures Contract”, removal of definition of option in goods, provision for registration of brokers, increase in the number of members of the FMC and enhancement of the powers of the FMC for imposing a minimum penalty ranging from ₹1,000 to ₹5,000.

Nilanjan Ghosh (2008), in the paper “The Futuristic Futures: How Gainful Currency Futures in India are to Commodity Market Players?” states that major commodities traded on the national commodity exchanges in India
are mostly either imported or exported. These include crude oil, precious and non-ferrous metals, natural gas, steel, and carbon credits. Importers in these commodities are not only compelled to take positions in futures markets to hedge against international price fluctuations, but often realize a lower margin than expected due to a depreciation of the domestic currency.

Nilanjan Ghosh (2008), in the article “Ruthlessness and Generosity of Markets: Futures as Instrument for Combating Agricultural Price Volatility.” states that in dealing with basis risk and international price volatility some developing countries like Argentina, Brazil, China, Hungary, India, Malaysia, Philippines, Russia, and South Africa have established commodity derivative markets. The success of agro-commodity futures in various other countries in dealing with international price volatility, and in helping local price discovery does prove a case for a developing nation like India to encourage further development of agro-commodity futures. Rather than banning agro-commodities from futures trading, the Government needs to create environments that will be more conducive for futures trading.

Nilanjan Ghosh (2008), in the article “Price Discovery in Commodity Markets: Floated Myths, Flouted Realities” states that in econometric point of view price discovery is cointegration, error correction models, simultaneous equation systems, and seemingly unrelated regression equations. In static sense, price discovery is implied by the existence of equilibrium prices, in dynamic framework price discovery describes how information is produced and transmitted across the markets.

Pradhan Kailash Chandra and Sham Bhat (2008), in their paper “Price Discovery and Causality in the NSE Futures Market” investigated the causal
relationship between the spot and futures on 25 individual securities. The study employed Johansen’s cointegration test and vector error correction model (VECM). The daily closing data is taken from November 9, 2001 to September 29, 2005 for the analysis. The results revealed that futures leads the spot in case of 9 individual securities, spot leads the futures in case of 7 individual securities and the feedback relation takes place between two markets in case of 9 individual securities.

Srinivasan, Sandhya (2008), in her paper “Futures Trading in Agricultural Commodities” explores the effect of the ban of the futures trading in four agricultural commodities – chickpea, potato, rubber and soya oil on 7 May, 2008. She found that, of the four banned commodities, only the price of potato declined after the ban due to the bumper crop. The ban resulted in a huge loss of trading volumes for the futures exchanges, but didn’t impact food prices significantly. Analysts suggested that about ₹300-400 crore of business was affected on a daily basis on NCDEX and NMCE alone, the two largest exchanges for trading in agricultural commodities. The total trading volume for the four commodities in the three national exchanges was valued at ₹15000 crore a month, almost 10 per cent of the total traded volume (estimated at ₹164080 crore a month). The ban also created negative sentiments among market participants and public. Banning futures is an illogical solution because it obstructs the development of a mechanism to regulate unhealthy speculation.

The Institute for Agriculture and Trade Policy (2008),” Commodities Market Speculation: The Risk to Food Security and Agriculture” reported that excessive speculation in agro-commodity markets has played a major role in the rapid rise and fall in global food prices. Commodity index funds create a constant upward pressure on commodity prices. They contributed $1.5 billion
to each of the Morgan Stanley and Goldman Sachs bottom lines in 2008. The IATP report notes that due to high prices, the total food import bill in developing countries increased from about $191 billion in 2006 to $254 billion in 2007.

Ali Jabir (2009), in his paper “Performance of Commodity Markets for Pulses in India: Can Futures Trading Help in Market Efficiency?” analysed the performance of futures market for four major pulses—gram, tur, urad and lentil—for magnitude and direction of spot and futures prices relation by Johansen’s Cointegration and Granger Causality test. Empirical results suggest the existence of a long-term equilibrium relation between futures and spot prices for three commodities, i.e. gram, urad and lentil under the study. Lack of cointegration for tur may be because of partially developed futures commodity exchanges, market manipulation by large traders, and greater market intervention by the government for MSP and procurement.

Archana Kshirsagar (2009), in her article “A tale of organized commodity exchanges” states that the Arthashastra of Kautulya (300 BC) even describes that the price of futures “shall be fixed taking into account the investment, the quantity to be delivered, duty, interest, rent and other expenses.” This description in reality matches the manner in which prices of forward and futures contracts are fixed at present in commodity markets. The Arthashastra even goes further and describes in detail the marketing system as prevalent then, and also the regulatory practices for both domestic trade as well as export-import trade during those times.

Bhuvan Sethi (2009), in the paper “Black Tea: A Peek into the Future” examines the price discovery function of domestic and world current prices from January 2000 to December 2007 using the Granger Causality Test. The
stationarity of the price series were tested using Augmented Dickey Fuller Test. The result shows that world price cause India prices.

Gosh, N., and Purohit, H.K.S., (2009), in their paper “An Indicative Exposition of Two Aspects of Chana Trading in India: Price Volatility – Payoff Dynamics, and Hedge Transfer in Futures Contract” they have reported on hedge transfer mechanisms and net payoffs from the same, under various market conditions for chana. The critical element that emerges from this exercise is that hedge transfer has not really benefited the hedger under conditions of peak arrival time of the pulse at the marketplace, which is during March. On the other hand, such hedge transfers have extensively helped the hedger during the festival season of October-November.

Gosh, N., S., Chakravarty and S.Kumar (2009), in their paper “Volatility and Price Discovery in Indian Wheat Market: Was the Futures Market to Blame?” examined the volatility and price discovery of wheat futures market for the period June 2005 to August 2007. Volatility was identified using GARCH (1,1) equation. They found that volatility was encountered only in such periods when the price rise was arrested, was coincidental with the government’s intervention at controlling the price, and with news of impending imports. They also found indications of information flows the futures market to the product market, and in fact, found instances of reverse flows.

Harish Kumar, Purohit, Bhuvan Sethi, Nilanjan Gosh (2009), in their paper “Price Dynamics of Natural Rubber in India” examines influence of crude oil price on domestic price of natural rubber using a regression equation for the period April 2003 to October 2009. They found that there is a positive relationship between crude oil price and natural rubber price.
Jatinder Bir Singh (2009), in his paper “Pricing Performance and Hedging Effectiveness: Soya Oil Futures Market in India” examined the cointegration among NBOT, NCDEX and MCX soya oil futures. It was found that there is a cointegrating relationship between the NBOT- NCDEX NBOT – MCX and NCDEX-MCX futures prices.

Kapil Gupta and Balwinder Singh (2009), in their paper “Price Discovery and Arbitrage Efficiency of Indian Equity Futures and Cash Markets” investigated the price discovery efficiency and validity of Law of One Price of NIFTY and 50 stocks by using high frequency data available at National Stock Exchange of India. The Johansen Cointegration test results and suggests that both markets are integrated of order one hence, price convergence on contract expiry date does take place, which implies that Indian equity futures and cash markets observe strong and stable long-run relationship. Granger Causality results, which suggests that significant bidirectional relationship (except for Nifty) exists between Indian equity futures and cash markets, however, there is unidirectional Granger Causality between Nifty and Nifty futures. VAR results suggest that the Indian equity futures market significantly lead the Indian cash market where, Nifty futures lead Nifty by five minutes. However, the length of lead-lag relationship between individual stock futures and cash market varies in the range of five to fifty minutes. Out of fifty individual stocks considered in the study, twenty seven individual stock futures lead cash market by five to forty minutes. Whereas, fifteen individual stocks lead individual stock futures by five to fifty five minutes and no lead-lag relationship exists between eight individual stocks and their respective futures contracts.
Madhoo Pavaskar (2009), in his article “Economic functions of futures market” states that risk management and price discovery are the main economic functions of futures market. The process by which price risks are reduced through futures market is known as hedging, or in modern management parlance “risk management” To hedge is to assume a position in futures market equal and opposite to an existing position in the ready or forward market.

