CHAPTER -2
LITERATURE REVIEW

2.1 Introduction

The trading of financial derivatives has received extensive attention, while at the same time it has led to a debate over its impact on the underlying stock market from various facets by the academicians. The researchers all over the world have done research on derivative trading and were able to find out various facts about derivative and its trading. In this literature review efforts have been made to bring into the picture the research done about various issues throughout the world by the researchers.

The literature survey and review is presented in four sections: first, the review of studies fundamental to capital market of India; second, the review of studies relating to the testing of capital market efficiency; third, the review of studies concerning the volatility study; last, the review of studies analyzing the causal relation between spot and index futures market.

2.2 Capital Market of India

There has been a wide range of studies concerning financial sector reforms in general, and capital market reforms in particular, since mid 1980s in India. This section highlights certain important studies that are context relevant. Several studies such as Sahni (1985), Kothari (1986), Mookerjee (1988), Lal (1990), Chandra (1990), Franscis (1991), Ramesh Gupta (1991,1992), Raghunathan (1991), Varma (1991), Gupta (1992), and Sinha (1993) comment upon the Indian capital market in general and trading systems in the stock exchanges in particular and suggest that the systems therein are rather antiquated and inefficient, and suffer from major weakness and malpractices. According to most of these studies, significant reforms are required if the stock exchanges are to be geared up to the envisaged growth in the Indian capital market.

Barua et al (1994) undertakes a comprehensive assessment of the private corporate debt market, the public sector bond market, the govt. securities market, the housing finance and other debt markets in India. This provides a diagnostic study of
the state of the Indian debt market, recommending necessary measures for the development of the secondary market for debt. It highlights the need to integrate the regulated debt market with the free debt market, the necessity for market making for financing and hedging options and interest rate derivatives, and tax reforms.

Cho (1998) points out the reasons for which reforms were made in Indian capital market stating the after reform developments. Shah (1999) describes the financial sector reforms in India as an attempt at developing financial markets as an alternative vehicle determining the allocation of capital in the economy.

Shah and Thomas (2003) review the changes which took place on India’s equity and debt markets in the decade of the 1990s. This has focused on the importance of crises as a mechanism for obtaining reforms.

Mohan (2004) provides the rationale of financial sector reforms in India, policy reforms in the financial sector, and the outcomes of the financial sector reform process in some detail.

Shirai (2004) examines the impact of financial and capital market reforms on corporate finance in India. India’s financial and capital market reforms since the early 1990s have had a positive impact on both the banking sector and capital markets. Nevertheless, the capital markets remain shallow, particularly when it comes to differentiating high-quality firms from low-quality ones (and thus lowering capital costs for the former compared with the latter). While some high-quality firms (e.g., large firms) have substituted bond finance for bank loans, this has not occurred to any significant degree for many other types of firms (e.g., old, export-oriented and commercial paper-issuing ones). This reflects the fact that most bonds are privately placed, exempting issuers from the stringent accounting and disclosure requirements necessary for public issues. As a result, banks remain major financiers for both high- and low-quality firms. The paper argues that India should build an infrastructure that will foster sound capital markets and strengthen banks’ incentives for better risk management.
Chakrabarti and Mohanty (2005) discuss how capital market in India is evolved in the reform period. Thomas (2005) explains the financial sector reforms in India with stories of success as well as failure.

Bajpai (2006) concludes that the capital market in India has gone through various stages of liberalization, bringing about fundamental and structural changes in the market design and operation, resulting in broader investment choices, drastic reduction in transaction costs, and efficiency, transparency and safety as also increased integration with the global markets. The opening up of the economy for investment and trade, the dismantling of administered interest and exchange rates regimes and setting up of sound regulatory institutions have enabled time.

Gurumurthy (2006) arrives at the conclusion that the achievements in the financial sector indicate that the financial sector could become competitive without involving unhealthy competition, within the constraints imposed by the macro-economic policy stance.

Mohan (2007) reviews India’s approach to financial sector reforms that set in process since early 1990s. Allen, Chakrabarti, and De (2007) concludes that with recent growth rates among large countries second only to China’s, India has experienced nothing short of an economic transformation since the liberalisation process began in the early 1990s.

Chhaochharia (2008) arrives at the conclusion that India has a more modern financial and banking system than China that allocates capital in a more efficient manner. However, the study is skeptical about who would emerge with the stronger capital market, as both the country is facing challenges regarding their capital markets.

Prasad and Rajan (2008) argues that the time has come to make a more concerted push toward the next generation of financial reforms. The study advocates that a growing and increasingly complex market-oriented economy and its greater integration with global trade and finance will require deeper, more efficient, and well-regulated financial markets.
The survey and review of literature about the financial sector reforms in India reveals that the reforms have been pursued vigorously and the results of the reforms have brought about improved efficiency and transparency in the financial sector. The reforms also brought into inter-linkage of financial markets across the globe leading to new product development and sophisticated risk management tools. Derivatives in general perform as an instrument to hedge the risk arising from movement in prices not only in commodity markets but also in securities market.

