Chapter 1

Introduction

1.1 Background

Financial sector has seen significant developments especially towards the end of twentieth century. The collapse of the Bretton Woods system\(^1\) of fixed exchange rates in 1971, and thereafter, progress in financial liberalization paved the way for growth of international financial transactions. This new era of financial globalization came along with numerous kinds of financial innovations and new risk management strategies. Notable among them was the birth of financial derivatives and rapid increase in their use. Presence of financial derivatives created an environment where speculation rather than productive economic enterprise became a dominant activity. Frequent financial crises during last three decades have raised concerns about the economic impact of these new instruments among market participants, policy makers and economists. The stock market crisis which occurred on 19\(^{th}\) October, 1987\(^2\) resulted in largest one-day drop in the history of NYSE. Other markets including Hong Kong and Europe were significantly affected. Pro-

\(^{1}\)Following the Second World War, in 1944, the Bretton Woods system replaced gold with US$ as the official reserve asset. Due to concerns about America’s rapidly deteriorating payment situation, the convertibility of dollar into gold was suspended on 15\(^{th}\) August, 1971. Speculation against the dollar in March 1973 led to the birth of the independent float, thus effectively terminating the Bretton Woods system.

\(^{2}\)The crisis of October, 1987 is referred to as Black Monday.
gram trading, over-valuation, illiquidity and market psychology were identified as the major causes behind the crisis. Almost a decade later in August, 1997, Asian crisis started with similar symptoms. The impact of this crisis immediately spilled over onto Frankfurt, Paris, Hong Kong and Tokyo exchanges triggering major losses. The primary cause behind this crisis was manipulation of prices using future and option trading in equity and foreign exchange markets. Derivatives played a key role in precipitating both the crises. It was also observed that volatility was unusually high during this period. Hence, abnormally high volatility related to derivative trading is a cause of concern and worry for regulators and policy makers. The most recent crisis that our study also covers, i.e., the Sub-Prime crisis, again showed presence of high volatility.

A financial crisis is a disturbance to financial markets and is associated with falling asset prices, high financial market volatility and problems of illiquidity and insolvency among financial market participants. The crisis spreads through the financial system, disrupting the market’s capacity to allocate capital (Bordo et al., 2001; Eichengreen and Portes, 1989). These crises are complex events caused by multiple reasons. There are three different strands of explanations available in literature for their predominant appearance in late twentieth century. Wagner and Berger (2004) and Calvo et al. (1996) argue that sudden capital stops is the main reason behind recent crises which means that growth advantages due to greater inflows of foreign capital were greatly diminished. Another strand points towards insufficient regulations or weak financial and monetary institutions as the key component of financial crises (Shimpaleea and Breuer, 2006; Leblang and Satyanath, 2006; and Claessens et al., 2004). Yet another major strand of literature, which we are focusing on, points towards the role of financial derivatives in causing extreme financial market instability leading to crisis.

According to Steinherr (2000), derivatives are the dynamite of financial crises and their exponential growth in last few decades has made financial crises considerably more virulent. The opinion of Steinherr (2000) is part of the ongoing debate about the desirability and undesirability of derivative instruments which empha-
sizes that their use constitutes a threat to financial market stability. Derivatives are an effective vehicle for excessive and leveraged speculation which may cause financial instability by increasing financial market volatility and by creating new types of risks. High volatility impairs the basic price building process and makes it difficult to price the risks which enhance the financial market instability.

The arguments presented in above paragraphs are further strengthened by CBOE VIX which closed well above its overall median daily closing level in October, 2008 when the impact of Sub-Prime crisis had propagated to almost all the countries. VIX is an important barometer of investor sentiment and is called investor fear index, Whaley (2009). The high values of VIX during crises period indicate that there is a correlation between high financial market volatility and periods of financial market instability (IMF, 2007). Although volatility has been very high during the recent period of financial turmoil and there is a significant growth in the development of markets for financial derivatives at the same time, it is not conclusively confirmed that speculative activity related to derivatives has caused the high volatility and thereby the recent crisis. This argument can only hold when it is proved that

*Derivative trading increases speculation;*

*Speculation increases financial market volatility;*

*Volatility increases financial market instability and thus the probability of financial crisis.*

First part of the argument can only be partially accepted as derivative trading is also used for hedging purposes but other parts are vague and are still open to debate. It has not been conclusively proved that high volatility due to speculative activity causes instability. Although, Illueca and Lafuente (2003) do point out that

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3Risk, in economics of finance, denotes the range of variability of expected returns, including possibilities of both loss and profit. Various types of risks include financial risk, interest rate risk, exchange risk, business risk and market risk etc.
high volatility leads to higher risk premium under risk aversion. The transmission of volatility from futures to spot market raises the required rate of return of investors in the market, leading to a mis-allocation of resources and a potential loss of welfare in the economy.

