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Differences in Impact of Stock Splits with Difference in Number of Splits (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. Stock splits add no value but increases number of shares.The results in above discussion suggests that reaction to stock splits is stronger and long lasting for single split companies as compared to first split and multiple split companies around the ex-split day. It also indicates that stock splits have significant impact on ARs for first split companies. The impact on AARs is strongest and most significant for multiple split companies. It implies that around ex-split day market distinguishes between first and multiple splits. More ARs are observed for multiple split companies around ex-split day.

1. Introduction

Stock splits in different empirical studies in past are observed to have impact on share prices, liquidity and other variables. It is an area of research that has attracted interest of various researchers in last few decades. Despite the fact that a lot of research studies have been done in past, still no unanimous conclusion has been achieved as different researchers have observed and reported different behaviour of share prices around stock splits.Brennan and Copeland (1988) tested signalling hypothesis for stock splits using mean adjusted returns around announcement day for a sample of 967 companies. They developed a transaction cost model and found empirical evidence to support signalling theory using announcement day ARs. They were of view that stock split is a costly signal from investors' point of view and investors who owned round-lots after split end up with odd-lots, which are more costly to sell. This explanation is not valid in current scenario because of introduction of dematerialization in financial markets. They suggested that since stock split is costly for investors therefore perfect split strategy to be adopted by a company should be to split continuously until its share prices reach a level where transaction costs are least. According to them cost of stock splits is composed of three types of costs- printing, legal and administrative costs. The administrative cost relating to stock splits is hard to determine and may increase due to an increase in number of shares.

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Gwstarson (1985) made a comparison of stock split companies and companies which did not announce stock splits. They concluded that relative prices of stock splits announcing companies increased.

Lakonishok and Lev (1987) analyzed corporate performances by examining earnings growth and cash dividend growth. They constructed a sample of splitting companies and a control sample with matching companies with same industry code, similar asset size and used chi-square test to test differences in growth rates. They found that splitting companies exhibited higher growth in earnings and dividends than control companies after split announcement. They also found three to four percent abnormal share price return around announcement day.

Kumar and Halageri (2013) examined share price reactions to stock split announcement and indicated that significant ARs are associated with stock splits. Baker and Gallagher (1980) after interviewing Chief Financial Officers reported that majority of them were of opinion that stock splits are done to attain optimal trading price range which improves liquidity. They also stated that small investors buy at lower share prices and do not like to invest their money when share prices are high. A stock split according to them broadens ownership base of investors.

Huang et.al (2008) pointed out that motivation behind stock splits is different for infrequent splitters and frequentsplitters. They concluded that frequent splitters announce stock splits in order to have more liquidity for their shares. Infrequent splitters announce stock splits to signal strong information about expected future earnings. Baker, Greenwood and Wurgler (2009) suggested catering theory of nominal share prices. They noted that higher split frequencies along with low post split prices worsened future returns on small cap stocks as compared to large stocks and resulting returns for shareholders were unusually low.

The researchers are of view that performance of company that announced split in past is considered while responding to subsequent splits by the same company. In India no research study has tried to compare behaviour of share prices after first and subsequent splits. The current study tries to find presence of differences in impact of split for first and subsequent splits, by comparing ARs and liquidity measures.

The study discusses analysis relating to research hypothesis that there is difference in impact of stock splits with differences in number of splits announced by a company around ex-split day. For this response of single split, first split and multiple split companies are considered. 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[1] is collected from Prowess 19.1, a database of Centre for Monitoring Indian Economy (CMIE)[2].
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. Additionalinformation is obtained from bseindia.com (official websiteof 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. 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 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}).