Bose, Suchismita conducted research on (2006) found that Derivatives products provide certain important economic benefits such as risk management or redistribution of risk away from risk-averse investors towards those more willing and able to bear risk. Derivatives also help price discovery, i.e. the process of determining the price level for any asset based on supply and demand. These functions of derivatives help in efficient capital allocation in the economy. At the same time their misuse also poses threat to the stability of the financial sector and the overall economy.

Routledge, Bryan and Zin, Stanley E of Carnegie Mellon University conducted research on “Model Uncertainty and Liquidity” in year 2001. Extreme market outcomes are often followed by a lack of liquidity and a lack of trade. This market collapse seems particularly acute for markets where traders rely heavily on a specific empirical model such as in derivative markets.

Sen Shankar Som and Ghosh Santanu Kumar (2006) studied the relationship between stock market liquidity and volatility and risk. The paper also deals with time series data by applying “Cochrane Orchtutt two step procedures”. An effort has been made to establish a relation between liquidity and volatility in their paper. It has been found that there is a statistically significant negative relationship between risk and stock market liquidity. Finally it is concluded that there is no significant relationship between liquidity and trading activity in terms of turnover.

Shenbagraman (2004) reviewed the role of some non-price variables such as open interests, trading volume and other factors, in the stock option market for determining the price of underlying shares in cash market. The study covered stock option contracts for four months from Nov. 2002 to Feb. 2003 consisting 77 trading
days. The study concluded that net open interest of stock option is one of the significant variables in determining future spot price of underlying share. The results clearly indicated that open interest based predictors are statistically more significant than volume based predictors in Indian context.

All the existing studies found that the Equity return has a significant and positive impact on the FII (Agarwal, 1997; Chakrabarti, 2001; and Trivedi & Nair, 2003). But given the huge volume of investments, foreign investors could play a role of market makers and book their profits i.e., they can buy financial assets when the prices are declining thereby jacking-up the asset prices and sell when the asset prices are increasing (Gordon & Gupta, 2003). Hence, there is a possibility of bi-directional relationship between FII and the equity returns.

Masih AM, Masih R, (2007), had studied “Global Stock Futures: A Diagnostenic Analysis of a Selected Emerging and Developed Markets with Special Reference to India”, by using tools correlation coefficients, granger’s causality test, augmented Dicky Fuller test (ADF), Elliott, Rothenberg and Stock point optimal test. The Authors, through this paper, have tried to find out what kind of relationship exists between emerging and developed futures markets of selected countries.

Kumar, R. and Chandra, A. (2000), had studied that Individuals often invest in securities based on approximate rule of thumb, not strictly in tune with market conditions. Their emotions drive their trading behavior, which in turn drives asset (stock) prices. Investors fall prey to their own mistakes and sometimes other’s mistakes, referred to as herd behavior. Markets are efficient, increasingly proving a theoretical concept as in practice they hardly move efficiently. The purely rational approach is being subsumed by a broader approach based upon the trading sentiments of investors. The present paper documents the role of emotional biases towards investment (or disinvestment) decisions of individuals, which in turn force stock prices to move.

Srivastava, S., Yadav, S. S., Jain, P. K. (2008), had conducted a survey of brokers in the recently introduced derivatives markets in India to examine the brokers’ assessment of market activity and their perception of benefits and costs of derivative
trading. The need for such a study was felt as previous studies relating to the impact of derivatives securities on Indian Stock market do not cover the perception of market participants who form an integral part of the functioning of derivatives markets. The issues covered in the survey included: perception of brokers about the attractiveness of different derivative securities for clients; profile of clients dealing in derivative securities; popularity of a particular derivative security out of the total set; different purposes for which the clients are using these securities in order of preference; issues concerning derivatives trading; reasons for non usage of derivatives by some investors.

The investors are using derivative securities for different purposes after its penetration into the Indian Capital market. They use these securities not only for risk management and profit enhancement but also for speculation and arbitrage. High net worth individuals and proprietary traders account for a large proportion of broker turnover. Interestingly, some retail participation was also witnessed despite the fact that these securities are beyond the reach of retail investors (because of complexity and high initial cost).

Naresh, G., (2006), studied the dynamic growth of the Derivatives market, particularly Futures & Options and the perceived risks to the financial sector continue to stimulate debate on the proper regulation of these instruments. Even though this market was initially fuelled by various expert teams survey, regulatory framework, recommendations byelaws and rules there is still a debate on the existing regulations such as why is regulation needed? When and where regulation needed? What are reasonable and attainable goals of these regulations? Therefore this article critically examines the views of market participants on the existing regulatory issues in trading Derivative securities in Indian capital market conditions.

