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Impact of Stock Splits on Returns: Evidence from Indian Stock Market

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Abstract

This paper investigates the effect on stock return after the stock split announcement and actual split in Indian context. We analyze the impact of stock split on it's return among firms that went through forward stock split in Indian market during 2010 to 2015. Our study includes 23 stocks, where we use the standard event study method to find the result. The abnormal return around split announcement day and actual split day are considered as the main factors to determine the market impact due to stock split. Cumulative Average Abnormal Return on percentage basis, Student's t test and p-value are employed to statistically check the stock price changes around the stock split announcement day and actual split day. We also use these tests across different window period (e.g. 10 day, 30 day and 90 day) from the event day (Split announcement day & Actual Split day) and check whether the event effect continues or downplays along with time. Results indicate a significantly positive impact of stock splits on the returns of stock around the announcement day (1.61 percent), whereas actual split day return (1.28 percent) is not significant under the assumption of significance level 10% (90% confidence interval).

Keywords: Stock Split, Return, Abnormal Return, Announcement Day, Split Day, Event Study, Cumulative Average Abnormal Return
JEL Classification: G10, G14

1.1 Introduction

Splits are seen as a highly expensive administrative activity without any impact on organizations' future earnings. There may be a lot of reasons for stock splits but the primary motivations behind such splits should be shareholders interest. Whenever stock prices grow continuously and comparatively trade at high prices, it can be noticed that the firm will decide on a stock split. The reason for such a split is to keep the price in a range which is attractive to investors or stock traders.

Forward and reverse are the two types of splits. In case of forward split, a single share is further divided into multiple shares e.g. 2 for 1 split where 1 share is divided into two shares thereby shareholders getting two shares for each share owned by them till the record date[1] of split. In case of a reverse split a number of shares are merged together to form a smaller number of shares e.g. 1 for 2 reverse split where 2 shares are merged into 1 share.

Another reason behind stock split is increasing its liquidity. In our study we are concerned about the abnormal return that can be earned after the announcement and actual split date, so that traders get a trading opportunity. The focus of our study is to check the validity of signaling hypothesis of the stock splits in Indian context. In case of signaling hypothesis if the abnormal returns are positive it means that market views the split as a favourable event for future of the company and vice verse.

We also focus on checking the statistical significance of returns on the day of event and around. We term the 'event day' for two major events of the stock split process 'Announcement day' and 'Split day' for each stock of our sample.

Announcement Day: On this day the company's management makes the information public. So we check for any abnormal return on and around this day.

Split Day: On this day the company's stock gets split at a ratio as announced earlier. So we check for any abnormal return on and around this day.

1.2 Literature Survey

Keith B. Johnson (1966) concluded from his study on NYSE traded stocks in 1959, that there is a statistically significant price change of stock, which goes under stock split. But there are many researches found which shows contrary results. Fama, Fisher and Jensen (1969) in their research on 'adjustment of Stock price to new information' concluded that stock splits have been lined with noticeable increase in dividend. Fama et al chose only those company stock in their sample whose splits includes all stock dividends of 25% of greater. They found the evidence that the market's views on stock splits are reflected after the announcement date and by the end of the month of split.

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[1] The date on which an investor must hold a share to become eligible to get the benefit of any corporate actions like stock split, bonus issue, dividend etc.

Stock split also increase liquidity in the market. If a stock is traded at a higher price, then trading of that particular stock for smaller traders is difficult and thus it becomes less liquid. Amihud (2002) found that illiquidity explains the expected return in stock. Amihud (2002) proposed that lower liquidity meant higher risk premium and higher liquidity translated to lower risk premium. Amihud (2000) tested that assets return is directly proportional to illiquidity. Change in the ratio of absolute return of stock to the daily dollar volume of stock due to the illiquidity of stock was also observed.

Patrick Dennis & Deon Strickland (2002) examined effect of the fund ownership composition on abnormal returns on announcement day along with the liquidity changes following a stock split. They found that abnormal return following a stock split is negatively co-related with the degree of institutional ownership before the split. They also found that in case of the firms with less institutional ownership before the split, normally increase their percentage share after the split.

