Impact of Derivative Trading On Stock Market Volatility in India: A Study of BSE-30 Index

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Abstract

Risk and return is a characteristic index of most financial derivatives and capital markets. Variations in the prices of financial and non-financial derivatives are induced, over time, by buy and sell dynamics. The previous two decades have witnessed many-fold raise in the volume of international derivatives due to the wave of globalization and liberalization comprehensive crosswise the world. This has led to quick and random variations in financial assets prices, interest rates and exchange rates, and consequently, to sensational the corporate world to an unwieldy financial risk. In the present very uncertain business scenario, the importance of risk management is to a extent greater than ever before. The appearance of derivatives market is a resourceful feat of financial derivatives that provides an efficient and a lesser amount of costly solution to the problem of risk that is set in the price unpredictability of the underlying asset. In India, the emergence and growth of derivatives market is relatively a recent phenomenon. Since its inception in June 2000, derivatives market has exhibited exponential development both in terms of volume and number of traded contracts. Derivatives trading in India has surpassed cash segment in terms of turnover and number of traded contracts. Some space is constant also to a discussion of the status of Financial Derivatives market and Derivatives stock market volatility segment.

Keywords: Derivatives in India, GARCH and Stock market volatility, Stock market volatility, Spot and Derivative Markets

Introduction

One of the for the most part important in the derivative finance is the impact of introduction of derivatives trading on the pricing of underlying assets. For the most part these studies are focused on the problem whether the derivatives trading increases or decreases stock market volatility in the underlying asset's price. Worldwide the studies are unconvincing about the effect of derivatives trading on the spot market volatility. Two hypotheses be present on the impact of derivatives on spot market volatility. Proponents of 'destabilizing forces' hypothesis disagree that derivatives trading increases stock market volatility because of high degree of leverage. So, volatility will increase after introduction of derivatives. Proponents of 'financial market completion' hypothesis argue that derivatives trading helps in price discovery, improve the on the whole derivative market intensity, enhance market efficiency, augment market liquidity, reduce asymmetric information and thereby reduce volatility of the cash market (Kumar *et al*, 1995; Antoniou *et al.*, 1998) [1]. This paper is an attempt to identify this financial derivatives market relationship. Apart from this, the paper also identifies derivatives understanding level of Indian investor and their sensitivity about future of derivatives in India. The rest of the article covers the following sections: review of literature is explained in section two; section three explains the methodology of the study, segment four presents the empirical results and finally, conclusions are presented in section five. Theoretically, it is argued that due to the inherent advantage of low transaction costs and leverage feature the derivative trading causes some speculative trading shift from the cash segment to the derivative segment. Such migration of speculative investors from the spot market to the derivative market will cause a decreased volatility in the spot market. Moreover the introduction of derivative contracts increase investment choices, enhances information flows, leads to well again price innovation and provides outstanding hedging opportunities. On the other hand it

is also argued by many experts that the derivative market promote unnecessary participation from the speculative investors. Such leverage based excessive speculative movement lowers the quality of information and thus destabilizes the underlying cash markets.

Literature Review

Mutually abstract and observed studies were accepted out to assess the impact of listing of futures and options on the cash market. Two hypotheses relating to the impact of derivatives trading on the spot market are prevailing in the literature. Proponents of ' destabilizing forces' hypothesis argue that derivatives trading increases stock market volatility since of elevated degree of leverage, likely being there of unaware traders due to low transactions cost involved to take position in the futures market. The lower level information of derivatives traders with respect to cash market traders is likely to increase the asset volatility. *Stein (1987)* in his original theoretical representation fulfilled that opportunity a futures market improves risk sharing and therefore reduces price volatility and if the speculators observe a noisy but informative signal, the hedgers react to the noise in the speculative trades producing an increase in volatility. These uneducated traders may well knock off balance the cash market. Cox (1976), Figlewski (1981) and Chatrath *et al* (1995) found results at the bottom of this hypothesis. On the other hand, the speculators complete the important role in provided that liquidity to the market and quick processing of information. Derivatives trading can augment the availability of information flow due to low transaction costs than those in the cash market thereby transmitting latest information more quickly to the futures market. Thus, financial derivatives market provides an additional channel by which in order can be transmitted to the cash markets. Everyday arrival and rapid processing of information might show the way to increased volatility in the underlying spot market. Antoniou and Holmes (1995) however did not find link between information and volatility. This also suggests that with the introduction of derivatives trading would be accompanied by a decline in trading volume of the underlying stock market