The emergence and growth of the market for derivative instruments is because of the willingness of risk-averse economic agents to guard themselves against uncertainties arising out of fluctuations in asset prices. By providing investors and issuers with a wider array of tools for managing risks and raising capital, derivatives improve the allocation of credit and the sharing of risk in the global economy,
lowering the cost of capital formation and stimulating economic growth. Now that world markets for trade and finance have become more integrated, derivatives have strengthened these important linkages between global markets, increasing market liquidity and efficiency, and have facilitated the flow of trade and finance.

Following the growing instability in the financial markets, the financial derivatives gained prominence after 1970. In recent years, the market for financial derivatives has grown in terms of the variety of instruments available, as well as their complexity and turnover. Financial derivatives have changed the world of finance through the creation of innovative ways to comprehend, measure, and manage risks. India started as a controlled economy and gradually moved towards a world where prices fluctuate every day. Derivatives in this context will provide wide range of benefits to the investors, as a risk management instruments. Thus allowing derivative trading is required to attract more investments not only from domestic sources but also from off shores. In this respect the liberalization process has resulted into development of derivatives market in India.

2.3 Efficiency of Index Futures Market

The process of financial liberalization in the developing countries has brought into the increased flow of funds from the developed countries. The rapid changes in the field of Information Technology, has lead to a progressive integration of the emerging markets with the developed markets. The Indian markets are no exception to this phenomenon. Due to liberalization India is attracting not only foreign direct investments but also foreign portfolio investments. Financial futures contracts are key instruments in portfolio management, as they allow for risk transference. Moreover, derivative markets play an important role within the price discovery process of underlying assets. Stock index futures have relatively lower transaction costs and capital requirements, so the arrival of external information is quickly incorporated into prices as investors’ expectations are updated. Thus stock index futures markets have experienced a substantial increase in trading activity, since the introduction of futures on indices.
In the context of above information plays a vital role not only in efficient price discovery but also in the creation of bubbles (lack of information flow). The role of bubbles in financial markets is intricately connected to the question of informational efficiency. The reason is both that bubbles above and below fundamental values are a violation of market efficiency, and that the fundamental value itself and deviations from it can only be defined with reference to a framework of informational efficiency in a market (cp. Roll’s critique in Roll, 1977). Because of this observation, this section starts with a short introduction to the topic of market efficiency and briefly reviews efficiency of Stock market after the introduction of index futures.

The subject of market efficiency has been intensely studied over last 40 years. The main principle of market efficiency was consolidated in 1970 by Eugene Fama in his “Efficient Capital markets: A review of theory and empirical work”. Fama defined an efficient market as “A market in which prices always ‘fully reflect’ available information”, and proposed the classifications of weak-form, semi-strong form, and strong-form market efficiency to concretize the “available information.” These three categories have by now become the standard in descriptions of market efficiency.

Nonetheless, the history of the efficient market hypothesis had begun earlier. Bachelier (1900) laid the theoretical groundwork for the efficient market hypothesis, which was postulated half a century later by Maurice Kendall. Kendall (1953) found that stock prices evolved randomly and that his data offered no way to predict future price movements. The explanation for this phenomenon, the efficient market hypothesis, initially seemed counterintuitive to the academic community. However, after the first shock had passed, scholars quickly embraced the theory and began to document its validity in real-world markets by studying empirical data.

To do so, they developed different frameworks to model the characteristics of market prices. The first type of framework – based on expected return efficient markets – includes such well-known models as the fair game model, the random walk and the sub-martingale models, as well as the market model and the famous capital asset pricing model (CAPM) of Sharpe (1964); Lintner (1965); Mossin (1996).
In the years from the 1950s to the 1970s, most studies based on the CAPM and fair game models found evidence consistent with the efficient market hypothesis. Despite some evidence to the contrary from the variance-based literature, by the early 1970s markets had therefore largely come to be considered to be efficient in the semistrong form, as defined by Fama (1970).

A second class of models used to test market efficiency focuses on variance as the key characteristic. Among them are the model of Shiller (1981), who reported that stock prices were too volatile to be efficient when compared to subsequent dividend payouts, and the model of Marsh and Merton (1986), which showed that Shiller’s results could be reversed by a change in assumptions regarding the dividend model. The reply of Schwartz (1970) to the seminal paper of Fama (1970) could also be considered to fall into the category of variance efficient market models, as it propagated the use of models that tested for variance-based strategies to generate excess returns in capital markets.


Granger et al., (1998), Covrig and Melvin (2001), Anderson et al., (2002) and Yan and Zivot (2004) examined the price discovery efficiency of currency futures market in various economies like Hong Kong, Indonesia, Japan, South Korea, Malaysia, Philippines, Singapore, Thailand, Taiwan, USA respectively and found that futures market is efficient for underlying currencies.

(2005) and Gupta and Singh (2006) evaluated the prices discovery efficiency of equity futures in different countries namely USA, Netherlands, Germany, Australia, Taiwan, India, Hong Kong respectively and observed significant evidence of efficient price discovery through equity futures market.