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

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.$\acute{a}_i$ measures mean returns not explained by market. $\hat{a}_i$ measures sensitivity of return (company i) to market return and $\mathring{a}_{it}$ 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:

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

Where, $\hat{\alpha}$ and $\hat{\beta}$ are OLS estimators of regression coefficientestimated over estimation window.
Impact on Average abnormal returns (AARs) – ex-splitday
The un-weighted cross-sectional average abnormal returnsin 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 presenton 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 are

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

independently and identically distributed, have same mean and variances and are cross-sectionally uncorrelated. is unknown and estimator ofcan be constructed from cross-sectional variance of ARs in period t_i. The Z-statistics is calculatedas 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 windowis 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

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

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

$$H_o : E\,(ASAR_{it}) = 0$$

For which following Z-statistic is constructed:

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

The significant positive impact of stock splits is found to be present on AARs on announcement day in section.

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:

$$CAAR_{it} = \sum_{t=t1}^{t2} AAR_{it} \quad (9)$$

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 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 to capture response of first split, multiple split and single split companies around ex-split day using equation (4). **Table 1 shows** response of first-split companies. AAR for first split companies is positive on ex-split day.

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 ex-split window is equal to zero. **Table 1** shows that there is negative AAR with significant Z-value on days - t_{-17} and t_{+9}.Positive AAR with significant Z-value is noted on day - t_{-14}.

The proportion test is used which tests the null hypothesis that the number of positive and negative ARs is equal. The null hypothesis is not rejected at 5% level of significance on any event day. However, proportion of positive ARs is more in comparison to negative ARs on days - t_{-2}, t_{-1} and t_0 days. But after t_0 proportion of negative ARs is more for rest of the event window.

Table 1: AARs - ex-split 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	-1.31%	3.80%	-1.43	5	12	.143
-19	-0.57%	2.72%	-0.87	7	10	.629
-18	-0.22%	3.12%	-0.29	7	10	.629
-17	-1.85%	3.07%	**-2.48**	5	12	.143
-16	0.92%	4.06%	0.94	9	8	1.00
-15	-0.21%	3.13%	-0.27	7	10	.629
-14	1.24%	2.32%	**2.21**	11	6	.332
-13	0.53%	2.84%	0.76	10	7	.629
-12	-0.49%	2.60%	-0.78	8	9	1.00
-11	-0.24%	3.42%	-0.28	7	10	.629
-10	0.91%	4.29%	0.88	12	5	.143
-9	1.16%	3.12%	1.54	11	6	.332
-8	0.55%	2.68%	0.84	9	8	1.00
-7	0.42%	4.14%	0.41	9	8	1.00
-6	-0.79%	3.14%	-1.03	7	10	.629
-5	-0.38%	3.41%	-0.46	7	10	.629
-4	-0.23%	2.84%	-0.34	7	10	.629
-3	1.21%	3.35%	1.49	9	8	1.00
-2	0.27%	2.59%	0.42	10	7	.629
-1	0.62%	2.69%	0.95	10	7	.629
0	-1.59%	17.47%	-0.38	12	5	.143
+1	-1.50%	3.76%	-1.65	8	9	1.00
+2	1.00%	4.51%	0.91	7	10	.629
+3	-0.47%	3.69%	-0.53	8	9	1.00
+4	0.05%	2.93%	0.06	7	10	.629
+5	0.75%	4.14%	0.75	9	8	1.00
+6	-0.71%	4.39%	-0.66	8	9	1.00
+7	-0.77%	3.28%	-0.97	6	11	.332
+8	0.41%	3.84%	0.44	9	8	1.00
+9	-1.82%	3.80%	**-1.98**	7	10	.629
+10	-0.72%	4.01%	-0.74	7	10	.629

+11	-1.72%	3.63%	-1.96	6	11	.332
+12	1.18%	4.22%	1.16	10	7	.629
+13	-0.27%	3.02%	-0.36	6	11	.332
+14	-0.44%	2.51%	-0.72	7	10	.629
+15	-0.41%	2.83%	-0.60	8	9	1.00
+16	0.03%	3.31%	0.04	8	9	1.00
+17	-0.03%	3.72%	-0.04	5	12	.143
+18	0.13%	3.21%	0.16	11	6	.332
+19	0.28%	3.37%	0.34	9	8	1.00
+20	-0.24%	2.71%	-0.37	8	9	1.00

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

Table 2 shows negative AAR on ex-split day for 22 companies which have announced a split for multiple times. Negative AAR with significant Z-value is noted on 3 days - t_0, t_{+3} and t_{+6}.