The experimental evidence, for the most part with reference to the U.S economy, suggests that the introduction of derivatives does not destabilize the underlying market. Bolonga and Cavallo (2002) in a current paper examined the stock market volatility in the post derivative period in the framework of Italian stock exchange. They employed Generalized Autoregressive Conditional Heteroscedasticity (GARCH) class of models and to account for the result of factors other than derivatives trading determining the volatility in the post derivative period, the GARCH model was computed after adjusting the stock return equation for market factors proxied by an index on which derivatives products are not available.

In the Indian context, early study by Thenmozhi (2002) examined whether there was any change in the volatility of the S&P CNX Nifty Index in India due to the introduction of Nifty futures and whether movements in futures prices provided predictive information regarding subsequent movements in index prices. The study shows that the inception of futures trading has reduced the volatility of spot index returns.

Shenbagaraman (2003) did not find significant impact on market volatility in India. Raju and Karnade (2003) also studied the behaviour of volatility of the S&P CNX Nifty index after the introduction of derivatives trading. All the above studies relating to S&P Nifty reported a decline in the volatility. Bandivadekar and Ghosh (2003) studied volatility behaviour of both NSE Nifty and BSE Sensex after the introduction of futures trading and documented ' futures effects' in the volatility behavior of NSE Nifty.

The present study not only provides additional empirical evidence in this regard but also contributes to the literature in some aspects. First, all the previous studies except Bandivadekar and Ghosh (2003) mainly concentrated on the volatility behaviour of S&P CNX Nifty on the presumption that turnover on BSE Futures and Options segment is negligible. This paper seeks to examine the behaviour of BSE Sensex after the introduction of derivatives trading in June 2000 since the important point is the volatility of the cash market affected or

unaffected by the futures trading. Secondly, this paper makes an attempt to examine the behaviour of not only those index on which derivatives products are available like S&P CNX Nifty and BSE Sensex but also the behaviour of those indices such as BSE-100, BSE-200, S&P CNX Nifty Junior, NSE 200 and S&P CNX Nifty 500 to see whether market wide volatility has declined due to other improvements like screen-based electronic trading, rolling settlement of ' T+2' and other institutional developments introduced in the Indian market in recent years. Thirdly, this paper tries to see the impact of introduction of futures trading and option trading simultaneously on the behavior of volatility of the indices. Finally, this paper also makes an attempt to find whether the reported decline in the volatility as claimed by certain previous studies is due to introduction of derivatives trading alone.

Data Collection

The very objective of this paper is to investigate the dynamics of the time varying volatility of India's derivatives stock market over the sample period spanning from **2nd, January, 1998 to 31st, dec, 2012.** The data of daily returns based on daily closing values of near month index has been used in the study. The required data are collected for the sample period from the BSE, India database. As capital market volatility is effectively depicted with the help of GARCH (1,1) class models, have been performed so as to produce the evidence of time varying volatility which shows clustering, high persistence and predictability and responds symmetrically for positive and negative shocks.

1. Pre future period i.e.02-01-1998 to 29-06-2001

2. Post future period i.e. 02-07-2001 to 31-03-2012

Methodology of the Study

The results were obtained on the basis of Rt which is rate of return r in period t, computed in logarithmic first difference.