Yang (2001) applied different econometric methods in order to find the optimal variance ratio in the Australian Futures Market during the period 1 January 1988 to 12 December 2000. Specifically, he used the OLS Regression, the Bi-variate Vector Autoregressive model (BVAR), the Error Correction model (ECM) and the multivariate diagonal VEC GARCH model. It was generally found that GARCH time varying hedge ratios provide the greater portfolio risk reduction but they do not produce the greater profit return. So, it is obvious that is a matter of investor to decide in which product to invest, the less risky or the more profitable.

Chuang (2003) examined the price discovery efficiency of TAISEX (Taiwan Stock Exchange Capitalisation Weighted Index Futures) and MSCI (Morgan Stanley Capital International Taiwan Index Futures) during 1998-99 and found strong statistical evidence of market efficiency in its weak form.

Hoque, Kim and Pyun, (2006) tested the market efficiency of eight different Asian emerging markets (Hong Kong, Indonesia, Malaysia, Korea, Singapore, Philippines, Taiwan and Thailand). They took weekly closing prices from April 1990 to February 2004. They used variance ratio test to find out whether these eight markets prove to be mean reverting or not. The basic findings were that five markets (Indonesia, Malaysia, Philippines, Singapore and Thailand), show specific mean-reverting and predictive behavior of stock prices while two markets (Taiwan and Korea) show some mean-reverting and unpredictable patterns in the time series.

Gupta and Singh (2006) also made an attempt to investigate the price discovery efficiency of the Nifty futures by considering lengthy time frame and their results showed the evidences that futures market has been an efficient price discovery vehicle.
Floros and Vougas (2008) examine efficiency of the Greek stock index futures market from 1999 to 2001. The results show that the Greek Futures markets are informationally more efficient than underlying stock markets.

Zhang et al (2010) tests the random walk hypothesis and weak form market efficiency in the VIX futures market using a variety of tests. A unit root in the aggregated market price series suggests that the VIX futures market is efficient. For the individual VIX futures price series, 51 of 54 futures contracts meet the sufficient condition for an efficient market: the prices are found to follow a random walk either because there is a unit root or because the increments are not correlated. Overall, the market for VIX futures has been efficient since the first day of trading.

Thus, it is observed that the study of efficiency of the futures market is very important from the point of view of an emerging market like India. But the literature is relatively thin in this direction.

2.4 Volatility of Index Futures Market

The volatility of stock futures market has been studied by a number of researchers from different angles. Despite a disagreement of the researchers regarding the kind of influence that the market of derivatives has on the underlying market, most of them agree that it is beneficial even if the volatility is increased or decreased because the derivatives’ market acts as a catalyst for the dissemination of information. Particularly, Danthine (1978) concluded that the derivatives’ market increases the depth of a market and consequently reduces its volatility.

The destabilization theory argues that the introduction of futures trading increases spot volatility. For example, Harris (1989) documents marginal increases in the variances of S&P 500 stocks after trading in S&P 500 index futures began. Lockwood and Linn (1990) report similar variance increases when index futures began trading in 1982. Brorsen (1991) finds that futures trading tend to reduce autocorrelations and increase the volatility of index stock returns. Lee and Ohk (1992) document that the volatility of stock returns in Australia, Hong Kong, Japan, the U.K., and the U.S. rose significantly, following the introduction of index futures. On the other hand, Antoniou and Holmes (1995), and Antoniou, Holmes, and Priestly (1997)
also document increases in spot volatilities after the introduction of index futures, however this increase is attributed to an increase in the rate of flow of information to spot markets.

On the other side, Edwards (1988a, b), Grossman (1988), and Bechetti and Roberts (1990) find that S&P 500 index futures have an insignificant impact on cash market volatility. Schwert (1990) maintains that the growth in stock index futures and options trading has not caused increases in volatility. Similar conclusions are reached by Beckett and Roberts (1990), Kamara, Miller and Siegel (1992), Pericli and Koutmos (1997), Galloway and Miller (1997), and Darat, Rahman and Zhong (2002), who document that introduction of stock index futures has either decreased or not significantly increased the volatility in spot markets, confirming the stabilization theory.

Hodgson et al (1991) study 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, which reinforces the findings of the previous U.S. studies. However, there was a problem of confounding variables such as floating of Australian dollar in late 1983, deregulation of stock exchanges, foreign bank ownership and mutual fund investment rules during 1984.

Chan et al (1991) estimate the intraday relationship between returns and returns volatility in the stock index and stock index futures. The study covers both S&P500 and Major Market Index futures. Results indicate a strong inter market dependence in the volatility of the cash and futures returns. It is also shown that the intraday volatility patterns that originate either in stock or futures market demonstrate predictability in the other market.

Bessembinder and Seguin (1992) examine 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
owing to 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.

Herbst et al (1992) examine the informational role of the end-of-day returns in the stock index futures for the period 1982 to 1988. Volatility is estimated from the standard deviation of the returns. It is shown that the end of day return volatility is positively correlated to the next day's spot returns.