Madhoo Pavaskar (2009), in his article “Option Contracts in Commodities” states that the call option and put option in market parlance is known by the name teji and mandi respectively. A put and call in market parlance is called teji-mandi. Hedging through options on the futures contracts has distinct advantage over hedging through direct operation in the futures market. In direct hedging through the futures contracts, the loses on the physical market transactions are, offset by the gain in the futures contracts; similarly, the gain in the physical transactions are lost, either wholly or to a considerable extent, by the loses in the futures contracts. But options enable the market participants to retain the gains, while avoiding the price risks. For, in options they can exercise their right to buy or sell the futures contract, as the case may be, only when the price of such a contract moves to their advantage, and not otherwise. Their loss, if any, is limited to the premium amount only.

Madhoo Pavaskar and Archna Kshirsagar (2009), in their paper “Hedging Efficiency of Copper” assessed the efficiency of copper futures market taking carrying cost or cost of carrying the commodity in storage are conservatively assumed at 2 per cent per month. Out of 294 simulated hedges 257(87.4 per cent) were in favour of short hedges and 37(12.6 per cent) were in favour of long hedges.
Madhoo Pavaskar (2009), in his paper “Market Microstructure: Another perspective” states that the most important element in the market microstructure is, of course, the transaction and other costs of successive marketing services. Market microstructure studies scarcely require serious knowledge of either mathematics or econometrics.

Madhoo Pavaskar (2009), in his article “Contango and Backardation” states that if at any time, the futures price were above the ready price, by an amount more than the carrying costs merchants could make an easy profit by selling forward in the futures market, buying simultaneously the actual commodity in the ready market, and fulfilling the futures contract eventually by delivering the same commodity in that market. On the other hand, if at any time, the futures price were below the ready price, by an amount less than the carrying costs, then it would be profitable for the merchants to sell ready goods, buy futures contracts, and demand actual delivery against them in the month of maturity.

Madhoo Pavaskar (2009), in his article “Theory of Normal Backwardation” states that the theory of normal backwardation is subject to certain qualifications. The proposition that the futures price must fall short of the expected price by the amount of the marginal risk premium \( FP = EP - r \) is only true if the hedgers are sellers in the futures market and not buyer. The theory was developed by Keynes during the period of great depression of 1929, when farm prices slumped suddenly and left most producers in the cold. The situation will be far different in export commodities, where hedgers are mostly exporters buying in the futures to cover their export commitments. The theory may also not be valid in markets where both buying and selling speculators outnumber the hedgers. In such a market, the competition among
the buying speculators may probably reduce or even inverse the risk premium so that the futures price may very well be identical with the expected price, if not above it. The theory was much more severely criticized by Holbrook, Working and Roger Gray.

Madhoo Pavaskar (2009), in his article “Types of Forward Contracts” describes different types of forward contracts. Ready delivery contract, forward contract, specific delivery contract, futures contract, non-transferable specific delivery contract, transferable specific delivery contract, on call contract, unfixed contract and option contract are the different types of forward contracts. Trading in on call and unfixed contracts came to an end after Central Government banned trading in NTSD contracts during 1960s.

Mahalik Mantu Kumar, Debashis Acharya and M. Suresh Babu (2009), in their paper “Price Discovery and Volatility Spillovers in Futures and Spot Commodity Markets: Some Empirical Evidence from India” examined price discovery and volatility spillovers in Indian spot-futures commodity markets by using cointegration, VECM and the bivariate EGARCH model. This study has used four futures and spot indices of Multi-Commodity Exchange (MCX), Mumbai that employs daily data spanning over 12th June 2005 to 31st December 2008. The four indices are MCXCOMDEX, MCXAGRI, MCXENERGY, and MCXMETAL. The above empirical findings reveal that the future commodity markets like LAGRIFP, LENERGYFP and LCOMDEXFP play a dominant role and serve effective price discovery in the spot commodity market but the reverse causality does not exist while metal commodity spot-future markets (LMETALFP & LMETALSP) are not taken into consideration as there is no cointegrating relationship between them. The study claims that volatility spillover exists from futures to spot.
Nilanjan Ghosh (2009), in his paper “Market Microstructure in the Indian Context” states that market microstructure involves the study of the impact of market structure and individual behaviour on the process of exchange in the market. Microstructure research provides a comparison of existing market structures with the performance of alternative market structures. The efficient market hypothesis is challenged by microstructure studies. Microstructure literature can be classified under three components: (1) the actual transaction process, (2) the effects of market structure and trading rules on the transaction process, and (3) the transaction process’ implication for fundamental economic decisions. Research on commodity market microstructure in India owes its origin well back to the 1930s, with research on cotton futures market in Mumbai by Prof.M.L. Dantwala and H.L. Dholakia, In the 1960s, Venkitaraman published his book on the theory of futures trading. At around the same time a host of articles and books came up on the microstructure of commodity derivative markets in India, most of them authored by Pavaskar.

Pavaskar M and Archana Kshirsagar (2009), in their paper” Pricing and Marketing Efficiency in Cotton and Need for Risk Management” they emphasise the need of price hedging through the use of commodity risk management instruments like futures contracts. Cotton prices decline almost as often as they rise notwithstanding the overall rising trend in cotton prices. During the last decade and a half, prices have risen 60 per cent of the times, and have fallen 40 per cent of the times over one-month, two-month periods for all three varieties of cotton. In other words, cotton market functionaries face the risk of price fall as well as price rise. When prices fall, stockists, be they merchants or mills, suffer losses; and when prices raise, exporters as well as those who have sold forward in the domestic markets suffer.
Raveendran, N., Selvam, S., Murugananthi, D., and Padmavathy, P., (2009), in their paper “Transmission of Futures Price to Spot Price: A Study on Indian Pepper” studied the cointegration of the pepper market for the period January 2004 to March 2007 taking data from Cochin market. They used Johansen’s Vector Error Correction Model (VECM) for this study. They concluded that futures prices influence spot prices and not vice versa, proving that price formation process at the spot market is based on futures prices.

Ritu Gupta (2009), in the paper “Cashew: A nut worth a lot” states that in India cashew futures were launched by the leading exchanges NCDEX and MCX. But the contracts have so far evinced little interest from both traders and exporter. Analysis from leading brokerages feels that the exchanges have chosen the wrong product which has been the key reason for the poor performance of the cashew futures trade. For example, since April 2006 not a single trade in cashew futures has taken place on NCDEX. The situation on the MCX platform is similar.

Sahadevan, K.G., (2009), in his paper “Do Farmers Benefit from Futures Trading? A Case Study of Mentha Oil Futures”, a sample survey was carried out among farmers in three major mentha growing districts of U.P., viz. Moradabad, Rampur, and Barabanki, revealed that farmers’ participation in futures market was abysmally low. There are three important reasons for their poor participation, particularly in mentha oil futures market. First, though they are exposed to price risk, the storability of oil without loss of its value saves them from the risk of selling when the price is the lowest during the May-July season. Moreover, not only farmers have the advantage of limited seasonal supply, but its demand too is significantly seasonal. This assures them fairly predictable higher price during November-February when the demand is high.
Second, farmers’ awareness about futures market is poor. Out of the 30 farmers examined, only seven were aware, only two had shown interest in initiating position in futures market, while the others had never taken positions. Finally, a majority of farmers are not able to access futures markets directly because they lack the critical minimum size to fulfill the contract specification. The market lot is prohibitive for them as no pooled investors (aggregators) are currently operating on their behalf.

