CHAPTER - VI

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

Over the last decade, many emerging and transition economies have started introducing derivative contracts. The introduction of it also has generated concerns of the policymakers, practitioners and regulators regarding its impact. One of the reasons for this concern is the belief that derivative trading may attracts speculators into the market who then destabilize spot prices.

Financial market liberalization since early 1990’s has brought major changes in the financial system of our country. The creation and empowerment of Securities and Exchange Board of India (SEBI) has helped in providing higher level accountability in the market. New institutions like National Stock Exchange of India (NSEIL), National Securities Clearing Corporation (NSCCL), and National Securities Depository (NSDL) have been the change agents and helped cleaning the system and provided safety to investing public at large. With modern technology in hand, these institutions have set benchmarks and standards for others to follow. The microstructure changes brought about reduction in transaction cost that helped investors to lock in a deal faster and cheaper. The major changes in the capital market have resulted in the complete transformation of structure and composition of the market. In addition Indian capital markets
also have started trading on derivative products in line with the developed countries.

Basically, a derivative is a product whose value is derived from the value of one or more basic variables called bases in a contractual manner. The underlying asset can be equity, commodities, interest rate or any other asset. The price of a derivative is contingent to the price of its underlying asset. Futures and Options are the different variants of derivative contract which are traded on exchanges, and they are standardized according to the rules and regulations of the exchange.

In India, the introduction of derivatives in its capital market started with Securities Exchange Board of India (SEBI) sets up a 24 member committee under the chairmanship of Dr. L. C. Gupta on November 18, 1996 to develop appropriate regulatory framework for derivatives trading in India. The committee submitted its report on March 17, 1998 prescribing necessary preconditions for introduction of derivatives trading in India. The committee recommended that derivatives should be declared as “securities” so that regulatory framework applicable to trading of “securities” could also govern trading of securities. SEBI also set up a group in June 1998 under the Chairmanship of Prof. J. R. Varma, to recommend measures for risk containment in derivatives market in India. The report, which was submitted in October 1998,
worked out the operational details of the functioning of derivative market in terms of margining system, methodology for charging initial margins, broker net worth, deposit requirement and real-time monitoring requirements etc.

The derivatives trading flagged off in India in June 2000 after SEBI granted the final approval to this effect in May 2000. SEBI permitted the derivative segment in two stock exchanges viz. NSE and BSE, and approved trading in Index Futures contracts based on S & P CNX Nifty and BSE (Sensex) index. This was followed by approval for trading in Options based on the two indices and Options on individual securities. The trading in Index Options commenced in June 2001 and the trading in Options on individual securities commenced in July 2001. Futures contracts on individual stocks were launched in November 2001 and the Interest Rate Futures trading commenced in March 2003. Trading and settlement in Derivatives contracts regulated in accordance with the rules, byelaws, and regulations of the respective exchanges and their clearing houses duly approved by SEBI and notified in the official Gazette. NSE also introduced trading in futures and option contracts based on CNX - IT index and CNX Bank Nifty Index in 29th August, 2003 & 1st June, 2005 respectively. On 1st June 2007 NSE launched its trading on futures and options indexes on CNX 100 and CNX Nifty Junior. In January 2008 NSE initiated Mini derivatives (Futures & Options) Contracts on Nifty 50. In March 2008 NSE also launched
Long Term Option contracts on S & P CNX Nifty Index. Derivative contracts on DEFTY index was introduced in the year December 2008.

India’s experience with of equity derivatives market has been extremely positive since its introduction. The derivatives turnover on the NSE has surpassed the equity market turnover. The turnover of derivatives on the NSE increased from Rs. 23,654 million in 2000-01 to Rs. 130,904,779 million in 2007-08. India has evidenced the world as one of the most successful developing countries in terms of a vibrant market for exchange-traded derivatives. This reiterates the strengths of the contemporary developments of India’s securities markets, which are based on nationwide market access, anonymous electronic trading, and a predominant retail market. NSE proved itself the market leader in derivative trading contributing 99.9% of the total turnover in 2007-08 in India. There is an increasing belief that the derivatives market is playing a crucial role in accelerating the speed, quality of information flow and thus enhancing the overall market depth, increasing market liquidity and ultimately reducing informational asymmetries in market volatility.