Kamara et al (1992) observe 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 non-parametric tests. The variance ratio F-tests used by Edwards (1988a, b) are sensitive to the underlying assumption of normally distributed stock returns. 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.

James (1993) studied 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 and Subrahmanyam (1993) compare 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 find 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. Overall results of Jegadeesh and Subrahmanyam (1993) suggest 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.

Darrat et al (1995) examines 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 (occasional and sudden extreme changes in stock prices). Term structure rates and OTC index have caused the stock price volatility while, inflation and risk premium have not influenced the volatility of stock prices.

Gregory et al (1996) examined how volatility of S&P 500 index futures affects the S&P 500 index volatility. The study also examines 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 E-GARCH 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 future and S&P500 index declines during the October 1987 crash.

Min and Najand (1999) investigated lead and lag relationship in returns and volatilities between cash market and KOSPI 200 futures interactions. This study depended on some ten-minute's price data belonging to the periods of 3 May 1996 and 16 October 1996 when futures transactions were introduced over KOSPI 200. Granger causality analysis was used in the study. As for the analysis results; futures market leads the cash market by as long as 30 minutes. The trading volume has significant explanatory power for volatility changes in both spot and futures markets. Futures transactions have stronger influence than cash transactions and the futures transactions have stronger influence over cash market volatility.
Gulen and Mayhew (2000) find that spot volatility is independent of changes in futures trading in eighteen countries and that information-less futures volume has a negative impact on spot volatility in Austria and the UK.

Thenmozhi (2002) showed that the inception of futures trading has reduced the volatility of spot index returns due to increased information flow. According to Shenbagaraman (2003) the introduction of derivative products did not have any significant impact on market volatility in India. Raju and Karande (2003) also reported a decline in volatility of S&P CNX Nifty after the introduction of index futures.

Nath (2003) studied the behavior of stock market volatility after derivatives and arrived at the conclusion that the volatility of the market as measured by benchmark indices like S&P CNX Nifty and S&P CNX Nifty Junior has fallen during the post-derivatives period. The finding is in-line with the earlier findings of Thenmozhi (2002), and Raju and Karande (2003).

Bandivadekar and Ghosh (2003), and Sah and Omkarnath (2005) also investigated the behaviour of volatility in cash market in futures trading era. They also found that futures trading have led to reduction in volatility in the underlying asset market but they attributed the degree of decline in volatility in the underlying market to the trading volume in futures market. They inferred that as the trade volume in the Futures and Options segment of BSE is very low, the volatility in BSE has not significantly declined; whereas in the case of NSE (where the trade volume is at the peak), the volatility in NIFTY has reduced significantly.

Mallikarjunappa and Afsal (2007) studied the volatility implications of the introduction of derivatives on the stock market in India using S&P CNX IT index and found that clustering and persistence of volatility in different degrees before and after derivatives and the listing in futures has increased the market volatility.

Kanas (2009), using a time-varying regime-switching vector error correction approach, finds that the NIKKEI stock index cash and futures prices are jointly characterized by regime switching, which is time-varying and dependent upon the basis, the interest rate, the volatility of the cash index, and the US futures market.
Gannon (2010) develops simultaneous volatility models that allow for simultaneous and unidirectional volatility and volume of trade effects. Intraday data from the Australian cash index and index futures markets are used to test these effects. Overnight volatility spillover effects are tested with the data from the S and P 500 index using alternative estimates of the United States volatility. It is found that the simultaneous volatility model is robust to alternative specifications of returns equations and to misspecification of the direction of volatility causality.

2.5 Causality between Stock index and Index Futures Market

There exist a number of studies in India and abroad concerning the investigation of the lead-lag relation between spot and index futures markets. Kawaller, Koch and Koch (1987) estimated the lead-lag relation between S&P 500 index futures and S&P 500 index using simultaneous equation model and found a stronger leading role of the futures market to the infrequent trading of component stocks. Finnerty and Park (1987) discovered a significant lead-lag relationship between futures and spot prices. Herbst et al. (1987) examined the relation between S&P 500 futures, value line futures and spot indexes and concluded that the futures prices lead their spot indices together with indications of higher lead for longer time spans.

Stoll and Whaley (1990) use 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 indicate 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. The findings are consistent with the evidence gathered by Koch and Koch (1987), MacKinlay and Ramasamy (1988).

Schwarz et al (1991) examine the price leadership of index futures over the spot market and test the dynamic efficiency of index futures as a price discovery vehicle. However, they use 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.

Tang, Mak and Choi (1992) studied 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.

Chan (1992) estimated 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 were used and it was observed that the futures market led the spot market, and this was primarily due to faster information processing by the futures market. However, under bad news it was the cash index that led over the futures market while, there was no effect on the lead-lag relation during different trading intensities.

Ghosh (1993) tested the applicability of the Cointegration and error correction models between S&P 500 index and its index future prices and concluded that there exist Cointegration relationship between the index and its future prices.

