3.1 Problem Statement

Corporate actions are initiatives taken up by a corporate that brings in a change to its stock price. There are numerous types of corporate actions that a firm can choose to initiate with varied objectives. These actions may include the announcement regarding right issue, bonus shares, stock split, buyback of shares, dividend, merger and acquisitions, etc. The corporate actions are initiated by the board of directors and approved by the companies’ shareholders. A proper understanding of these actions and resulting impact on the concerned stocks gives a good understanding of the company’s financial performance. It also helps to determine whether to buy or sell or hold a particular stock.

The efficient market hypothesis (EMH) is based on the thought that the securities market prices or returns are volatile and do not follow any regular pattern so it is impossible to beat the market. Paul Samuelsson (1956) was the first who provided the formal economic argument that random nature of changes in asset prices is a reflection of their efficiency. In 1965, the term “Efficient Market” was defined by Fama at first time. Some important definitions related to efficient market hypothesis are as follow: Fama (1965) defines EMH theory “…an efficient” market for securities, that is, a market where, given the available information, actual prices at every point in time represent very good estimates of intrinsic values. Mandelbrot (1966) also supported this vision and commented that if markets are working properly, then all public (and, in some versions, private) information regarding an asset will be channelled immediately into its price. Fama (1970) stated, “A market in which prices always fully reflect available information is called efficient.” In an efficient market, prices quickly translate in to the available information. In 1970, Fama classified EMH according to the level of information reflected in market prices – weak form, semi-strong form and strong form.

Efficient Market Hypothesis states that if the stock prices reflect the announcement of public information instantaneously and without bias, the market should be classified as semi strong form efficient (Fama 1970). As the stock market related information is easily accessible to all, there is no scope for anyone to earn abnormal return. The efficiency of a security market is subject to a host of factors such as the goodwill of the issuer company,
the characteristics of the security to be traded, the regulation and trading mechanism of
the market where the securities are to be traded, and the level of technology to be used by
analysts for scrutinizing the information regarding trading costs. A number of factors
determine stock prices, such as dividend policy, stock splits, bonus issues and Macro
Environmental factors, beside others. The event conveys information that potentially
influences the stock prices & the investigators would like to study. The information
content of events and its diffusion determine the efficiency of the capital market. In other
words, how quickly and correctly such information is reflected in security prices show the
efficiency of the capital market. In the developed countries, numerous research studies
have been conducted to analyse the efficiency of the capital market with respect to
information content of events.

The information content of public disclosures could be observed through stock market
reactions and trading volume changes around the date of announcement. Beaver (1968),
Ball and Brown (1968), Morse (1981), and Bamber and Cheon (1995)
argue that earnings
announcements accompanied by high trading volumes and abnormal returns around the
announcement window convey more information to investors than announcements which
generate low trading volumes and insignificant stock returns. Stock market reaction
represents investors’ belief about the firm value and trading volumes indicate investor’s
behaviour on firm’s shares. Both measures aim at estimating public announcements
information content and information asymmetry. Trading volume is also considered as a
measure of stock market liquidity given that it captures the willingness of some investors
who hold shares to sell, and the willingness of others to buy (Bamber, 1987).

An event study examines the average stock market response to a particular stock market
event, by averaging across the same event in different companies, or at different times in
the same company. The event could be a macroeconomic event such as a budget
announcement, interest rate announcement, GDP/IIP data etc., or company specific events
such as dividend announcement, bonus announcement, stock split announcement, merger
announcements, right issue announcements etc.

Rights issue is an important source of new equity funding for publicly quoted companies.
Rights issue targets existing shareholders and are allocated based on the number of shares
they hold. In these rights offerings, companies grant shareholders a chance to buy new
shares at a discount to the current trading price. According to The Companies Act, a
rights issue must be made before a new issue to the public because existing shareholders
have a “pre-emptive rights” on the new shares (Hillier, Ross, Westerfield & Jordan,
Past right issues have indicated that prior to the announcements of rights issue the market forces come into play and share prices change based on this information. The investors generally have a feeling that the prices will change because the price will now be cum rights. However, the rights issue announcements are often accompanied by corporate news over why the capital is being sought. The investors will therefore take this information into account and react to it. If the money is to be put to really good use, then the share price may rise, even though the prospect of extra shares has a dilutive effect (Hillier et al, 2013). According to Holthausen and Verrecchia (1990), when informedness and consensus increase, investors are able to utilize new information more effectively. As a result, more informed investors are willing to take riskier positions in response to new information. This is why stock price volatility is theoretically higher in markets which feature greater informedness and consensus. Olesaaya (2010) conducted a research on the rights issue’s returns effects on stock on companies listed at the NSE. The study found abnormal negative returns before rights issue announcement, abnormal positive returns during announcement and negative results thereafter. Karanja (2006) conducted a study on companies listed at NSE on post rights issue evaluation of effects on firms’ share price and volumes traded. He noted that most firms that announce rights issue usually experience a decrease in the share price after the issue at least in the very short run.

So the question which arises is: what is the influence of rights issues on share returns and price volatility of the issuing company?

Another corporate action under investigation of this study was Bonus issue. In order to give bonus shares to investors, a company builds a reserve by retaining a part of its profit over the years (the part that is not paid as dividend). When these free reserves increase, the company transfers a part of the money into the capital account, from which it issues bonus shares. The objectives of issuing bonus shares is to bring the amount of issued and paid up capital in line with the capital employed so as to depict more realistic earning capacity of the company and to bring down the abnormally high rate of dividend on its capital. A company may also go for bonus issue when the company cannot have sufficient cash balance to declare dividends. The bonus issue will result in to an increase in the number of shares which can get reflected as lower share price. The relationship between the announcement of bonus issues and their impact on share prices has been a constant source of discussion among researchers for the past few years. Though, the decision to issue Bonus shares increase the number of equity shares outstanding but they don’t have any effect on shareholders proportional ownership of shares because the distribution of accumulated reserves of a company through a bonus issue is just a transfer of retained
earnings into paid up share capital of the company. Thus, relative claim on the assets of a company by the existing shareholders remain the same even though they now hold an increased number of equity shares.