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 day - t_{+3}.

Table 2: AARs - ex-split day (multiple split companies)

Event day	AARs (%)	Standard deviation (%)	Z-values*	Num ber of positive ARs	Num ber of negative ARs	p -values for Test of Proportion**
-20	-0.21%	2.01%	-0.49	10	12	.832
-19	0.37%	2.76%	0 .6 3	10	12	.832
-18	-0.13%	2.24%	-0.27	9	13	.523
-17	-0.25%	2.20%	-0.52	11	11	1.00
-16	0.25%	2.57%	0 .4 5	9	13	.523
-15	-0.20%	3.35%	-0.27	10	12	.832
-14	-0.46%	2.56%	-0.84	7	15	.134
-13	0.19%	2.94%	0.31	11	11	1.00
-12	-0.31%	2.34%	-0.63	11	11	1.00
-11	-0.82%	2.27%	-1.69	6	16	.052
-10	-0.27%	2.56%	-0.49	11	11	1.00
-9	-0.61%	2.60%	-1.10	8	14	.286
-8	-0.45%	2.34%	-0.90	8	14	.286
-7	0.31%	3.10%	0.47	11	11	1.00
-6	0.56%	3.99%	0.66	12	10	.832
-5	0.06%	3.60%	0.08	10	12	.832
-4	0.61%	3.97%	0.72	11	11	1.00
-3	-0.02%	2.58%	-0.04	9	13	.523
-2	-0.82%	4.09%	-0.94	8	14	.286
-1	0.96%	4.46%	1.01	14	8	.286
0	-14.93%	34.45%	**-2.03**	13	9	.523
+1	0.01%	4.16%	0.01	12	10	.832
+2	0.24%	6.10%	0.19	10	12	.832
+3	-2.40%	3.38%	**-3.33**	4	18	**.004**
+4	-0.80%	3.90%	-0.96	7	15	.134
+5	-0.84%	3.49%	-1.13	9	13	.523
+6	-1.43%	2.24%	**-2.99**	6	16	.052

+7	-1.03%	3.35%	-1.44	9	13	.523
+8	-0.48%	4.01%	-0.56	10	12	.832
+9	-0.59%	4.03%	-0.68	9	13	.523
+10	0.02%	2.93%	0.03	12	10	.832
+11	1.17%	4.00%	1.38	10	12	.832
+12	-1.17%	3.51%	-1.57	9	13	.523
+13	0.31%	4.16%	0.35	9	13	.523
+14	-0.49%	3.55%	-0.65	7	15	.134
+15	-0.81%	3.12%	-1.22	10	12	.832
+16	-0.05%	6.17%	-0.04	12	10	.832
+17	-0.28%	4.49%	-0.29	8	14	.286
+18	0.02%	4.38%	0.02	13	9	.523
+19	-0.24%	2.32%	-0.48	8	14	.286
+20	0.57%	3.30%	0.82	14	8	.286

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

Table 3 reports response to stock splits done by 167 companies which have split for one time.AAR is negative on ex-split day for 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 ex-split window is equal to zero.

Tables 4 shows positive AAR with significant Z-value is noted on 5 days - on t_{-16},t_{-7},t_{-5},$t_{-1}$and t_{+1}. Negative AAR with significant Z-value is noted on 10 days- t_{+4}, t_{+6} to t_{+13}, t_{+15}. 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 16 days - t_{-11}, t_{+2}, t_{+4},t_{+6} to t_{+13}, t_{+15}, t_{+16},t_{+17} t_{+19} and t_{+20}.The null hypothesis is rejected and significant increase in number of positive ARs is on 2 days - t_0 and t_{+1}.