A number of studies have examined the effect of futures trading on the volatility of the underlying market. Ryoo and Smith (2004); Pok and Poshakwale (2004); Gulen and Mayhew (2000); Antoniou and Holmes (1995); Kamara, Miller and Siegel (1992); Lee and Ohk (1992); Brousseau et al. (1991); Schwert (1990); Damodaran (1990); Lockwood and Linn (1990); Harris (1989); Gilbert (1989); Stein (1987) and Figlewsky (1981); among others, report a positive relation between derivative trading and variances of the stock returns, implying that volatility has increased after derivative trading began. According to Ryoo and Smith (2004), the increase in volatility could be due to destabilizing effects of futures trading associated with speculation whereas Pok and Poshakwale (2004) attribute it to increase in flow of information to the underlying market. Hence, all above mentioned studies do not conclude that the derivative trading increases volatility due to speculation and the resulting high volatility destabilizes the underlying market.


Further, there are studies which report insignificant impact of derivative trading on spot market volatility (Rao and Tripathy; 2009; Debasis, 2009; Mallikarjunappa and Afsal, 2008; Kumar and Mukhopadhyay, 2007; Spyrou, 2005; Shen-
These studies accept the stabilization hypothesis and support the view that futures markets play an important role of price discovery, and have a beneficial effect on the underlying cash markets. According to Yu (2001) and Gulen and Mayhew (2000), the effect of futures trading on volatility of spot market may be varying because of difference in time period, model specification, and/or structure of the markets examined and other macroeconomic factors.

In Indian context, it is found that most of the studies which report a categorical decline in volatility take a very short period of 1-3 years on each side of introduction of derivatives in India whereas the studies which take relatively longer period of about a decade around introduction of derivative trading do not agree that volatility has decreased although they do report change in structure of volatility.4

These results are not very encouraging and warrant further study on the subject to shed more light on stabilization/destabilization hypothesis related to derivative trading. The first aim of our research work proposes to solve these issues by explaining the relation between speculation, volatility and instability based on theory; and using empirical techniques to assess the impact of derivative trading on volatility of spot market. More than a decade has passed since derivative trading started in India and the markets have matured considerably, hence, this is an opportune time to re-examine this issue.

Another issue which is closely related to the first aim is the effect of derivative expiration on volume, return and volatility of the underlying market. Derivative contracts call for cash settlement on the expiration day. The trading and manipulation activities of speculators and unwinding of cash positions by arbitrageurs in the cash markets sometimes cause distortion to price, volume and volatility near

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4Except Maniar (2007) who examined the post-derivative period of six years from 2001 to 2007 and reported a decline in volatility
the expiration day. If many arbitrageurs liquidate at the same time and in the same direction, price and volatility effects are possible. Speculators can also make deliberate attempts to manipulate prices. The severity of these effects partially depends on the stock market procedures for accommodating order imbalances. Considering the fact that large number of derivative transactions takes place on this day, the magnitude of these potential side effects can be large. Also, since index arbitrage is typically executed with expensive computer technology, the potential benefits are reaped by only a small number of institutional investors, but the side effects are suffered by all market participants.