As per details for the top 20 contracts for the year 2007 presented in Indian Securities Market Review of NSE, Kospi 200 options contract was the most traded in 2007 followed by Euro-Dollar Futures of CME with 621.47 million contracts. E-mini S&P 500 Futures, CME contract saw an increase of
61% in its traded volumes and moved to 3\textsuperscript{rd} position in the list of top traded contracts in 2007 from 6\textsuperscript{th} position in 2006. Another contract which witnessed a sharp increase in its volume in 2007 was the DJ Euro Stoxx 50 Futures contract leading to its positions’ improvement from 8\textsuperscript{th} to 6\textsuperscript{th} in 2007. In terms of trading volumes in single stock futures, while the NSE ranked first (1\textsuperscript{st}) in terms on number of contracts traded in 2006, it was shifted to second position as the Johannesburg Stock Exchange (JSE) overtook NSE with a 265.49 million contracts traded in 2007 at the JSE as against 179.33 contracts on the NSE. However, NSE faired very well in 2007 in terms of traded volumes in futures and options taken together, improving its worldwide ranking from 15\textsuperscript{th} in 2006 to 9\textsuperscript{th} in 2007. The traded volumes in the derivatives segment of the NSE saw an increase of 95 per cent in 2007 over the figure in 2006. In terms of trading volumes in single stock futures, while the NSE was ranked 1\textsuperscript{st} in terms on number of contracts traded in 2006, it got shifted to second position as the Johannesburg Stock Exchange (JSE) overtook NSE with a 265.49 million contracts traded in 2007 at the JSE as against 179.33 contracts on the NSE.

The present research work has been developed on the background of earlier studies attempted in this area. In finance literature, there are many empirical papers that provide indirect evidence on the relationship between trading volume and stock returns. Clark (1973) examines Mixture of Distributions Hypothesis which plays a prominent role in the empirical finance
arena. As suggested by Morgan (1976) volume is regarded as a major risk factor contributing to the volatility of returns, particularly in less liquid and thin markets, including emerging markets. In the mixture model of Epps and Epps (1976), trading volume is used to measure disagreement among traders, as investors revise their reservation prices based on the arrival of new information to the market. Similarly, positive contemporaneous relationship between variance of price change and trading volume was linked by Ragalski (1978), Figlewski and Cornell (1981) who studied the basic relationship between the variables. Tauchen and Pitts (1983), and Lastrapes and Lamoureux (1990) alleges that the conditional heteroskedasticity in stock returns can be explained by a serially correlated mixing variable that measures the rate at which information is transmitted to the market. These authors have shown that the information arrivals stemming from the existence of exogenous variables which can be identified by the mixture of distributions, and these variables exhibit time-varying ARCH effect.

There is quite strong body of literature advocating the use of the GARCH family of models to test the relationship between these variables. Lamoureux and Lastrapes (1990) examined the presence of ARCH/GARCH based on the hypothesis that daily returns are generated by a mixture of distributions using trading volume as a proxy for the rate of daily information arrival. They find that volatility persistence vanishes under the presence of trading volume series in the
conditional variance equation. Brailsford (1996) found that the direction in price change was significant across three measures of daily trading volume for the aggregate market and was significant for individual stocks. An overwhelming number of studies have examined both theoretical and empirical relationship between future return, trading volume and open interest. Bessembinder and Seguin (1993) investigated the relations between volume, volatility, and market depth in eight physical and financial futures markets and suggested that unexpected volume shocks have a larger effect on volatility, the role of open interest provides information to mitigate volatility and he suggested that the volatility-volume relation in financial markets depends on the type of trader. A large number of studies have been conducted at international level to test the relationship between futures return, trading volume and open interest contacts, whereas in India the empirical works are quite limited. Pati & Kumar (2006) tested the maturity, volume effects and volatility dynamics for Indian futures market and suggested that time-to-maturity is not a strong determinant for futures price volatility, but rate of information arrival proxies by volume and open interest are the important sources of volatility. Finally, they concluded that Samuelson Hypothesis does not provide support for Indian futures market so the investors should not base their investment decision on time-to-maturity with the background of existing literature. The current study attempts to shed light on the chemistry among variables by examining the dynamic relationship between
future return, trading volume and market depth for stock futures contracts in India.