Because the bonus issue dates are well known in advance and as such shouldn’t contain any new information. However, empirical studies on the topic have affirmed a significant market price reaction on the bonus issue announcement. Though a number of studies have documented the evidences on the impact of bonus issue on stock returns in India, the results remain inconclusive. A lot of differences do exist in the results of such studies which had taken place at different time frames. There are mixed results for volatility changes around bonus share announcements made by the firms at different time periods in Indian market.

So, it becomes essential to know whether the announcement of bonus shares will impact the share price of a company and if yes, how?

*Stock splits* which are considered as financial puzzles by many researchers is also considered in this study. The stock splits decision has two contrasting views: one view holds that stock split is a costly exercise that cannot affect the value of the firm, while the other view advocates that the value of the firm immediately and significantly increases upon the announcement of stock split. The literature on financial economics explains stock splits and positive abnormal returns accompanying their announcement. The empirical research studies related to stock splits undertakes to test signalling hypothesis, liquidity hypothesis, trading range hypothesis and the semi-strong form of efficient market hypothesis (EMH). Past studies have shown that the markets generally react positively to the announcement of a stock split (Asquith et al., 1989; Bar-Joseph and Brown, 1977; Brennan and Copeland, 1988; Grinblatt et al., 1984; Macey and Hara, 1997; McNicholas and Dravid, 1990; Lakonishok and Lev, 1987; Lijleblem, 1989; Woolridge and Chambers, 1983). A signalling explanation of splits based on information asymmetry received considerable attention in the academic literature. The basic assumption is that managers’ use splits to signal good information to investors. According to this view, the key role of splits is to convey information, not to seek out an optimal price level. The value increase on split announcements is often attributed to this signalling effect. One common interpretation of this phenomenon is that by splitting the firm’s stock managers are attempting to signal to outsiders that management believes that the firm’s stock price will increase (Ikenberry and Ramanathan, 2002). According to the information asymmetry (signalling) hypothesis (Brennan and Copeland, 1988; McNicholas and Dravid, 1990;
Woolridge and Chambers, 1983), managers of undervalued firms use stock splits to signal positive information about their future prospects to investors. The present study investigates the issue: whether a stock split signals positive information about the future prospects of companies.

A hypothesis used to explain the stock price reaction of stock splits is the semi-strong form of market efficiency (Fama, 1970). Semi-strong tests are called event studies (Fama, 1991). In an event study, it is measured how rapidly security prices respond to announcements such as stock split or dividend announcement or news of a takeover. The studies conducted on stock price reaction of stock splits or bonus issues are based on test of semi-strong form of market efficiency. According to semi-strong EMH, current market prices not only reflect all information content of historical prices/stocks but also reflect all the information, which are publicly available about the companies being studied.

The liquidity hypothesis considers that firms split their stocks so as to increase the number of trading shares in order to increase liquidity of the stock in the market. Liquidity hypothesis suggests that with increasing volumes of trade in post-split the stock market makes positive returns which get reflected in the decreasing expected returns on stocks in the market. The evidence for the liquidity hypothesis from the previous studies conducted is mixed. Desai et al. (1998) and Muscarella and Vetsuypens (1996) observe an increase in trading volume during the post-split period provide support for the liquidity hypothesis of stock splits. On the other side, Conroy et al. (1990) and Hwang (1995) present results which indicate that corporate liquidity decreases after the split. This study investigates if the sample of stock splits taken provides support for the liquidity hypothesis in the Indian context.

Buy back of shares by the companies is also an important corporate action because when the company buys back its own shares, the number of shares are reduced which in turn increases the EPS. In a way by resorting to share buyback the company is giving a positive signal to the investors that the value of their share is much higher than the prevailing market value. Capital structure can be rationalised through share repurchase as it increases the debt content and reduces the equity in the share capital. Increased leverage results in increasing the volatility in the share price making it more attractive. The study of Ishwar (2010) gives a contradictory findings from the past Indian market studies and opined that there was absence of any change in the movement of stock price reaction to buyback which further led to the inference that market anticipates the information provided by these announcements and incorporates this before the announcements.
This study strives to investigate four increasingly important corporate actions (i.e. right issue, bonus issue, stock split and buyback) and their impact on stock prices.

### 3.2 Need of the Study

With passage of time, in terms of efficiency, Indian stock market has started moving from 'weak form' towards 'strong form'. The researchers have been attempting to explain whether the efficiency of Indian markets is weak, semi-strong or strong. For this, a lot of researches have been conducted to measure the market reaction to corporate actions like the announcement of dividend, bonus shares and Mergers etc. But in India, only few studies have been conducted to check the efficiency of the capital market with respect to the information of such events.

The reviewed Literature in present study indicates previous work to measure the market efficiency with reference to corporate announcement for right issue, stock split, buy back, bonus, dividend, earnings and demonetization. Majority of studies have used market model along with event window period ranges from ± 10 to ±30 days, estimation window of approximately 60 to 150 days and any one or two types of either parametric or non parametric statistical tools.

The Literature Review shows that the selected event announcements have time varying impact on behaviour of investors which give mixed evidences of semi-strong form efficient market across the globe. The question of “How wealth and liquidity changes with announcements” remain unresolved because most of the studies’ findings are positive as well as negative for the affects of Corporate Financial announcements. The observations of studies carried out shows the mixed market reaction to these announcements. Findings of studies show that Right issue announcement effects are mostly negative whereas buyback & dividend announcements’ effects are positive. Further, there is either no effect or negative effect of stock split in India as compared to foreign countries whereas for buyback there are positive returns in India which is higher than foreign countries. Moreover, there are mixed results for bonus issue announcements.