Table 3: AARs - ex-split day (single split companies)

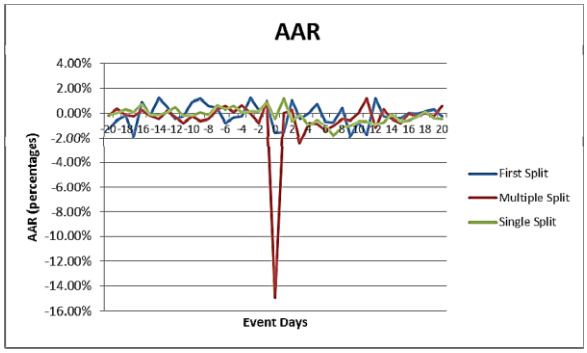
Event day	AARs (%)	Standard deviation(%)	Z-values*	Number of positive ARs	Number of negative ARs	p-values for Test of Proportion**
-20	-0.17%	3.34%	-0.65	73	94	.121
-19	0.01%	3.73%	0.05	80	87	.643
-18	0.32%	3.33%	1.25	82	85	.877
-17	0.10%	4.00%	0.32	84	83	1.00
-16	0.71%	3.88%	**2.38**	91	76	.279
-15	-0.15%	3.03%	-0.66	80	87	.643
-14	-0.12%	3.42%	-0.44	75	92	.216
-13	0.07%	3.59%	0.25	85	82	.877
-12	0.44%	3.32%	1.71	89	78	.439
-11	-0.17%	3.65%	-0.61	70	97	**.044**
-10	-0.18%	3.73%	-0.63	80	87	.643
-9	0.06%	3.93%	0.19	82	85	.877
-8	-0.14%	3.65%	-0.48	79	88	.536
-7	0.64%	3.73%	**2.22**	90	77	.353

-6	0.31%	3.39%	1.19	92	75	.216
-5	0.60%	3.28%	**2.36**	93	74	.163
-4	0.08%	4.08%	0.25	86	81	.757
-3	0.14%	3.67%	0.48	82	85	.877
-2	0.13%	3.54%	0.49	83	84	1.00
-1	0.92%	3.64%	**3.28**	92	75	.216
0	-0.50%	14.53%	-0.44	110	57	**.000**
+1	1.18%	4.75%	**3.20**	98	69	**.030**
+2	-0.64%	4.41%	-1.89	68	99	**.020**
+3	-0.14%	4.12%	-0.45	73	94	.121
+4	-1.02%	4.62%	**-2.86**	58	109	**.000**
+5	-0.60%	4.68%	-1.64	76	91	.279
+6	-1.01%	4.53%	**-2.87**	61	106	**.001**
+7	-1.78%	4.35%	**-5.30**	48	119	**.000**
+8	-1.12%	4.07%	**-3.55**	67	100	**.013**
+9	-1.02%	4.40%	**-3.01**	58	109	**.000**
+10	-0.71%	3.48%	**-2.63**	63	104	**.002**
+11	-0.68%	3.75%	**-2.34**	67	100	**.013**
+12	-0.89%	3.79%	**-3.04**	66	101	**.008**
+13	-0.72%	3.78%	**-2.46**	67	100	**.013**
+14	-0.06%	4.00%	-0.20	75	92	.216
+15	-0.71%	3.90%	**-2.34**	69	98	**.030**
+16	-0.60%	4.02%	-1.93	60	107	**.000**
+17	-0.29%	4.30%	-0.87	70	97	**.044**
+18	0.12%	4.15%	0.38	76	91	.279
+19	-0.44%	4.54%	-1.26	65	102	**.005**
+20	-0.45%	3.73%	-1.55	66	101	**.008**

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

When AARs of three groups of companies are plotted on a graph, and shown in **Figure 1.** It shows that AAR decreases significantly for multiple split companies aroundex-split day.

