

DERIVATIVES TRADING AND FACETS OF VOLATILITY : A STATISTICAL APPROACH IN CONTEXT OF INDIAN STOCK MARKET

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ABSTRACT

One of the latest and growing popular innovations in the finance world is the derivatives which have revolutionized the stock markets round the world. Derivatives have been linked up with several issues since their inception. One such issue is volatility which has been keen area of interest for the researches worldwide. The present paper is in line with the same theme of volatility inter woven with derivatives trading. The paper attempts to portray out the patterns of volatility prior and post to the introduction of derivatives. With the use of statistical tools and packages, the volatility pattern is highlighted in the context of Indian Stock Market at the two important Stock exchanges: National stock Exchange of India and Bombay Stock Exchange, i.e. NSE and BSE.

INTRODUCTION

Derivative products initially emerged as hedging devices against fluctuations in commodity prices. A derivative appears to be an instrument where pay offs are derived from a primitive or fundamental good. Derivative especially financial should be considered for inclusion in any organization risk control arsenal.

Derivative market segment is dominated by informed institutional investor & therefore this market segment is expected to be more efficient in price discovery. But apart from these roles, certain unwarranted part is also associated with derivative trading. The market segment provides good speculative opportunities & excessive speculative trading increases the volatility of the market.

The concept of volatility in the market is defined as a measure for the size and the frequency of fluctuation of the underlying assets' price for a time period. Simply stated, volatility is a measure for the variation of price of a financial instrument over time. It is used to quantify the risk of the financial instrument over the specified time period.

Stock market volatility is significant and understanding it is imperative to investing in stocks that suit your investment as trading style and risk tolerance level. Stock price rarely move in a straight line. Most of the time they move up and down & some of the time, they trend higher or lower. Most volatile

stock trends to chop more intensively & have a larger high low range their less volatile cousins short term investors prefer less volatile stocks because they can impressive profit while conservative traders like to stay away from volatile securities.

OBJECTIVE OF THE STUDY :

The paper attempts to figure out the pattern of stock market volatility in the Indian scenario just before and after the introduction of index based futures trading. The study uses a set of statistical tools to picture out the initial footprints of volatility scene due to the intervention of derivative products, more specifically the futures contracts. The study concentrates on the trading executed at the two giant exchanges, viz National Stock Exchange of India and Bombay Stock Exchange.

DATA & METHODOLOGY

The study uses data set for the period from 1st April, 1997 to 31st March, 2010. For the purpose of analysis, the daily closing prices from the official website of National Stock Exchange of India and Bombay Stock Exchange have been extracted. For evacuating any possibility of ambiguity, the log returns have been taken into play rather than merely closing prices.

THEORETICAL DEBATE :

Several theories have been propounded and empirical studies have been conducted so far with a prima objective of answering whether any

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relationship exists between these set of markets viz spot and futures market. This part of the literature gives a detailed review of all the proponents regarding the existence of connectivity interwoven between these two markets.

Primarily, there exist two schools of thought regarding the impact of inter-market activities on the volatility of cash (spot) prices, owing to the trading of futures market. One school of thinkers advocated on the side of "stabilizing impact" i.e. they hold that speculation in the futures market tends to stabilize the cash prices of the underlying, meaning there by that introduction and trading of futures contract have a stabilizing impact on the volatility of the spot market of the underlying in respect of which it is traded.

Significantly, the existence and operation of futures segment in a stock exchange tends to provide a mechanism for those participants who would buy and sell actual security in order to hedge themselves against unfavorable changes in the price of the underlying. Thus, with the existence of futures market, risk (both systematic and unsystematic) can spread across a large number of investors and transferred away from those who hedge spot position to those who are professional speculators. i.e. risk is to be shouldered by those who are more expert at tolerating risk rather than those who may be endangered with the mere presence of risks. With such a transfer of risk, the functioning of the spot market may substantially get improved as it reduces the need to incorporate risk premium in cash market transaction to compensate the risk of price

fluctuations.

Another school of thinkers oppose the notion of "stabilizing impact of derivatives trading". They advocate that futures markets are extremely volatile than their counterpart i.e. spot market. They discard the concept of positive inter relatedness of these two sets of markets. This view holds that the widespread speculation in the futures markets has a destabilizing impact on the spot market. Scholars reason out that the futures market is well known for its lower transaction costs and together with the requirements of lower margins. These two basic postulates of the futures trading is the prima facie casual factor for prompting speculative activity in the futures markets.

The effect of derivatives trading on cash market volatility is theoretically ambiguous and depends on the specific assumptions of the model (see Mayhew 2000). In keeping with this, the empirical evidence is also mixed.