Many previous studies have pointed towards significant expiration effects in terms of high volume and volatility. Dobano (2011); Debasis (2010); Tripathy (2010); Fung and Yung (2009); Bodla and Kiran (2008); Jindal and Bodla (2007); Vipul (2005); Alkebeck and Hagelin (2004); Mayhew (2000); Stoll and Whaley (1997); Karolyi (1996); Schlag (1996); Swidler, Schwartz, and Kristiansen (1994) and Pope and Yadav (1992); found significant volume affects on account of expiration days. Apart from higher volume Stoll and Whaley (1991, 1990, 1987 and 1986) also found evidence of a reversal of the Index. Maniar, Bhatt, and Maniyar (2009); Jindal and Bodla (2007); Lien and Yang (2005); Thenmozhi and Sony (2004); Chow et.al. (2003) and Stoll and Whaley (1997) found increased volatility in individual stock returns. Chamberlain, Cheung, and Kwan (1989) for TSE 300 Index; Barone-Adesi and Cyr (1992) for the TSE 35 Index on Toronto Stock Exchange and Illueca and Lafuente (2006) for Spanish Exchange found that price reversals, higher trading volume, and higher volatility are associated with expiration days. On the other hand, Lien and Yang (2003); Corredor, Lechon, and Santamaria (2001) in Spain; Gannon (1994) in Australia; Bacha and Vila (1994) in Japan; found no significant expiration-day effect on cash-market volatility. This indicates that, world over researchers are unanimous about the volume effect of expiration day.\(^5\) The impact on returns and volatility, however, is not clear. Some

\(^5\)Only Lien and Yang (2003), Felixson (2002) and Bollen and Whaley (1999) have found insignificant volume on expiration day.
studies show return reversal whereas others do not. Similarly, some researchers report high volatility and others find it insignificant.

In case of India, most of the studies are reporting significant expiration effect during a period of 4-6 years after introduction of derivatives in 2000. Indian researchers also agree on volume effects while the results regarding price effects and volatility effects are mixed. Since researchers in India and abroad are not unanimous about volatility effect, it needs to be further examined whether and to what extent the expiration effects add to higher than normal volatility and whether this volatility has a detrimental effect. Our study proposes to use a longer period to get comprehensive results on all the three variables, viz, return, volume and volatility, for this emerging market by using econometric models. Hence, the second aim is to analyze the impact of derivative expiration on spot market volume, return and volatility.

Above paragraphs amply prove that volatility is an important attribute of stock market. Regulators measure the performance of a market in terms of volatility. Speculators prefer high volatility as it gives them an opportunity to earn profits. Investors, on the other hand, consider volatility as unwanted fluctuations in the asset prices. An important implication of volatility for investors and speculators, which is our third aim, is its impact on return. Hence, relation between volatility and return has been an important topic for researchers. The capital asset pricing model and arbitrage pricing theory provide a theoretical foundation for this relationship.

Many studies have found the evidence of positive relation between the mean and variance of market returns which supports the basic prediction of several asset pricing models (Lundblad, 2007; Leon, Nave and Rubio, 2007; Lanne and Luoto, 2007; Maheu and McCurdy, 2007; Pastor, Sinha and Swaminathan, 2006; Pastor, Sinha and Swaminathan, 2006; Bali and Peng, 2006; Yakob and Delpachitra, 2006; Guo and Whitelaw, 2006; Ghysels, Clara and Valkanov, 2005; Bansal and Lundblad, 2002; Campbell and Hentschel, 1992; Chou, 1988; and French, Schwert and Stambaugh, 1987). This implies that changing conditional variances directly affect
the expected return on a portfolio. This variance is termed as risk and the profit gained through investments in securities is called return. The direct relationship between the two means that if an investor decides to invest in a security that has a relatively low risk, the potential return on that investment is typically fairly small. Conversely, an investment in a security that has a high risk factor also has the potential of higher returns.

In contrast, Mandimika and Chinzara (2010); Bekaert and Wu (2000); Nelson (1991), Bree, Glosten and Jagannathan (1989); Fama and Schwert (1977); Black (1976); and Cox and Ross, (1976) found a negative association. Kumar and Dhankar (2010) found a significant and negative risk-return relationship between stock returns and conditional volatility whereas a significant and positive relation was found between returns and standardized residuals, i.e., investors expect extra risk premium for unexpected volatility. Yokob and Delpachitra (2006) found it significant and positive in only two countries, i.e., China and Malaysia, out of 10 countries that they studied. Harvey (2001), Glosten et.al. (1993), and Turner et al. (1989) found both a positive and a negative relation depending on the method used. Baillie and DeGennaro (1990) found it to be insignificant in seven out of their eight specifications. Fraser and Power (1997) reported that in none of nine emerging markets were the coefficients significant, indicating the lack of a trade-off. This shows that the results are not conclusive. On one hand, many studies report a positive relationship whereas on the other hand almost equal number of studies report negative relationship. Not only this, some researchers also report mixed results or insignificant relationship.