Chatkrabarti, S., and Nilabja Ghosh (2010), in their research paper “Inter-Temporal Transfer of News and a Possible Asymmetry: Futures Trading in Agro- Commodities” explored the effect of information on futures prices, effect of underlying asset price on futures price and banning of future trading on futures prices with respect to information and volatility. They conducted the study for three agricultural commodities wheat, maize and chana taking nearest month maturity data from NCDEX website for the period 2004 to 2009. The time – series- based GARCH approach was used to study the behavior of price. The lag lengths (memory) are decided using the AKAIKE criterion and the t- statistics. They found that with respect to information futures price movement has a positive pressure on price movement. For wheat and maize spot price has positive impact on futures prices. But for chana the effect is neutral.

Madhoo Pavaskar (2010), in his article “In Search of Risk Premium” states that Holbrook Working, who has done pioneering empirical work in the U.S. on commodity futures trading for over five decades since the mid- 1920s and may well be regarded as the father of economics of commodity derivative markets, has criticized the Keynes-Hicks concept of risk premium and their theory of normal backwardation. Working’s criticism rests mainly on two
distinct logical as well as realistic arguments based on actual hedging practices. According to Working (1977) hedging is essentially a multipurpose concept, and is not necessarily done for avoiding risk of price fluctuations solely. Working distinguishes five kinds of hedging operations. They are anticipatory hedging, operational hedging, carrying charges hedging, risk avoidance hedging and selective hedging.

Madhoo Pavaskar (2010), in his article “Theory of Price Storage” states that according to Working, the backwardation in the futures price is better explained by the theory of price storage than the risk premium payable by hedgers to speculator. The price of storage that determines the relation between spot and futures prices, or between the prices of futures for two different delivery months, of any commodity at any time, could best be described algebraically by the equation \( P = FP - SP \) or \( FP_{t+1} - FP_t \), where \( P \) is the price storage, \( FP \) is the futures price, \( SP \) is the spot price, \( FP_{t+1} \) is the futures price for the distant delivery month contract, and \( FP_t \) is the futures price for the current/near delivery month contract.

Madhoo Pavakar (2010), in his paper “Economics of basis in commodity futures” states that basis is the difference between the spot price and the futures price. Hedging is essentially speculation on the basis; hedging returns depend on changes in the basis over the hedge period. A hedge involves the substitution of the basis risk for the price risk; its economic efficiency depends on the absolute as well as the relative limits of the two risks. The basis in commodity futures mostly works against short hedging, and in favour of long hedging.

Nilanjan Ghosh (2010), in his paper “Does thin commodity futures markets destabilize physical markets?”. Wheat futures markets in India in the
post–ban phase.” examined the mutual dependence of NCDEX wheat futures price and Narela Mandi spot price of wheat for the period May 2009 to March 2010. The Granger Causality test shows that there is no existence of causality between the futures and the physical market price of wheat. Hence, there is no indicative evidence of the physical market players considering the futures prices as reference price for wheat. The volume of trading of wheat futures contract on NCDEX is very small and correlation between spot price and futures price is 0.9343. This degree of correlation is merely reflections of the common market fundamentals, rather than mutual dependence.

Shivakumar, K.M., and Paramasivam,P., (2010), in their paper “Exchange Rates, Energy and Expensive Metal Futures during the Global Economic Crisis” analysed the relation between commodity futures and exchange rates using time series data on daily prices of crude oil futures, gold futures and exchange rates for the rupee-dollar for the period January 2007 to October 2009 sourced from MCX and RBI websites. They found that both exchange rate and crude oil futures experienced bidirectional causality. There was no causality among gold and crude oil futures in the study period. The cointegration analysis revealed that there was a long run relation between the exchange rate and commodity futures. With respect to long run relation crude oil futures were highly affected, but gold futures were not. So it can be observed that during the global commodity crisis, gold futures were performing better.

Sunanda Sen and Mahual Paul (2010), in their paper “Trading in India’s Commodity Futures Markets” an attempt was made to examine the direction of information transmission using Granger Causality test for chana, soya, potato and wheat markets. The result showed that for all the above four
commodities changes in futures prices leading those in spot market. They also opined that, the opening up of futures markets has matched the rising spot prices for a majority of goods. The uptrend in the in the spot market can be interpreted as a fallout of trading of these commodities in the futures markets. For futures to provide “price discovery,” spots should follow movements in the later. The spot price rise was obviously the answer to the lead by futures prices, which are subject to speculation. Thus, with futures prices on the rise, it generated an upward spurt in spot prices; too, leading to the suspicion that speculation in futures trade was behind the rise in spot prices. They also found that future trading also imparts volatility to both the spot and the futures markets. Comparing the monthly variations in spot prices of, rise, wheat, potato, onion, urad, and soya they have found a distinct rise in volatility for 5 out of the 6 sensitive items from January 2003 to December 2006, which were also the months when futures market in these commodities were open. This provides indirect evidence that probably the introduction of futures trade was responsible for wider fluctuations in the spot prices of these commodities.

Vasisht, A.K., (2010), in his paper “Econometric Analysis of Efficiency of Agro- Commodity Futures Market and Price Discovery” explored the efficiency of agro-commodity futures market operations in mitigating price risk and the price discovery function of futures for ensuring better hedge against price uncertainty in pepper, groundnut oil and guar gum. Daily futures and comparable spot price data for four contracts, each for three agro-commodities taken from NCDEX have been used to undertake the econometric study. The results reveal that there is no cointegration between the series in all the 12 samples. The absence of cointegration implies lack of a long-run stable relation between spot and futures prices. This shows the inability of futures
price to be the optimal forecast of the future spot price, and thus it can be concluded that the futures market is not efficient. The ratio of standard deviation of spot and futures were more than 1 for all samples of pepper and ground nut oil. This is indicative of a high level of speculative activity in these commodities.

Ali Jabir and Kriti Bardhan Gupta (2011), in their paper “Efficiency in agricultural commodity futures markets in India: Evidence from cointegration and causality tests” analysed the relationship between spot and futures markets of the commodities wheat, rice, maize, chickpea, black lentil, pepper, castor seed, soybean and sugar taking price series from NCDEX. The researchers used Johansen’s cointegration analysis and Granger causality tests. They found that cointegration exists significantly in futures and spot prices for all the selected agricultural commodities except for wheat and rice. Causality test indicates that futures markets have stronger ability to predict subsequent spot prices for chickpea, castor seed, soybean and sugar as compared to maize, black lentil and pepper, where bi-directional relationships exist in the short run.

Kushangur Dey and Debasish Maitra (2011), in his article “Price discovery and market efficiency revisited: Anecdotes from Indian commodity futures markets” suggests that Augmented Dickey Fuller (ADF) or Philippe-Perron (PP) test can be used for unit root. Garbade – Silver test can be used for estimating convergence and rate of convergence. Causality can be tested using Engle- Granger test. GARCH model will be considered to capture the volatility spillover.

Mukherjee Kedar Nath (2011), in his paper “Impact of Futures Trading on Indian Agricultural Commodity Market” an attempt has made to re-validate
the impact of futures trading on 9 agricultural commodities chana, wheat, chilli, jeera, pepper, mustard seed, castor deed, soya oil, and menthe oil taking daily price information in spot and futures markets, for a period of 7 years (2004 – 2010) from NCDEX. He used Multiple Regression, Vector Auto Regression, Granger Causality Test and GARCH model to analyze the market. The daily volatility figures, both before and after the introduction of futures contract, clearly depicts the fact that the price volatility for most of the selected agricultural commodities were higher during the pre-futures period and have been significantly reduced after being listed in the commodity futures market. In other words, the underlying market has been found to be stabilized, for most of the commodities, after the initiation of futures trading. The results of co-movement or alternatively called lead-lag relationship among the spot and futures markets, suggests that both spot and futures markets would react simultaneously to much of the information. The volatility spillover results are also found to be mixed.

