



## Differences in Impact of Stock Splits with Difference in Size of the Companies (Ex-Split Day)

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### Abstract:

*Stock split is a corporate decision in which company divides face value of the equity share into more than one unit. Ex-split Day is the effective day on which share starts trading in the stock market at new face value after stock split. The empirical results indicates that stock splits have significant impact on ARs in ex-split window irrespective of differences in size of sample companies. The significant impact on AARs is visible in ex-split window for small size companies for longest duration of time. The duration of effect is lesser for medium size companies and it is least for large size companies. The empirical results imply that both large size and small size companies have same cumulative effect on ARs.*

### 1. Introduction

Stock splits also termed as stock sub-division, occur when equity shares are split into a specific number of new equity shares at a reduced face value though total equity share capital remains unchanged and there is no change in paid up capital.

According to Section 4(1) of Companies Act 2013<sup>7</sup> Memorandum of Association (MOA) every company shall state in case of company having share capital, the amount of share capital with which company is to be registered and division thereof into shares of a fixed amount. Listed companies which have issued shares in denomination of Rs.10 or Rs.100 may change the standard denomination of shares by splitting or consolidating existing shares. An eligible company is free to make public offer of its equity shares in any denomination determined in accordance with Section 4(1) of the Act and in compliance with SEBI (Disclosure & Investors Protection) Guidelines 2000 (hereinafter referred to as DIP Guidelines).

In India Budhraj, Parekh and Singh (2004) studied stock splits of companies listed on BSE (Bombay Stock Exchange) and found ARs around bonus issue and stock splits announcement day over three day trading period.

Different studies have attempted to isolate directly or indirectly the effect of stock splits on share prices. It is difficult to generalize from the results because researchers used different time periods and stressed on split day or month. Majority of studies indicate that abnormal price movement occurs before announcement of stock splits. Researchers observed that market response lasts only for a few days around announcement and ex-split day. That needs to be tested in India also. There is a need to undertake studies that try to find capability of investors to process information and not be restricted to finding capability of markets to process information.

Bley (2002) tried to capture differences in liquidity with differences in market capitalization. Bley (2002) examined 40 stock splits in German stock market from 1994 to 1996. To avoid any size effects; he divided sample companies into two groups according to their market capitalization. He

concluded that, after stock splits, daily trading volume decreased significantly for class of high-market-capitalization shares.

Khatua and Pradhan (2013) tried to find how smaller companies and larger companies overreaction vary with market conditions, market uncertainty or volatility to company-specific news by investigating whether there are any significant differences between CARs of large and small size companies. They found that positive CARs around stock splits are caused by periods of high volatility and are more significant for large companies.

In India no study has tried to find whether there are any differences in impact of stock splits with differences in size of companies. The current study by analyzing ARs and liquidity measures tries to find presence of differences in impact of stock splits with differences in size of company.

Thus studies in past have noted that ownership structure of a company plays an important role in amount of liquidity gains associated with stock splits.

The research objective set for the study restricted to India is as follows:

- To investigate differences in effect of stock splits on share prices with differences in split ratios and size of company.
- In order to attain the research objective following research hypothesis is framed:
- HYP:1- Different size companies have different impact on share prices.

## 2. Research Methodology

The research papers and studies in the past are primarily used as basis to decide appropriate methodology used for analysing the impact of stock splits on share prices. The use of event study methods for analysis is well documented and evaluated in previous work. It helps in determining whether an event generates abnormal returns after a company makes a financial decision in relation to an asset or whether an event affects value of that asset.

The sample comprises of stock splits announced by companies listed on Bombay Stock Exchange (BSE) which became effective during period starting from 1st January 1999 and till 30th June 2013. The closing share prices data for the sample along with values of BSE Sensitive Index<sup>2</sup> is collected from Prowess 19.1, a database of Centre for Monitoring Indian Economy (CMIE)<sup>3</sup>. The stock split announcement dates are not directly published in any of the leading business dailies. The dates of announcement day are taken from Prowess database, Capital line and press reports of Economic Times. Additional information is obtained from bseindia.com (official website of BSE).

All sample companies are put in three different groups of companies- small-size, medium-size and large-size on the basis of their market capitalization on ex-split day. The group of companies termed as small size companies (79 Companies) have market capitalization up to Rs.2,000 million. The group of companies categorized as medium size companies (54 Companies) have market capitalization up to Rs.10,000 million and group of companies termed as large size companies (81 Companies) have market capitalization above Rs.10,000 million. Impact of stock splits on share prices is analysed through stock returns. The study tries to find effect around announcement day and same is discussed below.

**Impact of stock splits around ex-split day** is studied through abnormal returns (ARs) calculated using market model as a part of Event Study. Abnormal return is defined as actual return ( $R_{it}$ ) minus normal return ( $NR_{it}$ ).

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$$AR_{it} = R_{it} - NR_{it} \quad (1)$$

Normal Return is calculated using Market model which is –

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

And,

$$NR_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} \quad (2)$$

$R_{mt}$  is return on market index for day t.  $\hat{\alpha}_i$  measures mean returns not explained by market.  $\hat{\beta}_i$  measures sensitivity of return (company i) to market return and  $\hat{\epsilon}_{it}$  is the statistical error whose expectation is assumed to be zero.

Using Eq.(5.1) and Eq.(5.2), abnormal returns are defined as residuals or prediction errors of model which is as under:

$$AR_{it} = R_{it} - NR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \quad (3)$$

Where,  $\hat{\alpha}$  and  $\hat{\beta}$  are OLS estimators of regression coefficient estimated over estimation window.