This study distinguishes itself from previous studies in following ways:

1) Majority of the existing studies examine the impact on returns; literature on liquidity and volatility is very less. This study is more comprehensive; because (i) Four events has been considered (ii) A bigger sample has been considered (iii) Larger time frame has been considered (iv) A sample companies of two sectors has been considered at a time (v) Effect of announcement on Return, Liquidity and Volatility is measured.
2) In previous studies, only one or two types of parametric or non-parametric statistical tools are used to test the robustness of results. But in present study, both Parametric and Non-parametric test are used to examine the significant changes around selected event announcements which help in robustness of the study.

3) More advance models are used such as Average Security Return Variability Model (ASRV), PWCAAR, Econometric model, Contribution Ratio etc.

4) Volatility effect has been checked with either through historical measure or time varying measure only. But in present study, Historical and Time varying volatility measures have been used for strengthen the study with more robust results.

5) Size effect on market efficiency has also been studied with regard to Corporate Financial announcements.

6) Advance software like EViews, SPSS, and Analysis Tool Pack in Excel etc. are used.

Hence, this study was an attempt to test the efficiency of the Indian capital market with respect to information content of four major corporate events (Stock Split, Buyback, Bonus Issue, and Right Issue) on Banking & IT (Information Technology) companies.

3.3 Research Objectives

The study was aimed to achieve the following objectives:

1) To empirically analyse the presence of any abnormal returns on or surrounding the Corporate Financial announcements dates (Stock Split, Buyback, Bonus Issue, and Right Issue) for sample companies.

2) To study the information content in announcement of selected events.

3) To determine the impact of selected Corporate Financial announcements on shareholders’ wealth, liquidity & stock price volatility.

4) To investigate the historical and time varying volatility for selected corporate financial announcements.

5) To study the appropriateness of ARCH (Autoregressive conditional heteroscedastic) family models among symmetric and asymmetric both for best fit.

6) To conclude whether Indian stock market is efficient in weak form and semi – strong form based on the results of the study.

3.4 Research Hypothesis

The study strives to test the following hypothesis:

1) Corporate Financial announcements (Stock Split, Buyback, Bonus Issue, and Right Issue) do not create shareholders’ wealth for Banking & IT (Information Technology) companies’ i.e. AAR = 0 & CAAR = 0
2) There is no significant difference in AAR during before and after the announcement of corporate financial events.
3) There is no significant information content in Corporate Financial announcements for valuation of stock i.e. ASRV = 1
4) There is no significant difference in liquidity during before and after the announcement of corporate financial events.
5) There is no significant difference in volatility during before and after the announcement of corporate financial events.
6) Effect of Corporate Financial announcements on AAR, liquidity and volatility does not differ across their size of firm.
7) Indian stock market is efficient in weak form and semi – strong form.

3.5 Data & Methodology

This research work is descriptive and empirical in nature; it is aimed at describing and exploring the relationship between timing of selected financial event announcements and various factors such as abnormal returns, liquidity and risk. To achieve the objectives of the study, Secondary data was used. The data was sourced from Capitaline Data Base, BSE website, NSE website, Money Control.com & related financial web sites. The reference period for this study was ranged from January 2005 to December 2016. This study cover the companies listed on NSE from Banking & IT sectors. These sectors were considered because of their major contribution in GDP & major representative of BSE 500 and NIFTY 500 Indices. The corporate financial announcement effect was investigated with selected events which include Bonus issue, Right Issue; Stock Split & Buy Back.

The event window for this study was 21 days (+/- 10 days) and estimation period was 120 days before event window. The analysis was done for share price volatility and liquidity during 10 days before event announcement & 10 days after event announcement. The actual returns of the stocks were compared with expected stock returns based on market Index (Nifty 500). The National Stock Exchange of India Limited (NSE) is the leading stock exchange of India, located in Mumbai. The NSE was established in 1992 as the first demutualized electronic exchange in the country to provide a modern, fully automated screen-based electronic trading system which offered easy trading facility to the investors spread across the length and breadth of the country. Vikram Limaye is Managing Director & Chief Executive Officer (MD & CEO) of NSE. National Stock Exchange had a total market capitalization of more than US$1.41 trillion, making it the world’s 10th-largest stock exchange as of March 2017. NSE's flagship index, the NIFTY
50, the 50 stock index is used extensively by investors in India and around the world as a barometer of the Indian capital markets. However, only about 4% of the Indian economy / GDP is actually derived from the stock exchanges in India. NIFTY 500 tracks the performance of the securities forming part of Large-cap, Midcap and Small Cap universe - 500 securities. The NIFTY 500 Index represents about 95.2% of the free float market capitalization of the stocks listed on NSE as on March 31, 2017 (www.nseindia.com).

The description of variables for current study is given in Exhibit 3.1.

**Exhibit 3.1: Detail for Referenced Variables in the Present Study**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Nature</th>
<th>Variable</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAR = Average Abnormal Return</td>
<td>Dependent Variable</td>
<td>SCAPMTRADE = Small Cap Mean Trade</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>WAAR = Weighted Average Abnormal Return</td>
<td>Dependent Variable</td>
<td>LCPAMAMIVEST = Large Cap Mean Amivest</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>CAAR = Cumulative Average Abnormal Returns</td>
<td>Dependent Variable</td>
<td>MCAMAMIVEST = Medium Cap Mean Amivest</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>PWCAAR = Precision Weighted Cumulative Average Abnormal Return</td>
<td>Dependent Variable</td>
<td>SCAMAMIVEST = Small Cap Mean Amivest</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>ASRV = Average Security Return Variability</td>
<td>Dependent Variable</td>
<td>LCAPRISK = Large Cap Risk</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>MTRADE = Mean trade as proxy variable of Liquidity</td>
<td>Dependent Variable</td>
<td>MCAPRISK = Medium Cap Risk</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>MAMIVEST = Mean Amivest as proxy variable of Liquidity</td>
<td>Dependent Variable</td>
<td>SCAPRISK = Small Cap Risk</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>Variance as proxy variable of Risk</td>
<td>Dependent Variable</td>
<td>Right Issue Announcement</td>
<td>Independent Variable</td>
</tr>
<tr>
<td>LCAPAAR = Large Cap Average Abnormal Returns</td>
<td>Dependent Variable</td>
<td>Stock Split Announcement</td>
<td>Independent Variable</td>
</tr>
<tr>
<td>MCAPAAR = Medium Cap Average Abnormal Returns</td>
<td>Dependent Variable</td>
<td>Bonus Issue Announcement</td>
<td>Independent Variable</td>
</tr>
<tr>
<td>SCAPAAR = Small Cap Average Abnormal Returns</td>
<td>Dependent Variable</td>
<td>Buy Back Announcement</td>
<td>Independent Variable</td>
</tr>
<tr>
<td>LCAPMTRADE = Large Cap Mean Trade</td>
<td>Dependent Variable</td>
<td>Share Prices</td>
<td>Moderating Variable</td>
</tr>
<tr>
<td>MCAPMTRADE = Medium Cap Mean Trade</td>
<td>Dependent Variable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Market Model and OLS Regression Model was used to find out the extent of abnormal returns given by a stock in the event window of 21 days and with clean period of 120 days. The event window and estimation window was decided after making a review of event windows taken in previous studies. Appendix 3.1 indicates the event windows, estimation windows, model used, hypothesis undertaken, liquidity and risk measures taken in previous studies.