Abhyankar (1995) observed that there are several reasons that why the lead-lag relationship may exist. First, the lead-lag relationship between the spot index and future markets may be caused by infrequent trading of the composite stocks. That is, when the index is reweighed every time, some composite stocks’ prices taken by the index may well not be the price on which the market just traded. It is particularly the case when the stocks are not traded frequently. Therefore, the price the index takes is only the “stale” price. If index future price is supposed to reflect the instantaneous feedback to the changes in market-wide information flow, the spot index containing “stale” prices should lag behind the future price. Second, liquidity difference between these two markets may be the cause for the lead-lag relationship. If composite firms in the index take longer time to trade than the index future, market-wide information will be infused more quickly into the pricing than into spot market. Therefore, it is obvious that the lead-lag relationship is a function of relative liquidity rather than the absolute
liquidity. Third, market frictions (e.g. transaction costs, capital requirements, and short-selling restriction) can make the future markets more attractive to traders with private information to exploit the information advantage. In addition, Chan (1992) pointed out other possible sources for the lead-lag effect. For example, Gottlieb and Kalay (1985) believed that discreteness of spot stock prices as a friction is the source of the lead-lag relationship. Amihud and Mendelson (1980) claimed that stabilization of specialists is a potential source. Fishman and Longstaff (1989) argued that dual trading practice in the future market may have caused the lead-lag relationship between these two markets. Fourth, exactly by the same token, when firm specific information is available to some traders, they may prefer to trade on spot market for that particularly stock rather than trading on the future market (e.g. Subrahmanyam, 1991). That is, there might be the case that the spot market can lead the future market to some extent.

Teppo et al (1995) study 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.

West (1997) examined the lead-lag relationship in returns on Share Price Index futures and the All Ordinaries Index between 1992 and 1996 in Australia. It has been found that the market for index futures leads the equities market by up to 15 minutes. This relationship does vary slightly across the individual years in the sample. These findings are consistent with overseas research. However, the extent of the lead is smaller. There is also very strong evidence of the futures market lagging the equities market by 5 minutes at certain times. The extent of this feedback between the index futures market and the index appears to be greater than in overseas markets.

Abhyankar (1998) revisited 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.

Mukharjee, Kedarnath and Mishra (2000) in their working paper series made an effort 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. The results suggest 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. The lead-lag relation is asymmetric with weaker evidence that the spot index leads futures and stronger evidence that the stock index futures market leads the spot market.

Abdullah (2001) used a multiple regression model is used as the methodology to test for the lead and lag relationship between the stock index futures returns and KLSE CI returns. The study finds that there is a strong contemporaneous relationship and there exists a lead effect from the futures market to the spot market by one day in sub-periods 1 and 3. Sub-period 2 shows a mix lead-lag relationship between the two markets. For the whole period under review, the relationship has been found to be ambiguous and inconclusive.

Antoniou, Pescetto and Violaris (2001) addressed the important relationship between stock index and stock index futures markets in an international context. The results from applying the VAR-EGARCH methodology to the French, German and UK stock index and their corresponding stock index futures markets provide evidence of feedback effects in both mean and variance within and between countries. However, when the interdependence of market is allowed to influence the spot-futures price relationship, a feedback effect between the two UK markets is found. In particular, there appear to be significant bi-directional price spillover effects between French and UK markets.
Ap Gwilym, Owain and Buckle, Mike (2001), had studied the lead-lag relationship between the FTSE100 stock index and its derivative contracts. Their paper examines the lead/lag relationships between the FTSE100 stock market index and its related futures and options contracts, and also the interrelation between the derivatives markets. Both the index futures and index options contracts are found to lead the cash index as predicted. However, the call option market appears to marginally lead both the index futures and the put option market. In the only previous paper to examine the inter-market relationships between a stock index and related futures and options contracts, Fleming et al (Journal of Futures Markets, 16, 353-87, 1996) maintain that relative trading costs determine which market leads. As the trading costs of calls and puts are similar, other factors must be driving the relationships observed in this paper. They hypothesize that informed traders with bullish expectations wishing to gain leverage from the options market will buy calls or, with greater risk, sell puts. As market sentiment was bullish for most of the sample period examined, this could explain the call market leads reported.

Chris et al (2001) estimate the lead-lag relation between the FTSE 100 stock index futures and the FTSE 100 index. Based on the results obtained, they develop a trading strategy based on the predictive abilities of the futures market. The study is conducted using Co-integration and Error Correction model, ARMA model and vector auto-regressive model. The results indicate that futures lead the spot market attributable to faster flow of information into futures market mainly due to lower transaction costs. It is shown that the error co-integration model predicts the correct direction of the spot returns 68.75% of the time.

