

An Empirical Research on Stock Split: Volatility Measure of Stock Price

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Abstract

The study is to test on stock split that means the division of shares into a large number of shares with lower unit value. There is no change in the proportional holding of shares. A stock split has no immediate effect on a stockholder's equity. The prime objective of this paper is to analyze the information impact of the stock split on the BSE 500 of Bombay Stock Exchange. Data collection is based on secondary type, from website www.bseindia.com. The study is based on the stock split which is listed in the NSE and BSE of those companies which are included in the NSE 50 and the BSE 30 companies who splits their shares during the 1st January, 2001 to 30th January, 2015. Analysis of the stock split effect on the price and volume, have to be scrutinized Cumulative Abnormal Return (CAR), Average Abnormal Return (AAR), Mean Cumulative Abnormal Return (MCAR), Mean Average Abnormal Return (MAAR). The last test on whether the investor can make an above normal return by relying on public information impound in stock split. There is no significant trading volume difference on day before stock split but there is huge volume on the split date and after that.

Keywords: BSE 500, Stock Split, Cumulative Abnormal Return (CAR), Average Abnormal Return (ABR), Mean Cumulative Abnormal Return (MCAR), Mean Average Abnormal Return (MAAR). Estimation Windows, R-Square, Alpha, Beta, Expected Return, Abnormal Return.

Introduction

Stock split is the event is directly affects the stock price and the volume in the share market and having a positive or negative impact of it on the market. To check the reaction of the market on the announcement of the stock split starting from the announcement date to the event date and thereafter and also the show the cumulative abnormal return how gets affected by that in the stock market.

Review of Literature

Fama, Fisher, Jensen & Roll (1969) in their Seminal paper in stock split they have examined that the any abnormal returns are generating by the stock around the stock split event and the market give the immediate reaction in the case of any new information and it's also include the stock split announcement.

Robert Conroy and Robert Harris (1999) they find out the 5264 stocks were splits by the 200 firm during the 1925 to 1996 of the NYSE firms. The stock split effects on the earning per share before and after the announcement date of the stock split. And the equity market value of the stocks was also increased during that time period of split date announcement.

Wulff (2002) studied the data of stock split of those companies which are listed on the Frankfurt Stock Exchange and splits their share during the 1994 to 1996 in their study related to the market reaction to the stock splits.

Leledakis & al. (2009) A sample 89 stock splits of companies which were listed in the Athens Stock Exchange and done the stock split during the specified time period and found the positive abnormal return around the stock split date announcement. Conduct the study on 45 Spanish companies that are listed in the Spanish Stock Market Interconnection System from 1997 to 2005. Professional financial analysts were frequently updates their earning during the splits announcement. So the stock splits are considered as the positive signal from the market point of view.

Patrick Dennis & Deon Strickland (1998) they done the research on the “The Effect of Stock Splits on Liquidity: Evidence From Shareholder Ownership Composition” it says that the announcement of splits are associated with the wealth of the shareholder.

Yilmaz, Isil Sevilay & Seza Damosoglu Rahoades (2003) their research on “ An Analysis of Stock Splits in the Istanbul Stock Exchange” examined the hypothesis of the trading range of the Turkish Companies on their splits decisions.

Pantisa Pavabutr & Kulpatra Sirodom (2008) in their paper related to “The Impact of Stock Exchange on Price and Liquidity on The Stock Exchange of Thailand” measures the stock using the daily and intraday data between the time period of 2002 to 2004 of Thailand Stock Exchange with reference to the various aspects of liquidity and their impact on the stock price in the price and liquidity of the stock and Size of the split factor (SF) and post- split trading range are directly associated with the increase in splits adjusted price level and decrease in trade frictions.

Weld et al. (2009) in the U.S. the share prices are decide on the basis of the hallmarks as per the size and the sector in which the company is belonging to. And before the 1929 the U.S. capital market were priced very much high. The executives frown upon the too much price deviation from the other peers and for that they use the stock split option.

Leung et. Al. (2006) the both buying and selling use abnormal insider activity during the information related to stock split announcement. That examines by the author during 1980 to 2000 with reference to the stock split from the

perspective of the insider activity in Hong Kong.