3.6 Selection of Financial Announcements

To measure the announcement effect, the target companies were selected from the companies listed on NSE belonging to banking and IT sectors with availability of the data of financial event announcements. In total 184 target companies were selected. But sample companies/Announcements’ were made final to 146 as per below defined criteria i.e.:

- To include in the sample, company must be listed on NSE.
- To include in the sample, company must have 141 days stock price data.
- The confounding event sample companies were excluded from the sample with in specified event window by any of the company.

The NIFTY 500, a market index was used as a proxy for the market model to predict the expected returns of the securities using Ordinary Least Square regression modelling (OLS). However Exhibit 3.2 shows the number of companies included in sample for various corporate financial announcements under reference of this study:

**Exhibit 3.2: Sample Size for Financial Announcements in India’s Capital Market**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Events</th>
<th>No of Announcements/ No of Sample Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Right Issue</td>
<td>28</td>
</tr>
<tr>
<td>2</td>
<td>Stock Split</td>
<td>44</td>
</tr>
<tr>
<td>3</td>
<td>Bonus Issue</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>Buy Back</td>
<td>34</td>
</tr>
</tbody>
</table>

3.7 Methodology for Measuring the Effect of Selected Corporate Events’ Announcement on Abnormal Returns, Liquidity and Volatility/Risk

*Event Study* methodology using daily returns along with OLS market model was applied for the purpose of analysing the effect of Corporate Financial announcements. (Ball & Brown, 1968; Brown & Warner, 1980; Kothari Masulis, 1980; Leftwich, 1981; Bowman, 1983; Brown & Warner, 1985; Peterson, 1989; Henderson Jr. , 1990; fama et al, 1997; Mackinlay, 1997; Srinivasan, 1997; Mcwilliams ,2000; Mallikarjunappa, 2004; Brown &

Definition of some important terms must be understood before applying event study methodology i.e.:

- **Event of Interest** is announcement for any of event i.e. bonus announcement, right shares announcement etc.

- **Event Window** is the period for studying movement of share prices with regard to specific time as per occurrence of any event i.e. 5 days, 11 days, 21 days etc.

- **Estimation Window** refers to clean period chosen prior to event window for calculation of normal returns by regressing on the market index.

- **According to Mackinley (1997), Abnormal Returns** are defined as excess of actual returns over the expected returns. Average abnormal return is the average of abnormal return for all sample companies for each day during the whole event window. Cumulative average abnormal return is the sum of all AAR during the whole event window.

Present research work consist the announcement of four events namely; Buy Back, Bonus, and Right Issue & Stock Split as event interest. For studying the event interest chosen, the event window of 21 days i.e. -10, through 0, to +10 was taken. Here, 0 refers to announcement date, -10 through 0 is the time period prior to announcement and 0 to +10 is the time period after the announcement date. Further, the event window was sub classified as various smaller run – up windows i.e. -10; -1, -1; +1, -2; +2, -3; +3, -4; +4, -5; +5, -7; +7. The estimation window for this study was 120 days.

To determine the market adjusted abnormal returns of selected events single factor market model (Fama, et.al., 1969) was used. As per market model, the individual daily stock returns were arrived at by using OLS regression model.

**3.7.1 Abnormal Return (AR), Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) were worked out as Follows:**

\[
AR_{it} = R_{it} - (\alpha_{it} + \beta_{i} R_{mt})
\]

Where, AR= Abnormal Returns

\( R \) = Security Actual Returns

\( \alpha \) = Constant value
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\[ \beta = \text{Security Sensitivity to Market} \]

\[ AAR_t = \frac{1}{N} \sum_{i=1}^{n} AR_{it} \]

Where, AAR = Average Abnormal Returns

N= No. of announcements in the sample

\[ CAAR = \sum_{t=1}^{T} AAR_t \]

Where, CAAR = Cumulative Average Abnormal Returns

To determine the Cumulative effect of selected events, Cumulative average abnormal returns and Precision weighted cumulative average abnormal returns (Cowan 2007) both were considered.

The Precision-weighted average was constructed using the relative weights of each stock. The precision-weighted return weight each stock in inverse proportion to its standard deviation. The precision-weighted cumulative average was calculated as specified below (Rani, N. Et.al., 2016):

\[ \text{PWCAAR}_{t_1, t_2} = \sum_{j=1}^{N} \sum_{i=t_1}^{t_2} \omega_j AR_{ji} \]

Where, PWCAAR = Precision weighted cumulative average abnormal return

Where,

\[ \omega_j = \left( \frac{\sum_{i=t_1}^{t_2} \delta^2_{AR_{ij}}}{\sum_{i=1}^{N} \sum_{k=t_1}^{t_2} \delta^2_{AR_{ik}}} \right)^{\frac{1}{2}} \]

\[ \delta^2_{AR_{ij}} = \frac{\sum_{k=T_{De}}^{T_{Db}} (AR_{jk})^2}{D_j - 2} \left[ 1 + \frac{1}{D_j} + \frac{(R_{mt} - \bar{R}_m)^2}{\sum_{k=T_{De}}^{T_{Db}} (R_{mk} - \bar{R}_m)^2} \right] \]

Dj is the number of non-missing estimation period returns for firm j.