Brooks, Rew and Ritson (2001) investigated the lead-lag relation for FTSE 100 index for 1996-1997 by incorporating error correction model, error correction model with cost of carry, ARIMA and VAR. They compared the forecasting ability of models, and different trading strategies under error correction model with cost of carry models. They found the leading power of futures market and underline the higher predictive ability of error correction model - cost of carry model.
Abdullah, Mahdhir, Nasir, Annuar Mohd., Mohamad, Shamsher, Aliahmed, Huson Joher and Hassan, Taufiq (2002), studied the launching of the futures contract on the Kuala Lumpur Stock Exchange Composite Index. Due to its recentness in the country, many issues pertaining to this equity derivatives instrument have not been explored. Thus, the development of stock index futures opens many opportunities for research in this area. Their study examines the temporal relationship between the price of the Kuala Lumpur Stock Exchange Composite Index futures contract (FKLI) and its underlying stock index, the Kuala Lumpur Stock Exchange Composite Index (KLSE CI). The five-year period under study is split into three sub-periods to observe the price co-movement pattern under different volatility levels. The study finds that futures market tends to lead the spot market by one day during the periods of stable market, and there is a mixed lead-lag relationship between the two markets during the period of highly volatile market.

Asche and Guttormsen (2002) examined the relationship between spot and future prices. Findings indicate that futures prices leads spot prices, and that futures contracts with longer time to expiration leads contracts with shorter time to expiration.

Frino and West (2002) examined the lead-lag relationship in returns on stock index futures and the underlying stock index for the Australian market between 1992 and 1997. They found that futures returns lead index returns by twenty to twenty-five minutes and there was some evidence of feedback from the equities market to the futures market.

Hyun-Jung and Smith (2004) investigates impact of KOSPI 200 futures on spot market trading. Results show that futures trading increase the speed at which information is impounded into spot market prices, reduces the persistence of information and increases spot market volatility. The spot and futures prices are co-integrated and there is bidirectional causality between the two markets.

Gee and Karim (2005) analyzed the lead-lag relationship between spot and futures markets of the Malaysian Kuala Lumpur Composite Index (KLCI) by employing the cointegration and error-correction approach. The results of the Error-correction model (ECM) suggest that futures price lead spot price and the change in
futures price is relatively more efficient as compared to spot price. The results also indicate that spot price do lead futures price but the lead-lag relationship is relatively weak as compared to the impact of futures price on spot price.

Sah and Omkarnath (2005) examined the nature and extent of relation between NSE-50 Futures and volatility of S&P CNX Nifty. They used Granger causality test to study relationship between volatility and futures market activity. The sample data consisted of daily closing prices of S&P Nifty and turnover from June 12, 2000 through March 25, 2004 for near month and from June 12 through January 29, 2004 for middle month and far month contracts. Their empirical study suggested that futures market activity destabilized the underlying market. The direction of causation was bi-directional in case of near month; however, causality ran from Nifty Futures to volatility of S&P Nifty in case of far month contract.

Bose (2007) analysed whether the Indian Stock Index Futures market plays an important role in the assimilation of information and price discovery in the stock market. Using Futures prices for the S&P CNX Nifty Index traded on the National Stock Exchange of India, we find that there is significant information flow from the futures to the spot market and futures prices/returns have predictive power for the spot prices.

Hadgal (2007) focused on the possible lead-lag relationship among the spot and futures market in India. There is no conclusive proof of any lead or lag relationship, as the futures market in India as not mature and it is imperfect.

A new study of Kasman and Kasman (2008) examined the impact of futures on volatility of the underlying asset (via GARCH model) including the question of whether a cointegrating relation exists between spot prices and futures prices (via ECM model). They used the Istanbul Stock Price Index 30 (ISE 30) futures and spot prices and concluded that there is a long run relation (nearly one-to-one) between spot and futures prices and causality runs from spot prices to future prices, but not vice-versa.

Reddy and Sebastian (2008) studied the temporal relationship between the equities market and the derivatives market segments of the stock market using various
methods and by identifying lead-lag relationship between the value of a representative index of the equities market and the price of a corresponding index futures contract in the derivatives market. The study observed that price innovations appeared first in the derivatives market and were then transmitted to the equities market. The dynamics of such information transport between stock market and derivatives market were studied using the information theoretic concept of entropy, which captures non-linear dynamic relationship also.

Debasish and Mishra (2008) examined the lead-lag relationships between the NSE Nifty stock market index and its related futures and options contracts, and also the interrelation between the derivatives markets. The study finds that both the index futures and index options contracts lead the cash index.

Debasish (2009) investigated the effect of futures trading on the volatility and operating efficiency of the underlying Indian stock market by taking a sample of selected individual stocks. The results of this study suggest that there is a trade-off between gains and costs associated with the introduction of derivatives trading at least on a short-term perspective. The study offers a unique contribution in examining the impact of introduction of index futures trading in NSE Nifty index and the index futures covering a period since introduction of index futures in Indian Capital Market. The results suggest that the market would have to pay a certain price, such as a loss of market efficiency for the sake of market stabilization.