Lakonishok and Lev in 1987 found that if the price of the stock before the split was very high, in such cases stock split is a good option to enhance the marketability of such a stock, same was concluded by Baker and Gallagher in 1980.

The new reduced price of the stock after the split motivates the even the individuals with lesser funds to purchase the stock at a reduced price. Angel in 1997 established that splits may be helpful in reducing tick size of the stock.

According to Grinblatt, Masulis and Titman in 1984 splits give out hints about the present and also the future performance of the stock being split and such a signal is a very expensive signal. Brennan and Copeland in 1988, also Bernnan and hughes in 1991 concluded that split is an expensive signal due to the reason that brokerage charges after the split increase the trading cost of a single share after the split of the stock with reduced price. The required evidence for signaling hypothesis was given by the visibility of positive abnormal return around the announcement of split according to various empirical studies such as Mukherji, Kim and Walker in 1997, also Ikenberry and Ramnath in 2002.

Abbe Fransson (2005) researched on reverse stock splits cases in between 1995 and 2004, which were traded at Stockholm Stock Exchange (Sweden). They did not observe any significant abnormal return around the split announcement day or any significant change in Bid-Ask Spread and trading volume.

Avner Arbel and Gene Swanson (Spring, 1993) studied on the role of information richness of a stock and its connection with the impact after split announcement. They found that the post announcement market price adjustment is fast and complete in case of information rich stock, where as it is slow and incomplete in case of information poor stock.

In their research paper 'The valuation effects of stock splits in NASDAQ' (2006), Katerina Lyroudi, Apostolos Dasilas and Antonios Varnas found a positive impact on stocks going under split. They took a sample of 57 observations of NASDAQ listed stocks traded during the year 1999 and 2000.

Majority of the previously done research on stock splits focused on measuring the abnormal return around the announcement date of the split. The research also looked at the impact on liquidity due to the split. Use of split as a signaling mechanism was also studied by few researchers. Our paper focuses on the abnormal return accumulated through out a window period from the announcement day as well as actual split day and their statistical significance.

2.1 Data & Source

Sample: The focus was on listed companies in National Stock Exchange which comes under Nifty 500[2] index and that underwent forward stock split. As on 31 March 2016, the Nifty 500 index represents around 94% of the free float market capitalization of listed stock on NSE[3]. We have selected Nifty 500 as the market index, as it consists companies which belong to 73 different industry sectors i.e. highly diversified index.

Out of several Nifty 500 stocks that underwent forward stock splits between 2010 to 2015, 23 stocks were selected randomly. Stocks that underwent splits during the Subprime Financial Crisis of 2008 to 2009 were avoided. Also, stocks that underwent exercises like merger, etc. were excluded.

2.2 Methodology

Standard event study method is used to analyse the effect of stock splits on its return. An American economist Eugene Fama introduced this method in 1969. It is a statistical method to analyse the effect of the event on the value of the firm. In case of our study we have analysed two events e.g. the day of announcement of stock split and actual stock split day. Here, we investigate whether there is any positive or negative effect on shareholder's wealth due to the stock split announcement and actual stock split during our study period.

We export the required data like daily closing price of each stock for around two years (one year before and after the announcement) from NSE web database to Microsoft excel in order to perform event study.

As a first step, we calculate the daily actual return of each stock, by calculating percentage change in closing price. Same way, we also find the Nifty 500 daily return, which is selected as market as it is India's one of the most diversified index and we selected our sample from this Nifty 500 stock list.

$$\text{Daily Return (\%)} = \frac{Current\ day\ closing\ price - Previous\ day\ closing\ price}{Previous\ day\ closing\ price} \times 100$$

[2] It is known as S&P CNX 500. This is the first broad based market index in India of listed companies in NSE. S&P represents Standard & Poors as an agency which publishes stock market index worldwide

[3] NSE stands for National Stock Exchange of India Limited. It is rank one of stock exchanges in India in terms of volume traded in both equity and derivative segment. It was established in 1992 and started its operation in 1994

(to be multiplied by 100 only if it is mentioned in percentage term)

Then we run a regression on daily return for at least past one year starting the day before the announcement of stock split between a selected stock and the market to find out the expected return of the stock.