Rmt is the return on the market index on day t in the event window,

Rmk is the return on the market index on day k in the estimation window.

\( \bar{R}_m \) is the mean market return over estimation period.

k represents the trading day in estimation period.
3.7.2 *Average Security Return Variability Model (ASRV)* was applied to check the informational efficiency of selected event announcement. If ASRV is equals to one then there is no informational content is present in event announcement. But if ASRV is greater than one then event announcement proves to be presence of informational efficiency.

\[ ASRV_t = SRV_{i,t} \times (1/n) \]

where,

\[ SRV_{i,t} = \frac{AR_i^2}{V(AR)} \]

Where, \( SRV_{i,t} \) = Security Returns Variability of security \( i \) in time \( t \) \( AR_i^2 \) = Abnormal returns on security \( i \) on day \( t \) \( V(AR) \) = Variance of Abnormal Returns during the announcement period. (*Beaver, 1968; Prakash, 2013; Sujith, 2009*)

3.7.3 *Descriptive statistics* of the data on abnormal returns, liquidity measures and variance were determined. To examine the normality of data on these measures *Kolmogorov–Smirnov test* (*Stephens, M. A. 1974; Marsaglia G, Tsang WW & Wang J 2003; Arnold, Taylor B. and Emerson, John W. 2011*) was applied.

3.7.4 *Regression of Pre and Post CAARs & Contribution ratio* was also applied to check the relationship for specific pattern and concentration of abnormal returns throughout the event window. Pre CAAR was calculated as accumulation of pre – event AAR (day \(-10\) to \(-1\)) and Post CAAR was calculated as accumulation of post event AAR (day 0 to \(+10\)). Pre and Post CAAR values were calculated for each sample company for each event announcement. To test if there is any continuation pattern in abnormal returns, Post CAAR regress on Pre CAAR in the form:

\[ \text{Post CAAR} = \gamma_0 + \gamma_1 \text{Pre CAAR} + e_i \]

(*Bijoy & Sehgal, Sanjay, 2015*)
A significantly positive value for $\gamma_1$ shall confirm continuation pattern, a significantly negative $\gamma_1$ implies reversal pattern while an insignificant $\gamma_1$ shall indicate an absence of relationship between post- and pre-event returns.

Further, Contribution ratio was also used to check the concentration of abnormal returns. Various Run up event windows were used, namely, -10 to -1 (ten days); -1 to 0 (two days); -1 to +1 (three days); -2 to +2 (five days); -3 to +3 (seven days); -4 to +4 (nine days); -5 to +5 (eleven days); and -7 to +7 (fifteen days). CAAR values for various run up event windows were calculated to check if a large part of price reaction had occur very close to the event date.

$$\text{Contribution ratio} = \frac{\text{CAAR Run Up}}{\text{CAAR Total}}$$

Where, CAAR Run Up is cumulative average abnormal returns for Run up event window and CAAR Total are cumulative average abnormal returns for total event period (21 days).

3.8 Test Used for Examining the Significance of Abnormal Returns:

To determine the statistical significance of market adjusted average abnormal returns of corporate events various parametric & Non-parametric tests were considered. Brief descriptions of these tests are given below:


3.8.1 The Crude Dependence Adjustment Test (CDA): This test is based on the single variance estimated from estimation window for each sample company. After that all variances of sample companies are used to get the aggregate standard deviation. This aggregate figure is used to discount the average abnormal returns and cumulative average abnormal returns for testing of potential dependence of returns across the sample. Brown and Warner (1980, 1985) explain that the test as Crude dependence adjustment test uses a single variance estimate for the entire sample. To comprise the dependence across firms’ average residuals, in event time, Brown and Warner (1980) propose that the standard deviation of average residuals should be estimated from the time series of the average abnormal returns over the estimation period. Estimation of pre- event standard deviation of daily abnormal returns can be calculated from following formula:
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Where,

\( i,_{pre} \) = Standard deviation of abnormal returns of security i estimated from pre-event measurement period.

\( n \) = Number of days in pre-measurement period

\( AAR_{pre} \) = Average of abnormal return of security i estimated from pre-event measurement period.

Aggregate pre-event standard deviation is computed as follows:-

\[
\sigma_{N,pre} = \sqrt{\frac{\sum_{i=1}^{N} \sigma_{i,pre}^2}{N}}
\]

\( i,_{pre} \) is applied on AAR of each day. The t-test for AARs is as follows:-

\[
AAR_t \ t \ stat = \frac{AAR_t}{\sigma_{N,pre}}
\]

For testing CAARs, the t-test formula is:-

\[
CAAR_t \ t \ stat = \frac{CAAR_t}{\sigma_{N,pre} \sqrt{N_t}}
\]

Where ‘\( N_t \)’ = the absolute value of event day ‘t’ plus 1 (e.g. for event day -10, the absolute value is 10 and \( N_t = 11 \)). A testable hypothesis is set. H1: The null hypothesis being tested is abnormal returns on & around events are less than or equal to zero. If AARt/CAARt are greater than zero & statistically significant it shows that the stock prices on an average reacted positively to event announcement. Thus lead to raise the wealth of shareholders. If the t-test statistic is greater in absolute value than 1.64 or 1.96 or 2.58, the relevant abnormal return is statistically significant at 10% or 5% or 1% respectively.