Nilamjan Ghosh and Sarika Ruchuri (2011), in their paper “Impact of tariff regimes on price discovery and spillover effects of Soya Oil futures in India: Some preliminary observation from an econometric analysis” examined the price discovery function of soya oil market of NCDEX for the period July 2005 to January 2011 using Garbade – Silver model. They found that futures market dominated price making prior to April 2008, after April 2008, the spot market has dominated the futures markets.

Peter and Pillai (2011), in their paper “Hedging Efficiency of Short Hedges of a Commodity Futures Market” assessed the hedging efficiency of rubber futures market by considering 12172 short hedges of contracts for 84 successive delivery months, beginning from June 2003 delivery till October
The result showed that in as many as 83 out of 100 hedges in rubber futures, short hedgers; do not in any way benefit from hedging. The losses of the short hedgers in the physical market are not offset, either fully or even partially, by hedging in futures, but whenever the short hedgers made gains in the physical market, these are lost too through in the futures. The market exhibited a bias against short hedging i.e. the market exhibited a bias in favour of long hedging. This confirms the theory of inherent bias.

Peter and Pillai (2011), in their paper “Impact of Commodity Futures on Volatility of Underlying Asset Price” compared the spot price volatility of Indian Rubber for two periods. Spot price volatility during two different environments, i.e. spot price when there was futures’ trading and spot price when the futures trading was suspended are compared. Spot price volatility of international rubber price for the above two periods was also compared. The result showed that spot market volatility of Indian rubber was decreased when futures trading in rubber was suspended and spot market volatility increased when there was futures trading. The increased volatility was due to speculative activity as a result of mismatch between demand and supply.

2.3 Studies on Futures Trading in International Context

Nathan Associates, (1974), in the paper “Review of Initial Trading Experience at the Chicago Board Options Exchange” studied the impact of listing options on the Chicago Board of Exchange. He reported that the introduction of options seemed to have helped stabilize trading in the underlying stocks. This was the first study to determine the stabilization/destabilization effect. This result has been supported by Skinner (1989) and also by other authors for the UK, Canada, Switzerland and Sweden.
Cox, C., (1976), in his study “Futures Trading and Market Information” found that futures trading can alter the available information and thus spot market volatility for two reasons. First, futures attract additional traders to a market. Second, as transaction costs in the futures market are lower than those in the spot market, new information may be transmitted to the futures market more quickly.

Danthine, J., (1978), in his study, “Information, futures prices, and stabilizing speculation” argues that the futures markets improve market depth and reduce volatility.

Edwards, Franklin, R., Edwards (1988 a), in his paper “Does Futures trading increase stock market volatility?” verified the fact that stock index futures trading has destabilized the spot market in the long run. Using variance ratio F tests from June 1973 to May 1987, he concludes that the introduction of futures trading has not induced a change in the volatility in the long run. He observes that there is some evidence of futures-induced short-run volatility, particularly on futures contract expiration days, but this volatility does not appear to carry over to longer periods of time.

Harris, L. H., (1989), in his paper “The October 1987 S&P 500 stock-futures basis” observed increased volatility after the introduction of index futures by comparing daily return volatilities during the pre-futures (1975-1982) and post-futures (1982-1987) between S&P 500 and a non S&P 500 group of stocks controlling for differences in firm attributes (beta, price-level, size and trading frequency). He noted that increase in volatility is a common phenomenon in different markets and index futures by themselves may not bear the sole responsibility. He pointed out other index-related instruments and
developments such as growth in index funds and increase in foreign ownership of equity as possible explanations of higher volatility in stock markets.

Ross, S.A., (1989), in his paper “Information and volatility: The no-arbitrage martingale approach to timing and resolution irrelevancy” noticed that the volatility of the asset price will increase as the rate of information flow increases. Thus, if futures increase the flow of information, then in the absence of arbitrage opportunity, the volatility of the spot price must change.

Herbst, Anthony F. and Edwin D.Maberly, (1990), in their paper “Stock Index futures, expiration day volatility and the “special” showed that expiration day volatility of the stock index futures and the "special" Friday opening. Volatility is measured by the standard deviation of returns. It is seen that there is a fall in the triple witching hour due to change in settlement procedure from the third Friday to preceding Thursday.

Chin Kalok, Chan, K.C. and Karolyi, G.A., (1991), in their study “Intraday Volatility in the Stock Market and Stock Index Futures Markets” investigated the intraday relationship among price changes and volatility of price changes in the stock index and stock index futures markets. They have found the stronger interdependence in both the directions in the volatility of price changes between the cash and the futures markets than that observed in case of price changes only. Their evidence supported that the price innovations originate in one market, e.g. cash (futures) market, can predict the future volatility in the other, such as futures (cash), market. In other words, both cash and futures markets serve important role in discovering the price.

Hodgson, A, Nicholls, D., (1991), in their research paper “The impact of index futures on Australian share-market volatility” studied the impact of All
Ordinaries Share Index (AOI) futures on the Associated Australian Stock Exchanges over the All Ordinaries Share Index. The study spans for a period of six years from 1981 to 1987. Standard deviation of daily and weekly returns is estimated to measure the change in volatilities of the underlying index. The results indicate that the introduction of futures and options trading has not affected the long-term volatility.

Bessembinder, H., and Seguin, P.J., (1992), in their paper “Futures trading activity and stock price volatility” examined whether greater futures trading activity (volume and open interest) is associated with greater equity volatility. Their findings are consistent with the theories predicting that active futures markets enhance the liquidity and depth of the equity markets. They provide additional evidence suggesting that active futures markets are associated with decreased rather than increased volatility.

Kamara, A., Miller, T., and Siegel, A., (1992), in their study “The effects of futures trading on the stability of the S&P 500 returns” noticed the stability of S&P 500 index returns with the introduction of S&P 500 index futures. They also assess the change in the volatility of S&P 500 index due to the introduction of futures trading for the period 1976 to 1987. The changes in the volatilities are examined using parametric and nonparametric tests. Apart from F-tests, Kolmogorov-Smirnov two-sample test and Wilcoxon Rank sum test are used to find out if the dispersion is significantly high in the post-futures period. The results show that the daily returns volatility is higher in the post futures period while the monthly returns remain unchanged. He concludes that increase in volatility of daily return in the post-futures period is necessarily not related to the inception of futures trading.
Hamao, Y., Masulis, R., and Ng, V. (1994), in their study “Correlations in Price Changes and Volatility across International Stock Markets,” investigated the short-run interdependence of prices and price volatility across three major international stock markets namely, the Tokyo, London and New York with daytime and overnight returns data. Their analysis utilizes a Two-stage GARCH model, where in the first stage they extract the unexpected shocks from the daytime returns of one market and use it as a proxy for volatility surprise while modeling the other market’s overnight returns in the second stage GARCH model. They found that cross-market interdependence in returns and volatilities is generally bi-directional between the New York and Tokyo markets particularly after 1987 crash. So far very few studies have examined the co-movement of Indian stock market with foreign markets.

Lamoureux, Christopher G. and Sunil, K., Panikkath, (1994), in their study “Variations in Stock Returns: symmetries and other patterns, working paper” found that the direction of the volatility effect is not consistent over time. After 1987, the residual variance of both optioned stocks and stocks in a matched control group increased at the time of the option listing. This might be interpreted in two ways; viz. perhaps the listing has no true impact on volatility and there is some common unknown factor that is driving the magnitude of the idiosyncratic risk for different stocks. Or perhaps, there are spillover effects associated with listing options for some stocks, such that the dynamics of other stocks also changes.

Antoniou, Antonios, and Phil Holmes (1995), in their paper “Futures trading, information and spot price volatility: evidence for the FTSE -100 stock index futures contract using GARCH” studied the relationship between information and volatility in FTSE-100 index in the U.K. using GARCH
technique. They found that introduction of FTSE-100 index futures has changed volatility in the spot market, they attribute this to better and faster dissemination of information flow due to trading in stock index futures.