Ikenberry, Rankine and Stice (1996) and Desai and Jain (1997) they reported the positive response from the market after the stock splitting events and its positive effect is shown during the one –year period after the stock split announcements.

Huang, Liano and Pan (2005) the year in which the stock split was announced having a highest change in operating performance and that takes continuous four subsequent years too decline the operating changes. There is a negative relationship between effect of the announcement of the stock split and the operating performance after the announcement of the stock split during the continuous four – year period.

((Lakonishok & Lev, 1987); (McNichols & Dravid, 1990 Stock)) Split: Reasons and valuations Effects, Trading Range Hypothesis:))According to that every stock has their own popular trading range in the stock market. Intention behind the stock splits was to bring down the prices of stocks as such level so that the small investor can afford the shares and buy that.

Stock Split: Reasons and valuations Effects, Signaling Hypothesis:(Asquith, Healy, & Palepu, 1989), (Ikenberry, Rankine, & Stice, 1996) provide the evidence of the company's growth in the near future by the splitting up the shares and that signal having the impact on the stock prices. (Fama, Fisher, Jensen, & Roll, 1969), (Lakonishok & Lev, 1987) suggest that the stock split announcement is associated with the abnormal return and that gives the financial signals of the higher dividend paid by the company in the future.

Stock Split: Reasons and valuations Effects, Multiple Event Hypothesis: (D'Mello et al., 2003). Generally it is shown that the firm issuing the equity shares after the splitting up the shares and that event reveal the positive information in the market and due to that the share prices will be at higher prices and that will impact positively for the firm to raise the more funds from the market

Research Methodology

Objective of Study: The aim of this study is to examine four important aspects related to the stock split event:

1. To analysis volatility of stock split and its impact on stock return.
2. To identify implied volatility of stock split.
3. To investigate the ex date abnormal return.
4. To estimate stock return with before stock split and after stock split.

Hypothesis:

H0 (Null Hypothesis): There is no significant difference in

the abnormal returns and abnormal value of the listed stock in BSE and NSE before and after the stock split.

H1 (Alternative Hypothesis): There is a significant difference in the abnormal returns and abnormal value of the listed stock in BSE and NSE before and after the stock split.

Period of Study:

The study consist of the BSE 30 companies and NSE 50 companies which were done the stock spilt during the 1st January, 2001 to 30th January, 2015 during which the 25 companies stocks where splits. And 2 companies first one Sun Pharmaceuticals Industries Limited and second Jindal Steel and Power Ltd have done the stock spilt for two times. During these time period in the year 2011 the maximum stock

spilt were occurred i.e. 5 different companies were done the stock split.

Sample Design:

Sample Size: For the purpose of study of the Stock Splits: Reasons and Valuation Effects 25 samples are selected from the NSE and the BSE which are splits during the specific time period.

Sample Technique: The study is based on the stock split which is listed in the NSE and BSE of those companies which are included in the NSE 50 and the BSE 30 companies who splits their shares during the 1st January, 2001 to 30th January, 2015.

Window Table:

No.	Time Period	Window
1	30 days before Split date to 1 day before Split date	ED-30 to ED-1
2	10 days before Split date to 1 day before Split date	ED-10 to ED-1
3	The Split date	ED
4	1 day after Split date to 10 days after split date	ED+1 to ED+10
5	1 day after Split date to 30 days after split date	ED+1 to ED+30

Data Collection Method:

For the research purpose I choose the secondary data which are already available on the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE) about the stock split from the 1st January, 2001 to 31st January, 2015.

Tools and Techniques for the Data Analysis

Beta: The risk is inherent to the entire market or an entire market segment. Systematic risk, also known as “undiversifiable risk,” “volatility” or “market risk,”.

$$\beta = \frac{n\sum xy - (\sum x)(\sum y)}{n\sum x^2 - (\sum x)^2}$$

Alpha: The intercept of the characteristics regression line is alpha i.e. the distance between the intersection and horizontal axis. It indicates that the stock return is independent of the market return. A positive value of alpha is a healthy sign.