Impact on Average abnormal returns (AARs) – ex-split day

The un-weighted cross-sectional average abnormal returns in period t are calculated using:

$$AAR_{it} = \frac{\sum_{i=1}^N AR_{it}}{N} \quad (4)$$

Where, N is number of shares for which ARs are present on an event day in the event window. The event window is from  $t_{-20}$  to  $t_{+20}$ . The null hypothesis tested is:

Z-test is used to test statistical significance of AARs on an event day. It assumes that AARs

$$H_0 : E (AAR_{it}) = 0$$

are independently and identically distributed, have same mean and variances and are cross-sectionally uncorrelated.  $\sigma$  is unknown and estimator of  $\sigma$  can be constructed from cross-sectional variance of ARs in period  $t_j$ . The Z-statistics is calculated as under:

$$Z = \sqrt{N} \left( \frac{AAR_{it}}{s_t} \right) \approx N(0,1) \quad (5)$$

If AARs are not zero and statistically significant it indicates that share prices behave positively or negatively to stock splits and affect wealth of shareholders.

The assumption that variance of all ARs is equal for all companies may not be true. Some shares may be more volatile than others lowering power of Z-test. So, weighted average of abnormal returns can be taken which puts lower weight on ARs with high variance. Reciprocal of estimated standard deviation of ARs of estimation window is used as weights to calculate SARs of individual company in following way:

$$SAR_{it} = \sum_{i=1}^N \frac{AR_{it}}{s_i} \quad (6)$$

And

$$ASAR_{it} = \frac{1}{N} \sum_{i=1}^N SAR_{it} = \frac{1}{N} \sum_{i=1}^N \frac{AR_{it}}{s_i}$$

The  $ASAR_{it}$  is cross sectional average of SARs. The ASARs are assumed to be uncorrelated across companies and used to test null hypothesis:

$$H_0 : E (ASAR_{it}) = 0$$

For which following Z-statistic is constructed: (8)

$$Z_s = \sqrt{N} (ASAR_{it}) = \frac{1}{\sqrt{N}} (\sum_{i=1}^N SAR_{it})$$

The significant positive impact of stock splits is found to be present on AARs on announcement day in section 5.1.1. The study tries to analyse cumulative effect of AARs using Cumulative average abnormal returns (CAARs). CAAR is obtained by aggregating AARs for event day  $t_1$  through  $t_2$  using:

$$CAAR_{it} = \sum_{t=t_1}^{t_2} AAR_{it} \quad (9)$$

The null hypothesis tested is that CAAR at the end of period over which AARs are aggregated is zero. If CAAR is greater than zero; with significant Z-values it implies that there is significant impact of stock splits on ARs.

For testing statistical significance of CAARs for N number of companies over t days ( $t_1$  through  $t_2$ ),  $Z_{CS}$  -statistic is calculated at 5% level of significance using following:

$$Z_{cs} = \frac{1}{\sqrt{N * T}} \left( \sum_{i=t_1}^{t_2} SAR_{it} \right) \quad (10)$$

The sample companies are grouped on the basis of market capitalization as small size, medium size and large size companies. The changes in share prices are studied through ARs which are calculated using equation (1), (2) and (3).

The AARs are calculated using equation (4). **Table 1** shows response of small size companies to stock splits in ex-split window. The Z-test is used to find statistical significance of AARs using equation (5). The null hypothesis tested is that AAR on an event day in the ex-split window is equal to zero.

**Tables 1** show that AARs increase and are positive on 5 days starting from  $t_{-3}$  day and till  $t_{+1}$  day after which AARs are negative for 14 days in the ex-split window. Positive AAR with significant Z-value is noted on 2 days -  $t_{-1}$  and  $t_{+1}$ . Negative AAR with significant Z-value is noted on day -  $t_{+4}$ ,  $t_{+7}$ ,  $t_{+8}$ ,  $t_{+9}$ ,  $t_{+10}$ ,  $t_{+12}$  and  $t_{+15}$ .

The proportion of positive ARs is more in comparison to number of companies with negative ARs on  $t_0$  and  $t_{+1}$  day. However after  $t_{+1}$  day the proportion of companies with negative ARs starts increasing.

The proportion test is used which tests the null hypothesis that the number of positive and negative ARs is equal. The null hypothesis is rejected at 5% level of significance and significant increase in number of negative ARs is observed on 7 days -  $t_{+7}$ ,  $t_{+8}$ ,  $t_{+9}$ ,  $t_{+10}$ ,  $t_{+12}$ ,  $t_{+15}$  and  $t_{+18}$ . The null hypothesis is rejected and significant increase in number of positive ARs is on 2 days -  $t_{-1}$  and  $t_{+1}$  day.

**Table 1: AAR - ex-split day (small size companies)**

| Event day | AARs(%) | Standard deviation (%) | Z-values* | Number of positive ARs | Number of negative ARs | p-values for Test of Proportion** |
|-----------|---------|------------------------|-----------|------------------------|------------------------|-----------------------------------|
| -20       | -0.23%  | 3.43%                  | -0.60     | 35                     | 44                     | .368                              |
| -19       | 0.27%   | 4.32%                  | 0.56      | 42                     | 37                     | .653                              |
| -18       | 0.62%   | 3.47%                  | 1.59      | 40                     | 39                     | 1.00                              |
| -17       | 0.26%   | 4.54%                  | 0.51      | 45                     | 34                     | .260                              |
| -16       | -0.04%  | 5.03%                  | -0.07     | 41                     | 38                     | .822                              |