3.8.2 Cross-Sectional Test: Test statistics were conducted to calculate the AAR and CAAR during the event window resulted from the announcement of events. If calculated level of t-value of AAR or CAAR goes beyond the critical t-value, the null hypothesis is rejected representing the significant impact of announcement on the securities. It means it can be concluded that prices of security is inefficient in the market at its semi-strong form. Brown and Warner (1985) explained that the cross-sectional test is subject to event-induced volatility. Thus, the test has low power.
A simple test for testing $H_0: \text{AAR}=0$ is given by

$$t = \frac{\text{AAR}_t}{\hat{\sigma}_{\text{AAR}_t}/\sqrt{N}}$$

Where,

$$\hat{\sigma}^2_{\text{AAR}_t} = \frac{1}{N - 1} \sum_{i=1}^{N} \left( AR_{it} - \frac{1}{N} \sum_{j=1}^{N} AR_{jt} \right)^2$$

3.8.3 Patell's Test: Patell (1976) proposes a test statistic where the event period abnormal returns are standardized by the standard deviation of the estimation period abnormal returns. This test statistics assumes cross-sectional independence in abnormal returns; it also assumes that there is no event-induced change in the variance of event period abnormal returns. The standardized abnormal return (SAR) for each security is calculated as:

$$SAR_{jt} = \frac{AR_{jt}}{\hat{\sigma}_{AR_{jt}}}$$

Where

$$\hat{\sigma}^2_{AR_{jt}} = \frac{\sum_{k=T_{D_0}}^{T_{D_1}} (AR_{jk})^2}{D_j - 2} \left[ 1 + \frac{1}{D_j} + \frac{(R_{mt} - \bar{R}_m)^2}{\sum_{k=T_{D_0}}^{T_{D_1}} (R_{mk} - \bar{R}_m)^2} \right]$$

Total standardized abnormal return (TSAR) across the sample is given as below:

$$TSAR_{jt} = \sum_{j=1}^{N} SAR_{jt}$$

The variance of TSARt is given as :

$$Q_t = \sum_{j=1}^{N} D_j - 2$$

$$Z_{\text{Patell},t} = TSAR_t/Q_t$$

The test statistic for the null hypothesis that CAAR $T_1:T_2 = 0$ is given as below :

$$Z_{T_1:T_2} = \frac{1}{\sqrt{N}} \sum_{j=1}^{N} Z_{T_1:T_2}$$
Where,\[
Z_{T_1,T_2}^j = \frac{1}{\sqrt{Q_{T_1,T_2}^j}} \sum_{t=T_1}^{T_2} SAR_{jt}
\]
and
\[
Q_{T_1,T_2}^j = (T_2 - T_1 + 1) \frac{D_j - 2}{D_j - 4}
\]

The Patell test statistics of CAAR is not adjusted for serial dependence. Mikkelsen and Partch (1988) corrected the Patell test for the likely serial correlation of abnormal returns of each security within the event window. The serial correlation occurs as all the abnormal returns are functions of the same market model. The corrected test statistic for the null hypothesis that CAAR = 0 is given as per Equation:

\[
Z_{CAAR} = N^{-\frac{1}{2}} \sum_{j=1}^{N} \frac{CAR_{T_1,T_2}^j}{\delta_{CAR_{T_1,T_2}^j}}
\]

Where,
\[
\delta_{CAR_{T_1,T_2}^j}^2 = \frac{\sum_{k=T_1}^{T_2} AR_{jk}^2}{D_j - 2} \left\{ L \left[ 1 + \frac{L}{D_j} + \frac{\left( \sum_{i=T_1}^{T_2} R_{mi} - L\bar{R}_m \right)^2}{\sum_{k=1}^{D_j} \left( R_{mk} - \bar{R}_m \right)^2} \right] \right\}
\]

3.8.4 Standardized Cross-Sectional Test (SCS) OR BMP Test (Boehmer, Musumeci, and Poulsen, 1991): Standardized cross-sectional test (Boehmer et al., 1991) includes the information from both estimation and the event period. Residuals for event window are standardized by estimation period standard deviation. The test is same as Patell’s test except that there is a final adjustment in the place of analytical variance of the total standardized abnormal return.

\[
Z_t = \frac{TSAR_t}{N^{\frac{1}{2}}(\delta_{SAR_t})}
\]

where,
\[
\delta_{SAR_t}^2 = \frac{1}{N - 1} \sum_{i=1}^{N} \left( SAR_{it} - \frac{1}{N} \sum_{j=1}^{N} SAR_{jt} \right)^2
\]

The standardized cumulative abnormal return for stock j is:

\[
SCAR_{T_1,T_2}^j = \left( \frac{CAR_{T_1,T_2}^j}{\delta_{CAR_{T_1,T_2}^j}} \right)
\]

Then the standardized cross-sectional test for the null hypothesis that CAAR = 0 is given as:

\[
Z_t = \frac{\sum_{i=1}^{N} SCAR_{T_1,T_2}^i}{N^{\frac{1}{2}}(\delta_{SCAR_{T_1,T_2}^i})}
\]
where,
\[ \delta^2_{\text{SCAR}(\tau_i, \tau_j)} = \frac{1}{N - 1} \sum_{i=1}^{N} \left( \text{SCAR}_{\tau_i, \tau_j} - \frac{1}{N} \sum_{j=1}^{N} \text{SCAR}_{\tau_j, \tau_j} \right)^2 \]

Two non-parametric test statistics, namely, generalized sign test (Cowan, 1992), rank test (Corrado, 1989) are used to check the significance of AAR and cumulative abnormal returns over the event window.

3.8.5 Generalized Sign Test (Gsign Z): The generalized sign test is a modified version of the sign test by allowing the null hypothesis having positive abnormal residuals to be different from 0.5 (Cowan, 1992).

The generalized sign test analyse whether the number of stocks with positive cumulative abnormal returns in the event period exceeds the number expected in the absence of abnormal performance or not. The expected number is based on the fraction of positive abnormal returns in the 120 day estimation period as:

\[ \hat{p} = \frac{1}{n} \sum_{j=1}^{n} \frac{1}{120} \sum_{t=1}^{120} S_{jt} \]

Where \[ S_{jt} = \begin{cases} 1 & \text{if } AR_{jt} > 0 \\ 0 & \text{otherwise} \end{cases} \]

The following statistic has an approximate unit normal distribution with parameter \[ \hat{p} \]:

\[ G \text{SIGN}_Z = \frac{w - n\hat{p}}{\sqrt{n\hat{p}(1 - \hat{p})}} \]

Where ‘\( w \)’ is the number of stocks in the event window for which the CAR is positive.