Figure 1: AARs - ex-split day (first split, multiple split and singlesplit companies



To further analyse AARs, ASARs are calculated using equation (6) and (7). To test statistical significance of A SA Rs 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), 6 days (multiple split companies) and 17 days (single split companies).

Table 4: AARs and Z_S-values -ex-split day(first split,multiple split and single split companies)

Event day	AAR (%) first split	Z_S – values*	AAR (%) multiple split	Z_S – values*	AAR (%) single split	Z_S – values*
-20	-1.31%	-1.11	-0.21%	-0.98	-0.17%	-0.43
-19	-0.57%	-0.27	0.37%	0.74	0.01%	1.04
-18	-0.22%	0.19	-0.13%	0.27	0.32%	0.81
-17	-1.85%	-1.35	-0.25%	-0.11	0.10%	1.36
-16	0.92%	1.46	0.25%	0.51	0.71%	**2.07**
-15	-0.21%	-0.72	-0.20%	-0.31	-0.15%	-0.99
-14	1.24%	1.18	-0.46%	-0.72	-0.12%	0.09
-13	0.53%	0.16	0.19%	0.42	0.07%	-0.83
-12	-0.49%	-0.38	-0.31%	-0.40	0.44%	1.40
-11	-0.24%	-0.15	-0.82%	-0.92	-0.17%	-1.02
-10	0.91%	0.79	-0.27%	-0.15	-0.18%	0.26
-9	1.16%	1.96	-0.61%	-0.37	0.06%	0.83
-8	0.55%	0.52	-0.45%	-0.92	-0.14%	-0.53
-7	0.42%	1.17	0.31%	0.40	0.64%	**2.43**
-6	-0.79%	0.22	0.56%	0.41	0.31%	1.02
-5	-0.38%	-0.52	0.06%	-0.20	0.60%	1.72
-4	-0.23%	-0.14	0.61%	1.12	0.08%	0.52
-3	1.21%	1.32	-0.02%	0.54	0.14%	0.78
-2	0.27%	0.36	-0.82%	-1.03	0.13%	-0.19
-1	0.62%	0.72	0.96%	**2.12**	0.92%	**2.11**
0	-1.59%	**-5.50**	-14.93%	**-30.59**	-0.50%	**-8.40**
+1	-1.50%	.72	0.01%	0.03	1.18%	**4.30**
+2	1.00%	60	0.24%	1.23	-0.64%	**-3.08**
+3	-0.47%	.70	-2.40%	**-3.91**	-0.14%	-1.14
+4	0.05%	17	-0.80%	-0.85	-1.02%	**-4.44**
+5	0.75%	31	-0.84%	-1.51	-0.60%	**-2.32**
+6	-0.71%	.52	-1.43%	**-2.17**	-1.01%	**-6.24**
+7	-0.77%	.52	-1.03%	**-2.01**	-1.78%	**-6.88**
+8	0.41%	29	-0.48%	-0.21	-1.12%	**-4.31**
+9	-1.82%	**.47**	-0.59%	-0.43	-1.02%	**-3.13**
+10	-0.72%	.38	0.02%	0.29	-0.71%	**-2.90**
+11	-1.72%	**.12**	1.17%	**1.98**	-0.68%	**-2.55**
+12	1.18%	**97**	-1.17%	-1.11	-0.89%	**-2.39**
+13	-0.27%	.41	0.31%	0.67	-0.72%	**-3.03**
+14	-0.44%	.01	-0.49%	-0.33	-0.06%	-0.53
+15	-0.41%	.16	-0.81%	-1.12	-0.71%	-1.30
+16	0.03%	0.80	-0.05%	0.82	-0.60%	**-2.04**
+17	-0.03%	0.12	-0.28%	-1.75	-0.29%	-0.91
+18	0.13%	0.22	0.02%	-0.52	0.12%	0.09
+19	0.28%	0.20	-0.24%	0.09	-0.44%	-1.78
+20	-0.24%	0.03	0.57%	1.05	-0.45%	-1.69

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

Impact on CAARs - ex-split day (first split, multiple split and single split companies)

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

To test statistical significance of CA A Rs 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 ex-split window is equal to zero.

Table 5 shows that CAARs are not having significant Z_{CS}-values for first split companies in ex-split window. CAARs are having significant Z_{CS}-values for multiple split companies in ex-split window for 21 days - from t_0 and till t_{+20} day. CAARs are having significant Z_{CS}-values for single split companies in ex-split window for 13 days - from t_{+7} and till t_{+20} day.

Table 5: CAARs and Z_{CS} values - ex-split day (firstsplit, multiple split and single split companies)

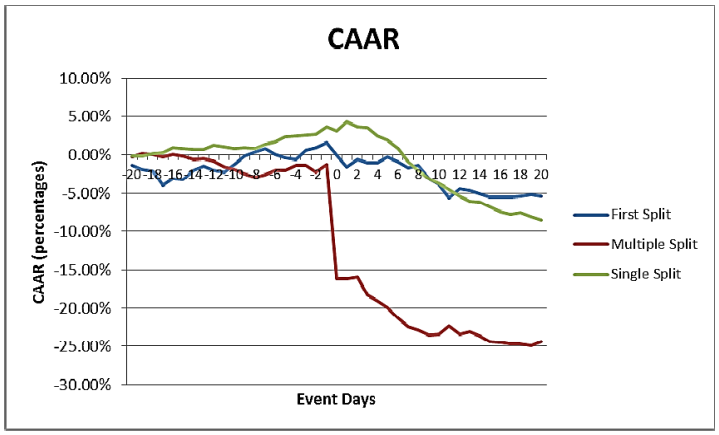
Event day	First split		Multiple split		Single split	
	CAAR (%)	Zcs values*	CAAR (%)	Zcs values*	CAAR (%)	Zcs values*
-20	-1.31%	-0.17	-0.21%	-0.15	-0.17%	-0.07
-19	-1.89%	-0.22	0.16%	-0.04	-0.15%	0.10
-18	-2.11%	-0.19	0.03%	0.01	0.17%	0.22
-17	-3.95%	-0.40	-0.21%	-0.01	0.27%	0.44
-16	-3.03%	-0.17	0.03%	0.07	0.98%	0.76
-15	-3.23%	-0.28	-0.16%	0.02	0.83%	0.60
-14	-1.99%	-0.10	-0.62%	-0.09	0.71%	0.62
-13	-1.46%	-0.07	-0.43%	-0.03	0.78%	0.49
-12	-1.95%	-0.13	-0.74%	-0.09	1.22%	0.71
-11	-2.19%	-0.15	-1.56%	-0.23	1.05%	0.55
-10	-1.28%	-0.03	-1.83%	-0.26	0.86%	0.59
-9	-0.12%	0.28	-2.44%	-0.31	0.92%	0.72
-8	0.43%	0.36	-2.89%	-0.46	0.79%	0.63
-7	0.85%	0.54	-2.58%	-0.40	1.43%	1.01
-6	0.06%	0.58	-2.01%	-0.33	1.74%	1.17
-5	-0.31%	0.49	-1.95%	-0.36	2.34%	1.44
-4	-0.54%	0.47	-1.34%	-0.19	2.42%	1.52
-3	0.67%	0.68	-1.36%	-0.11	2.55%	1.64
-2	0.93%	0.73	-2.18%	-0.27	2.69%	1.61
-1	1.55%	0.85	-1.21%	0.07	3.61%	1.94
0	-0.04%	-0.01	-16.15%	**-4.71**	3.11%	0.63
+1	-1.55%	-0.28	-16.14%	**-4.71**	4.29%	1.30
+2	-0.55%	-0.19	-15.89%	**-4.52**	3.65%	0.82
+3	-1.02%	-0.30	-18.30%	**-5.13**	3.50%	0.65
+4	-0.98%	-0.27	-19.10%	**-5.26**	2.48%	-0.05
+5	-0.23%	-0.06	-19.93%	**-5.50**	1.88%	-0.41
+6	-0.93%	-0.30	-21.36%	**-5.84**	0.88%	-1.39
+7	-1.71%	-0.54	-22.39%	**-6.15**	-0.91%	**-2.46**
+8	-1.30%	-0.49	-22.87%	**-6.18**	-2.02%	**-3.13**

+9	-3.12%	-1.04	-23.45%	**-6.25**	-3.05%	**-3.62**
+10	-3.84%	-1.10	-23.43%	**-6.20**	-3.75%	**-4.08**
+11	-5.56%	-1.43	-22.26%	**-5.90**	-4.43%	**-4.47**
+12	-4.38%	-1.12	-23.43%	**-6.07**	-5.33%	**-4.85**
+13	-4.65%	-1.18	-23.12%	**-5.96**	-6.05%	**-5.32**
+14	-5.08%	-1.19	-23.61%	**-6.02**	-6.11%	**-5.40**
+15	-5.50%	-1.21	-24.42%	**-6.19**	-6.81%	**-5.61**
+16	-5.46%	-1.09	-24.47%	**-6.06**	-7.41%	**-5.92**
+17	-5.50%	-1.07	-24.74%	**-6.34**	-7.70%	**-6.07**
+18	-5.37%	-1.03	-24.72%	**-6.42**	-7.58%	**-6.05**
+19	-5.09%	-1.00	-24.96%	**-6.40**	-8.02%	**-6.33**
+20	-5.33%	-1.00	-24.38%	**-6.24**	-8.47%	**-6.59**

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

When CAARs of the three group of companies are plotted on a graph it can be noted in **Figure 2** that CAARs show a downward trend after the ex-split day for multiple split companies.

Figure 2: CAARs - ex-split day (first split, multiplesplit and single split 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 all event windows of different days in 41 days period for single split and multiple split companies. The null hypothesis is rejected for all event windows of different time periods for multiple split and single split companies. However CAAR is significant when event window is just restricted to 2 days around ex-split day for first split companies.

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

Event days	No. of Days	First split		Multiple split		Single split	
		CAAR (%)	Zcs – values*	CAAR (%)	Zcs – values*	CAAR (%)	Zcs – values*
-20 to +20	41	-5.33%	-1.00	-24.38%	**-6.24**	-8.47%	**-6.59**
-10 to +10	21	-1.65%	-1.32	-21.87%	**-8.34**	-4.80%	**-6.46**
-5 to +5	11	-0.29%	-1.23	-17.92%	**-9.97**	0.14%	**-3.06**
-2 to +2	5	-1.22%	**-2.47**	-14.53%	**-12.63**	1.09%	**-2.35**
-2 to 0	3	-0.71%	**-2.55**	-14.79%	**-17.03**	0.56%	**-3.74**
0 to +2	3	-2.10%	**-3.82**	-14.68%	**-16.94**	0.04%	**-4.14**
-1 to +1	3	-2.48%	**-3.75**	-13.96%	**-16.42**	1.60%	-1.14

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

3. Conclusion

The results in above discussion suggests that reaction to stock splits is stronger and long lasting for single split companies as compared to first split and multiple split companies around the ex-split day. It also indicates that stock splits have significant impact on ARs for first split companies. This reaction is not present for first split companies around announcement day. But the impact on AARs is strongest and most significant for multiple split companies. It implies that around ex-split day market distinguishes between first and multiple splits. The same was not done around announcement day of stock splits.

This reaction may be strongest for multiple split companies because of lower prices around ex-split day.

The comparative lower prices may be the reason for significant AARs around ex-split day for the multiple split companies. The argument is supported by the observation that CAARs of multiple split companies are negative after the ex-split day in steepest manner. After multiple splits, face value of shares goes down further resulting in an increase in trading due to lower prices especially around ex-split day when trading at lower price becomes effective. As a result more ARs are observedfor multiple split companies around ex-split day.

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Footnotes

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).

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