STOCK MARKET VOLATILITY DURING DIVIDEND ANNOUNCEMENT
A CASE OF SELECTED BANKS IN INDIA

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ABSTRACT

An attempt has been made in this paper to examine the share price volatility at the individual banks. The empirical analysis has been done by using Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model and GARMAN KLASS Model. It is based on daily data for the time period from January 1st 2000 to December 31st 2010. The analysis reveals that the mean of volatility is high during the pre-event period for the selected 21 banks in the Indian Capital market by using both models.

Keywords: GARCH, GARMAN KLASS Model, Stock Market Volatility

1. INTRODUCTION

Stock market volatility has vital importance for investor’s decision making, and has considerable influence on investor behavior in the market. In general terms, volatility may be described as a phenomenon, which characterizes changeableness of a variable under consideration. Volatility is associated with unpredictability and uncertainty and is synonymous with risk, and hence high volatility is thought of as a symptom of market disruption whereby securities are not being priced fairly. It measures the variability or dispersion about a central tendency. However, there are some subtleties that make volatility challenging to analyse and implement. Since volatility is a standard measure of financial vulnerability, it plays a key role in assessing the risk/return tradeoffs.

The existence of excessive volatility or “noise” also undermines the usefulness of stock prices as a “signal” about the true intrinsic value of a firm, a concept that is core to the paradigm of international efficiency of the markets. Considerable research effort has already gone into modeling time–varying conditional heteroskedastic asset returns. It is important because if both returns and volatility can be forecasted, then it is possible to construct dynamic asset allocation models that use time dependent mean–variance optimization over each period.

More specifically, this paper is an attempt made towards examining the share price volatility among the consequent dividend paying banks during the year 2000-2001 to 2009-2010 in National Stock Exchange in India.
The rest of the paper is as follows: Profile of the Industries is explained in section II, Review of literature is explained in section III; section IV explains the data and methodology of the study; Section V presents the Limitations of the study; Section VI presents the empirical results. Finally, conclusions are presented in section VII.

2. RELATED WORKS

Many traditional asset-pricing models (e.g. Sharpe 1964; Merton, 1973) postulate a positive relationship between a stock portfolio’s expected return and the condition variance as a proxy for risk. More recent theoretical works (Whitelaw 2000, Bekaaert and Wu 2000; Wu 2001) consistently assert that stock market volatility should be negatively correlated with stock returns.

Earlier studies for instance French et.al. (1987) found a positive and significant relationship and studies such as Baillie and DeGennaro (1990) Theodossiou and Lee (1995) reported a positive but insignificant relationship between stock market volatility and stock returns. Consistent with the asymmetric volatility argument, many researchers (Nelson 1991, Glosten et.al. 1993, Bekaaert and Wu 2000, Wu 2001; Brandt and Kang 2003) recently report negative and often significant relationship between the two.

Researchers have empirically demonstrated (e.g. Harvay 2001, Li et.al. 2003) that the relationship between return and volatility depends on the specification of the conditional volatility. In particular, using a parametric GARCH-M model, Li, et.al. (2003) finds that a positive but statistically insignificant relationship exists for all the 12 major developed market. By contrast, using a flexible semi parametric GARCH-M model, they document that a negative relationship prevails in most cases and is significant in 6 out of 12 markets.

Malkiel and Xu (1999) used a disaggregate approach to study the behaviour of stock market volatility. While the volatility for the stock market as a whole has been remarkably stable over time, the volatility of individual stocks appears to have increased.

Yu (2002) evaluates the performance of nine alternative models for predicting stock price volatility. The main results are (i) the stochastic model provides the best performance among the candidates; (ii) ARCH type models can perform well or badly depending on form chosen the performance of the GARCH (3,2) model, the best model within ARCH family, is sensitive to the choice of assessment measures; and(iii) the regression and exponentially weighted moving average models do not perform well according to any assessment measure, in contrast to the results found in various markets.