3.8.6 Rank Test: The rank test (Corrado, 1989) considers the combined estimation period and event period as a one set of series, and assigns a rank on daily bases for each firm. Corrado Rank test (Corrado, 1989; Corrado & Zivney, 1992; Corrado & Truong, 2008) provides correct results even in case of skewed data.

\[ C_{\text{rank}} = \frac{1}{N} \sum_{i=1}^{N} \left[ K_{i0} - \frac{m+1}{2} \right] / s(K) \]

Here \( m \) is the number of total observations in the estimation and event window.

The standard deviation is as;

\[ s(K) = \sqrt{\frac{1}{m} \sum_{t=1}^{T} \left( \frac{1}{N} \sum_{i=1}^{N} \left( K_{it} - \frac{m+1}{2} \right) \right)^2} \]
Corrado’s rank statistics test is based on median & is more resistant against the event-induced variance on day ‘0’ and has a better performance than the traditional test used by Brown-Warner (Boehmer vd., 1991: 256).

3.8.7 Run test as non parametric is used in SPSS to determine the randomness of data for Abnormal returns, liquidity and variance. Usually, in non-parametric, no basic distribution is assumed. Run test is calculated by using the following formula:

\[ \mu_r = \left( \frac{2n_1n_2}{n_1 + n_2} \right) + 1 \]

The standard error of expected number of runs is calculated as:

\[ \sigma_r = \sqrt{\frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}} \]

\[ Z = \frac{r - \mu_r}{\sigma_r} \]

3.8.8 Paired t-Test: As parametric, this is used to test the significant differences between two dependent samples from normal population with same distribution. T-test is based on the assumption that variances of samples are equal. In paired sample t-test, every problem is considered twice, resulting in pairs of interpretation.

\[ t = \frac{X - \mu_0}{S/\sqrt{n}} \]

3.8.9 Wilcoxon Paired Signed Rank Test: As nonparametric, this is used to test the significant differences between two dependent samples from population with same distribution. This is alternative to paired t-test in lack of assumption for normality of data. This test considers both direction and magnitude of differences.

The impact of selected Corporate Financial announcements on liquidity and risk was calculated at two points in time; one before and one after the announcement. The time period considered for short-term analysis was 10 days before and 10 days after the announcement date.

The following liquidity and risk measures were evaluated to achieve the desired objective of the research study.

3.9 Liquidity Measures
Liquidity is the capability of trading assets quickly without distorting prices (Doroshenko, 2011). To study the impact of various events on liquidity, two commonly used measures, from the literature reviewed (Amihud, Mendelson & Lauterbach, 1997; Wulff, 2002; Mishra, 2007; Huang, Liano, & Pan, 2007), was used. These measures are: trade to total trade ratio and Amivest ratio. These measures apply trading volume and stock price data to depict liquidity; higher the value of the measure higher is the liquidity. These are defined below:

3.9.1 Liquidity as Concept of Trading Activity : Ratio of Trade with Total Trades: This is defined as the ratio of trading volume with total trading volume of market.

\[
\text{Trade to Total Trade Ratio} = \frac{\text{Trading Volume}}{\text{Total Trading Volume of Market}}
\]

3.9.2 Liquidity as Concept of Price Impact : The Amivest Liquidity Ratio (L2): This measure of liquidity is used to find out the rupee volume of trading associated with a 1% change in the price of a security. It is originally developed by Amivest Corp. and has been considered a good proxy for liquidity & market depth by various research studies (Khan & Baker, 1993; Amihud, 1997; Muscarella & Piwowar, 2001; Huang et al., 2007). The ratio is presented as:

\[
\text{Amivest Ratio} = \frac{1}{N} \sum_{d=1}^{N} \frac{\text{VOL}_d}{|R_d|}
\]

With larger Amivest liquidity ratio market should be more liquid, as in a liquid market, a higher rupee trading volume should lead to a small price change. It is based on the perception that for a liquid security, a large trading volume may be visible with a small change in price.

3.10 Risk Measure for Historical Volatility

Variance was used as a proxy to determine the change in risk subsequent to announcement of selected events. It is a well-accepted measure, in various earlier studies (Dravid, 1987; Ohlson & Penman, 1985; Wulff, 2002; Balachandran et al., 2005). To observe the impact of announcement effect on Risk/Volatility measure such as the variance was taken. To measure the significant differences, the pre-announcement and post-announcement means of these measures (for the specific time periods) was compared with paired sample t-test.

3.11 Procedure for Determining the Effect of Corporate Financial announcements across size of Firms’
Some more factors were considered for detailed analysis. First of all, companies in the sample were sorted out as large, mid and small on the basis of Market capitalisation as on March 31, 2016 to measure the effect of companies’ announcements separately. As per NSE, stocks are classified into three different types of categories on the basis of market capitalization – large cap, mid cap and the small cap. Companies with the market capitalization of more than $ 10 billion are considered as a large Cap companies. Similarly, companies having market capitalization between $ 2 billion and $ 10 billion are known as Mid Cap companies. Further, companies with market capitalization of less than $ 2 billion are said to be small cap companies. Appendix 3.2 indicates the list for segregation of sample companies across their size (Source: Capitaline Database from Capital Market Publishers Pvt. Ltd., Screener as on Feb 9, 2018).

3.11.1 Single Factor Anova Test : Anova test is used to check the mean difference of variable for more than two samples. ANOVA is based on comparing the variance (or variation) between the data samples to variation within each particular sample. If the between variation is much larger than the within variation, the means of different samples will not be equal. If the between and within variations are approximately the same size, then there will be no significant difference between sample means.