As far as modelling and forecasting is concerned, there exist a strand of literature focusing on the modelling and forecasting of equity markets by Akgiray (1989), Dimson and Marsh (1990), Pagan and Schwert (1990), Bollerslev et.al (1992), Francis and Van Dijk (1996), Brailsford and Faff (1996), McMillan, Speight and Gwilym (2000) and Brooks and Persand (2002). The observations of these studies are; First, large changes tend to be followed by large changes and small changes tend to be followed by small changes, which mean that volatility clustering is observed in financial returns data. Secondly, financial time series data often exhibit leptokurtosis, which indicate that the return distribution is fat-tailed as observed by Mandelbrot (1963), Fama (1965), Laurent and Peters (2002). Finally, changes in stock prices tend to be negatively related to changes in stock volatility which is identified to be “leverage effect” Black (1976), Christie (1982), Nelson (1991), Koutmas and Saidi (1995).

There exist literature on modelling and forecasting volatility at international level, however only a limited attempt has been made the Indian stock market. Varma (1999) examined the volatility estimation models comparing GARCH and EWMA models in the risk management setting. Pandey (2002) analyzed the extreme value estimators and found the performance with
Parkinson estimator for forecasting volatility over these horizons. Karmakar (2005) has estimated that the movement in stock returns volatility is not explained by the fundamental economic factors, but reported the presence of ‘fade’ due to the actions of noise traders, liberalizing policies and procedures of the government. Kumar (2006) examined the comparative performance of volatility forecasting models in Indian markets and the results were found contrary to Brailsford and Faff (1996). Still, further research is needed to forecast the volatility of futures market for an in-depth understanding about the behavioural characteristics of Indian capital markets, and to fill the gap in the existing literature.

In India as of now there is no scientific study that used some of the modern econometric techniques to measure the relationship between price volatility, trading volume and market depth in stock futures market and to identify a suitable model for forecasting stock future markets volatility. There are some studies, which used Granger Causality test, GARCH (1,1) and EGARCH (1,1) model. Therefore, in this study Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test were used to check the stationarity of the series. The GARCH class family models and ARIMA model were used to evaluate the relationship, modeling and forecasting twenty five future securities.
On the above backdrop, the main objectives of the present study are:

1. To study the conceptual framework of derivatives and development of derivatives market in India.
2. To assess the dynamic relationship between price volatility, trading volume and market depth for select stock futures contracts in India.
3. To identify the suitable model to forecast volatility for stock futures contracts in India.
4. Finally, to summarize the findings and provide suggestions for the policy makers, academicians and research community.

The study is purely based on the secondary data for examining futures market in terms of relationship, modelling and forecasting volatility in India. The study period spanned from January 2003 to December 2008 with a sample of 25 stock futures contracts in India. During the sample period, the futures securities traded from 9:55 A.M to 3:30 P.M. All the required information for the stock futures contracts was collected from National Stock exchange (NSE) and their contract specifications, trading details were retrieved from their website terminal (www.nseindia.com). Out of the three types of contracts that are usually traded in the futures markets (i.e.) near month, middle month and far month futures contracts, near month futures contracts are considered for the purpose of analysis, because most trading activities take place in the near month
contracts than on the other two types of contracts. The data were analyzed by using the econometric software package Eviews.