Darrat, A.F., and Rahman, S., (1995), in their paper “Has futures trading activity caused stock price volatility?” studied if futures trading activity has caused stock price volatility. The study is conducted on S&P 500 index futures for a period of 1982 - 1991. The study also examines the influence of macro-economic variables such as inflation, term structure rates on the volatility of the S&P 500 stock returns. Granger causality tests are applied to assess the impact on stock price volatility due to futures trading and other relevant macro-economic variables. The results indicate that the futures trading have not caused any jump volatility.

Gregory, K., and Michael, T., (1996), in their paper “Temporal relationships and dynamic interactions between spot and futures stock markets” examined how volatility of S&P 500 index futures affects the S&P 500 index volatility. The study also examined the effect of good and bad news on the spot market volatility. The change in the correlation between the index and futures before and after October 1987 crash is also examined. Volatility is estimated by EGARCH model. It is shown that the bad news increases the volatility than the good news and the degree of asymmetry is much higher for the futures market. The correlation between the S&P 500 index futures and S&P500 index declined during the October 1987 crash.

Danish, Norwegian, Swedish, and Finnish stock markets for the period 2 May 1988 to 30 June 1994 by employing the multivariate EGARCH model. They found that volatility transmission was asymmetric, spillovers being more pronounced for bad than good news. Significant price and volatility spillovers exist but they are few in number.

Wei, P., Poon, P.S., and Zee, S., (1997), in their paper “The effect of option listing on bid-ask spreads, Price volatility and trading activity of the underlying OTC stocks” reported an increase in volatility for options on OTC stocks in the USA. However no consensus result emerges, which probably a result of different data and time-periods studied, as also the inherent endogenously of the option listing decision.

Bollen et.al (1998), in their paper “A note on the impact of options on stock return volatility, Journal of Banking and Finance” found that the direction of the volatility effect is not consistent over time.

Chatrath, A., and Song, F., (1998), in their paper “Information and Volatility in Futures and Spot Markets: The Case of Japanese Yen” investigated the intraday behavior of the spot and futures market following the release of information and also investigated the role of such information in the volatility spill over among the two markets. Their results have supported that one market leading to greater volatility in the other is partly driven by information and therefore the leading role played by the futures market may be the result of new information efficiently reflected in the futures market.

Mayhew Stewart (2000), in their paper “The Impact of Derivatives on Cash Markets: What have we learned?” found that futures trading is associated with increased volatility in the United States and Japan. In some countries,
there is no robust, significant effect, and in many others, volatility is lower after futures have been introduced.

Georgi Geogiev (2001), in his paper “Benefits of Commodity Investment”, shown that direct commodity investment can provide significant portfolio diversification benefits beyond those available from commodity based stock and bond investment. These benefits stem from the unique exposure of commodities to market forces such as unexpected inflation and positive return in futures-based commodity investment in periods of high volatility.

Gilgert, C.L., (2004), in the paper “Trends and Volatility in Agricultural Commodity Prices”, examined the volatility of 21 agro-commodity prices over the period of 1960 – 2002 and shows that volatility was high in many commodities but on the whole the negative trend was prevalent for all commodities averaging around 2 per cent. Among them volatility of coconut oil, groundnut oil, maize, rice, soya bean oil, sugar, cotton, jute, palm oil, rubber, soya bean and wheat were found to be -2.76 per cent, -1.56 per cent, -2.22 per cent, -2.54 per cent, -2.36 per cent, -2.57 per cent, -1.96 per cent, -3.56 per cent, -2.50 per cent, -2.51 per cent, -2.04 per cent and -1.41 per cent respectively.

Fu, L.Q., and Qing, Z.J., (2006), in their paper “Price discovery and volatility spillovers: Evidence from Chinese spot-futures markets” examined the price discovery process and volatility spillovers in Chinese spot-futures markets through Johansen cointegration, VECM and bivariate EGARCH model. The empirical results indicated that the models provided evidence to support the long-term equilibrium relationships and significant bidirectional information flows between spot and futures markets in China, with futures
being dominant. Although innovations in one market could predict the futures volatility in another market, the volatility spillovers from futures to spot were more significant than the other way round.

Finnerty, J.E., and Park, H.Y., (1987), in their research paper “Stock Index Futures: Does the Tail Wag the Dog? A Technical Note,” noticed a significant lead-lag relationship between futures and spot prices of S&P 500 and Value Line futures lead the spot index between 0 to 16 minutes.

Kawaller et al., (1987), in their study “The Temporal Price Relationship Between S&P 500 Futures and the S&P 500 Index” an attempt was made to examine the cointegration and lead lag relationship between US S&P 500 Futures and S&P 500 Index for the period Jan. 1984- Dec. 1985. They found that markets were cointegrated, futures market leads cash market.

Protopapadakis and Stoll (1983), in their research paper “Spot and Futures Prices and the Law of One Price” examined the cointegration and causality between futures and cash commodity markets of Silver, Copper, Tin, Lead, Zinc, Coffee, Sugar, Soybean Meal, wheat and Rubber of U.S.A for a very long period from 1972 to 1980. They found that markets were cointegrated and causality was bidirectional.

Witt, H. J., Schroeder, T. C., and Hayenga. M. L., (1986), in their paper “A Comparison of Analytical Approaches for Estimating Hedge Ratios for Agricultural Commodities.” illustrated the difference among the alternate hedge ratio estimation approaches. Each was estimated by using the same data to estimate cross- hedging relationships between barley and sorghum cash prices and nearby corn futures prices. The prices of Minneapolis barley (No.3) and Kansas City sorghum (No.2) are Thursday closing prices reported by the U.S
Department of agriculture. It was found that optimal hedge ratios generated by price–level regressions are statistically correct as those by the other procedures.


Harris, C., (1989), in his paper “The October 1987 S&P 500 Stock-Futures Basis”, examined the relationship between S&P 500 index and futures during the October 1987 stock market crash using five-minute data. A correlation technique and weighted least squares (WLS) model have been employed for examining the objective of the study. The analysis revealed that the S&P 500 cash index displayed more autocorrelation that the futures and the futures market lead the spot market.

Stoll, H.R., and Whaley, R.E., (1990), in their paper “Program trading and expiration day effects” used ARIMA model and ordinary least squares to estimate the lead-lag between S&P 500 index futures, Major Market Index futures and the underlying spot market. The results indicated that S&P 500 and Major Market Index futures lead the cash market by 10 minutes and they attribute this to faster dissemination of information into futures market.

Lai and Lai (1991), in their paper “A Cointegration Test for Market Efficiency” examined the cointegration of USD, BP, DM, SF, CD and JY of U.S.A., U.K., Germany, France, Canadian and Japan respectively for the period July 1973 to Dec. 1989. It was found out that the markets were cointegrated.
Schawrz, T.V., and Francis, E.L., (1991), in their paper “Dynamic efficiency and price leadership in stock index cash and futures markets” examined the price leadership of index futures over the spot market and test the dynamic efficiency of index futures as a price discovery vehicle. They used Garbade & Silber model to quantify the price discovery function of the futures market. The study is done on the Major Market Index for the sample period 1985 to 1988. The results show that the spot and futures are integrated such that average mispricing leading to arbitrage is eliminated within one to seven days.

Chan (1992), in the paper “A Further Analysis of the Lead-Lag Relationship Between the Cash Market and Stock Index Futures Market” examined the lead and lag relationship among US S&P500 Futures and S&P 500 Index MMI Futures and MMI Index and 20 Stock Futures taking the price series between Aug. 1984 to June 1985 and Jan. n1987 to Sept. 1987. The study said that causality is bidirectional and futures market leads cash market.