We use Market Model Method[4] to calculate expected return. The Market Model Method is used as it also takes care of excess return (α) along with volatility measurement (β) (both the associated risk).

$R_t = \alpha + \beta \times R_{mt} + \varepsilon_t$

Where,

R_{mt} = The market (Nifty 500 index in our case) return for day t

β = Sensitivity of a stock against the market. It is a measure of risk of stock for someone holding a large, diversified portfolio

α = The performance of portfolio with respect to market

ε_t = Statistical error for regression

From regression, we estimate α (i.e. intercept) and β (i.e. slope). These are termed as $\hat{\alpha}$ and $\hat{\beta}$.

We use these estimates to calculate the expected return ($E(R_t)$) of a firm from a specific day during the event period. We take ε_t as zero in our case, as we assume there is not any other factor to influence the dependent variable.

Hence, the Expected return of a stock

$$E(Rt) = \hat{\alpha} + \hat{\beta} \times R_{mt}$$

The Abnormal Return (AR) can be calculated as by subtracting actual return of stock by expected return of stock.

$AR_t = R_t - E(R_t) = R_t - (\hat{\alpha} + \hat{\beta} \times R_{mt})$

2.2.1 Window Selection

Window selection is the time period for which the cumulative average abnormal return is calculated. In our research, we have taken 0 to +9, 0 to +29 and 0 to +89 windows to calculate CAAR. Here '+' signify the days after the announcement of split and the actual stock split. We

[4] There are other methods to calculate the expected return or prediction Error. Those are Mean Adjusted Return Method and Market Adjusted Return Method

have selected these 10 day, 30 day and 90 day windows to test the longevity and magnitude of the effect of the events.

2.2.2 CAAR Calculation

CAAR stand for cumulative Average Abnormal Return. It is a method of calculating abnormal return of a few stocks for a certain time period.

It is calculated as

CAAR = $\frac{1}{Nt} \times \sum_{1}^{Nt} AR_t$

Where

N_t = Number of days in time interval
AR_t = Abnormal Return for day t

In our case, we have calculated the average return for each stock for all trading days than calculated the Cumulative Abnormal Return (CAR) for each stock for respective windows of 10 days, 30 days and 90 days. After that we calculated the arithmetic mean of CARs across all samples to Cumulative Average Abnormal Return).

2.2.3 Two Tail test

A two-tail test is a statistical test in which the critical area of distribution is two-sided and the test is performed to check whether a sample is greater than or less than a certain range of values.

In two tail test, critical area exists on both extreme side of a benchmark value on a normal distribution[5] or bell curve and test is done to find whether a sample data is less than or greater than that critical range of values. On the other hand, one-tail test examines only one directional deviation from a benchmark value. Our assumption, the null hypothesis can be rejected if a sample is found in this critical region.

In our case, we have used two-tail test, because stock return fluctuates in both negative and positive direction and both positive and negative abnormal return can be earned.

2.2.4 Student's t test

Student's t test[6] is used to test a hypothesis. It checks whether two sets of data are significantly different from each other or not.

[5] It is the most common continuous probability distribution. It is a bell-shaped curve which is symmetry across its mean.
[6] William Sealy Gosset, an Irish chemist introduced this test in 1908. He termed it as 'student' against his pen name

The t-statistics are calculated as:

$$t = \frac{AR_t}{\sqrt{Var(AR_t)}}$$

Where,

AR_t = Abnormal Return for the estimated market models and

$$Var(AR_t) = \sigma^2 (1 + \frac{1}{N} + \frac{\left(R_m - \hat{R}_m\right)^2}{(N-1) \times \sigma^2(R_m)})$$

And

$$\hat{\sigma}^2 = \frac{1}{N-2} \times \sum_{t=1}^{N} [E(R_t) - \left(\hat{\alpha} + \hat{\beta} \times R_{mt}\right)]^2$$

Where,

σ^2 = The residual variance from market model method used in regression

N = Number of observation taken as sample in market model method

R_{mt} = market return on day t.