Pradhan and Bhat (2009) investigated price discovery, information and forecasting in Nifty futures markets. Johansen’s (1988) Vector Error Correction Model (VECM) is employed to investigate the causal relationship between spot and futures prices. The Johansen’s VECM results found that the spot market leads the futures market and spot prices tend to discover new information more rapidly than futures prices.

Floros (2009) examined the price discovery between futures and spot markets in South Africa over the period 2002 to 2006. Granger causality, VECM and ECM-TGARCH(1,1) results suggest a bidirectional causality (feedback) between futures
and spot prices. We show that futures and spot play a strong price discovery role (FTSE/JSE Top 40 futures prices lead spot prices and vice-versa).

Başdağ (2009) examined the lead-lag relationship between the Istanbul Stock Exchange 30 (ISE 30) Index and index futures prices at the Turkish Derivatives Exchange using daily observations from February 2005 to May 2008. It is found out that spot prices lead the futures prices for ISE 30 Index contrary to the results for different countries.

Athanasios (2010) examined the dynamic relationship between the FTSE/ASE-20 spot price index, the FTSE/ASE-20 futures price index and their respective volatilities. The empirical results provide strong evidence that both feedback and simultaneously characterize the dynamic relationship between futures trading activity and volatility of the underlying market.

In a recent work Debasish (2011) examines the long-term relationship between spot prices and futures prices. The study finds a single long-term relationship for each of the selected companies across the six sectors.

Theissen (2011) reconsidered the issue of price discovery in spot and futures markets. He used a threshold error correction model to allow for arbitrage opportunities to have an impact on the return dynamics. It has been found that the futures market leads in the process of price discovery.

The study of Antoniou and Garrett (1993) for October 1987 with FTSE 100 index, Abhyankar (1998)’s study on the FTSE 100, and Vector Autoregressive-Exponential Generalized Autoregressive Conditional Heteroskedastic (VAREGARCH) model of Antoniou et al. (2001) by using multivariate analysis for France, Germany and the UK confirm that futures markets lead spot markets. For other countries with smaller size derivatives exchange the studies all support that the lagged values of futures affect the adjustment in spot prices. For Greece Floros and Vougas (2007), for India Sinha and Sharma (2005) on Nifty Futures confirm the results of the literature on the direction of lead-lag relation.
The lead-lag effect between spot index market and index future market has lured many investigations into its profitability implication in real market transactions. This type of investigations is interesting in the sense that if traders can take advantage of these effects and make profits, these opportunities should disappear quickly since many other will quickly do it too, which implies that the efficient market hypothesis is invalid in the context. For example, Leitch and Tanner (1991) found that the accuracy of statistical forecast may not necessarily positively link with trading profitability.

2.6 TO SUM UP

The review of literature provides sufficient evidences that equity futures market has been an efficient price discovery vehicle. Even in India, the studies found significant causal relationship between these two markets. The current study examines specifically the price discovery efficiency of Indian equity futures market. Thus, the current study will be of great benefit for the traders and will help to fill the gap in the literature.

The current discussions also delineate the controversial role of speculators, and recognize the impact of price manipulation and herding behavior on equity markets. Research on the volume-volatility relationship shows that there is a positive correlation between the two, but it is not clear as yet whether volume can represent the information signal per se. Regarding the role of derivatives, evidence both supports and refutes the argument of market stabilization, while new research areas, such as individual share futures, feedback trading, and volatility futures, are explored.

Looking ahead, one should be very open-minded when analyzing stock market data, since it is difficult to identify and model all the factors responsible for price swings. Most of the time, the interaction among drivers of volatility makes it difficult to isolate their precise impact, while economic theory could remain silent as to why markets have moved toward a certain direction. From a methodological perspective, modeling and forecasting equity volatility warrants even further investigation. What is complicated but at the same time appealing is to design an empirical framework that attenuates the intricate characteristics of a stochastic global environment.
The previous literatures clearly explains that though the pricing formula for futures derives the fair value depending on the spot market prices, the empirical work shows us that futures prices mostly lead the spot prices. However, the literature is very thin in the sense that there exist almost no studies examining the relation between spot and index futures markets in the aftermath of global financial crisis. Furthermore, there exist only a few such studies in the context of India’s capital market. Therefore, the main purpose of this study is to investigate whether futures prices lead the spot prices for NSE 50 (Nifty) in India or other way around.

Therefore, it is inferred that an empirical study concerning the investigation of the efficient market hypothesis, capital market volatility, and lead-lag relationship between stock index and index futures markets is very significant for an emerging market economy like India. In India, the derivatives market is an innovation of the last decade and thus, empirical studies of this kind would certainly unveil important policy implications for the robust growth and development of capital market of the country. Furthermore, the extant literature is very thin concerning studies of this kind in the context of India. So, it is imperative to conduct a research on the topic of investigating the relationship between spot and index futures markets in India with the benchmarks of stock market efficiency and volatility.
REFERENCES


79