The earlier literature pertaining to the relationship between price volatility, trading volume and market depth in stock futures market and models for forecasting stock future markets volatility were reviewed which have formed the base of the present study. Most of the studies concluded that there exist a positive relationship between return and trading volume series. But, as far as modeling and forecasting futures market volatility is concerned, the Ordinary Least Square (OLS) model was found to be the earliest and simplest model to forecast the volatility behaviour of share market as per risk evaluation criteria. But, normally the OLS model does not takes into account of serial correlation problem. As far as non linear models, the asymmetric model is considered to be the more appropriate model to measure the effect of “good news” or “bad news” using in sample and out sample forecast error statistics criteria. It was also found out that most of the studies were related into the international level and Indian studies were found to be very limited related to testing the relationship between price volatility, trading volume and market depth in stock futures market and to identify a suitable model for forecasting stock future markets volatility. At the national level, further study can be conducted by taking the latest available data.
In Chapter III, the study discussed the concept and types of the derivatives and its instruments such as: forwards, futures and options. A forward or futures contracts involves an obligation to buy or sell an asset at a certain time in future for a certain price which are called calls and puts, respectively. A call option gives the holder the right to buy an asset by a certain date for a certain price. Derivatives have been very successful innovations in capital markets. Three types of traders can be identified in these markets (i.e.) hedgers, speculators and arbitragers. Hedgers are in the position where they face risk associated with the price asset. They use derivatives to reduce this risk. Speculators wish to bet on future movements in the price of an asset. They use derivatives to get extra leverage. Arbitragers are in business to take advantage of a discrepancy between prices in two different markets. This chapter discussed more detailed about futures market. Along with this, the relationship between spot and futures prices that can be explained by two models they are Cost of Carry model and Expectations model. Indian derivative market along with the mechanics of trading, its economic and social functions of derivative market and the various factors affecting futures markets are discussed in this chapter.

In Chapter IV investigates various unresolved issues regarding futures markets, using formal methods appropriate for inferring causal relationships between price movements, trading volume and market depth for stock future contracts. The initial results of the study were observed with various
characteristics like volatility clustering, leptokurtosis and asymmetry effects etc. However, an attempt was made to estimate the market depth and volatility by using various GARCH types of models to draw valid conclusion. The findings of the analysis suggest that the information in trading volume is simultaneous for all investors except HCLTECH and ONGC stock futures contracts. Only, for these two stock futures contracts the information was found to have taken a long time to die out, indicates that information is persistent. On the other hand the major market moves towards the end of each day were observed with a lagging period of four days for all the contracts except ITC stock futures. This shows that the contracts are not closed at the end of a day and the information gets carried till the end of fourth day. Our findings indicate that there is a positive relationship between return volatility, trading volume and open interest variables. The futures return volatility is influenced by both expected and unexpected trading volume and open interest respectively, but the unexpected components has more impact on volatility than the expected components. In addition, the returns were found to be influenced by lagged volatility. The market depth was found not having any effect on volatility. Finally, our results indicated that unexpected components prices to be more important information for both practitioners and researchers which supports sequential information arrival hypothesis and mixture of distribution hypothesis in stock futures contracts.
In Chapter V compares the performances of various volatility forecasting models through linear and nonlinear approach by using in-sample and out-sample forecast error statistics Root Mean Square Error and Mean Absolute Error. Our analysis attempted to forecast volatility and to identify which model is the appropriate model for forecasting the volatility characteristics according to statistic and risk management evaluation criteria, the autoregressive model and linear regression models rationally shared and ranked first for out-of-sample forecasts in the Root Mean Square Error (RMSE) statistics. In nonlinear model the IGARCH model dominates the forecasting performance and it was considered as the best model followed by TGARCH model. Despite its mathematical and statistical simplicity, the IGARCH model provided the most accurate forecast compared to other competing models in the study.