Degree of Freedom = (Total number of sample – 1). In our case, it is 22.

t statistics of 1.717 or above is considered as statistically significant at 10% significance level (90% confidence) for degree of freedom 22.

2.2.5 Return Hypothesis Testing

The Return hypothesis is design to understand the abnormal return from a company stock before and after the split. We define two hypotheses one for stock split announcement day and other for stock split date.

Stock split announcement hypothesis:

H_0 = Abnormal return <= 0 on or after the stock split announcement day but before actual stock split day.

H_1 = Abnormal return > 0 on or after the stock split announcement day but before actual stock split, if H_1 is accepted i.e. the positive abnormal return. It is because splits indicate favourable and positive performance of the firm.

Stock split hypothesis:

H_0 = Abnormal return >= on or after the actual stock split day.

H_1 = Abnormal return < 0 on or after the actual stock split day, if H_1 is accepted, the liquidity premium hypothesis is accepted i.e. the negative abnormal return. It is because splits will increase the liquidity of stock and liquidity premium earlier enjoyed will not continue.

2.2.6 Significance Level & P Value

The significance level which is denoted by α, is nothing but the probability of rejecting the null hypothesis. In statistical probability hypothesis, p value, or calculated probability value, indicates the evidence against the null hypothesis to reject the same. It determines the statistical significance of a set of data, which is compared to defined significance level of study. If we say significance level is 10%, it means that whenever p value is less than 10% H_0 (Null hypothesis) will be rejected. But from this statement we cannot ensure that H_0 is accepted. Because there may be chance of type II[7] error. Significance level is also the maximum probability of Type I[8] error.

In our case, we are setting a 10% significance level. So, p value should be less than 0.10 to be called it significant.

3.0 Results & Analysis

In this section, we are analysing the Average Abnormal Return (AAR), obtained from our sample data and then test the significance using the t value and p value. We perform the event study for two major events 'Announcement day' and 'Split day' of each company.

First we test the significance of announcement day itself and the 10 day, 30 day and 90 days' window from the day of announcement. Daily and window basis t-stat value, p value, AAR and CAAR are stated on table 1 and table 2 respectively.

Next, we test the significance of the split day itself and then 10 day, 30 day and 90 days' window from the day of split. Table 3 and Table 4 shows the respective statistical values.

3.1 Effect after announcement day:

Table 1: 10-day daily return with t stat post announcement day (AD)

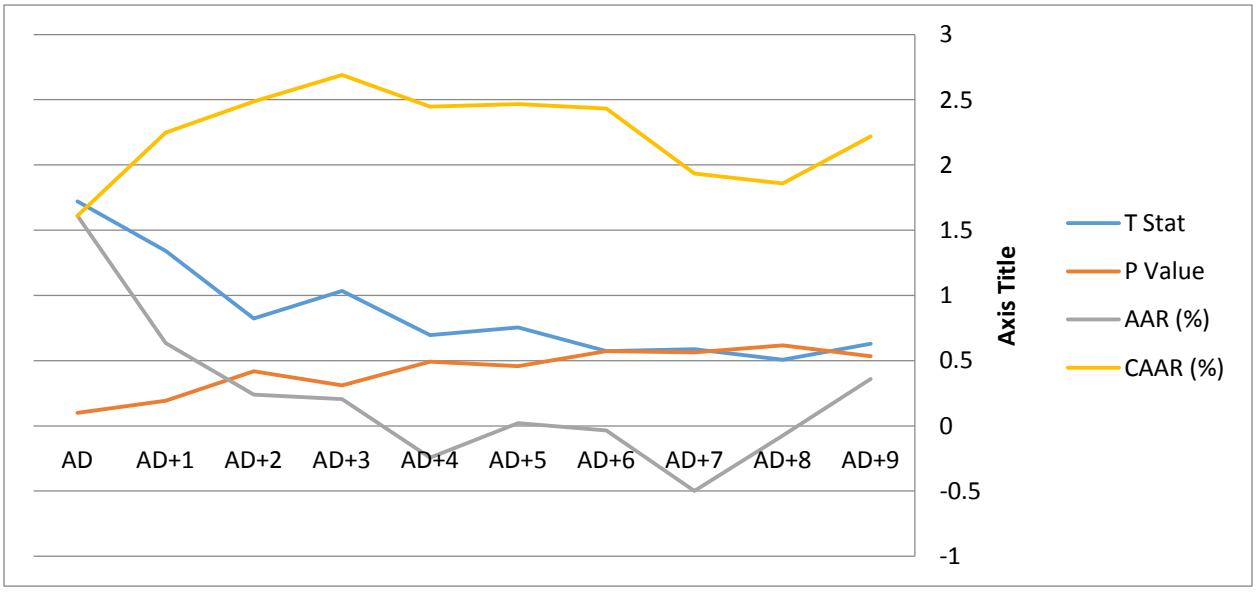
Day	T Stat	P Value	AAR (%)	CAAR (%)	Significant
AD+9	0.630278	0.534725	0.35947	2.218474	No
AD+8	0.507706	0.616494	-0.07411	1.859004	No
AD+7	0.587164	0.562814	-0.49791	1.933116	No
AD+6	0.572552	0.572503	-0.03625	2.431029	No
AD+5	0.753535	0.458773	0.020689	2.467279	No
AD+4	0.696448	0.493127	-0.24435	2.44659	No

[7] Accepting false Null hypothesis: The error occurred when we accept a null hypothesis, which is false
[8] Rejecting true Null hypothesis : The error occurred when we reject a null hypothesis, which is true

AD+3	1.035351	0.311269	0.205454	2.690938	No
AD+2	0.82393	0.418442	0.238276	2.485484	No
AD+1	1.341619	0.192817	0.635544	2.247207	No
AD	**1.721072**	**0.098664**	**1.611663**	**1.611664**	**Yes**

Cumulative Average Abnormal Return of 10-day Post Announcement = 2.218%

Fig 1: Effect after stock split announcement



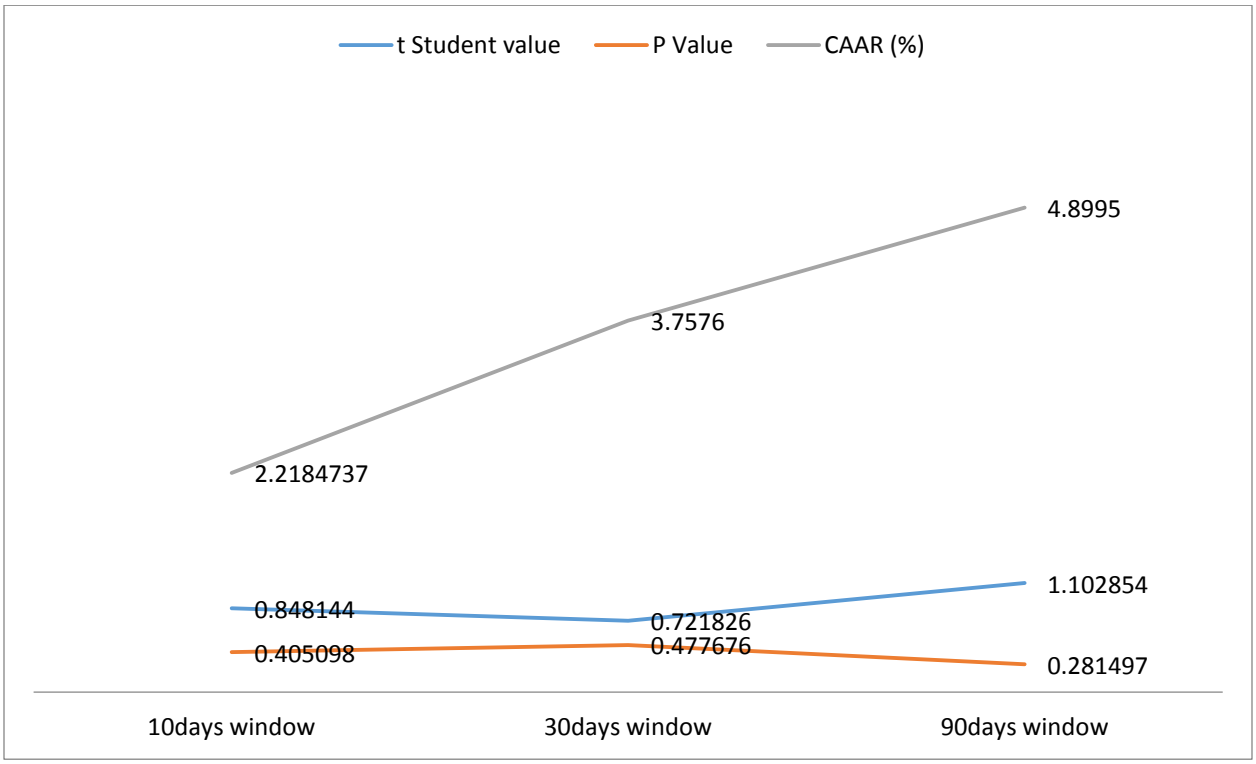
The values of Average Abnormal Returns (AARs) given in table 1 shows that the returns are positive as well as negative from the event day. The abnormal returns are positive on 70% (7 days) times while negative on 30% (3 days) times from the event day. The trend in AAR values of 10 days after the announcement of stock split indicate that it is possible to earn negative returns around the event day. AAR on the event day was 1.611%, but it decreases by next couple of days, although CAAR remains positive. t value and p value are significant on the event day with 10% significance level (i.e. 90% confidence interval). So, the study shows that the significant abnormal return can be earned on the event day only. Alternative hypothesis, H_1 is accepted for the event day hence signaling hypothesis is accepted or true i.e. the positive abnormal return is because splits indicate favourable and positive performance of the firm.