EMPIRICAL RESULTS :

The period of study is further sub-divided into pre futures and post futures period. In the case of National stock Exchange of India, the pre future period is from 01-04-1997 to 11-06-2000 where as post futures period is from 12-06-2010 to 31-03-2010. For Bombay Stock Exchange, the period from 01-04-1997 to 08-06-2000 is pre futures period and span of 09-06-2000 to 31-03-2010 is post futures time. For the data set from 1st April, 1997 to 31st March, 2010, following results have been worked out taking into account the first log difference of the daily close prices at National stock Exchange of India and Bomaby Stock Exchange:

Table 1.1: Descriptive Statistics on Daily Close Prices of NSE

	TOTAL PERIOD	POST-FUTURES PERIOD	PRE-FUTURES PERIOD
Mean	0.000226	0.00023	0.000226
Median	0.000528	0.000625	0.000155
Maximum	0.070939	0.070939	0.032743
Minimum	-0.05669	-0.05669	-0.0356
Std. Dev.	0.00762	0.007469	0.008071
Skewness	-0.23151	-0.30973	-0.04139
Kurtosis	9.143026	10.82431	5.214354
Jarque-Bera	5126.567	6278.428	162.651
Probability	0	0	0
Sum	0.733246	0.561602	0.17965
Sum Sq. Dev.	0.188173	0.136385	0.05172
Observations	3242	2446	795

Table 1.2: Descriptive Statistics on Daily Close Prices of BSE

	TOTAL PERIOD	POST-FUTURES PERIOD	PRE-FUTURES PERIOD
Mean	0.000215	0.000236	0.000152
Median	0.000512	0.000561	0.000392
Maximum	0.069444	0.069444	0.031765
Minimum	-0.05129	-0.05129	-0.03258
Std. Dev.	0.007671	0.007487	0.008213
Skewness	-0.14109	-0.15909	-0.09414
Kurtosis	8.036359	9.611281	4.524804
Jarque-Bera	3423.35	4444.917	78.09257
Probability	0	0	0
Sum	0.694921	0.574401	0.12052
Sum Sq. Dev.	0.189944	0.136448	0.053492
Observations	3229	2435	794

Following are the line graphs portrayed to indicate the trend and patterns of volatility in different situations:

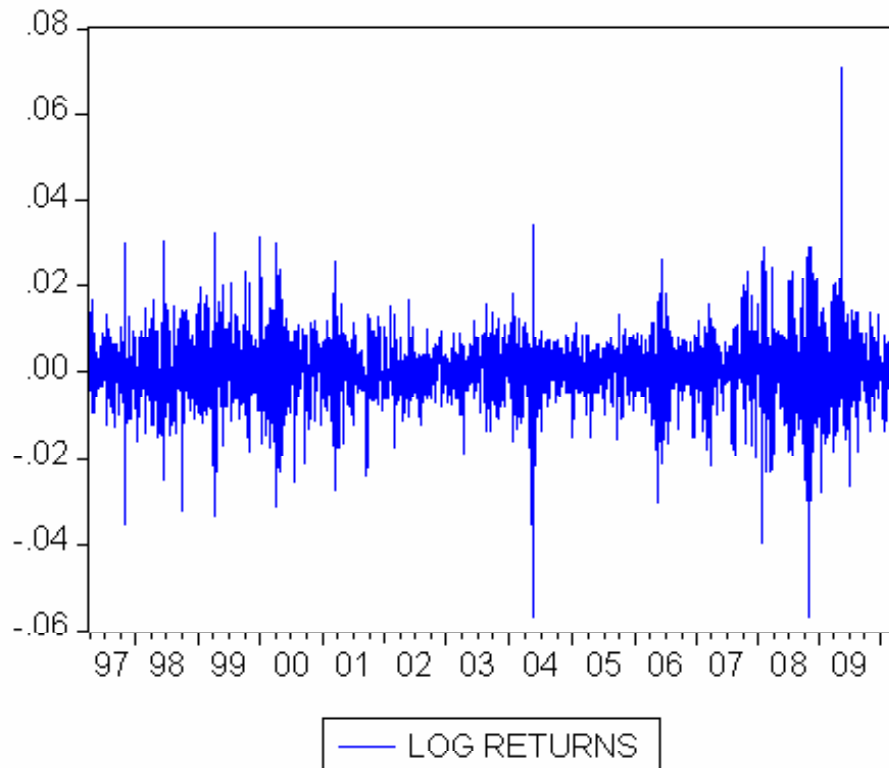
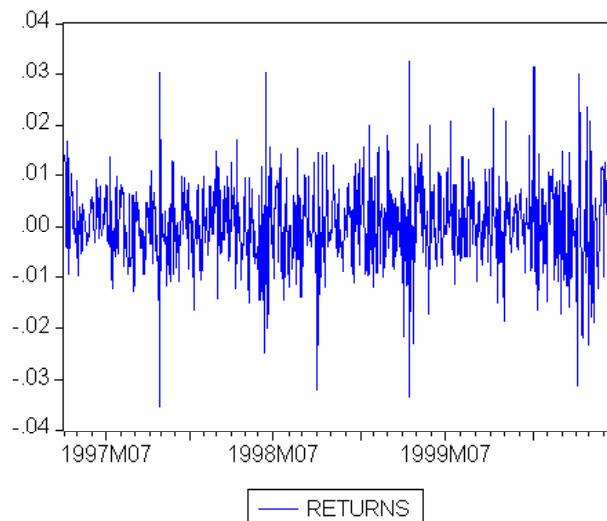
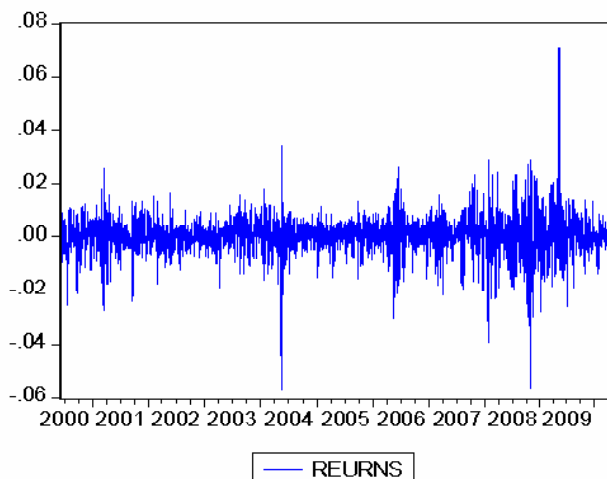
FIGURE 1.1: GRAPH FOR THE PERIOD 01-04-1997 to 31-03-2010(NSE)