|     |        |        |              |    |    |             |
|-----|--------|--------|--------------|----|----|-------------|
| -15 | 0.02%  | 4.18%  | 0.04         | 40 | 39 | 1.00        |
| -14 | -0.28% | 4.29%  | -0.59        | 35 | 44 | .368        |
| -13 | 0.45%  | 3.90%  | 1.02         | 45 | 34 | .260        |
| -12 | 0.17%  | 3.47%  | 0.43         | 41 | 38 | .822        |
| -11 | 0.04%  | 4.75%  | 0.07         | 36 | 43 | .500        |
| -10 | -0.81% | 4.51%  | -1.59        | 34 | 45 | .260        |
| -9  | -0.66% | 4.19%  | -1.40        | 32 | 47 | .115        |
| -8  | 0.36%  | 3.64%  | 0.88         | 46 | 33 | .177        |
| -7  | 0.86%  | 4.29%  | 1.78         | 44 | 35 | .368        |
| -6  | 0.06%  | 3.89%  | 0.14         | 40 | 39 | 1.00        |
| -5  | 0.52%  | 3.84%  | 1.21         | 41 | 38 | .822        |
| -4  | -0.40% | 4.42%  | -0.80        | 36 | 43 | .500        |
| -3  | 0.44%  | 4.45%  | 0.89         | 39 | 40 | 1.00        |
| -2  | 0.08%  | 4.01%  | 0.18         | 42 | 37 | .653        |
| -1  | 1.38%  | 3.85%  | <b>3.19</b>  | 46 | 33 | .177        |
| 0   | 1.40%  | 10.46% | 1.19         | 59 | 20 | <b>.000</b> |
| +1  | 1.98%  | 5.57%  | <b>3.15</b>  | 51 | 28 | <b>.013</b> |
| +2  | -0.13% | 5.61%  | -0.20        | 34 | 45 | .260        |
| +3  | -0.65% | 5.48%  | -1.06        | 32 | 47 | .115        |
| +4  | -0.65% | 5.93%  | -0.97        | 30 | 49 | <b>.042</b> |
| +5  | -1.06% | 5.50%  | -1.71        | 33 | 46 | .177        |
| +6  | -1.03% | 4.99%  | -1.83        | 29 | 50 | <b>.024</b> |
| +7  | -1.39% | 4.63%  | <b>-2.67</b> | 28 | 51 | <b>.013</b> |
| +8  | -1.52% | 4.21%  | <b>-3.20</b> | 29 | 50 | <b>.024</b> |
| +9  | -1.50% | 4.79%  | <b>-2.79</b> | 25 | 54 | <b>.001</b> |
| +10 | -0.97% | 3.88%  | <b>-2.22</b> | 31 | 48 | .071        |
| +11 | -0.57% | 4.35%  | -1.16        | 37 | 42 | .653        |
| +12 | -1.25% | 4.37%  | <b>-2.54</b> | 30 | 49 | <b>.042</b> |
| +13 | -0.79% | 4.36%  | -1.60        | 32 | 47 | .115        |
| +14 | 0.09%  | 4.69%  | 0.18         | 41 | 38 | .822        |
| +15 | -1.32% | 4.84%  | <b>-2.44</b> | 33 | 46 | .177        |
| +16 | -0.75% | 5.05%  | -1.32        | 27 | 52 | <b>.007</b> |
| +17 | -0.03% | 5.77%  | -0.04        | 35 | 44 | .368        |
| +18 | 1.08%  | 4.83%  | <b>1.98</b>  | 43 | 36 | .500        |
| +19 | 0.30%  | 5.39%  | 0.50         | 38 | 41 | .822        |
| +20 | -0.47% | 4.30%  | -0.97        | 33 | 46 | .177        |

\*Values in bold are significant at 5% level of significance.

**Table 2** reports response to split of medium-size and shows that AARs increase and are positive on 7 days starting from  $t_{-7}$  and till  $t_{-1}$  day in ex-split window. There are negative AARs on ex-split day and these negative.

AARs are incessant throughout the ex-split window other than on  $t_{+1}$  day. Positive AAR with significant Z-value is noted on 3 days -  $t_{-16}$ ,  $t_{-7}$  and  $t_{-6}$ . Negative AAR with significant Z-value is noted on 5 days -  $t_{-15}$ ,  $t_{+7}$ ,  $t_{+9}$ ,  $t_{+11}$  and  $t_{+20}$ .

The proportion test is used to test the null hypothesis that the number of positive and negative ARs is equal. The null hypothesis is rejected at 5% level of significance and significant increase in number of negative ARs is observed on 8 days -  $t_{+7}, t_{+9}, t_{+10}, t_{+11}, t_{+13}, t_{+14}, t_{+19}$  and  $t_{+20}$ . The null hypothesis is rejected and significant increase in number of positive ARs is on day  $t_0$ .

**Table 2: AAR - ex-split day (medium size companies)**

| Eventday | AARs(%) | Standard deviation (%) | Z-values*    | Number of positive ARs | Number of negative ARs | p-values for Test of Proportion** |
|----------|---------|------------------------|--------------|------------------------|------------------------|-----------------------------------|
| -20      | 0.02%   | 3.51%                  | 0.05         | 26                     | 28                     | .892                              |
| -19      | -0.48%  | 3.49%                  | -1.01        | 25                     | 29                     | .683                              |
| -18      | -0.40%  | 3.44%                  | -0.85        | 22                     | 32                     | .220                              |
| -17      | -0.32%  | 3.47%                  | -0.68        | 24                     | 30                     | .497                              |
| -16      | 1.51%   | 3.19%                  | <b>3.49</b>  | 33                     | 21                     | .134                              |
| -15      | -0.75%  | 2.73%                  | <b>-2.02</b> | 23                     | 31                     | .341                              |
| -14      | -0.08%  | 2.80%                  | -0.20        | 23                     | 31                     | .341                              |
| -13      | 0.08%   | 2.76%                  | 0.22         | 26                     | 28                     | .892                              |
| 11       | 0.00%   | 3.09%                  | -0.01        | 25                     | 29                     | .683                              |
| -10      | 0.47%   | 3.46%                  | 0.99         | 32                     | 22                     | .220                              |
| -9       | 0.38%   | 3.87%                  | 0.71         | 31                     | 23                     | .341                              |
| -8       | -0.14%  | 3.51%                  | -0.29        | 27                     | 27                     | 1.00                              |
| -7       | 1.12%   | 3.83%                  | <b>2.15</b>  | 32                     | 22                     | .220                              |
| -6       | 1.06%   | 3.29%                  | <b>2.37</b>  | 32                     | 22                     | .220                              |
| -5       | 0.58%   | 2.94%                  | 1.45         | 29                     | 25                     | .683                              |
| -4       | 0.09%   | 4.17%                  | 0.16         | 28                     | 26                     | .892                              |
| -3       | 0.29%   | 2.82%                  | 0.76         | 27                     | 27                     | 1.00                              |
| -2       | 0.25%   | 3.88%                  | 0.48         | 30                     | 24                     | .497                              |
| -1       | 0.57%   | 3.39%                  | 1.23         | 30                     | 24                     | .497                              |
| 0        | -1.04%  | 17.12%                 | -0.45        | 35                     | 19                     | <b>.040</b>                       |
| +1       | 0.27%   | 4.86%                  | 0.41         | 25                     | 29                     | .683                              |
| +2       | -0.34%  | 4.36%                  | -0.58        | 24                     | 30                     | .497                              |
| +3       | -0.09%  | 3.11%                  | -0.20        | 27                     | 27                     | 1.00                              |
| +4       | -0.75%  | 3.94%                  | -1.40        | 21                     | 33                     | .134                              |
| +5       | -0.32%  | 3.84%                  | -0.61        | 27                     | 27                     | 1.00                              |
| +6       | -1.14%  | 4.34%                  | -1.93        | 20                     | 34                     | .076                              |
| +7       | -2.13%  | 3.94%                  | <b>-3.97</b> | 14                     | 40                     | <b>.001</b>                       |
| +8       | -1.13%  | 4.59%                  | -1.82        | 24                     | 30                     | .497                              |
| +9       | -1.65%  | 4.53%                  | <b>-2.67</b> | 17                     | 37                     | <b>.009</b>                       |
| +10      | -0.96%  | 3.77%                  | -1.87        | 19                     | 35                     | <b>.040</b>                       |
| +11      | -1.36%  | 3.55%                  | <b>-2.82</b> | 17                     | 37                     | <b>.009</b>                       |
| +12      | -0.37%  | 3.01%                  | -0.91        | 23                     | 31                     | .341                              |
| +13      | -0.56%  | 3.72%                  | -1.10        | 18                     | 36                     | <b>.020</b>                       |
| +14      | -0.53%  | 3.56%                  | -1.10        | 19                     | 35                     | <b>.040</b>                       |
| +15      | -0.42%  | 2.86%                  | -1.08        | 24                     | 30                     | .497                              |
| +16      | -0.62%  | 2.74%                  | -1.67        | 21                     | 33                     | .134                              |
| +17      | -0.71%  | 2.72%                  | -1.93        | 20                     | 34                     | .076                              |
| +18      | -0.84%  | 3.53%                  | -1.76        | 23                     | 31                     | .341                              |

|     |        |       |              |    |    |             |
|-----|--------|-------|--------------|----|----|-------------|
| +19 | -0.91% | 4.54% | -1.48        | 17 | 37 | <b>.009</b> |
| +20 | -0.92% | 3.30% | <b>-2.05</b> | 19 | 35 | <b>.040</b> |

\*Values in bold are significant at 5% level of significance.

**Table 3** reports response of large size companies shows that AARs increase and are positive on 6 days starting from  $t_{-6}$  and till  $t_{+1}$  day (except on  $t_{-3}$  and  $t_0$ ) in ex-split window. Negative AAR with significant Z-value is noted on days-  $t_{-11}$ ,  $t_{+4}$ ,  $t_{+6}$ ,  $t_{+7}$ ,  $t_{+10}$  and  $t_{+19}$ .

The proportion of positive ARs is more on day -  $t_0$  and  $t_{+1}$ . The proportion test, tests null hypothesis that the number of positive and negative ARs is equal. The null hypothesis is rejected at 5% level of significance and significant increase in number of positive ARs is observed on day -  $t_{+1}$ . The null hypothesis is rejected and significant increase in number of negative ARs is on 8 days -  $t_{-11}$ ,  $t_{-8}$ ,  $t_{+3}$ ,  $t_{+4}$ ,  $t_{+6}$ ,  $t_{+7}$ ,  $t_{+10}$  and  $t_{+17}$ .

**Table 3: AARs - ex-split day (large size companies)**

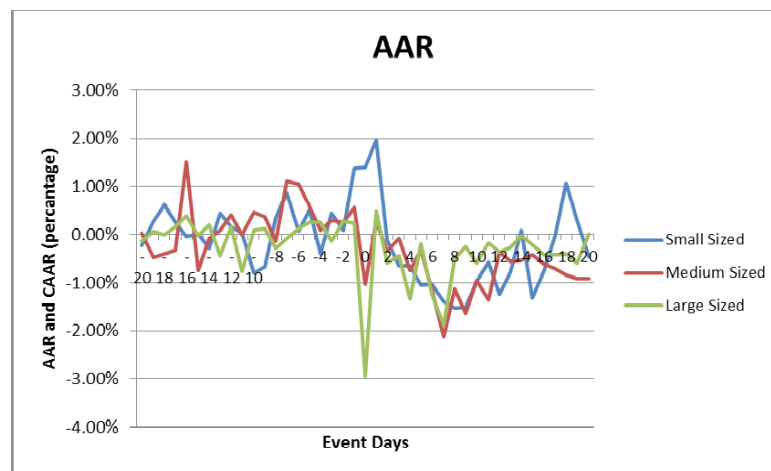
| Event day | AARs(%) | Standard deviation (%) | Z-values*    | Number of positive ARs | Number of negative ARs | p-values for Test of Proportion** |
|-----------|---------|------------------------|--------------|------------------------|------------------------|-----------------------------------|
| -20       | -0.14%  | 2.82%                  | -0.44        | 33                     | 48                     | .119                              |
| -19       | 0.06%   | 2.52%                  | 0.22         | 33                     | 48                     | .119                              |
| -18       | 0.00%   | 2.62%                  | -0.01        | 39                     | 42                     | .824                              |
| -17       | 0.17%   | 2.90%                  | 0.54         | 37                     | 44                     | .505                              |
| -16       | 0.40%   | 3.12%                  | 1.14         | 41                     | 40                     | 1.00                              |
| -15       | -0.03%  | 2.70%                  | -0.10        | 38                     | 43                     | .657                              |
| -14       | 0.21%   | 2.63%                  | 0.71         | 40                     | 41                     | 1.00                              |
| -13       | -0.44%  | 4.00%                  | -1.00        | 36                     | 45                     | .374                              |
| -12       | 0.16%   | 3.54%                  | 0.41         | 42                     | 39                     | .824                              |
| -11       | -0.77%  | 2.06%                  | <b>-3.39</b> | 25                     | 56                     | <b>.001</b>                       |
| -10       | 0.09%   | 2.48%                  | 0.32         | 36                     | 45                     | .374                              |
| -9        | 0.14%   | 2.61%                  | 0.46         | 39                     | 42                     | .824                              |
| -8        | -0.29%  | 2.96%                  | -0.88        | 30                     | 51                     | <b>.026</b>                       |
| -7        | -0.08%  | 2.47%                  | -0.30        | 38                     | 43                     | .657                              |
| -6        | 0.12%   | 2.33%                  | 0.48         | 45                     | 36                     | .374                              |
| -5        | 0.26%   | 2.88%                  | 0.82         | 45                     | 36                     | .374                              |
| -4        | 0.26%   | 2.90%                  | 0.80         | 45                     | 36                     | .374                              |
| -3        | -0.14%  | 2.19%                  | -0.57        | 39                     | 42                     | .824                              |
| -2        | 0.27%   | 3.44%                  | 0.70         | 36                     | 45                     | .374                              |
| -1        | 0.25%   | 3.03%                  | 0.74         | 39                     | 42                     | .824                              |
| 0         | -2.95%  | 17.87%                 | -1.48        | 45                     | 36                     | .374                              |
| +1        | 0.49%   | 3.44%                  | 1.29         | 50                     | 31                     | <b>.045</b>                       |
| +2        | -0.59%  | 3.00%                  | -1.77        | 32                     | 49                     | .075                              |
| +3        | -0.44%  | 2.70%                  | -1.46        | 27                     | 54                     | <b>.004</b>                       |
| +4        | -1.34%  | 3.12%                  | <b>-3.88</b> | 22                     | 59                     | <b>.000</b>                       |
| +5        | -0.20%  | 3.96%                  | -0.45        | 37                     | 44                     | .505                              |
| +6        | -1.24%  | 2.40%                  | <b>-4.64</b> | 28                     | 53                     | <b>.007</b>                       |
| +7        | -1.88%  | 3.81%                  | <b>-4.44</b> | 20                     | 61                     | <b>.000</b>                       |
| +8        | -0.51%  | 4.05%                  | -1.13        | 34                     | 47                     | .182                              |
| +9        | -0.26%  | 4.28%                  | -0.54        | 34                     | 47                     | .182                              |

|     |        |       |              |    |    |             |
|-----|--------|-------|--------------|----|----|-------------|
| +10 | -0.59% | 2.66% | <b>-2.00</b> | 28 | 53 | <b>.007</b> |
| +11 | -0.18% | 2.92% | -0.55        | 32 | 49 | .075        |
| +12 | -0.36% | 3.31% | -0.98        | 34 | 47 | .182        |
| +13 | -0.27% | 2.79% | -0.86        | 38 | 43 | .657        |
| +14 | -0.02% | 2.57% | -0.08        | 32 | 49 | .075        |
| +15 | -0.21% | 2.66% | -0.70        | 34 | 47 | .182        |
| +16 | -0.42% | 3.27% | -1.17        | 33 | 48 | .119        |
| +17 | -0.43% | 2.60% | -1.48        | 31 | 50 | <b>.045</b> |
| +18 | -0.40% | 3.49% | -1.03        | 34 | 47 | .182        |
| +19 | -0.60% | 2.54% | <b>-2.14</b> | 32 | 49 | .075        |
| +20 | 0.01%  | 3.11% | 0.02         | 38 | 43 | .657        |

\*Values in bold are significant at 5% level of significance.

The AARs for three groups with different sizes when plotted on a graph is shown in **Figure 1**. It can be noted that maximum decline in AARs around ex-split day is for large size companies. To further analyse AARs, ASARs are calculated using equation (6) and (7). To test the statistical significance of ASARs  $Z_S$ -test is done using equation (8). The null hypothesis tested is that ASARs on an event day is equal to zero. It can be observed in **Table 4** that ASARs with significant  $Z_S$ -values at 5% level of significance are present for 22 days (small size companies), 13 days (medium size companies) and 6 days (large sized companies). The significant impact on the AARs is stronger for small size companies around ex-split day.