Market participants are interested in return on their investment and use derivatives to increase their earnings. Hence, from the point of view of investor it is important to find the impact of volatility on return. Our study proposes to use econometric models to evaluate this relationship in Indian context with reference to introduction of derivative trading. It examines it in both pre-derivative period and post-derivative period to find out how derivative trading has altered it. Thus, the impact of derivative trading on risk-return relationship is the third aim of this
research work.

The Indian securities market has been using derivatives in some or the other form for more than 150 years but the real boom came in 1990s only. The liberalization process that commenced in 1991 allowed foreign investors to invest directly in the stock markets. National Stock Exchange of India started operation in 1994. It pioneered nationwide electronic trading, set up clearing corporation and allowed paperless settlement of trades at the depository. This resulted in lower settlement and transaction costs; greater transparency; and fraud mitigation. Despite these efforts major structural problems persisted. Presence of trading cycles and absence of rolling settlement had given rise to leveraged derivative-type trading within cash market. Following Asian crisis (1997-98), Indian markets embarked on a period of fundamental transformation and many financial sector reforms were initiated to curb spot volatility. In 2000, Government and regulators took few major decisions which revolutionized the Indian capital market. They introduced rolling settlement; banned carry forward trading and introduced derivative on Indian exchanges. The aim was to provide tools for risk management to investors and to improve the informational efficiency of the cash market. As a result of this, last decade witnessed major transformations and structural changes in the Indian market. It is yet to be seen if these changes succeeded in curbing volatility, especially, whether the high volatility observed in Indian market during Sub-Prime crisis of 2007-08 was related to derivative trading and to what extent it destabilized the Indian market.

NSE established itself as the sole leader in derivative segment in the country and accounted for 99% of the market share in 2010-11. It played a catalytic role in reforming the Indian securities market in terms of micro-structure, market practices and trading volumes. Both the derivative and the cash market have been well integrated with uniform trade practices and trade timings. NSE manages both the cash and derivative segments. Screen-based trading allows the arbitrageurs to use computer programs for identifying arbitrage conditions and ensures quick execution of orders. Index and stock-based derivatives are traded in monthly
series; the expiration date for each series being the last Thursday of the expiry month, i.e., Indian market experiences the quadruple witching day. At any point of time, three monthly series are traded side by side and are cash settled on the expiration or an early exercise. During 2001-08, highly liquid index futures and options provided a simple and efficient arbitrage opportunity to traders. Futures and options contracts were cash settled so there was no direct pressure due to delivery demands on the cash market on expiration days. As opposed to these facilitators of a smooth arbitrage, short sales in the cash market were banned during this period by the market regulator SEBI which may have constrained the arbitrage transactions requiring a short position in the cash market. After 2008, the ban on short-sales was lifted. Since then there is significant increase in use of computer programs for doing arbitrage. This is known as algorithmic trading. It is yet to be seen if these changes have altered the impact of expiration day on the volatility of Indian spot market.

A growing number of market participants; growth in volumes; reduction in transaction costs; significant improvement in efficiency, transparency, and safety; level of compliance with international standards; best of risk management framework for exchange-traded derivatives; and increasing efforts for centralization of OTC markets have earned for the Indian securities market a new respect among the securities markets in the world. However, considering the short history of only a decade of futures and options trading in India and the presence of several market frictions and restrictions that might have hindered the efficient operation of Indian securities markets, a study of the effect of futures and options trading on spot market during complete last decade is warranted for the Indian capital market. It will also help clarify issues mentioned in above paragraphs. A long period faces all weathers and also makes the markets mature; hence implications from a careful study will be of importance to regulators and policy makers. It will help market participants take appropriate financial decisions and thus will help in building a more effective market operation system in India.
1.2 Purpose of the Study

To address the concerns related to implications of derivatives trading, this thesis examines the following questions with respect to an emerging market India:

1. How do derivatives affect return, volume and volatility in spot market? Does derivative trading increase financial market volatility and poses a threat to financial market stability?

2. Is there any significant link between volume & returns; and volume & volatility in spot market? Does derivative trading alter these links?

3. Is there any significant relation between risk and return in spot market? Does derivative trading alter this relationship?

4. How does expiration of derivatives affect spot return, volume and volatility?

5. Are there any significant changes in structure of volatility during post-derivative period? Is there any link between derivatives, volatility and Sub-Prime crisis?

1.3 Scope and Significance of the Study

Our study analysis the impact of derivative trading on Indian Capital market which comprises of equity and bond market but we have focused on equity market only. We have not considered currency derivatives, interest rate derivatives and commodity derivatives either. We have selected equity markets with a view to make an in-depth study of this important segment of financial markets. This has also been done to ensure that study does not become unwieldy. Till few years back India had two main exchanges namely BSE and NSE; and NSE accounted for most of derivative trading till 2010-11. Hence, we are considering the equity and derivative market segments of this exchange. The daily data on its benchmark spot index S&P CNX Nifty forms our return and volume series. It is a diversified index, accurately reflecting the overall market. It includes 50 largest and most
liquid Indian securities and covers 23 sectors of the Indian economy as of November 2011. We have also used daily data on S&P500 US spot index to judge the impact of this developed economy on Indian market. The reason behind using US data is its high correlation with Indian data.\footnote{The correlation coefficient of S&P CNX Nifty and S&P500 data is 0.17.}

The study period extends from 3rd January, 1995 to 30th June, 2011. The data, in the form of Nifty closing prices, has been obtained from NSE website www.nseindia.com. The Nifty volume data, however, is available from 2nd January, 1997 only. Daily data on S&P500 index has been obtained from Yahoo Finance website. Since the study period is long, hence, we could not find a proxy variable during this period on which derivatives were not introduced. Although, we have used lagged Nifty returns to assess the impact of domestic market.

The data of the two indices did not match completely as there were some days when trading took place in Indian market but not in US market and vice versa. Apart from this, data of some special or gazetted holidays was also not available. These missing values have been filled with previous day’s closing price of respective indices. This common procedure guarantees a continuous data sample which is necessary for estimating GARCH models which we propose to use for calculating conditional volatility of Indian spot market. After matching Nifty with S&P500 we got approximately 3930 observations. The study period is then divided into two parts based on a statistical test.\footnote{Chows test has been used for the purpose.} The pre-derivative period runs from 3rd January, 1995 to 9th June, 2000 and post-derivative period runs from 12th June, 2000 to 30th June, 2011. To effectively analyse the post-derivative period of more than a decade, we again divide it based on the statistical test into three sub-periods. The first period runs from 12th June, 2000 to 16th May, 2004; second period runs from 18th May, 2004 to 10th September, 2008; and third period runs from 12th September, 2008 to 30th June, 2011.

Spot market volatility is a significant indicator of effect of derivative trading. High volatility can cause mis-allocation of resources in spot market and lead to
losses. In extreme case, it can destabilize the market to an extent that a crisis-like situation can develop. Hence, regulators and policy makers in India have always been interested in knowing the status of volatility, especially, after introduction of derivative trading in India. Our study proposes to use GARCH and three asymmetric models viz., TGARCH, EGARCH, PGARCH models to evaluate the impact of derivatives. GARCH model has properties which suit the Indian environment (Debasish, 2009; Rao and Tripathy, 2009; Mallikarjunappa and Afsal, 2008; Maniar, 2007; Kumar and Mukhopadyay, 2007) and its use will also facilitate an easier comparison with existing estimation results. GARCH model also helps in removing excess kurtosis in returns.\footnote{The analysis of Nifty spot index in chapter 5 of this thesis shows kurtosis much higher than 3 in all the sample periods considered.}

Using asymmetric models mentioned above, the study adequately addresses the issue of asymmetric (leverage) effect in the Indian market and clearly shows that the asymmetric effect is present in Indian market during all the periods considered. We give a comprehensive analysis of impact of derivatives and its expiration on all the three popular variables of spot market, viz., return, volume and volatility using both primary and secondary data. Not only this, we also explore the impact of derivatives on inter-play of these variables, i.e., we also explore the volume-return link, volume-volatility link and risk-return relationship.