FIGURE 1.2: GRAPH FOR THE PERIOD 01-04-1997 to 09-06-**FIGURE 1.3: GRAPH FOR THE PERIOD 12-06-2000 to 31-03-2010(NSE)**

Note: Graphical analysis is done only for National stock Exchange of India as it accounts for 99.9% of total derivatives trading and participation at Bombay Stock Exchange is negligible for derivatives.

INTERPRETATION

The results obtained for the period of analysis pinpoint the trends of volatility in relation with the introduction of derivatives. For the period before the birth of derivatives especially futures, the scene of National Stock Exchange presents sharp trends in volatility and thus too much of volatility clustering. From the figure 1.1, the indication is that after the

birth of derivatives there is smoothness in the curve and hence less of volatility. A higher standard deviation is indicative of the fact that volatility has decreased in the post futures period, declining from 0.008071 for pre futures period to 0.007469 in the post futures period for National Stock Exchange of India. For Bombay Stock Exchange, the same trend has been witnessed. The standard deviation falling from 0.008243 in pre futures period to 0.007487 in post futures period also coincide with the results of NSE. The results for NSE are more of concern as turnover on derivative segment NSE accounts for 99.9% of total derivatives trading in India.

CONCLUSION :

Thus from the above study it is evident that futures trading has a significant impact on the spot market. No matter, we have adopted statistical and pictorial approach but the outcome can't be overlooked. The present study paves the way for more careful investigation using more sophisticated tools so that the extent and magnitude of volatility can be projected more accurately. So, one can conclude from the above results that volatility clustering is an essential characteristic of Indian Stock Market and the situation has been fuelled more with the intervention of futures trading. Thus the issue of volatility needs to be analyzed from other approaches too.

REFERENCES :

- Antoniou, A., Holmes, P., & Priestley, R. 1998. The effect of stock index futures trading on stock index volatility. *Journal of Futures Markets*, 18, 151-166.
- Antoniou, A. & Holmes, P. 1995. Futures trading, information and spot price volatility: evidence for the FTSE 100 stock index futures contracting using GARCH. *Journal of Banking and Finance*, 19, 117-129.
- Cox, C. C. 1976. Futures trading and market information. *Journal of Political Economy*, 84, 1215-1237.
- Gorton, G. B. & Pennacchi, G. G. 1993. Security baskets and index-linked securities. *Journal of Business*, 66, 1-27.
- Harris, L. 1989. S&P 500 cash stock price volatilities. *Journal of Finance*, 44, 1155-1175.
- Subrahmanyam, A. 1991. A theory of trading in stock index futures. *Review of Financial Studies*, 4, 17-51.