**Policy Implication from the Study:**

1. The results pave the way for the investors that negative shocks have larger impact on volatility than the positive shocks and unexpected components will have a greater impact on futures market returns which is due to the structural changes, global impact and herding behaviour in stock markets.

2. The results of the study suggest that open interest does not have any effect on volatility, so the market players can understand that the market depth does not influence the volatility.
3. The study observes that the futures market increase the efficiency of the market by providing information to decision-makers and planners to cater the needs of the market participants.

4. The study reveals that volatility in futures market is due to the powerful influence of exogenous factors like interest rates, discount rates etc.

5. The fluctuations in underlying assets is mainly based upon the margin requirements, which seduced the market participants to play a dominant role in derivative market, So Clearing house should increase the margin requirements for membership in terms of capital adequacy (Net Worth, Security Deposits).

6. Hedgers and Speculators are the two market participants interested in knowing the results, Hedgers enters the futures market to offset the risk of substantial loss in the future, while speculators take positions based on their expectation of the movements of that contract. So, investors should base their decision based upon trading volume.

7. In the light of results and recent developments in derivatives market, the open positions of the members are marked to market based on contract settlement price for each contract at the end of the day, so SEBI should consider to settle difference on cash basis at T+1.
8. Clearing members serves as a trading terminal for monitoring the open positions for all the trading members in clearing and settlement system. A clearing member may set limits for a trading members clearing and settling through him. National Security Clearing Corporation Limited (NSCCL) assists the clearing member to monitor the intra-day limits set up by a clearing member and whenever a trading member exceeds the limits, it stops that particular trading member from further trading.

9. Finally, the findings of this study has a message for the market regulators that risk management practices should be further strengthened to take care of greater market volatility associated with an increase in the volume of trading.

**Limitation of the Study:**

Since this study is based upon the secondary data, all the limitations inherent to the secondary data will also be applicable to this study. In this research work, our special focus is to examine the relationship, modelling and forecasting volatility for select stock futures securities in India. The overall structural patterns, volatility behaviour and persistence of information for stock futures contracts are alone considered for the period. The research opens an area for further study of using other key determining variables like Inflation Rates,
Industrial Production Index, Gross Domestic Product, Money Supply and Exchange Rate etc. are the factors not taken into account. This might have resulted in more consolidated results than the univariate analysis employed in this research.

Broader and long term issues involving Foreign Institutional Investment, Foreign Direct Investment and Global Meltdown impact in India and their Nation wide implications have not been discussed in this research. The micro structure aspects of stock futures contracts returns have not been attempted. Moreover, the analysis is done on stock futures of National Stock Exchange (NSE) alone which only constitutes 99 per cent of the market share rather than Bombay Stock Exchange’s Sensitive Index (Sensex) which contains thirty major companies of India. The thesis work is limited to the period from January 2003 to December 2008 and is based on daily data. In spite of these limitations, it is hoped that the findings will be applicable to identify the status for developing derivative markets.

**Agenda for Further Research:**

The results of this dissertation present several questions that deserve further research. Some of these issues relate directly to the futures market volatility while others do not. So, an in depth analysis is required at International level between the developed and emerging markets, will be an interesting areas
yet to be answered by the researchers for the investors community. Finally, several directions for future research could be investigated to improve the volatility behaviour of Indian financial time series; they are

1. International comparison between futures contract returns and trading volume will be useful to predict the characteristics of Indian stock markets.
2. Relationship between returns and volume change by considering the seasonality effect.
3. Long run persistence of shocks in the volatility with fractionally integrated models would certainly allow catching better dynamic of the series.
4. Forecasting volatility by using the macro economic variables like Inflation, Money Supply, Foreign Institutional Investors and Industrial Production Index.
5. Measuring the impact of derivatives on the underlying spot market.
6. Price discovery and volatility spillovers between spot and futures market.
7. Testing the hedging effectiveness of stock futures contracts.
References:


