



## Differences in Impact of Stock Splits with Difference in Number of Splits (Announcement Day)

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### Abstract:

*A stock split is a decision by company's board of directors to increase number of outstanding shares of the company without changing shareholders equity but by changing face value of equity shares. The results show that no significant impact on ARs is present for first and multiple split companies in announcement window. However significant impact is present in announcement window for single split companies. The empirical result of CAARs stress again that there is a difference in impact of stock splits for single split, first split and multiple split companies in announcement window. The impact of stock splits is positive and significant for single split companies. The impact on first split companies and single split companies is not similar. In theory response of first split and single split companies should be same because they are initial split announcements by companies with no information about subsequent splits. However empirical results show a difference in impact of stock splits for the two groups.*

### 1. Introduction

According to Efficient market hypothesis (EMH) information is quickly absorbed and reflected in the share prices. The past prices cannot be used to forecast future prices. Stock split is defined as a corporate announcement which simply results in reduction of face value of equity shares and increase in number of shares outstanding.

Huang et al. (2008) reported that infrequent split (a split that happens infrequently for a company) signals good news. They further reported that frequent splitters carryout splits in order to take advantage of increases in liquidity associated with stock splits. The impact on ARs for first split and single split companies should be same as in both group of companies stock splits is happening for first time. The differences in impact of stock splits can be present for multiple splits companies (Huang et al., 2008). Ghaghori et al.<sup>1</sup> (2013) analyzed ARs of companies that split and companies that split again. Ghaghori et al. (2013) reported that single split and first split companies have more significant impact on ARs. Less significant effect on ARs was reported for multiple splits companies.

According to studies in past relating to single split and multiple splits, share prices and reactions of investors to subsequent splits depends on previous splits and performance of companies thereafter. Lakonishok and Lev (1981) reported that earnings of companies that split grew faster subsequently as compared to earnings of control group of non-splitting companies. They assumed that if stock splits are cosmetic then companies which announce more than one split are providing predictable information's, so subsequent splitting should have little or no impact on stock returns. However they noted an increase in variance for multiple splits and suggested that splits convey economic information every time they are announced.

Angel et al.(1997), Pilotte and Manuel (1996), and Pilotte (1997) were some of the scholars who studied multiple splits after first stock split. Pilotte and Manual (1996) concluded that market

reaction to subsequent splits was smaller than the reaction to first split announcement. Pilotte and Manuel (1996) and Pilotte (1997) also suggested that experience from previous splits contributes to variance of returns. They after studying earnings of companies that split two times were of view that information from prior splits could be possible reason for success of next stock splits. According to them investors study earnings after previous stock splits closely to get indications of the earnings. This helps them to draw conclusion whether current split will echo trends of prior splits or not. The market reacts positively if immediate earnings are high even though earnings after previous splits were low. Pilotte (1997) pointed out that reaction to subsequent splits may be different if economy is booming or growing steadily. The market will react favourably to all stock splits due to growth prospects during above circumstances.

Conroy and Harris (1999) suggested signalling effects of present splits using past splits. They suggested that if present stock splits are announced at higher split ratio, than earnings after last split are observed. Higher earnings in past establishes strong signal and confidence in earnings. It in turn increases tradability and thus there exists signalling effect in relation to multiple stock splits. The study discusses analysis relating to the research objective set for the study restricted to India is as follows:

- To investigate differences in effect of stock splits on share prices for multiple splits or single-split companies.
- In order to attain the research objective following research hypotheses is framed:

**HYP:1-** Single stock split and multiple stock splits 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).

There is another research question which needs to be answered. It must be analysed whether companies which have announced multiple splits show an impact of stock splits different from companies which have announced only single split. To attain the objective three groups of companies are made - multiple split companies<sup>4</sup>, single split<sup>5</sup> companies and first split<sup>6</sup> companies.

After applying the filtering conditions relating to event study on all the multiple splits announced in period of study, a final sample of 39 events is obtained. This final sample of multiple splits companies consists of 17 companies where first stock split is done and 22 companies where next split is done. Another group of companies is identified consisting of single time split companies

only (168). For the three groups of companies – first split, multiple splits and single split are compared and impact of stock splits is studied using AARs, CAARs and different liquidity measures to find absence or presence of any differences.

**Impact of stock splits around announcement 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 ( $NR_{it}$ ).

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

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  $\epsilon_{it}$  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 coefficients estimated over estimation window.

### 3. 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 AARs are present on an event day in the event window.

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

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

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

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:

And

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

$$ASAR_{it} = \frac{1}{N} \sum_{i=1}^N SAR_{it} = \frac{1}{N} \sum_{i=1}^N \frac{AR_{it}}{s_i} \quad (7)$$

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

For which following Z-statistic  $H_0 : E(ASAR_{it}) = 0$  is constructed.

$$Z_s = \sqrt{N} (ASAR_{it}) = \frac{1}{\sqrt{N}} (\sum_{i=1}^N SAR_{it}) \quad (8)$$

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:

$$Z_{CS} = \frac{1}{\sqrt{N * T}} \left( \sum_{i=t_{1i}}^{t_{2i}} SAR_{it} \right) \quad (10)$$

The changes in share prices are studied through ARs which are calculated using equation (1), (2) and (3).

The AARs are calculated to capture response of first split, multiple split and single split companies around ex-split day using equation (4).

#### 4. Impact on AARs - announcement day (first splits, multiplesplit and single split)

The AARs for three groups are calculated using equation (4). **Table 1** shows response of 17 first-split companies.

The Z-test is used to find statistical significance of AARs using equation (5). The null hypothesis tested is that the AAR on an event day in announcement window is equal to zero.

**Tables 1 shows** that AARs increase and are positive on 7 days starting from  $t_{-5}$  and till  $t_{+1}$  day after which AARs are negative for almost entire announcement window.

Negative AAR with significant Z-value is noted on days -  $t_{-15}$ ,  $t_{-14}$ ,  $t_{+7}$ ,  $t_{+9}$ ,  $t_{+10}$  and  $t_{+16}$ .

The proportion test is used which tests the null hypothesis that 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 4 days -  $t_{-15}$ ,  $t_{+5}$ ,  $t_{+9}$  and  $t_{+20}$ .

**Table 1: AARs - announcement day (first split companies)**

Event day	AARs (%)	Standard deviation (%)	Z-values*	Number of positive Ars	Number of negative ARs	p-values for Test of Proportion**
-20	0.38%	5.99%	0.26	7	10	.629
-19	1.90%	5.84%	1.34	11	6	.332
-18	0.49%	5.82%	0.34	6	11	.332
-17	-0.95%	3.35%	-1.17	6	11	.332
-16	-0.68%	2.94%	-0.96	7	10	.629
-15	-1.36%	2.41%	<b>-2.33</b>	4	13	<b>.049</b>
-14	-1.32%	2.57%	<b>-2.12</b>	6	11	.332
-13	-0.21%	5.11%	-0.17	5	12	.143
-12	-0.86%	3.33%	-1.06	6	11	.332
-11	1.05%	5.36%	0.81	8	9	1.00
-10	0.87%	3.77%	0.95	10	7	.629
-9	0.44%	4.28%	0.42	9	8	1.00
-8	1.01%	4.63%	0.90	8	9	1.00
-7	0.75%	5.25%	0.59	8	9	1.00
-6	-1.38%	4.30%	-1.32	5	12	.143
-5	1.53%	4.92%	1.28	10	7	.629
-4	0.28%	3.55%	0.33	9	8	1.00
-3	0.03%	4.41%	0.02	6	11	.332
-2	0.44%	3.36%	0.54	7	10	.629
-1	0.86%	3.66%	0.97	9	8	1.00
0	1.25%	3.74%	1.37	10	7	.629
+1	0.57%	3.89%	0.61	9	8	1.00
+2	-0.17%	4.20%	-0.17	6	11	.332
+3	0.74%	3.52%	0.87	11	6	.332
+4	-0.45%	2.77%	-0.67	5	12	.143
+5	-1.39%	3.25%	-1.76	4	13	<b>.049</b>
+6	0.27%	3.73%	0.30	9	8	1.00
+7	-2.10%	3.65%	<b>-2.37</b>	6	11	.332
+8	-0.21%	2.60%	-0.34	9	8	1.00
+9	-1.56%	2.42%	<b>-2.67</b>	4	13	<b>.049</b>
+10	-1.57%	2.58%	<b>-2.51</b>	5	12	.143
+11	-0.89%	3.82%	-0.97	6	11	.332
+12	0.19%	2.53%	0.30	9	8	1.00
+13	0.35%	2.05%	0.71	10	7	.629
+14	-0.95%	3.38%	-1.16	7	10	.629
+15	-0.36%	3.95%	-0.37	6	11	.332
+16	-1.41%	2.51%	<b>-2.32</b>	5	12	.143
+17	0.11%	3.46%	0.13	9	8	1.00
+18	-0.73%	3.52%	-0.85	8	9	1.00
+19	-0.44%	3.27%	-0.55	7	10	.629
+20	-1.16%	2.67%	-1.80	4	13	<b>.049</b>