The analysis of previous Indian studies shows that the researchers who have taken a small period around introduction of derivatives report reduction in volatility whereas researchers who have taken relatively longer period report inconclusive results. Hence, there is a significant lack of long-term empirical studies on this subject with respect to Indian market and this study fills this gap as it uses the longest possible period before and after introduction of future trading in India leaving behind the high figures of notional trading volume and tremendous success of futures on individual stocks. According to Aggarwal (1988), a small amount of time does not allow derivatives to mature and index arbitrage & other trading strategies based on derivatives do not become an important activity immediately after their
introduction. Apart from this a large number of time-series observations are also essential to obtain reliable GARCH parameters.

Study on volatility would be incomplete without a reference to spot volatility on derivative expiration day. The analysis of expiration effect is particularly relevant because the investor, who bases his strategy on a study of the recent historical series of returns, trading volumes and volatility, could arrive at an optimal strategy for making profits and keeping his risk to a minimum on the Indian spot market. Studies in developed markets have shown significant impact of this day on spot return, volume and volatility. But researchers are not unanimous about the impact. In Indian context, researchers agree on the volume effect but there is no consensus on return and volatility effect. As mentioned earlier, the review of Indian literature reveals that most of the studies are using a small period of 4-6 years to arrive at a conclusion. Our study uses a long period of about a decade to get conclusive result on all the three variables. Further, along with symmetric GARCH model we also use three asymmetric models to confirm the impact of derivative expiration. Power-GARCH model, one of the asymmetric models used in this study, has not been used for this purpose by any researcher. This model directly calculates conditional volatility instead of variance. Hence, this study proposes to fill the gap and extend the prior studies by finding alternative investment opportunities available in the market in the pre-expiration period and expiration period.

Apart from finding the impact of derivative trading on spot volatility, our study also finds the implications of this volatility for Indian capital market. To achieve this we also analyze the risk-return relationship. The review of earlier studies on Indian market suggests either positive or insignificant results that too by using a short period after introduction of derivatives in India. Some researchers argue that CAPM is valid in Indian market while others do not agree. Following Lundblad (2007), we take a relatively longer period of about 17 years to get significant results using symmetric and three asymmetric GARCH-M models. Further, to see the impact of derivative trading on this relationship we explore it in pre-derivative as well as post-derivative periods. No previous Indian study has evaluated this
relationship while keeping introduction of derivative trading as a central event.

For all the above mentioned work, we are primarily employing event study methodology using a combination of price and volume data. Hence, exploring volume-return link in this case would provide insight into the structure of financial markets and would add to the existing debate over the empirical distribution of speculative prices (Karpof, 1987). Significant volume-volatility relationship would point towards predictive power of volume in explaining future volatility. Thus, to explore the impact of derivative trading on these links we are evaluating them in both pre-derivative and post-derivative periods.

In a decade long post-derivative period, India has faced many challenges. Many regulatory reforms were introduced and successfully implemented. To better understand the structure of conditional volatility during this period we, further, divide it into three sub-periods and scrutinize it by applying the models on these sub-periods.

To compare the performance of three asymmetric GARCH and GARCH-M models we have used the measures of RMSE, MAE and MAPE. The model, which gives the least value of all the measures, is considered best in a particular period. Eviews 7.0 econometric package has been used for evaluating the models.

Finally, to confirm our results on secondary data and for taking the perception of market participants on implications of derivative trading we have also collected primary data. For this purpose we administered a questionnaire to selected members of NSE, BSE and other regulatory bodies such as SEBI who have long experience and knowledge of derivative operations and their opinion has been assessed using SPSS statistical package.

1.4 Sources of Data

NSE started equity trading in 1994 and established itself as a market leader in the derivative segment. S&P CNX Nifty is its well diversified index consisting of 50 liquid stocks; hence the study considers Nifty as a proxy for the Indian stock
market and uses its time series data to see the impact of derivative trading on stock market volatility. Daily closing prices for a total period of 17 years from January 3, 1995 to June 30, 2011 are used. The pre-derivative period runs from January 3, 1995 to June 9, 2000 and post-derivative period runs from June 12, 2000 to June 30, 2011. To separate the impact of US market (which is a proxy for world in our study) from that of domestic market on volatility, the data of S&P500 index is used as an additional independent variable.