**Figure 1: AARs - ex-split day (different size companies)**



**Table 4: AARs and  $Z_S$ -values - ex-split day (different size companies)**

| Event day | AAR (%) small-size | $Z_S$ - values* | AAR (%) medium-size | $Z_S$ - values* | AAR (%) large-size | $Z_S$ - values* |
|-----------|--------------------|-----------------|---------------------|-----------------|--------------------|-----------------|
| -20       | -0.23%             | -1.22           | 0.02%               | 0.23            | -0.14%             | -0.73           |
| -19       | 0.27%              | 1.11            | -0.48%              | -0.64           | 0.06%              | 0.13            |
| -18       | 0.62%              | 0.16            | -0.40%              | -1.20           | 0.00%              | -0.03           |
| -17       | 0.26%              | 1.82            | -0.32%              | -0.32           | 0.17%              | 1.28            |
| -16       | -0.04%             | -0.13           | 1.51%               | <b>3.08</b>     | 0.40%              | 0.85            |
| -15       | 0.02%              | <b>-4.29</b>    | -0.75%              | -1.72           | -0.03%             | -0.19           |
| -14       | -0.28%             | -1.11           | -0.08%              | -0.06           | 0.21%              | 0.50            |
| -13       | 0.45%              | -1.76           | 0.08%               | -0.21           | -0.44%             | -1.56           |



|     |        |               |        |              |        |               |
|-----|--------|---------------|--------|--------------|--------|---------------|
| -12 | 0.17%  | 0.50          | 0.42%  | 1.00         | 0.16%  | -0.03         |
| -11 | 0.04%  | -1.88         | 0.00%  | 0.67         | -0.77% | <b>-2.58</b>  |
| -10 | -0.81% | -0.14         | 0.47%  | 1.29         | 0.09%  | 0.41          |
| -9  | -0.66% | 0.33          | 0.38%  | 0.94         | 0.14%  | 0.75          |
| -8  | 0.36%  | -1.32         | -0.14% | -0.36        | -0.29% | -0.80         |
| -7  | 0.86%  | <b>2.93</b>   | 1.12%  | <b>2.70</b>  | -0.08% | -1.03         |
| -6  | 0.06%  | 1.46          | 1.06%  | <b>2.30</b>  | 0.12%  | 0.39          |
| -5  | 0.52%  | 1.25          | 0.58%  | 1.19         | 0.26%  | 0.43          |
| -4  | -0.40% | -0.90         | 0.09%  | 0.04         | 0.26%  | 0.80          |
| -3  | 0.44%  | 1.48          | 0.29%  | 0.67         | -0.14% | 0.07          |
| -2  | 0.08%  | 0.16          | 0.25%  | -0.09        | 0.27%  | 0.88          |
| -1  | 1.38%  | <b>2.76</b>   | 0.57%  | 1.03         | 0.25%  | 0.25          |
| 0   | 1.40%  | <b>-18.60</b> | -1.04% | <b>-3.15</b> | -2.95% | <b>-18.35</b> |
| +1  | 1.98%  | <b>6.41</b>   | 0.27%  | 0.68         | 0.49%  | <b>3.09</b>   |
| +2  | -0.13% | <b>-4.17</b>  | -0.34% | -0.30        | -0.59% | -1.69         |
| +3  | -0.65% | <b>-5.15</b>  | -0.09% | -0.24        | -0.44% | -1.90         |
| +4  | -0.65% | <b>-8.07</b>  | -0.75% | <b>-2.21</b> | -1.34% | <b>-4.36</b>  |
| +5  | -1.06% | <b>-4.54</b>  | -0.32% | -0.86        | -0.20% | -1.44         |
| +6  | -1.03% | <b>-12.04</b> | -1.14% | <b>-2.88</b> | -1.24% | <b>-5.10</b>  |
| +7  | -1.39% | <b>-14.19</b> | -2.13% | <b>-5.32</b> | -1.88% | <b>-6.13</b>  |
| +8  | -1.52% | <b>-8.64</b>  | -1.13% | <b>-3.38</b> | -0.51% | -1.90         |
| +9  | -1.50% | <b>-7.67</b>  | -1.65% | <b>-4.00</b> | -0.26% | -0.20         |
| +10 | -0.97% | <b>-6.37</b>  | -0.96% | <b>-2.34</b> | -0.59% | -1.88         |
| +11 | -0.57% | <b>-5.34</b>  | -1.36% | <b>-3.73</b> | -0.18% | -0.50         |
| +12 | -1.25% | <b>-3.91</b>  | -0.37% | -0.58        | -0.36% | -0.98         |
| +13 | -0.79% | <b>-5.25</b>  | -0.56% | -1.74        | -0.27% | -1.19         |
| +14 | 0.09%  | <b>-2.33</b>  | -0.53% | -0.90        | -0.02% | -0.01         |
| +15 | -1.32% | <b>-3.12</b>  | -0.42% | -0.29        | -0.21% | -0.32         |
| +16 | -0.75% | <b>-4.60</b>  | -0.62% | -1.51        | -0.42% | -0.94         |
| +17 | -0.03% | <b>-3.25</b>  | -0.71% | -1.62        | -0.43% | -1.11         |
| +18 | 1.08%  | -1.06         | -0.84% | <b>-2.02</b> | -0.40% | -1.23         |
| +19 | 0.30%  | -1.40         | -0.91% | <b>-2.42</b> | -0.60% | -1.90         |
| +20 | -0.47% | <b>-3.52</b>  | -0.92% | -1.73        | 0.01%  | -0.26         |

\*Values in bold are significant at 5% level of significance.

#### Impact on CAAR - ex-split day (different size companies)

To study cumulative effect of stock splits on AARs cumulative average abnormal returns (CAARs) are calculated using equation (9).

In Table 5 it is reported that CAARs are increasing for all three groups of companies with different sizes. To test statistical significance of CAARs  $Z_{CS}$ -test is done at 5% level of significance, taking SCAARs and using equation (10). The null hypothesis tested is that SCAARs on an event day in the ex-split window is equal to zero.

Table 5 shows that CAARs are having significant  $Z_{CS}$ - values on 21 days from  $t_0$  and till  $t_{+20}$  except  $t_{+1}$  (small size companies). The CAARs are having significant  $Z_{CS}$ - values on 11 days from  $t_{+10}$  and till  $t_{+20}$  (medium size companies). The CAARs are having significant  $Z_{CS}$ -values on 21 days from  $t_0$  and till  $t_{+20}$  (large size companies).