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

Table 2 reports negative AARs on announcement day for 22 companies which have announced split for multiple times. Negative AAR with significant Z-value is noted on 2 days -  $t_{+4}$  and  $t_{+8}$ .

The proportion test is used to test the null hypothesis that 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 2 days -  $t_{+2}$  and  $t_{+5}$ .

**Table 2: AARs - announcement day (multiple splitcompanies)**

Event day	AARs (%)	Standard deviation (%)	Z-values*	Number of positive ARs	Number of negative ARs	p-values for Test of Proportion**
-20	0.41%	3.81%	0.51	10	12	.832
-19	0.22%	3.31%	0.31	11	11	1.00
-18	0.22%	3.84%	0.27	13	9	.523
-17	0.52%	3.92%	0.62	13	9	.523
-16	1.30%	4.48%	1.36	10	12	.832
-15	0.38%	5.94%	0.30	8	14	.286
-14	0.48%	3.24%	0.69	9	13	.523
-13	-0.17%	2.92%	-0.28	13	9	.523
-12	0.16%	2.44%	0.30	12	10	.832
-11	-0.90%	2.67%	-1.57	9	13	.523
-10	-0.37%	2.86%	-0.61	13	9	.523
-9	-0.63%	2.75%	-1.08	9	13	.523
-8	0.25%	4.43%	0.26	7	15	.134
-7	0.74%	2.96%	1.17	13	9	.523
-6	0.43%	3.05%	0.67	14	8	.286
-5	0.22%	3.80%	0.28	10	12	.832
-4	0.58%	4.82%	0.57	11	11	1.00
-3	0.22%	3.06%	0.34	12	10	.832
-2	0.36%	3.15%	0.54	10	12	.832
-1	-0.12%	5.51%	-0.10	13	9	.523
0	-0.06%	3.05%	-0.09	10	12	.832
+1	-0.71%	3.00%	-1.11	6	16	.052
+2	-1.29%	4.62%	-1.31	5	17	<b>.017</b>
+3	0.29%	4.24%	0.33	10	12	.832
+4	-1.57%	2.42%	<b>-3.04</b>	7	15	.134
+5	-0.88%	2.61%	-1.58	4	18	<b>.004</b>
+6	-0.59%	2.81%	-0.99	10	12	.832
+7	0.10%	2.17%	0.21	10	12	.832
+8	-1.15%	2.40%	<b>-2.25</b>	6	16	.052
+9	-0.48%	3.48%	-0.64	7	15	.134
+10	0.19%	2.62%	0.34	13	9	.523
+11	-0.94%	3.11%	-1.41	8	14	.286
+12	-0.35%	2.05%	-0.79	8	14	.286
+13	0.16%	2.79%	0.27	10	12	.832
+14	0.46%	3.52%	0.62	12	10	.832
+15	1.16%	3.45%	1.58	12	10	.832
+16	-0.59%	1.90%	-1.46	6	16	.052
+17	-0.37%	2.34%	-0.74	8	14	.286
+18	-0.24%	3.57%	-0.32	8	14	.286
+19	1.04%	3.24%	1.50	13	9	.523
+20	0.34%	2.13%	0.74	13	9	.523

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



**Table 3** reports response to the stock splits of 167 companies which have done stock splits for one time (single split companies).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 announcement window is equal to zero.

**Tables 3** show that AARs increase and are positive on 12 days starting from  $t_{-10}$  and till  $t_{+1}$  day after which AARs are negative for 19 days in the announcement window. Positive AAR with significant Z-value is noted on 7 days -  $t_{-19}$ ,  $t_{-10}$ ,  $t_{-5}$ ,  $t_{-4}$ ,  $t_{-3}$ ,  $t_0$  and  $t_{+1}$ .Negative AAR with significant Z-value is noted on 4 days-  $t_{+3}$ ,  $t_{+4}$ ,  $t_{+5}$  and  $t_{+6}$ .