Regression: A statistical measure that attempts to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables).

$$\hat{y} = b_0 + b_1 . x$$

Cumulative Return: The aggregate amount that an investment has gained or lost over time, independent of the period of time involved. Presented as a percentage, the cumulative return is the raw mathematical return of the following calculation:

$$\frac{(\text{Current Price of Security}) - (\text{Original Price of Security})}{(\text{Original Price of Security})}$$

Abnormal return will generate An abnormal return is the difference between the actual return of a security and the expected return.

$$\text{Abnormal Return} = \text{Actual Return} - \text{Expected Return}$$

BSE				
Sr. No.	Script Name	Split Date	FV Before	FV After
1	STATE BANK OF INDIA	20-Nov-14	10	1
2	CIPLA LTD	11-May-04	10	2
3	SUN PHARMACEUTICALS INDUSTRIES LTD.	25-Nov-10	5	1
		13-Jan-03	10	5
4	MAHINDRA AND MAHINDRA LTD.	29-Mar-10	10	5
5	AXIS BANK	28-Jul-14	10	2
6	BHARAT HEAVY ELECTRICALS LTD(BHEL)	3-Oct-11	10	2
7	HOUSING DEVELOPMENT FINANCE CORPORATION LTD	18-Aug-10	10	2
8	ICICI BANK	4-Dec-14	10	2
9	ITC LTD	21-Sep-05	10	1
10	ONGC	8-Feb-11	10	5
11	HDFC BANK	14-Jul-11	10	2
12	TATA MOTORS LTD	12-Sep-11	10	2
13	BHARTI AIRTEL LTD.	24-Jul-09	10	5
14	HINDALCO INDUSTRIES LTD	30-Aug-05	10	1
15	DR REDDYS LABORATORIES LTD	10-Oct-01	10	5
16	HERO MOTOCROP LTD	12-Mar-01	10	2
17	SESA STERLITE LTD	8-Aug-08	10	1
18	TATA POWER COMPNAY LTD	26-Sep-11	10	1

NSE-50 and selected 24 companies for our research. The following data represent the brief overview of companies and their split details.

NSE				
No.	Script Name	Split Date	FV Before	FV After
1	JINDAL STEEL AND POWER LTD	21-Jan-08	5	1
		22-Dec-03	10	5
2	SESA STERLITE LTD	8-Aug-08	10	1

3	HINDALCO INDUSTRIES LTD	30-Aug-05	10	1
4	MAHINDRA & MAHINDRA LTD	29-Mar-10	10	5
5	ASIAN PAINTS LTD	30-Jul-13	10	1
6	HOUSING DEVELOPMENT FINANCE CORPORATION LTD	18-Aug-10	10	2
7	BHARTI AIRTEL	24-Jul-09	10	5
8	DR REDDYS LABORATORIES LTD	10-Oct-01	10	5
9	HERO MOTOCROP LTD	12-Mar-01	10	2
10	NMDC LTD	10-Apr-08	10	1
11	CIPLA LTD	11-May-04	10	2
12	LUPIN LTD	27-Aug-10	10	2
13	SUN PHARMACEUTICALS INDUSTRIES LIMITED	25-Nov-10	5	1
		13-Jan-03	10	5
14	ONGC	8-Feb-11	10	5
15	BHEL	3-Oct-11	10	2
16	HDFC BANK LTD	14-Jul-11	10	2
17	AXIS BANK LTD	28-Jul-14	10	2
18	ITC LTD	21-Sep-05	10	1
19	TATA MOTORS LTD	12-Sep-11	10	2
20	STATE BANK OF INDIA	20-Nov-14	10	1
21	ICICI BANK	4-Dec-14	10	2
22	AMBUJA CEMENTS LTD	20-Jun-05	10	2
23	PUNJAB NATIONAL BANK	18-Dec-14	10	2
24	BANK OF BARODA	22-Jan-15	10	2

Stock prices on the specific day as per the above given window table:

Sr. No.	Company	ED-30	ED-10	ED	ED+10	ED+30
1	STATE BANK OF INDIA	2442.35	2782.25	297.10	320.25	315.25
2	CIPLA LTD	1137.20	1344.40	255.70	251.20	197.25
3	SUN PHARMACEUTICALS INDUSTRIES LTD.	2103.85	2324.25	456.25	447.55	492.15
		565.05	599.60	294.95	283.40	283.75
4	MAHINDRA AND MAHINDRA LTD.	956.90	1136.85	553.35	508.40	546.30
5	AXIS BANK	1772.25	1846.70	395.70	381.60	418.30

6	BHARAT HEAVY ELECTRICALS LTD(BHEL)	1764.95	1657.35	321.25	321.75	275.95
7	HOUSING DEVELOPMENT FINANCE CORPORATION LTD	2906.45	3058.15	621.20	622.50	730.00
8	ICICI BANK	1537.00	1689.10	361.85	345.20	353.90
9	ITC LTD	1724.35	1830.25	140.15	131.50	125.80
10	ONGC	1300.10	1138.70	281.80	272.45	272.55
11	HDFC BANK	2358.95	2502.60	505.90	487.60	438.70
12	TATA MOTORS LTD	956.80	714.05	146.40	147.00	191.75
13	BHARTI AIRTEL LTD.	830.45	782.30	415.50	383.80	406.25
14	HINDALCO INDUSTRIES LTD	1239.45	1424.10	141.85	150.35	137.00
15	DR REDDY'S LABORATORIES LTD	1849.20	1801.95	917.65	1079.65	956.05
16	HERO MOTOCROP LTD	872.05	716.25	160.45	145.35	121.80
17	SESA STERLITE LTD	3417.00	3101.45	175.65	153.90	127.25
18	TATA POWER COMPANY LTD	1296.25	1045.96	992.35	97.20	100.10
19	JINDAL STEEL AND POWER LTD	15137.10	16094.80	2114.90	2283.70	2138.20
		846.40	912.90	529.05	630.35	563.40
20	ASIAN PAINTS LTD	4578.90	4833.70	510.25	434.30	442.10
21	NMDC LTD	9995.00	9564.35	1413.40	1342.55	428.20
22	LUPIN LTD	1874.65	1832.10	372.50	374.50	413.25
23	AMBUJA CEMENTS LTD	442.25	446.50	59.30	60.65	67.20
24	PUNJAB NATIONAL BANK	949.20	1094.90	225.95	219.45	192.00
25	BANK OF BARODA	1072.00	1077.80	223.90	175.85	180.15

BSE-30 companies as per the above given window table:

BSE						
Sr. No.	Script Name	ED-30 to ED-1	ED-10 to ED-1	ED	ED+1 to ED+10	ED+1 to ED+30
1	STATE BANK OF INDIA	-28.4221	-10.9998	-1.01869	-9.49391	-36.1699
2	CIPLA LTD	-28.9648	-22.0962	-8.2184	-16.4094	-51.2811
3	SUN PHARMACEUTICALS INDUSTRIES LTD.	-34.054	-18.9911	-1.9112	-10.2777	-26.9735
		-17.5828	-10.3153	-2.47778	-12.4888	-27.245
4	MAHINDRA AND MAHINDRA LTD.	-31.2616	-10.0672	-1.08689	-8.41041	-21.4668
5	AXIS BANK	-31.499	-2.03942	-2.77491	-14.7691	-30.7933
6	BHARAT HEAVY ELECTRICALS LTD(BHEL)	-52.0306	-21.0793	-4.96498	-9.34945	-45.6078
7	HOUSING DEVELOPMENT FINANCE CORPORATION LTD	-24.6661	-6.75669	-2.1517	-6.87943	-33.4602
8	ICICI BANK	-26.6632	-10.2433	-0.75887	-16.5691	-36.2836
9	ITC LTD	-37.5806	-7.70647	-1.82242	-12.8068	-52.6817
10	ONGC	-51.9787	-19.8893	-3.43744	-7.31848	-31.6271
11	HDFC BANK	-40.5199	-13.6994	-1.30575	-14.3528	-46.6657
12	TATA MOTORS LTD	-54.0609	1.67002	-7.31632	-16.873	-12.9113
13	BHARTI AIRTEL LTD.	-27.7335	-4.56767	-0.48606	-9.75931	-26.4765
14	HINDALCO INDUSTRIES LTD	-38.5836	-10.4621	-2.08194	-15.1365	-39.801
15	DR REDDYS LABORATORIES LTD	-12.381	-10.0452	-2.70671	-9.7913	-27.7763
16	HERO MOTOCROP LTD	-60.1495	-26.0281	-4.80042	-19.6735	-52.8726
17	SESA STERLITE LTD	-56.0106	-18.3238	-1.77678	-23.3226	-67.3976
18	TATA POWER COMPNAY LTD	-62.1021	-13.4473	-4.1014	-20.2781	-46.9436