**Table 5: CAARs and Z<sub>CS</sub> -values - ex-split day (different size companies)**

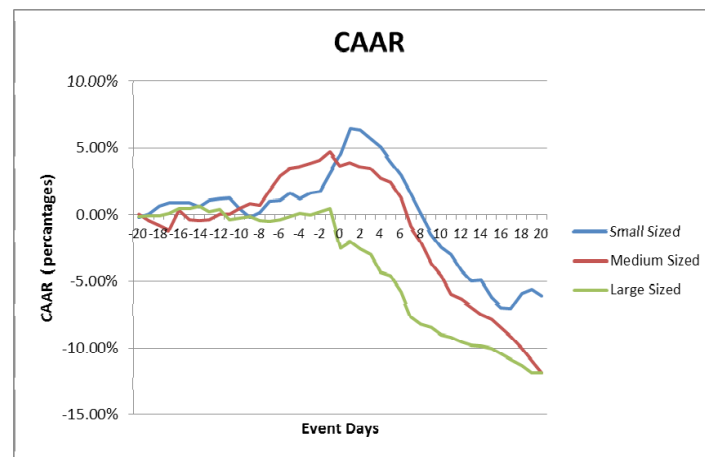
| Eventday | CAAR (%)<br>small size | Z <sub>cs</sub> - values* | CAAR (%)<br>medium size | Z <sub>cs</sub> -<br>values* | CAAR (%)<br>large size | Z <sub>cs</sub> -<br>values* |
|----------|------------------------|---------------------------|-------------------------|------------------------------|------------------------|------------------------------|
| -20      | -0.23%                 | -0.19                     | 0.02%                   | 0.04                         | -0.14%                 | -0.11                        |
| -19      | 0.04%                  | -0.02                     | -0.45%                  | -0.06                        | -0.08%                 | -0.09                        |
| -18      | 0.66%                  | 0.01                      | -0.85%                  | -0.25                        | -0.08%                 | -0.10                        |
| -17      | 0.92%                  | 0.29                      | -1.17%                  | -0.30                        | 0.09%                  | 0.10                         |
| -16      | 0.88%                  | 0.27                      | 0.34%                   | 0.18                         | 0.49%                  | 0.23                         |
| -15      | 0.90%                  | -0.40                     | -0.41%                  | -0.09                        | 0.46%                  | 0.20                         |
| -14      | 0.62%                  | -0.57                     | -0.48%                  | -0.10                        | 0.67%                  | 0.28                         |
| -13      | 1.06%                  | -0.85                     | -0.40%                  | -0.13                        | 0.22%                  | 0.04                         |
| -12      | 1.23%                  | -0.77                     | 0.01%                   | 0.03                         | 0.38%                  | 0.03                         |
| -11      | 1.27%                  | -1.06                     | 0.01%                   | 0.13                         | -0.39%                 | -0.37                        |
| -10      | 0.46%                  | -1.08                     | 0.47%                   | 0.33                         | -0.30%                 | -0.31                        |
| -9       | -0.20%                 | -1.03                     | 0.85%                   | 0.48                         | -0.17%                 | -0.19                        |
| -8       | 0.16%                  | -1.24                     | 0.71%                   | 0.42                         | -0.46%                 | -0.32                        |
| -7       | 1.01%                  | -0.78                     | 1.83%                   | 0.84                         | -0.54%                 | -0.48                        |
| -6       | 1.08%                  | -0.55                     | 2.89%                   | 1.20                         | -0.41%                 | -0.41                        |
| -5       | 1.60%                  | -0.36                     | 3.48%                   | 1.39                         | -0.15%                 | -0.35                        |
| -4       | 1.20%                  | -0.50                     | 3.57%                   | 1.40                         | 0.11%                  | -0.22                        |
| -3       | 1.65%                  | -0.27                     | 3.86%                   | 1.50                         | -0.03%                 | -0.21                        |
| -2       | 1.73%                  | -0.24                     | 4.12%                   | 1.49                         | 0.24%                  | -0.08                        |
| -1       | 3.11%                  | 0.19                      | 4.69%                   | 1.65                         | 0.48%                  | -0.04                        |
| <b>0</b> | 4.51%                  | <b>-2.71</b>              | 3.65%                   | 1.16                         | -2.46%                 | <b>-2.90</b>                 |
| +1       | 6.49%                  | -1.71                     | 3.92%                   | 1.26                         | -1.97%                 | <b>-2.42</b>                 |
| +2       | 6.36%                  | <b>-2.36</b>              | 3.57%                   | 1.22                         | -2.56%                 | <b>-2.68</b>                 |
| +3       | 5.71%                  | <b>-3.17</b>              | 3.49%                   | 1.18                         | -3.00%                 | <b>-2.98</b>                 |
| +4       | 5.06%                  | <b>-4.43</b>              | 2.73%                   | 0.83                         | -4.34%                 | <b>-3.66</b>                 |
| +5       | 4.00%                  | <b>-5.14</b>              | 2.41%                   | 0.70                         | -4.54%                 | <b>-3.89</b>                 |
| +6       | 2.98%                  | <b>-7.02</b>              | 1.27%                   | 0.25                         | -5.77%                 | <b>-4.68</b>                 |
| +7       | 1.58%                  | <b>-9.24</b>              | -0.86%                  | -0.58                        | -7.65%                 | <b>-5.64</b>                 |
| +8       | 0.07%                  | <b>-10.59</b>             | -1.99%                  | -1.11                        | -8.16%                 | <b>-5.94</b>                 |
| +9       | -1.43%                 | <b>-11.78</b>             | -3.64%                  | -1.74                        | -8.42%                 | <b>-5.97</b>                 |
| +10      | -2.40%                 | <b>-12.78</b>             | -4.60%                  | <b>-2.10</b>                 | -9.01%                 | <b>-6.26</b>                 |
| +11      | -2.97%                 | <b>-13.61</b>             | -5.96%                  | <b>-2.68</b>                 | -9.19%                 | <b>-6.34</b>                 |
| +12      | -4.22%                 | <b>-14.22</b>             | -6.33%                  | <b>-2.77</b>                 | -9.55%                 | <b>-6.49</b>                 |
| +13      | -5.01%                 | <b>-15.04</b>             | -6.89%                  | <b>-3.04</b>                 | -9.81%                 | <b>-6.68</b>                 |
| +14      | -4.91%                 | <b>-15.41</b>             | -7.43%                  | <b>-3.18</b>                 | -9.83%                 | <b>-6.68</b>                 |
| +15      | -6.24%                 | <b>-15.89</b>             | -7.85%                  | <b>-3.23</b>                 | -10.04%                | <b>-6.73</b>                 |
| +16      | -6.99%                 | <b>-16.61</b>             | -8.47%                  | <b>-3.46</b>                 | -10.47%                | <b>-6.87</b>                 |
| +17      | -7.02%                 | <b>-17.12</b>             | -9.18%                  | <b>-3.72</b>                 | -10.89%                | <b>-7.05</b>                 |
| +18      | -5.94%                 | <b>-17.29</b>             | -10.03%                 | <b>-4.03</b>                 | -11.29%                | <b>-7.24</b>                 |
| +19      | -5.64%                 | <b>-17.50</b>             | -10.94%                 | <b>-4.41</b>                 | -11.90%                | <b>-7.54</b>                 |
| +20      | -6.11%                 | <b>-18.05</b>             | -11.86%                 | <b>-4.68</b>                 | -11.89%                | <b>-7.58</b>                 |