The proportion test is used which tests the null hypothesis that 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 6 days -  $t_{-11}$ ,  $t_{-5}$ ,  $t_{+4}$ ,  $t_{+6}$ ,  $t_{+8}$  and  $t_{+20}$ .The null hypothesis is rejected and significant increase in number of positive ARs is on 2 days -  $t_{-10}$  and  $t_{+5}$ .

**Table 3: AARs - announcement day (single split companies)**

Event day	AARs (%)	Standard deviation (%)	Z-values*	Number of positive ARs	Number of negative ARs	p-values for Test of Proportion**
-20	0.53%	3.71%	1.85	85	82	.877
-19	0.86%	4.28%	<b>2.58</b>	88	79	.536
-18	0.60%	4.10%	1.90	78	89	.439
-17	0.02%	4.07%	0.07	81	86	.757
-16	0.09%	3.31%	0.37	77	90	.353
-15	0.25%	3.29%	0.99	78	89	.439
-14	0.43%	4.00%	1.38	93	74	.163
-13	0.39%	3.81%	1.32	75	92	.216
-12	0.06%	3.93%	0.21	78	89	.439
-11	-0.19%	3.41%	-0.70	64	103	<b>.003</b>
-10	0.71%	3.57%	<b>2.56</b>	103	64	<b>.003</b>
-9	0.27%	4.04%	0.88	84	83	1.00
-8	0.24%	3.48%	0.88	87	80	.643
-7	0.34%	3.47%	1.28	90	77	.353
-6	0.11%	3.57%	0.41	85	82	.877
-5	0.70%	4.35%	<b>2.08</b>	100	67	<b>.013</b>
-4	0.98%	4.19%	<b>3.02</b>	88	79	.536
-3	0.73%	4.27%	<b>2.21</b>	92	75	.216
-2	0.17%	3.89%	0.55	80	87	.643
-1	0.41%	3.66%	1.46	94	73	.121
0	0.82%	4.23%	<b>2.52</b>	95	72	.088
+1	0.78%	4.41%	<b>2.28</b>	86	81	.757
+2	-0.14%	3.34%	-0.55	75	92	.216
+3	-0.59%	3.53%	<b>-2.14</b>	72	95	.088
+4	-0.63%	3.78%	<b>-2.16</b>	68	99	<b>.020</b>
+5	-0.54%	3.08%	<b>-2.28</b>	67	100	<b>.013</b>
+6	-0.50%	3.22%	<b>-2.02</b>	62	105	<b>.001</b>
+7	-0.18%	2.96%	-0.79	75	92	.216
+8	-0.43%	3.19%	-1.76	66	101	<b>.008</b>

+9	0.02%	3.34%	0.06	80	87	.643
+10	-0.21%	3.00%	-0.89	73	94	.121
+11	-0.25%	3.60%	-0.88	75	92	.216
+12	-0.21%	3.09%	-0.86	75	92	.216
+13	-0.12%	2.93%	-0.51	70	97	<b>.044</b>
+14	0.20%	3.16%	0.81	87	80	.643
+15	0.13%	3.55%	0.49	89	78	.439
+16	0.10%	3.07%	0.44	80	87	.643
+17	-0.30%	3.27%	-1.20	76	91	.279
+18	0.19%	3.30%	0.74	87	80	.643
+19	-0.28%	2.99%	-1.19	73	94	.121
+20	-0.50%	3.56%	-1.82	69	98	<b>.030</b>

\*Values in bold are significant at 5% level of significance. To further analyse AARs, ASARs are calculated using equation (6) and (7). To test 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 4 days (first split companies), 3 days (multiple split companies) and 14 days (single split companies).