Li, et.al. (2003) examined the relationship between expected stock returns and volatility in the twelve largest international stock markets during January 1980 – December 2001. Consistent with the most previous studies they found the estimated relationship between return and volatility sensitive to the way volatilities are examined. Batra (2004) examined the time variation in volatility in the Indian stock market during 1979-2003. The study has used the asymmetric GARCH methodology augmented by structural changes. The paper identifies sudden shifts in the stock price volatility and nature of events that cause these shifts in volatility. He undertook an analysis of the stock market cycles in India to see if bull and bear phases of the market have exhibited greater volatility in recent times. The empirical analysis in the paper reveals that the period around the BOP crisis and subsequent initiation of the economic reforms in India is the most volatile period in the stock market. Shin (2005) examined the relationship between return and risk in a number of emerging stock markets. In this study, the researcher employed both a parametric and semi parametric GARCH model for the purpose of estimation and inference.
3. RESEARCH METHODOLOGY

3.1. Research Design

Share market is high volatile in nature; hence the investors are seeking market insights for better action towards their investment. This study is focused on Stock market volatility during dividend announcement on the selected industries in Indian Capital Market. Thus, this study is both descriptive and analytical research, and it uses event study method to measure the volatility of share prices during the dividend announcements.

3.2. Data and its Sources

The data employed in the study consists of daily prices for the time period from January 1st 2000 to December 31st 2010 for consequent dividend paying banks in NSE in India. The prices used were daily open and close prices; this data has been collected from the Prowess.

3.3. Objectives of the Study

- To compute the extent of stock volatility during pre- and post-dividend announcement by using GARCH Model.
- To compute the extent of stock volatility during pre- and post-dividend announcement by using GARMAN KLASS Model.

3.4. Sample

- Sample is drawn from companies listed on the National Stock Exchange that have announced consequent dividend for 10 years from the year 2000-2001 to 2009-2010. There were 551 consequent dividend paying companies out of which 155 companies were found to be high trading volume companies and based on the availability of data only 21 banks were considered for the present study.

3.5. Sampling Technique Used

- Purposive Sampling technique is adopted for selecting high trading volume shares which observed to produce abnormal gains.

3.6. Period of study

- The study covers a period of 10 years from spanning 2000-2001 to 2009-2010.
- The rationale behind the choice of this study period is based on the fact that the period captures a complete business cycle that has witnessed both bullish and bearish trend.
- In each year, 31 days scripts were captured based on dividend announcement date during the financial year.

3.7. Tools used for Analysis

3.7.1. GARCH Volatility

- The Generalized Autoregressive Conditional Heteroscedasticity model (GARCH) has been introduced by Tim Bollerslev in 1986. It is the generalization of the Autoregressive Conditional Heteroscedasticity model (ARCH) proposed by Robert Fry Engle in 1982. These models are used to characterize observed time series. They are part of the most popular class of econometric models for describing a series with time varying conditional variance. They are used to simulate the historical volatility of a share price over a period of time. The following equation is used to compute GARCH Volatility.

\[ h_{t+1} = \omega + \alpha \varepsilon_t^2 + \beta h_t \]

Where, \( h \) is variance,
3.7.2. Garman Klass model Volatility

- Another method that has been frequently used to measure volatility of share price is the Garman and Klass [1980] extreme-value estimator. This is said to be 8.4 times more efficient than the classical estimator. It not only incorporates the close to close information but also combines the Parkinson measure. Garman Klass model comprises of open, high, low and close share prices. In this model a high positive value indicates that there is high positive volatility in open, high, low and close stock price and a high negative value indicates that there is high negative volatility in open, high, low and closing share price.

\[ \sigma^2 = \frac{1}{T} \sum_{t=1}^{T} (0.513 \ln(H_t/L_t))^2 - 0.019 \ln(C_t/O_t) \ln(H_t/O_t) - 2 \ln(H_t/O_t) \ln(L_t/O_t)). \]

4. EMPIRICAL ANALYSIS

<table>
<thead>
<tr>
<th>Year</th>
<th>Pre-Event</th>
<th>Post-Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2001</td>
<td>0.1914</td>
<td>0.1558</td>
</tr>
<tr>
<td>2001-2002</td>
<td>0.1710</td>
<td>0.1086</td>
</tr>
<tr>
<td>2002-2003</td>
<td>0.1116</td>
<td>0.1178</td>
</tr>
<tr>
<td>2003-2004</td>
<td>0.1670</td>
<td>0.1374</td>
</tr>
<tr>
<td>2004-2005</td>
<td>0.2595</td>
<td>0.1670</td>
</tr>
<tr>
<td>2005-2006</td>
<td>0.1014</td>
<td>0.0873</td>
</tr>
<tr>
<td>2006-2007</td>
<td>0.1655</td>
<td>0.1710</td>
</tr>
<tr>
<td>2007-2008</td>
<td>0.1289</td>
<td>0.1005</td>
</tr>
<tr>
<td>2008-2009</td>
<td>0.1101</td>
<td>0.1068</td>
</tr>
<tr>
<td>2009-2010</td>
<td>0.2173</td>
<td>0.3032</td>
</tr>
<tr>
<td>Mean</td>
<td>0.16</td>
<td>0.15</td>
</tr>
<tr>
<td>SD</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>CV</td>
<td>31.50</td>
<td>42.97</td>
</tr>
</tbody>
</table>