Fig 1 shows the graphical representation of both the significance level and return are showing downward trend and fading away with time.

Table 2: Significance test for 10 day, 30 day and 90 day window from the day of announcement.

Statistical parameter	10-day window	30-day window	90-day window
t Student value	0.84814	0.72183	1.10285
P Value	0.4051	0.47768	0.2815
CAAR (%)	2.21847	3.7576	4.8995
Significance:	**No**	**No**	**No**

Figure 2: Effect after stock split announcement day (different window)



From table 2, it is found that CAAR value remain positive for 10 day, 30 days and 90 days' window and increases from 2.5% to 4.89%. This can be interpreted as signaling hypothesis that investor can earn some return in between the two events announcement day and stock split day due to the market expectation of stock split announcement as favourable information about the future of the firm. These empirical results are coherent with many theoretical models which proposed that the announcement of stock split brings positive information about the future performance of the companies. The cumulative average abnormal return for the (AD to AD+9) period is 2.218%, which confirms the signaling hypothesis. Again, it is observed from t

value and p value that abnormal return for the 10 days, 30 days and 90-day window are not significant. Null hypothesis, H_0 cannot be rejected for these longer windows.

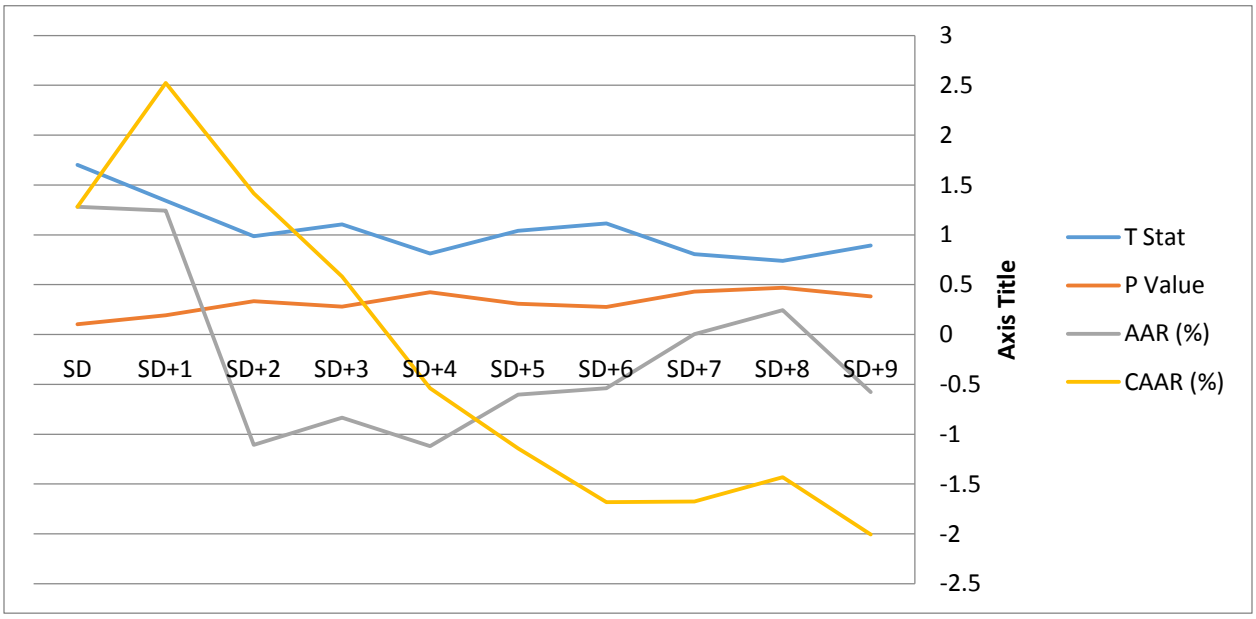
3.2 Effect after Split Day