Chan, Kalok, (1992), in his paper “A further analysis of the lead-lag relationship between the cash market and stock index futures market” calculated the lead-lag relation between Major Market Index and Major Market Index futures under conditions of good and bad news, different trading intensities and under varying market wide movements. ARMA models are used for his study. It is seen that the futures market leads the spot again attributed to faster information processing by the futures market. However, under bad news it is the cash index that leads over the futures market while, there is no effect on the lead-lag relation during different trading intensities.

examined the causal relationship between stock index futures and cash index prices in Hong Kong, which revealed that futures prices cause cash index prices to change in the pre-crash period but not vice versa. In the post-crash period, they found that bi-directional causality existed between the two variables.

James, T.W., (1993), in his paper “How price discovery by futures impacts the cash market” examined the impact of price discovery by futures market on the cash market volatility. The study is conducted using Garbade and Silber model to estimate the price discovery function of the futures market. The results affirm that futures market is beneficial with respect to cash market as it offers better efficiency, liquidity and also lowers the long-term volatility of the spot market.

Jegadeesh, Narasimhan, and Avanidhar Subrahmanyam, (1993), in their study “Liquidity effects of the introduction of the S&P 500 index futures contracts on the underlying stocks” compared the spread in NYSE before and after the introduction of futures on S&P 500 index as volatility can also be measured in terms of individual stock bid-ask spread. They found that average spread has increased subsequent to the introduction of futures trading. When they repeat their test by controlling for factors like price, return variance, and volume of trade, they still find higher spreads during the post-futures period. They also found that introduction of index futures did not reduce spreads in the spot market, and there is weak evidence that spreads might have increased in the post futures period.

Wahab and Lashgari (1993), in their study “Price Dynamics and Error Correction in Stock Index and Stock Index Futures Markets: A Cointegration
Approach” studied cointegration, causality and lead lag relationship between FTSE100- FTSE100 Futures and S&P 500-S&P 500 Futures of U.K. and U.S.A for the period Jan. 1988 to May 1992. They found that the markets were cointegrated, causality was bidirectional and cash market leads futures market.

Hong Choi and Subrahmanyam, A., (1994), in their paper “Using intraday data to test for effects of index futures on the underlying stock markets” studied the impact of futures trading on the volatility and liquidity (as measured by bid-ask spread) of the spot market. Intraday data of S&P 500 and Major Market Index is used for a period of one year. The results indicate that the average intraday day bid-ask spread in post Major Market Index futures has increased while there is no significant change in the volatility. The trading volume has registered a rise in both S&P 500 and Major Market Index. Information asymmetry also has posted an increase due the introduction of futures trading.

Abhyankar, A.H., (1995), in his paper “Return and volatility dynamics in the FT-SE 100 stock index and stock index futures markets” studied the lead-lag relationship between hourly returns in the FT-SE 100 stock index futures and the underlying cash index using hourly data for the period 1986 - 1990. They test the lead-lag relation for periods of differential transactional costs, good and bad news (measured by the size of returns), spot volume and spot volatility. The results revealed that the futures lead of the spot index. It was found that the futures lead over spot was insensitive to variations is spot transaction volume. An AR (2) - EGARCH (1,1) model was then fitted to spot and futures returns to give a time series of estimated volatilities, and it was observed that during periods of high volatility, futures markets led spot market returns.
Chatrath, A., Kamath, R., Chakornpipat, R., and Ramchander, S., (1995), in their paper “Lead-lag associations between option trading and cash market volatility” found that S&P 100 stock index options trading had a stabilizing effect on the underlying stock index. Studies of volatility effects of individual equity options have also reported mixed results.

Martikainen et al., (1995), in their paper “On The Dynamics of Stock Index Futures and Individual Stock Returns” examined the cointegration and lead-lag relationship between RCAS, RFUT and 22 Individual Stock and Futures Contracts on Same Stocks of Finland for the period Jan. 1989 to Dec. 1990. The study revealed that markets were cointegrated, causality was bidirectional and futures market leads cash market.

Teppo, M., Jukka, P., and Vesa, P., (1995), in their research study “On the dynamics of stock index futures and individual stock returns,” examined the two-way causality between the Finnish stock index futures and the stock index for a period of one year from 1989 - 1990. Granger Causality tests are applied on the daily returns due to non-availability of intra-day data. The results indicate that the futures market provides predictive information for both frequent and infrequently traded stocks while the reverse causality is found to be weak.

Tse, Y.K., (1995), in his paper “Lead-Lag relationship between spot index and futures price of Nikkei stock average” studied the behaviour of prices in the Nikkei index and the corresponding SIMEX traded futures contract and found that lagged changes of the futures price affect the short-term adjustments of the futures price.

Arshanapalli and Doukas (1997), in their study “The Linkages of S&P 500 Stock Index and S&P 500 Stock Index Futures Prices during October 1987”
investigated the information transmission between S&P500 Futures and S&P500 Index of USA, taking the price series during October 1987. The result shows that there exists long run relationship and bidirectional causality between futures market and futures market. It was also found that futures market leads cash market.

Abhyankar, A., (1998), in his study “Linear and nonlinear Granger causality: evidence from the UK stock index futures market” examined the relationship using 5-minute returns by regressing spot returns on lagged spot and futures returns, and futures returns on lagged spot and futures returns using EGARCH. It was found that the futures returns led the spot returns by 15 - 20 minutes.

De Jong, F., and Donders, M.W.M., (1998), in their study “Intraday Lead-Lag Relationship between the Futures, Options and Stock Market” found that even in the presence of significant contemporaneous correlation among the spot, futures and the options market, the futures price changes lead both the changes in the cash index and index option by five to ten minutes. But, among the cash and the options market, the relations are largely symmetrical and neither market consistently leads the other.

Jong and Donders (1998), in their paper “Intraday Lead-Lag Relationships between the Futures, Options and Stock Market” examined the lead-lag relationships between European AEX Index Futures, AEX Index Options and AEX Index for the period Jan. to July 1992 and Jan. to June 1993. They found that there is unidirectional causality from futures to options and cash and bidirectional causality for Options and Cash. They also found that futures leads options and cash and no lead lag between options and cash.
Pizzi et al., (1998), in their paper “An Examination of the Relationship Between Stock Index Cash and Futures Markets: A Cointegration Approach” an attempt was made to study the cointegration, causality and lead lag relationship between US S&P 500 and S&P 500 Futures for the period Jan. 1987 to Mar. 1987. They noticed that markets were cointegrated, causality was bidirectional and futures market leads cash market.

Yoshie Saito Lord and Steven C. Turner (1998), in their paper “Basis risk for Rice” examined the relationship between basis risk and cross-hedging hedging – ratios using rice. The risk was modeled by using auto correlated cash prices and basis. The result suggests that incorporating prior basis information improves hedge ratio calculation under minimum variance criterion. They also found that basis risk is a decreasing function of information about certainty on production. The cross- hedging between rough rice futures contract and medium-grain rice was found to be ineffective.

Booth et al., (1999), in their study “Price Discovery in the German Equity Index Derivatives Markets” examined the price discovery function of German FDAX, ODAX and DAX taking the price series from Jan. 1992 to Dec.1994. The study found that there is cointegration among the price series. It was also found that there is unidirectional causality from futures to options and cash. There is also bidirectional causality for Options and Cash. The result of the lead lag relationship showed that futures leads options and cash and no lead lag between options and cash.

Min and Najand (1999), in their paper “A Further Investigation of the Lead-Lag Relationship Between The Spot Market and Stock Index Futures: Early Evidence from Korea” studied the cointegration and lead-lag relationship
between Korean KOSPI200 Futures and KOSPI200 Index for the period May 1996 to Oct. 1996. It was found that markets were cointegrated, causality was bidirectional and futures market leads cash market.