It is observed from the above table that financial volatility model GARCH has been computed for banking industry. The Share prices are volatile in nature normally and the pre-event period has predicted high volatility during the years 2000-01 (0.1914), 2001-02 (0.1710), 2003-04 (0.1670), 2004-05 (0.2595), 2005-06 (0.1014), 2007-08 (0.1289), and 2008-09 (0.1101). Similarly, the post-event window has triggered high volatility during the years 2002-03 (0.1178), 2006-07 (0.1710) and 2009-10 (0.3032).
The pre-event mean volatility is 0.16, standard deviation is 0.05 and coefficient of variance is 31.50. The post-event mean volatility is 0.15, standard deviation is 0.06 and coefficient of variance is 42.97. The overall observation of Banking Industry as per GARCH Model shows that the volatility is slightly high during the pre-event period than post-event period.

Table No: 2
Garman Klass Volatility of Banking Industry during Pre- and Post-period of dividend announcement

<table>
<thead>
<tr>
<th>Banking Years</th>
<th>Pre-event</th>
<th>Post-event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2001</td>
<td>0.46</td>
<td>0.93</td>
</tr>
<tr>
<td>2001-2002</td>
<td>1.18</td>
<td>0.39</td>
</tr>
<tr>
<td>2002-2003</td>
<td>0.80</td>
<td>0.87</td>
</tr>
<tr>
<td>2003-2004</td>
<td>1.54</td>
<td>1.77</td>
</tr>
<tr>
<td>2004-2005</td>
<td>0.45</td>
<td>1.26</td>
</tr>
<tr>
<td>2005-2006</td>
<td>1.64</td>
<td>1.01</td>
</tr>
<tr>
<td>2006-2007</td>
<td>6.65</td>
<td>1.30</td>
</tr>
<tr>
<td>2007-2008</td>
<td>1.27</td>
<td>5.07</td>
</tr>
<tr>
<td>2008-2009</td>
<td>1.48</td>
<td>1.98</td>
</tr>
<tr>
<td>2009-2010</td>
<td>1.38</td>
<td>0.52</td>
</tr>
<tr>
<td>Mean</td>
<td>1.68</td>
<td>1.51</td>
</tr>
<tr>
<td>SD</td>
<td>1.80</td>
<td>1.35</td>
</tr>
<tr>
<td>CV</td>
<td>106.70</td>
<td>89.18</td>
</tr>
</tbody>
</table>

SD – Standard Deviation, CV – Coefficient of Variance

It can be inferred from the table that financial volatility model Garman-Klass has been computed for banking industry. Here, Share prices had shown high volatility during the years of 2001-2002 (1.18), 2005-2006 (1.64), 2006-2007 (6.65), and 2009-2010 (1.38). Similarly, the post-event window has attained high volatility in the years of 2000-2001 (0.93), 2002-2003(0.87), 2003-2004 (1.77), 2004-2005 (1.26), 2007-2008 (5.07) and 2008-2009(1.98).

The pre-event mean volatility is 1.68, standard deviation is 1.80 and coefficient of variance is 106.70. The post-event mean volatility is 1.51, standard deviation is 1.35 and coefficient of variance is 89.18. The overall observation of Banking Industry as per Garman-Klass Model shows that the volatility is slightly high during the pre-event period than post-event period.

5. Conclusion

This study in particular addresses only the share price volatility of selected banks in National Stock Exchange of India using GARCH (1, 1) Model and GARMAN KLAS Model. It can be observed that the GARCH volatility and GARMAN KLAS volatility shows that the mean of volatility is high for banking industry during pre-event period among the selected banks.

The study has tried to dig into the very vast and interesting issue, which requires more elaborated analysis. Future research can be extended for other industries by utilizing the more sophisticated techniques of operational research.
6. References