\*Values in bold are significant at 5% level of significance.

In order to have visual idea of comparative CAARs of the three groups **Figure 2** can be seen which shows that CAARs are negative immediately after ex-split day for large size companies.

The CAARs are aggregated for different time periods in event window of 41 days. The null hypothesis tested using  $Z_{CS}$ -test is that CAAR is zero at end of period over which cumulated. **Table 6** shows that null hypothesis is rejected and significant  $Z_{CS}$ -values are present for medium size companies for event windows which are of longer duration. The null hypothesis is rejected and significant  $Z_{CS}$ -values are present for all event windows of different days in 41 day period for large size and small size companies.

**Figure 2: CAARs -ex-split day (different sizecompanies)**



**Table 6: CAARs and  $Z_{CS}$  -values - ex-split day(in event window of 41 days -different size companies)**

| Eventdays  | No. ofdays | CAAR (%)<br>small size | $Z_{cs}$ -<br>values* | CAAR(%)<br>medium size | $Z_{cs}$ -<br>values* | CAAR<br>(%)<br>largesize | $Z_{cs}$ -<br>values<br>* |
|------------|------------|------------------------|-----------------------|------------------------|-----------------------|--------------------------|---------------------------|
| -20 to +20 | 41         | -6.11%                 | <b>-18.05</b>         | -11.86%                | <b>-4.68</b>          | -11.89%                  | <b>-7.58</b>              |
| -10 to +10 | 21         | -3.67%                 | <b>-16.37</b>         | -4.60%                 | <b>-3.12</b>          | -8.62%                   | <b>-8.23</b>              |
| -5 to +5   | 11         | 2.93%                  | <b>-8.86</b>          | -0.48%                 | -0.98                 | -4.12%                   | <b>-6.70</b>              |
| -2 to +2   | 5          | 4.71%                  | <b>-6.01</b>          | -0.29%                 | -0.82                 | -2.52%                   | <b>-7.07</b>              |
| -2 to 0    | 3          | 2.86%                  | <b>-9.06</b>          | -0.22%                 | -1.27                 | -2.43%                   | <b>-9.94</b>              |
| 0 to +2    | 3          | 3.25%                  | <b>-9.44</b>          | -1.11%                 | -1.60                 | -3.04%                   | <b>-9.79</b>              |
| -1 to +1   | 3          | 4.76%                  | <b>-5.44</b>          | -0.20%                 | -0.83                 | -3.06%                   | <b>-8.67</b>              |

\*Values in bold are significant at 5% level of significance.

### Conclusion

The empirical results in above discussion indicates that stock splits have significant impact on ARs in ex-split window irrespective of differences in size of sample companies. The significant impact on AARs is visible in ex-split window for small size companies for longest duration of time. The duration of effect is lesser for medium size companies and it is least for large size companies. The results are in line with conclusions drawn by Ikenberry et al.<sup>4</sup>(1996),Atiases (1985), and Lev and Penman (1990)<sup>5</sup>.

The empirical results imply that both large size and small size companies have same cumulative effect on ARs. Ideally in an efficient market large size companies are less vulnerable to market turmoil because of their volume, turnover and self monitoring capacity

(Atiase, 1985<sup>6</sup>, Lev and Penman, 1990<sup>7</sup>). However empirical results in current study show same cumulative effect on ARs for both small and large size companies. This may be because there is a reduction in share prices around ex-split day and shares are attractive for investors irrespective of the size of the company.

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### Footnotes

1. Herein after referred to as “Act”
2. BSE Sensitive index is a robust representative of Indian stock market and used as proxy for market portfolio because it is value weighted index which uses free float market capital as value weights and appropriate for such type of analysis same is suggested by Womack et al. (1996) and Fama (1998).
3. CMIE is an independent private sector economic research organization. It has built largest database on Indian economy and companies in form of databases and research reports. It is widely used by academics and industries in India. Ikenberry et al. (1996) reported that ARs were higher for small size companies as compared to large size companies. According to them this was because large size companies are less vulnerable to market turmoil because of their volume, turnover and self monitoring capacity.
4. Atiase (1985), Freeman (1997) and Lev and Penman (1990) reported that large size companies report more earning forecasts than small size companies.
5. Atiase (1985) established that amount of unpredicted news transferred to market by earning report is inversely proportional to market capitalization or size of the company.
6. Lev and Penman (1990) reported that larger companies report more earning forecasts than smaller companies.