Cumulative return of the stock split of the NSE-50 companies as per the above given window table:

NSE						
Sr. No.	Script Name	ED-30 to ED-1	ED-10 to ED-1	ED	ED+1 to ED+10	ED+1 to ED+30
1	STATE BANK OF INDIA	-29.5863	-10.9715	-0.92496	-9.67564	-35.0994
2	CIPLA LTD	-29.0184	-21.1513	-6.86135	-17.3874	-52.5847
3	SUN PHARMACEUTICALS INDUSTRIES LTD.	-34.6576	-21.4813	-2.85609	-10.4223	-25.425
		-20.7696	-9.45578	-1.36578	-11.1252	-25.1702
4	MAHINDRA AND MAHINDRA LTD.	-13.1767	-4.82614	-0.36563	-7.51626	-26.7673
5	AXIS BANK	-32.469	-1.79723	-2.88088	-14.5606	-29.7174
6	BHARAT HEAVY ELECTRICALS LTD(BHEL)	-51.7731	-20.9955	-5.12912	-8.83807	-45.7011
7	HOUSING DEVELOPMENT FINANCE CORPORATION LTD	-24.3074	-6.49051	-2.25496	-6.94155	-33.7156
8	ICICI BANK	-25.6083	-10.0439	-0.852	-17.9604	-37.2454
9	ITC LTD	-36.1929	-7.57263	-2.18623	-11.8882	-53.7056
10	ONGC	-52.7856	-20.4593	-3.65506	-7.24419	-30.6026
11	HDFC BANK	-41.696	-13.9511	-1.3307	-14.3566	-45.4647
12	TATA MOTORS LTD	-55.325	1.692469	-7.59661	-15.4449	-11.3675
13	BHARTI AIRTEL LTD.	-28.0634	-4.60851	-0.48949	-9.89036	-26.1462
14	HINDALCO INDUSTRIES LTD	-39.3797	-12.2567	-1.59079	-13.9004	-39.4715
15	DR REDDYS LABORATORIES LTD	-13.1024	-9.66248	-2.28636	-9.83016	-27.4753
16	HERO MOTOCROP LTD	-50.3161	-24.1465	-8.33583	-16.6212	-41.8923
17	SESA STERLITE LTD	-55.6458	-18.3425	-1.91286	-23.6719	-67.6262
18	TATA POWER COMPNAY LTD	-62.3373	-13.6091	-4.12622	-19.7119	-46.6836
19	JINDAL STEEL AND POWER LTD.	-28.1168	-33.5538	-26.3746	10.74815	-27.9499
		-4.94759	0.846683	-0.02832	0.670958	-11.0573
20	ASIAN PAINTS LTD.	-45.7661	-21.0542	-3.84021	-15.4835	-41.7536
21	NMDC LTD	-70.8612	-23.0031	-2.4404	-14.4015	-60.6383
22	LUPIN LTD	-52.9569	-15.4704	-7.27404	6.095991	-7.87272
23	AMBUJA CEMENTS LTD	-32.3901	-10.2864	-1.84757	-12.7259	-35.739
24	PANJAB NATIONAL BANKS	-31.1743	-3.83188	-3.34965	-15.8167	-46.1727
25	BANK OF BARODA	-43.3907	-8.31484	-1.23178	-17.2626	-48.2306