Observation: Table 3: 10-Day daily return with t-statistics post -split day (SD)

Day	T Stat	P Value	AAR (%)	CAAR (%)	Significant
SD+9	0.891533	0.381875	-0.57621	-2.00716	No
SD+8	0.737511	0.468269	0.245228	-1.43095	No
SD+7	0.804784	0.429185	0.004571	-1.67618	No
SD+6	1.112701	0.277332	-0.5383	-1.68075	No
SD+5	1.038919	0.309641	-0.60327	-1.14245	No
SD+4	0.812545	0.42481	-1.12076	-0.53918	No
SD+3	1.105191	0.280504	-0.83392	0.581588	No
SD+2	0.984482	0.335122	-1.10831	1.415512	No
SD+1	1.3413	0.192919	1.243818	2.523819	No
SD	1.699982	0.10262	1.280002	1.280002	No

Cumulative Average Abnormal Return of 10-day post announcement = -2.007%

Fig 3: Effect after split



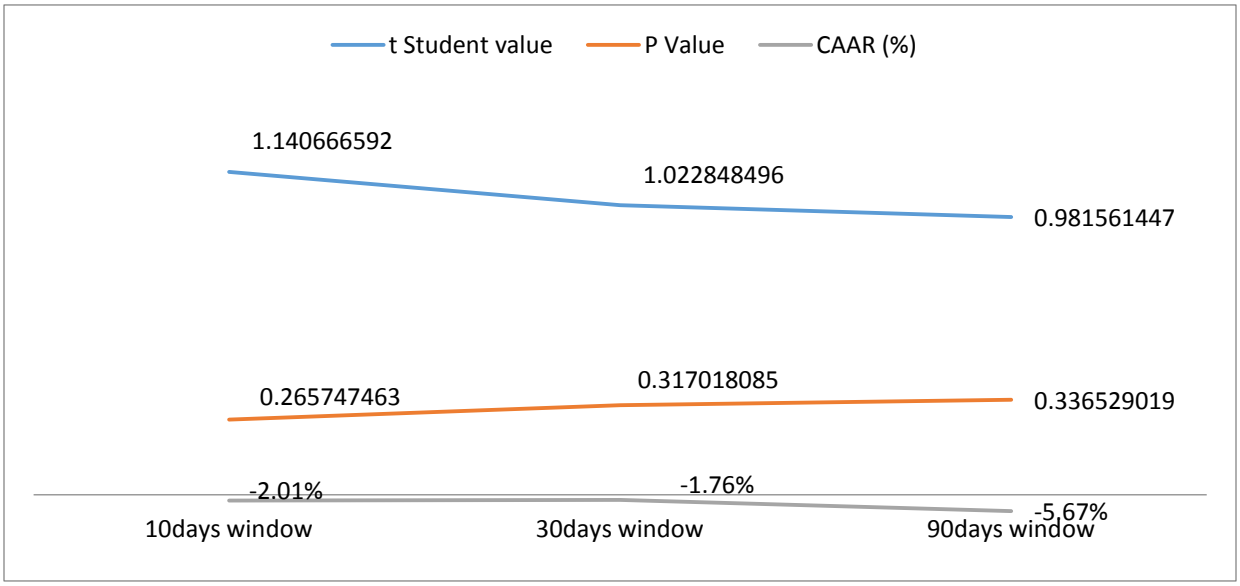
The values of Average Abnormal Returns (AARs) given in table 3 shows that there both positive and negative value of AARs from the split day. These values are positive on 50% (5 days) and 50% (5 days) of total days after the event day. The 10-day AARs after the split indicates that it is possible for a stock to earn negative return around the event day. AAR on the event day was 1.28%, but it decreases by next couple of days, resulting CAAR also become negative. The t-value and p value are not significant on or after the event day for 10% significance level (90% confidence interval). Even though the cumulative returns are negative they are not statistically significant, hence H_0 cannot be rejected and H_1 cannot be accepted due to the same liquidity premium hypothesis cannot be accepted.