**Table 4: AARs and  $Z_s$ -values - announcement day (first split, multiple split and single split)**

Event day	AAR (%) first split	$Z_s$ - values*	AAR (%) multiple split	$Z_s$ - values*	AAR (%) single split	$Z_s$ - values*
-20	0.38%	-0.19	0.41%	0.79	0.53%	<b>2.55</b>
-19	1.90%	<b>2.50</b>	0.22%	0.24	0.86%	<b>2.21</b>
-18	0.49%	-0.15	0.22%	0.54	0.60%	1.47
-17	-0.95%	-1.11	0.52%	0.68	0.02%	0.42
-16	-0.68%	-0.08	1.30%	1.59	0.09%	0.07
-15	-1.36%	-1.26	0.38%	0.02	0.25%	0.01
-14	-1.32%	-0.90	0.48%	0.62	0.43%	<b>2.00</b>
-13	-0.21%	-0.25	-0.17%	-0.33	0.39%	1.16
-12	-0.86%	-0.69	0.16%	0.25	0.06%	0.82
-11	1.05%	1.07	-0.90%	-0.75	-0.19%	-0.59
-10	0.87%	0.65	-0.37%	-1.01	0.71%	<b>2.47</b>
-9	0.44%	0.48	-0.63%	-1.45	0.27%	0.75
-8	1.01%	1.26	0.25%	0.32	0.24%	0.69
-7	0.75%	1.04	0.74%	1.72	0.34%	0.81
-6	-1.38%	-1.76	0.43%	1.29	0.11%	1.51
-5	1.53%	<b>3.23</b>	0.22%	0.29	0.70%	<b>3.99</b>
-4	0.28%	0.68	0.58%	1.72	0.98%	<b>2.98</b>
-3	0.03%	-0.61	0.22%	0.71	0.73%	<b>2.18</b>
-2	0.44%	-0.04	0.36%	1.20	0.17%	0.21
-1	0.86%	0.24	-0.12%	-0.84	0.41%	<b>2.03</b>
0	1.25%	1.84	-0.06%	0.89	0.82%	<b>3.80</b>
+1	0.57%	-0.08	-0.71%	-1.04	0.78%	<b>3.32</b>
+2	-0.17%	-0.34	-1.29%	<b>-2.55</b>	-0.14%	-0.68
+3	0.74%	0.95	0.29%	0.89	-0.59%	<b>-2.69</b>
+4	-0.45%	-0.87	-1.57%	<b>-2.05</b>	-0.63%	<b>-2.34</b>

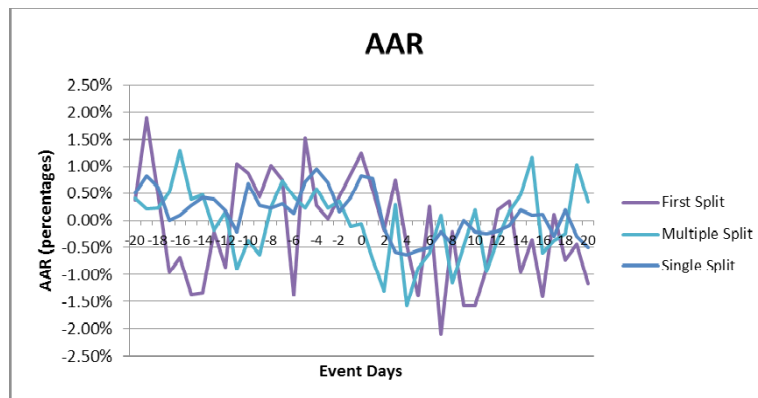


+5	-1.39%	-0.97	-0.88%	-1.25	-0.54%	-1.76
+6	0.27%	-0.10	-0.59%	-0.81	-0.50%	<b>-2.49</b>
+7	-2.10%	<b>-2.14</b>	0.10%	-0.07	-0.18%	-1.07
+8	-0.21%	-0.58	-1.15%	<b>-2.20</b>	-0.43%	<b>-2.12</b>
+9	-1.56%	<b>-2.22</b>	-0.48%	-0.55	0.02%	0.26
+10	-1.57%	-1.52	0.19%	0.68	-0.21%	-0.06
+11	-0.89%	-0.47	-0.94%	-1.17	-0.25%	-0.90
+12	0.19%	-0.02	-0.35%	-0.52	-0.21%	-1.26
+13	0.35%	0.65	0.16%	0.46	-0.12%	-1.13
+14	-0.95%	-0.65	0.46%	1.45	0.20%	0.24
+15	-0.36%	0.06	1.16%	0.86	0.13%	1.14
+16	-1.41%	-1.35	-0.59%	-1.42	0.10%	0.23
+17	0.11%	-0.31	-0.37%	-0.53	-0.30%	-1.15
+18	-0.73%	0.03	-0.24%	-0.86	0.19%	0.25
+19	-0.44%	-0.30	1.04%	1.72	-0.28%	-0.67
+20	-1.16%	-1.09	0.34%	0.75	-0.50%	-1.23

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

In **Figure 1** AARs for first split, multiple split and single split companies are plotted on a graph seems to follow same pattern irrespective of the group.