3.12 Methodology for Examining the Effect of Event Announcement on Time Varying Volatility

Various econometric tools i.e ADF, Regression, Arch family models, Residual diagnostic (Correlogram squared statistic, Arch LM & Jerqua-berry normality test) was applied to check the time -varying volatility using E-views-7 Econometrics package. First of all Stationarity was checked by Augmented Dickey-Fuller Test (ADF) (Dickey and Fuller 1979). After that Heteroscedasticity test was applied. To test the presence of heteroscedasticity in residual of the return series, Lagrange Multiplier (lm) test for Autoregressive conditional heteroscedasticity (arch) was used. It is sensible to compute the Engle (1982) test for an arch effect to ensure that there is no arch effect.

Arch models represent the main methodologies that were applied in modelling the stock market volatility. The present study employed symmetric and asymmetric Arch family models. Arch 5 and Garch (1, 1) as symmetric and Tarch & Egarch as asymmetric used for modelling of conditional volatility.

3.12.1 The Generalized arch Model : The Garch model (Bollerslev 1986), which allows the conditional variance to be dependent upon previous own lags; conform to the conditional variance equation in the simplest form as:
mean equation: \( r_t = \mu + \omega \sigma_t^2 + \epsilon_t \) and

variance equation: \( \sigma_t^2 = \omega + \alpha_1 \epsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \).

Where, \( \omega > 0, \alpha_1 \geq 0, \beta_1 \geq 0, \) and \( r_t \) is the return of the asset at time \( t \), \( \mu \) is the average return, and \( \epsilon_t \) is the residual return.

The size of parameters \( \alpha \) and \( \beta \) determine the short-run dynamics of the volatility time series. If the sum of the coefficient is equal to one, then any shock will lead to a permanent change in all future values. Hence, a shock to the conditional variance is ‘persistence.’

**3.12.2 The Exponential Garch Model:** This model is based on the logarithmic expression of the conditional variability. The presence of leverage effect can be tested and this model enables to find out the best model, which capture the symmetries of the Indian stock market (Nelson 1991) and hence the following equation:

\[
\ln( \sigma_t^2 ) = \omega + \beta_1 \ln( \sigma_{t-1}^2 ) + \alpha_1 \left\{ \frac{\epsilon_{t-1}}{\sigma_{t-1}} - \sqrt{\frac{\pi}{2}} \right\} - \gamma \frac{\epsilon_{t-1}}{\sigma_{t-1}}.
\]

The left-hand side is the log of the conditional variance. The coefficient \( \gamma \) is known as the asymmetry or leverage term. The presence of leverage effects can be tested by the hypothesis that:

\[ \gamma \neq 0. \]

**3.12.3 Threshold Garch Model:** The generalized specification of the threshold garch for the conditional variance (Zakoian 1994) is given by:

\[
\sigma_t^2 = \omega + \alpha_1 \epsilon_{t-1}^2 + \gamma d_{t-1} \epsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2,
\]

The \( \gamma \) is known as the asymmetry or leverage parameter. In this model, good news \((\epsilon_t > 0)\) and the bad news \((\epsilon_t < 0)\) have the differential effect on the conditional variance. Good news has an impact of \( \alpha i \), while bad news has the impact on \( \alpha i + \gamma i \). Hence, if \( \gamma \) is significant and positive, negative shocks have a larger effect on \( \sigma_t^2 \) than the positive shocks.

**3.13 Significance of the Study**

This study will be highly useful for corporate, investors, fund managers, corporate executives & administrators of financial institutions in decision making in line with the results of about impact of various important announcements. From fund managers/investors’ perspective, the study will help them in designing their trading
strategies for different sectors. Changes in daily return volatility not only affect systematic risk but also important to underlying traders who hold undiversified portfolios. From firms’ perspective, the study will help to achieve the objective of shareholder’s wealth maximization. This is possible through Signalling device by sending a message to investors who undervalued the same while valuing the shares.

3.14 Limitations of the study:

The following are some of the limitations of the study.

- The study is confined to only NSE listed companies of Banking & Information Technology (IT) sectors which have announced the sample event announcements during the study period 2005-2016.

- The Capitaline and Prowess are the agencies which have been publishing information regarding the corporate event announcements in India on a regular basis. However, data compiled by the Capitaline have obvious limitations. In the absence of more reliable data, Capitaline data on corporate event announcements information are used in this study.

- The study is confined to only 21 days event window which is sufficient for short term analysis but long term analysis is missing for complete impact.

- The assumption of event study poses a serious issue because it assumes that there is no other announcement during the period. However, to get all the news and announcement data was not feasible.

- There is biasness on the part of inclusion of events in the sample. Because researcher excludes the dividend announcement from the sample due to longer reference period for current study i.e. 12 years from Jan 2005-Dec 2016 with 22,619 observations on daily basis. It would be unmanageable for the researcher if dividend announcement was also added in the selected sample.

Despite the above limitations, the researcher put in all his best efforts to overcome the limitations and completing the study.

3.15: Organisation of the Study

The study has been organized as under:

**Chapter- 1:** presents an overview of capital market efficiency in India, meaning, definition, forms of Market efficiency and types of returns. In addition, reasons for internal events considered for the analysis such as Right issue, Stock Split, Bonus and buy Back announcements.
Chapter -2: describe the review of the existing literature on present topic.

Chapter -3: has been devoted to the description of the problem statement and research methodology used in the study.

Chapter- 4: presents the results relating to analysis for impact of Right issue announcement on Share price volatility and Liquidity.

Chapter- 5: presents the results relating to analysis for impact of Stock Split announcement on Share price volatility and Liquidity.

Chapter- 6: presents the results relating to analysis for impact of Buy Back announcement on Share price volatility and Liquidity

Chapter- 7: presents the results relating to analysis for impact of Bonus announcement on Share price volatility and Liquidity.

Chapter-8: presents the findings & conclusion related to objectives of the current study.

3.16 References


Research Methodology


• Linda Norman; Published on Mar 19, 2016; https://www.youtube.com/watch?v=YrWzdce7VoWl


Research Methodology