Generalized ARCH or the GARCH (r, m) model is proposed by Bollerslev (1986). Theoretically this model is equivalent to infinitive order ARCH model (that is why it gets its name the generalized ARCH model). In GARCH (r, m) model the conditional volatility ht is the function of past conditional volatility (ht-r) and past squared innovations in mean equation (e2t-m) The GARCH (1, 1) model is more popular in practice. This model for the stock returns can be presented as follows:

$$Rt = c + rRt\text{-}1 + et$$

$$e\,t = zt.\sqrt{ht}, \text{ where } zt \sim N(0, 1)$$

$$ht = w + ae2t\text{-}1 + \beta\, ht\text{-}1$$

The unconditional (average) variance from this model is:

$$\sigma 2 = \frac{w}{1 - a - \beta}$$

(a +β) measures the persistence of volatility. In practice, this usually observed very close to 1, which signifies that the volatility of asset returns is highly persistent. The effect of any shock in volatility dies out at a rate of (1-a-b). If (a+b) ≥1 the effect of shock will never die out. The volatility will be defined only if (α+b) <1. Therefore, this condition is imposed while estimating the GARCH model. Since the variance cannot be negative, another parameter restriction which is required to be imposed while estimating a GARCH model is the non-negativity of w, α and β coefficients. Dummy variable is also used to study the impact of future on volatility of stock which is zero before the introduction of future and 1 after the introduction of future. The conditional mean equation:

Rt = c +rRt-1 +e

et = zt.√ht, where zt ~N (0, 1)

The conditional variance equation is:

ht=w +α e 2t-1+ β ht-1+γDummy

A significant positive (negative) coefficient of dummy variable would indicate that introduction of derivatives increases (decreases) the volatility of underlying stock & Index.

GARACH (1,1) Analysis pre and post Period

An empirical analysis of GARACH (1,1) Effect for daily rate of returns of BSE-30 Index introductions of derivatives market in pre and post period companies is given in Table 4.49. It is clearly observed that the effect of the mean equation co-efficient of derivatives contracts pre and post introduction period at 84849.09 was less than the post period. It also reveals the average daily percentage change to be very little in the pre and post period of price returns. In variance of equations, C is the intercept and co-efficient of parameters pre period (ω)84849.09,α1 at 1.372619, β at -0.81716 and pre period of introduction ω 29989.2,α1 1.03222,β-0.6936 were significant at 5% level. The sum of pre period α1 and β prices at 0.555459and post period 0.338665was close to one. This shows that the shocks to the conditional will be highly persistent and mean reverts slowly. The pre period influenced not post period prices. The overall analysis of the GARCH MODEL shows the time varying volatility in pre and post introduction period prices. Hence rejected the null hypothesis and accept the alternative hypothesis, i.e. there is significant difference between pre and post period during the study period.

Conclusion

We cover intentional the behavior of volatility of stock market after introduction of future by using GARCH (1, 1) model. We have considered BSE-30 Index and 24 individual stocks of derivative stocks. In case of 30 index index, the volatility in the index has declined after the introduction of pre and post but the magnitude of dummy variable is very low which shows decline in volatility is very low. It shows a increase in volatility but there are post period which shows reduction in the volatility. There is, thus, mixed results regarding the impact of constituent stocks of Index. Index shows contradictory pattern of increase in its unconditional GARCH volatility. This may be due to bundling effect of constituent stocks of Index.

Results in Overall Summary of GRACH (1, 1) Effect in Daily Returns of Pre and Post Periods Introduction of Derivatives Market

Equation Name	Over all Analysis of GRACH (1,1)	Pre Periods	Post Periods
Mean Equation	Coefficient	**730037.7**	**732781.1**
	Std. Error	**13.0557**	**10.73301**
	z-Statistic	**55916.9**	**68273.59**
	Prob.	**0**	**0**
Variance Equation	Coefficient	**84849.09**	**946789**
	Std. Error	**0.56724**	**0.03919**
	z-Statistic	**-5.34756**	**-60.367**
	Prob.	**0**	**0**

Source: www.bseindia.com, computed from E-views.

Note: *significant at 5% level.

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