**Figure 1: AARs - announcement day (first split, multiple split and single split)**



**Impact on CAARs - announcement day (first split, multiplesplit and single split)**

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

In **Table 5** it is reported that CAARs are positive for all three group of companies. To test statistical significance of CAARs  $Z_{CS}$ -test is done at 5% level of significance, taking SCAARs using equation (10). The null hypothesis tested is that SCAARs on an event day in announcement window is equal to zero.

**Table 5: CAARs and Z<sub>CS</sub> values –announcement day(first split, multiple split and single split)**

Event day	First split		Multiple split		Single split	
	CAAR (%)	Zcs - values*	CAAR (%)	Zcs - values *	CAAR (%)	Zcs - values *
-20	0.38%	-0.03	0.41%	0.12	0.53%	0.40
-19	2.28%	0.36	0.63%	0.16	1.39%	0.74
-18	2.76%	0.34	0.85%	0.25	1.99%	0.97
-17	1.81%	0.16	1.37%	0.35	2.01%	1.04
-16	1.13%	0.15	2.68%	0.60	2.10%	1.05
-15	-0.23%	-0.05	3.06%	0.60	2.35%	1.05
-14	-1.55%	-0.19	3.54%	0.70	2.78%	1.36
-13	-1.76%	-0.22	3.36%	0.65	3.17%	1.55
-12	-2.62%	-0.33	3.52%	0.69	3.23%	1.67
-11	-1.57%	-0.16	2.62%	0.57	3.05%	1.58
-10	-0.70%	-0.06	2.25%	0.41	3.76%	<b>1.97</b>
-9	-0.27%	0.01	1.62%	0.19	4.03%	<b>2.09</b>
-8	0.75%	0.21	1.87%	0.24	4.27%	<b>2.19</b>
-7	1.49%	0.37	2.60%	0.51	4.61%	<b>2.32</b>
-6	0.11%	0.10	3.04%	0.71	4.72%	<b>2.55</b>
-5	1.64%	0.60	3.26%	0.75	5.43%	<b>3.18</b>
-4	1.92%	0.71	3.84%	1.02	6.41%	<b>3.64</b>
-3	1.95%	0.61	4.07%	1.13	7.14%	<b>3.98</b>
-2	2.39%	0.61	4.43%	1.32	7.30%	<b>4.02</b>
-1	3.25%	0.64	4.31%	1.19	7.72%	<b>4.33</b>
0	4.50%	0.93	4.26%	1.33	8.54%	<b>4.93</b>
+1	5.07%	0.92	3.55%	1.16	9.32%	<b>5.45</b>
+2	4.90%	0.86	2.25%	0.77	9.18%	<b>5.34</b>
+3	5.64%	1.01	2.55%	0.91	8.59%	<b>4.92</b>
+4	5.19%	0.88	0.98%	0.59	7.96%	<b>4.56</b>
+5	3.80%	0.73	0.10%	0.39	7.42%	<b>4.28</b>
+6	4.07%	0.71	-0.50%	0.26	6.91%	<b>3.89</b>
+7	1.97%	0.38	-0.40%	0.25	6.73%	<b>3.73</b>
+8	1.76%	0.29	-1.55%	-0.09	6.30%	<b>3.40</b>
+9	0.19%	-0.06	-2.03%	-0.18	6.31%	<b>3.44</b>
+10	-1.37%	-0.30	-1.84%	-0.07	6.11%	<b>3.43</b>
+11	-2.27%	-0.37	-2.78%	-0.25	5.86%	<b>3.29</b>
+12	-2.08%	-0.38	-3.12%	-0.33	5.66%	<b>3.09</b>
+13	-1.73%	-0.28	-2.96%	-0.26	5.54%	<b>2.91</b>
+14	-2.68%	-0.38	-2.50%	-0.03	5.74%	<b>2.95</b>
+15	-3.04%	-0.37	-1.34%	0.10	5.87%	<b>3.13</b>
+16	-4.45%	-0.58	-1.93%	-0.12	5.98%	<b>3.16</b>
+17	-4.34%	-0.63	-2.30%	-0.20	5.68%	<b>2.99</b>
+18	-5.07%	-0.62	-2.54%	-0.34	5.87%	<b>3.02</b>
+19	-5.51%	-0.67	-1.50%	-0.07	5.59%	<b>2.92</b>
+20	-6.67%	-0.84	-1.17%	0.05	5.09%	<b>2.73</b>