To complement secondary data we have also used primary data. A questionnaire has been designed for this purpose and is administered to members and sub-members of NSE, BSE and SEBI.

1.5 Research Methodology

In order to assess the implications of derivative trading for Indian capital market we will examine the existing theoretical literature to gain insight about the nature of relationship between derivative trading, speculation, volatility and financial market stability. This will help us understand whether derivative trading encourages excessive speculation and enhances volatility and under what circumstances this heightened volatility constitutes a threat to stability. This can be done in two ways: one, by elaborating the benefits and risks associated with the use of derivative instruments and showing how derivative instruments might reinforce the factors that turn volatility into financial market instability; two, by reviewing the theory of speculation to explain the impact of derivative trading on financial market volatility.

For all the research questions identified above we will use an empirical, deductive and quantitative approach. It is most suitable approach as the study is based on theory and hypotheses have already been formulated. These hypotheses are concerned with cause & effect and relationship between variables. They will be empirically tested using econometric models to arrive at results. Since we will be testing and fitting existing models to Indian market, our approach is exploratory...
in nature.

To confirm our empirical results on secondary data and to study the perception of market participants on this topic we will again use deductive and quantitative approach and develop a questionnaire. This questionnaire will be used to take feedback on the topic. Non-probability, purposive, judgmental sampling technique will be used for selecting the members and sub-members of NSE, BSE and SEBI as respondents. The feedback will then be statistically analyzed to arrive at a conclusion. Full details of research methodology used are presented in chapter four of this thesis.

1.6 Limitations of the Study

Our study is focusing on equity and derivative market segments of NSE as they are the most active segments during the period of study.

Second, Nifty, the benchmark index of NSE, well represents the Indian economy. Hence, it has been used to evaluate the impact of derivative trading and its expiration in our study. We do not cover individual stocks due to it becoming unwieldy and requiring much more time. Further, index being aggregative and representative in its nature, the usefulness of the study does not get much affected by not taking individual stocks.

Third, the study uses only daily data and does not use high frequency data. The study undertaken is, however, unique as no study of this nature covering such a long period making a detailed analysis seems to have been undertaken by any other research scholar. In fact a long period faces all weathers and the results of the analysis become more reliable for studying the market behavior.

Fourth, while analysing the Nifty returns we found that the values of relevant dummies and other coefficients were significant only at very high lags in the symmetric and asymmetric GARCH models. Further, the analysis of three sub-periods of post-derivative period indicated that the data of the period January 2008 to March 2009 was highly non-normal as it was giving extremely high JB
statistics. On removing this highly volatile data from the analysis of full-period and post-derivative period we could calculate significant values of all dummies and coefficients at lag 1. Due to this we were left with 3652 observations out of 3930 initially taken by us. However, for the three sub-periods of the post-derivative period we retained the data of this period. The details of running GARCH and its asymmetric counterparts by including the data of 2008 are shown in Appendix A.

1.7 Future Scope of Study

As stated earlier, the focus of our study is NSE’s equity market, separate study can be undertaken on bond markets. Impact on individual stocks and other sectoral indices of new exchanges can also be evaluated.

The research can be further expanded by selecting and analysing high frequency intra-day data and by inclusion of additional economic variables in the GARCH conditional variance equation. Multivariate GARCH can also be employed for this purpose.

After Sub-Prime crisis, Indian Government has been trying to centralize the trading of OTC markets; hence, it can also be a major area of research in future.

1.8 Organization of the Thesis

The study is organized into seven chapters including the present one. Chapter two gives the theoretical framework wherein we form the basis for our empirical work. Chapter three reviews empirical studies concerning impact of derivatives and their expiration, and relationship between risk and return. In this chapter the basic contours of the present study are discussed, which evolve by reviewing prior research work. Chapter four describes the research methodology and econometric technique in detail. The impact of derivatives and their expiration on spot market return, volume and volatility; and impact on relationship between risk and return is empirically examined extensively in chapter five using secondary data. Chapter
six covers the perception of market on implications of derivative trading for Indian capital market. The feedback of market participants is collected using a questionnaire and analyzed using statistical technique. Finally, chapter seven summarises the findings, policy implications and recommendations.