Tse (1999), in the paper “Price Discovery and Volatility Spillovers in the DJIA Index and Futures Markets” examined the cointegration, causality and lead lag relationship between US DJIA Futures and DJIA Index for the period Nov. 1997 to April 1998. The result was that the markets were cointegrated, causality was bidirectional and futures market leads cash market.

Turkington, J., and Walsh, D., (1999), in their study “Price discovery and Causality in the Australian Share Price index Futures Market”, examined the high frequency causal relationship between Shares Prices Index (SPI) futures and the All-Ordiaries Index (AOI) in Australia. The empirical analysis was evaluated by using the cost-of-carry model, ARMA (p,q), Bivariate VEC,VAR models and impulse response functions. The study found that SPI futures and the spot AOI index are integrated. It showed a strong evidence of bi-directional causality between the two series.

Frino A. et al. (2000), in their paper “The Lead-Lag Relationship between Equities and Stock Index Futures Markets around Information Releases” investigated the temporal relationship among the spot and the futures market around the release of different types of information. They have found that the lead of the futures market strengthens significantly around the release of macroeconomic information, while, the leading role of the futures market weakens around stock-specific information release. Therefore, according to them the disintegration in the relationship between the two markets is mainly driven by noise associated with trading activity around the release of different types of information.
Frino et al. (2000), in their study “The Lead-Lag Relationship between Equities and Stock Index Futures Markets around Information Releases” examined Lead-Lag Relationship between Australian AOI and SPI for the period Aug. 1995 to Dec. 1996. They found that markets are cointegrated and causality is bidirectional and Futures Market Leads Cash Market.

Chan and Lien (2001), in their paper “Cash Settlement and Price Discovery in Futures Markets” studied cointegration and lead and lag relationship between Feeder Cattle and Live/Lean Hog Futures and Spot Markets of US commodity market taking prices from Sept. 1977 to Dec. 1998. The study revealed that causality is bidirectional, cash market leads futures market and there is cointegration between the markets.

Chris, B., Alistar, G.H., and Stuart, T., (2001), in their paper “A trading strategy based on the lead-lag relationship between the spot index and future contracts for the FTSE 100”, examined to estimate the lead-lag relation between the FTSE 100 stock index futures and the FTSE 100 index. Cointegration and error correction model, ARMA model and vector auto regressive model have been employed to examine the objectives of the study. The result indicate that futures lead the spot market attributable to faster flow of information into the futures market mainly due to lower transaction costs.

Theobald and Yallup (2001), in their study “Mean Reversion and Basis Dynamics” examined the cointegration, causality and lead lag relationship between U.K. FTSE100 Futures and FTSE100 Index for the period Jan. 1999 to Dec. 1999. They found that those markets were cointegrated, causality was bidirectional and futures market leads cash market.
Chen et al. (2002), in their study “A Comparison of Hedge Effectiveness and Price Discovery Between TAIFEX TAIEX Index Futures and SGX MSCI Taiwan Index Futures” an attempt is made to find out the cointegration and lead and lag relationship between TAIFEXTAIEX- TAIEX and SGXMSCIb-MSCIb taking price series from July 1998 to July 2000. The study found that there is cointegration between the markets, causality is bidirectional and SGXMSCIb leads both TAIFEXTAIEX-TAIEX

Moosa, I.A., (2002), in his paper “Price discovery and risk transfer in the crude oil futures markets: some structural time series evidence” examined the price discovery function of crude oil future market using Garbade and Silber model using the daily data of spot and one-month future prices of WTI crude oil covering from 2 January 1985 to July 1996. He found that sixty percent of the price discovery function is performed in future market. The result also showed a fairly elastic supply of arbitrage service. This study shows that Garbade and Silber model is more suitable for description of intraday behaviour of spot and future prices.

Monoyios and Sarno (2002), in their paper “Mean Reversion in Stock Index Futures Markets: A Nonlinear Analysis” examined cointegration and lead-lag relationship between S&P 500 and FTSE 100 Futures U.S.A. and U.K. for the period Jan. 1988 to Dec. 1998. The result revealed that markets were coe integrated, causality was bidirectional and futures market leads cash market.

Sheng-Syan Chen, Cheng-few Lee and Keshab Shrestha (2002), in their paper “Futures hedge ratios: a review” reviewed different theoretical approaches to the optimal futures hedge ratios. These approaches are based on minimum
variance, mean-variance, expected utility, mean extended-Gini coefficient, as well as semi variance. Under minimum variance hedge ratio different static hedge ratios are MV hedge ratio, Optimum mean-variance hedge ratio, Sharpe hedge ratio, Maximum expected utility hedge ratio, Minimum MEG coefficient hedge ratio, Optimum mean-MEG hedge ratio, Minimum GSV hedge ratio and Maximum mean-GSV hedge ratio. Various ways of estimating these hedge ratios are also discussed, ranging from simple ordinary least squares to complicated heteroscedastic cointegration methods. Under martingale and joint-normality conditions, different hedge ratios are the same as the minimum variance hedge ratio. Otherwise, the optimal hedge ratios based on the different approaches are different and there is no single optimal hedge ratio that is distinctly superior to the remaining ones.

Beaulieu et al. (2003), in the paper “Does Tick Size Influence Price Discovery? Evidence from the Toronto Stock Exchange” studied cointegration between TSE35 Index Futures and TSE35 Index of Canada, taking the price series from Aug. 1991 to Oct.1991. The result shows that there is long run relationship between TSE35 Index Futures and TSE35 Index. They also found that and futures market leads cash market.

Burak Cerrahoglu and Barsendu Mukherjee (2003), in their paper “The benefits of commodity investment” described the benefits of investment in commodities. They analysed monthly returns for a series of stock, bond, commodity, and hedge fund indices for the time period from January 1900 through December 2002. Data was obtained for each of the indices and relevant sub indices (GSCI), as well as the Standard and Poor’s 500 and MSCI World Stock Indices, the Lehman Brothers etc. They found that commodity
investment is a shield against inflation. Commodities provide a positive return while other asset classes decrease in value during inflation.

Kavussanos, M., and Nomikos, N.K., (2003), “Price Discovery, Causality and Forecasting in the Freight Futures Market”, investigated the casual relationship between futures and spot prices in the freight futures markets employing the Vector Error Correction Model (VECM) and General Impulse Response(GIR). The study compared the forecasting performance of the VECM with that of Vector Auto Regressive (VAR), Auto Regressive Integrated Moving Average (ARIMA) and Random Walk (RW) models. The results found that futures price tend to discover new information more rapidly than spot prices and information from the futures prices can be used to generate more accurate forecasts of the spot prices.

Lien et al. (2003), in their study “Structural Change and Lead-Lag Relationship Between the NIKKEI Spot Index and Futures Price: A Genetic Programming Approach” examined the cointegration and Lead-Lag Relationship Between the NIKKEI Spot Index and Futures Price of Singapore for the period Sept. 1995 to Dec. 1999. They found that markets were cointegrated, causality is bidirectional and Cash Market Leads Futures Market.

Lin et al. (2003), in their paper “An Application of Threshold Cointegration to Taiwan Stock Index Futures and Spot Markets” studied the cointegration and lead-lag relationship between the Taiwan TAIFEXTAIEX and TAIX for the period Jan. 1999 to Mar. 2000. They found that the markets were not cointegrated, causality was bidirectional and cash market leads futures market.

Chan et al. (2004), in their empirical study “Do Different Futures Contract in One Stock Exchange Have the Same Price Discovery Capability?”
Empirical Study of Taiwan Futures Exchange” an attempt is made to find out the cointegration and lead and lag relationship between Taiwan TAIFEX, Mini-TAIEX, TE and TBI taking price series from Oct. 2001 to Mar. 2002. They found that there is cointegration between the markets, causality is bidirectional and futures market leads cash market.