T-Test: Two - Sample Assuming Equal Variances of the BSE-30

Particular	Pre-Split		Post-Split	
	ED-30 to ED-1	ED-10 to ED-1	ED+1 to ED+30	ED+1 to ED+10
Mean	-37.69708	-12.3730	-37.60182	-13.36629
Variance	211.81964	52.1497	177.07550	21.96289
Observations	19	19	19	19
Df	36		36	
t Stat	-6.79411		-7.48791	
P(T<=t) one-tail	3.06178		3.80006	
t Critical one-tail	1.68829		1.68829	
P(T<=t) two-tail	6.12356		7.60012	
t Critical two-tail	2.02809		2.02809	

The output contains the observed t value for Pre - Split (-6.79411) and Post - Split (-7.48791) minus and the p-value and the critical table t value plus for both a one-tailed and a two-tailed test. Since this test is two-tailed the p-value of 6.12356 for the Pre – Split and the 7.60012 for the Post – Split is used to compare to $\alpha=0.05$. the table value of $t=2.0281$ for

both Pre – Split and Post – Split in a two-tailed test, which allows one to verify that the statistical conclusion is to fail to accept the null hypothesis because the observed t value is -6.79411 in Pre – Split and the -7.48791 in the Post - Split, which is greater than the 2.02809.

Particular	Pre-Split		Post-Split	
	ED-30 to ED-1	ED-10 to ED-1	ED+1 to ED+30	ED +1 to ED+10
Mean	-37.25238	-12.77027585	-36.34354	-11.30231
Variance	253.64172	72.95045744	210.33143	56.09161
Observations	27	27	27	27
Df	52		52	
t Stat	-7.03927		-7.97171	
P(T<=t) one-tail	2.14198		7.05559	
t Critical one-tail	1.67468		1.67469	
P(T<=t) two-tail	4.28396		1.41112	
t Critical two-tail	2.00664		2.00665	

The output contains the observed t value for Pre - Split (-7.03927) and Post - Split (-7.97171) minus and the p-value and the critical table t value plus for both a one-tailed and a two-tailed test. Since this test is two-tailed the p-value of 4.28396 for the Pre – Split and the 1.41112 for the Post – Split is used to compare to $\alpha=0.05$. the table value of $t=2.00664$ for both Pre – Split and Post – Split in a two-tailed test, which allows one to verify that the statistical conclusion is to fail to accept the null hypothesis because the observed t value is -7.03927 in Pre – Split and the -7.97171 in the Post - Split, which is greater than the 2.00664.

Findings:

Over the years relationship between stock splits & stock prices has been the subject of much empirical discussion within the finance literature. Stock splits date is known well in advance and therefore should contain no new information. As such, one would not expect any significant price reaction on stock splits announcement. Evidence here suggests signs of insider trading activity up thirty days prior to the stock split. There is a significant volume difference between the day before and after the stock split. But the direction of change (increase or decrease) varied between companies. In aggregate, there is a significant trading volume difference between a day before stock split and after that, with a negative direction of change (a decrease in volume). There is no significant trading volume difference on day before stock split but there is huge volume on the split date and after that.

Reference:

- Saraswathi Thirunellai, (2014), Stock Splits: Reasons and valuations effects available on:
http://www.nseindia.com/research/content/RP_12_Jan2014.pdf
- Mark S. Grinblatt, Ronald W. Masulis and Sheridam Titman (July 1984), “The Valuation Effects of Stock Splits and Stock Dividends”, *Journal of Financial Economics* 13 (1984) 461-490. Available from:
http://164.67.163.139/Documents/areas/fac/finance/valuation_splits.pdf
- Mathias Kronlund,(July 22, 2012), “The Market Reaction to Stock Announcements: Earning Information After All”, Available from:
<https://www0.gsb.columbia.edu/mygsb/faculty/research/pubs/files/5520/stockplits.pdf>
- Nehal Josphipura, “Market Reactions to Stock Splits in Large and Liquid Stocks: Evidence from the Indian Stock Market”, Available from:
<http://www.nmims.edu/NMIMSmanagementreview/pdf/Oct-Nov-13-Jan-14/Market-Reaction-Stock-Splits-Large-Liquid-Stocks.pdf>