Fig.3 shows the graphical representation of the result that both the significance level and returns fade away with time.

Table 4: Significance test for 10-day, 30-day and 90-day window from the day of split

Statistical parameter	10-day window	30-day window	90-day window
t Student value	1.140667	1.022848	0.981561
P Value	0.265747	0.317018	0.336529
CAAR (%)	-2.01%	-1.76%	-5.67%
Significance:	**No**	**No**	**No**

Fig 4: Effect after stock split announcement day (different windows)



From table 4, it is found that CAAR value remains negative for 10-day, 30-day and 90-day window and decreases more by 90 days. This can be interpreted as diminishing liquidity premium. Before split an extra return, premium was available. But as liquidity in that specific

stock increases after the actual split, the liquidity premium vanishes. But it is observed from t value and p value that abnormal returns for the 10-day, 30-day and 90-day window are not significant. Null hypothesis, H_0 cannot be rejected for these longer windows.

4.0 Limitations:

- We have not considered any possible concurrent event which may affect the stock price during the study period. It may weaken abnormal return due to stock split event.
- All stocks are not traded every day. We have observed a few trading days where there is no trade on that specific stock in NSE platform. In those cases, we assume previous day's closing price as that day's closing price.
- The result is dependent on the method of calculation of market return. Different method results different abnormal returns.
- Our research is based on narrow sample compared to total stock split between the period 2010 to 2015.
- In some of the stocks from our sample has a shorter period in between Stock Split announcement and actual stock split day. Hence, in such cases the 90day period window from stock announcement day overlap with the actual split day.

5.0 Conclusions

Our Study focuses on the 23 stock split events in India during the period of year 2010 to 2015 and observes any impact on stock price movement due to these stock splits. The standard event study method is used to investigate the market reaction along with statistical parameters t value, p value and CAAR.

In our study, we notice a significant reaction on the stock price on the split announcement day (AD), whereas it is less significant in case of actual stock split day. The empirical result infers that an Average Abnormal Return (AAR) of 1.61% can be earned on that split announcement day, which is also statistically significant at a significance level of 10% (t value = 1.721, p value = 0.098). Signaling hypothesis can be accepted. But within a few days after the stock split announcement, the effect become ineffective, as we observe that the t value and p value are not significant in 10 day, 30 day and 90 days' window periods. In contrast to announcement event, the empirical results of actual stock splits event do not show any statistical significant on that specific day (SD) or the window period after.

The empirical evidence from our sample concludes that an abnormal return can be earned by a shareholder or a market trader of Nifty 500 companies (goes under stock split) along the stock split announcement event. In Indian context, a few research works can be found where stock split and its impact on stock return is analysed. There is a huge opportunity of further research by extending the research to

a) Industry sector wise analysis taking industry indices as market,

b) Comparative study of the impact of bonus issue & cash dividend announcement,

c) Considering other variables like political, economic events,

d) Analysing the post split impact on Bid-Ask spread and volumes traded on a stock (goes under stock split).

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