Covrig et al. (2004), in their paper “The Contribution of a Satellite Market to Price Discovery: Evidence from the Singapore Exchange” investigated the cointegration and lead and lag relationship between Japan and Singapore Nikkei 225 Futures and Nikkei 225 Index for the period Mar. 2000 to June 2000. The result indicated that there is cointegration between the markets, causality is bidirectional and futures market leads cash market.

Gray Gorton; K., Geert Rouwenhorst (2004), in their paper “Facts and Fantasies about Commodity Futures” pointed out that as inflation accelerates beyond a point, stocks and bonds tend to dip, following the consequent increase in input and labour costs on the one hand, and the inelastic output prices, owing to the reduction in demand flowing from inflation on the other, resulting eventually in the decline in corporate profits. Commodity futures or derivatives, in contrast, are positively correlated with inflation. When inflation rises, prices of commodities and their derivatives tend to rise as well.

Ibrahim Bamba and Leigh Maynard (2004), in their paper “Hedging-Effectiveness of Milk Futures Using Value-At-Risk Procedures” tested the effectiveness of the Class III Milk futures market in terms of the reduction in Value-at-Risk (VaR) for milk producers located in four regions: Wisconsin, Northeast, Florida and California. Constant hedge ratios are estimated using Myers and Thompson’s generalized conditional hedge ratio technique, and
time-varying hedge ratios are estimated using an exponentially weighted moving average method. The results suggest that uniform hedging strategies can reduce substantially the VaR of milk cash price for appropriately chosen hedge length and hedge signals.

Kenourgios (2004), in the paper “Price Discovery in the Athens Derivatives Exchange: Evidence for the FTSE/ASE-20 Futures Market” studied cointegration, causality and lead lag relationship between FTSE/ASE-20 Futures and FTSE/ASE-20 Index of Athens for the period Aug. 1999 to June 2002. The researcher found that markets are cointegrated, causality is bidirectional and futures market leads cash market.

Pattarin and Ferretti (2004), in their study “The Mib30 Index and Futures Relationship: Econometric Analysis and Implications for Hedging” studied the cointegration, causality and lead lag relationship between Italian Mib30 and Fib30 for the period Nov. 1994 to Sept. 2002. They found that markets were cointegrated, causality was bidirectional and futures market leads cash market.

So and Tse (2004), in their study “Price Discovery in the Hang Seng Index Markets: Index, Futures and the Tracker Fund” examined the cointegration and lead lag relationship between Hong Kong HIS, HSIF and TF for the period Nov. 1999 to June 2002. They found that the markets were cointegrated and futures market leads cash market.

Nash, Y Chen, Ray Y Chou, Nathan Liu and Gang Shyy (2005), in their paper “Optimal Hedge Ratio of Commodity Futures Using Bivariate DCC-CARR and DCC-GARCH Models” an attempt has made to compute the Optimal Hedge Ratios (OHRs) between spot and futures using different methods. They
have used the Dynamic Conditional Correlation – Conditional Autoregressive Range (DCC-CARR) model, ordinary least squares (OLS) estimator, Constant Conditional Correlation models, and DCC-GARCH model. They used weekly data of closed, highest and lowest prices on spot and futures for Coffee, Corn, Gold and Soybean obtained from Datastream. The time periods of commodities are from January, 1, 1979 to April, 7, 2005. The results show that the DCC-CARR model performs better than other hedge models for the selected commodities. For the out-sample hedge, the DCC-CARR model is the best model for all commodities. DCC-CARR model is the better model for investors to find the minimum-variance of a portfolio.

Floros Christos and Dimitrios V. Vougas (2006), in their paper “Hedging Effectiveness in Greek Stock Index Futures Market, 1999-2001” examined hedging effectiveness in Greek stock index futures market. They measured hedging effectiveness using three different methods: (i) the OLS method, (ii) the method of Ederington (1979), and (iii) the method suggested by Park and Switzer. In both cases for Greek stock index futures, the hedge ratio from MGARCH model provides greater variance reduction, in line with similar findings in the literature.

UNCTAD (2006), in the article “The Overview of the World’s Commodity Exchanges”, states that the prices affected by speculation for most global agricultural trade are determined at the Chicago Board of Trade, the New York Board of Trade of Trade and the London International Financial Futures Exchange.

from Mexico”, investigated the hypotheses that the recently established Mexican stock index futures markets effectively served the price discovery function, and that the introduction of futures trading led to volatility in the underlying spot market using a total of 799 daily observations which covers the period 15 April 1999 to 24 July 2002. By using VECM and EGARCH models, the empirical evidence showed that the futures price index was a useful price discovery vehicle and future trading had also been a source of instability for the spot market.

Zapata, H., Fortenbery, T.R., and Armstrong, D., (2005), in their paper “Price discovery in the world sugar futures and cash markets: implications for the Dominican Republic”, examined the relationship between 11 future prices traded in New York and the World cash prices for exported sugar by considering the observation from January 1990 to January 1995. They found that the future market for sugar leads the cash market in price discovery. However, they also found unidirectional causality from future price to spot but not vice versa. The finding of cointegration between futures and cash prices suggests that sugar future contract is a useful vehicle for reducing overall market price risk faced by cash market participants selling at the world price. Further it was found through impulse response function that a one unit shock in the future price innovation generates a quick (one month) and positive response in futures and cash prices, but not vice versa.

Masters, M.W., and Adam K. White. (2008), in their paper “How Institutional Investors Are Driving Up Food and Energy Prices” pointed out that, the US Commodity Futures Trading Commission (CFTC) regulates the U.S.-based commodity exchanges. CFTC also influences regulation of major commodity exchanges in other countries. Global agricultural prices are
Review of Literature

Influenced by U.S. agro-commodity prices. In the U.S., the commodity index funds have become important investors in commodities and they usually bet on commodity prices to increase. In July 2008, $317 billion were invested in commodity invested funds. The main traders of these funds are Goldman Sachs and American Insurance Group, and their products are globally traded. They involve funds in commodity market speculation. The commodity index funds bundle futures contracts according to a formula that weights and tracks the prices of agro- and non-agro-commodities as a single financial instrument. The huge amount of money invested through commodity index funds creates price volatility as a result of index fund “bets.” Since 2003 commodity index speculation has increased by over 1900 per cent. This led to increase in crude oil prices by over $37 per barrel in 2007. During the period March 2003 and March 2008 the prices of commodities coffee, corn, cotton, soya bean oil, soya bean, sugar, wheat, wheat KC, Brent crude oil, gas oil, gasoline, natural gas, aluminum, lead, nickel, zinc, copper, gold and silver increased 167 per cent, 134 per cent, 40 per cent, 199 per cent, 143 per cent, 69 per cent, 314 per cent, 276 per cent, 213 per cent, 192 per cent, 145 per cent, 71 per cent, 120 per cent, 564 per cent, 282 per cent, 225 per cent, 413 per cent, 182 per cent and 331 per cent respectively.

2.4 Conclusion

Review of literature on commodity derivative trading in Indian and International context revealed mixed results in relation to economic functions and benefits of futures trading. Most of the commodities traded on multi commodity exchanges and single commodity exchanges have acquired good trading volume within small time span after the starting of the futures trading. But a few commodities showed little interest from market participants. Many
commodities are traded on different exchanges; it has adversely affected liquidity of the market and resulted in the poor performance of the exchanges. Spot price volatility of the commodities have either decreased or increased or remained constant over time. Causality of the commodities are either decreased or increased or remained constant over time. Farmers’ participation in the futures market is abysmally low because of many reasons. Farmers’ awareness about futures trading is poor and farmers are not able to access futures market directly because they lack the critical minimum size to fulfill the contract specifications. Literature review on commodity futures trading in international context revealed that option contract is better risk management tool than futures contract.