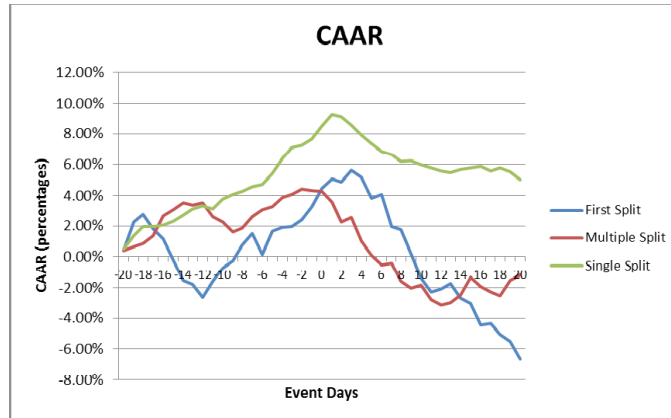
\*Values in bold are significant at 5% level of significance.

**Table 6** shows that CAARs are not having significant Z<sub>CS</sub>-values for first split and multiple split

companies in the announcement window. CAARs are having significant  $Z_{CS}$ -values for single split companies in announcement window for 30 days from  $t_{-10}$  and till  $t_{+20}$  day.

**Figure 2** shows CAAR for the three groups of companies on a graph. It can be seen that CAARs are positive only for single split companies.

**Figure 2: CAARs - announcement day (first split, multiple split and single split)**



**Table 6: CAARs and  $Z_{CS}$  -values - announcement day(in event window of 41 days - first split, multiple split and single split)**

Event days	No. of days	First split		Multiple split		Single split	
		CAAR (%)	$Z_{CS}$ - values*	CAAR (%)	$Z_{CS}$ - values*	CAAR (%)	$Z_{CS}$ - values*
-20 to +20	41	-6.67%	-0.841	-1.17%	0.048	5.09%	<b>2.706</b>
-10 to +10	21	0.20%	-0.188	-4.46%	-0.893	3.06%	<b>2.502</b>
-5 to +5	11	3.69%	1.217	-2.94%	-0.612	2.69%	<b>3.308</b>
-2 to +2	5	2.95%	0.727	-1.82%	-1.047	2.04%	<b>3.892</b>
-2 to 0	3	2.55%	1.179	0.19%	0.720	1.40%	<b>3.486</b>
0 to +2	3	1.65%	0.820	-2.06%	-1.557	1.46%	<b>3.742</b>
-1 to +1	3	2.68%	1.155	-0.88%	-0.574	2.02%	<b>5.311</b>

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

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 all event windows of different days in 41 days period for single split companies.

## 5. Conclusion

The results show that no significant impact on ARs is present for first and multiple split companies in announcement window. However significant impact is present in announcement window for single split companies. From this it can be inferred that single split companies respond in a more positive and long lasting manner to stock splits in comparison to multiple split companies (first split or multiple split) in line with results of Gharghori et al. (2013) in announcement window.

The empirical result of CAARs stress again that there is a difference in impact of stock splits for single split, first split and multiple split companies in announcement window. The impact of

stock splits is positive and significant for single split companies. The impact on first split companies and single split companies is not similar. The impact on first split companies is similar to that of multiple split companies (Huang et al., 2008)<sup>7</sup>. The results of the study show significant returns only for single split companies which are infrequent splitters.

In theory response of first split and single split companies should be same because they are initial split announcements by companies with no information about subsequent splits. However empirical results show a difference in impact of stock splits for the two groups.

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### Footnotes

1. Ghargho ri et al. (2013) considered impact of splitting pattern on ARs of companies.
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.
4. Multiple split companies consist of companies which have announced stock splits again after first split in period of study.
5. Single split companies are companies which have announced split only once during period of study.
6. First split companies are companies which announced split for first time in period of study.
7. Huang et al., (2008) were of opinion that frequent splitters split with an object to affect liquidity while infrequent splitters split with an object to provide strong signals to the market.