

IMPACT OF STOCK SPLIT ON SHORT-TERM LIQUIDITY OF STOCKS IN EX-SPLIT PERIOD: EVIDENCE FROM INDIAN STOCK MARKET

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ABSTRACT

In contrast to theoretical explanation that no direct consequence either from the view point of the splitting firm or its shareholders, stock markets have found to react optimistically worldwide on announcement and execution of splits. In order to justify such observed market reaction various explanations have emerged over time in the literature of finance among which the major and widely-accepted explanations are the information signaling and trading range or liquidity hypothesis. The advocates of liquidity hypothesis states that firms splits their stocks to realign their stock prices which have increased substantially to a lower and more favourable trading range to make the stocks attractive and affordable to small and wealth-constrained investors and hence to enhance liquidity of their stocks. But, as empirical evidence is mixed on liquidity effect of split with documented improvement as well as reduction or no change in post-split liquidity both in the context of stock markets of different countries abroad and in the context of Indian stock market, present study has made a modest attempt to examine the validity of liquidity hypotheses of stock split in Indian stock market by analysing changes in trading volume and number of trades following ex-split day using daily data for one month before and after the split for a sample of splits occurred during more than seventeen years in Indian stock market. Empirical findings of the study demonstrate that split leads to improvements in post-split liquidity in the month following split lending support to the most of the earlier studies conducted in Indian context and indirectly imply that splits make the stocks more attractive to small and retail investors in the market.

KEYWORDS: *Stock Split, Liquidity Hypothesis, Trading Volume, Split Ex-day.*

Introduction

Theoretically stock split is not associated with any direct consequence either from the view point of the splitting firm or from the view point of the shareholders of the splitting firm. A split though increases the number of outstanding shares and decreases the par value of each share proportionately with the split factor; total share capital and capital structure of the firm, value of share-holdings of shareholders and their proportionate ownership in the firm remain unaltered after the split. Still, it has been observed and documented in a large number of studies that stock markets react optimistically worldwide on and surrounding announcement and execution of splits. In order to justify such observed market reaction various explanations have emerged over time in the literature of finance among which the major and widely-

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accepted explanations are the information signaling [proposed by Fama, Fisher, Jensen and Roll (1969)] and trading range or liquidity hypothesis [proposed by Copeland (1979)] along with others like, change in underlying characteristics of return distribution (i.e., return volatility), change in ownership composition, attention getting device, optimal tick-size, bid-ask spread and transaction cost, tax-option value of stock, etc.

The signalling hypothesis states that by splitting their stocks, firms try to convey favourable private information about stability of past performances and superior future performances of the firms. On the other hand, advocates of liquidity hypothesis of stock split believe that firms often undertake splits to realign their stock prices which have increased substantially and significantly to a lower and more favourable trading range that are comparable with other similar firms in the industry and market averages to make the stocks attractive and affordable to small and wealth-constrained investors, which in turn helps to increase the number of investors, trading volume and hence liquidity of the stock. Again, signalling and liquidity hypotheses are interrelated. If the firms possess any unfavourable information about their firms, they are most likely to not going for split even when the stock prices are too high because they anticipate that the stock prices will return to the normal range anyway when the unfavourable information is disseminated in the market. Similarly, if the firms do not have any explicit desire to signal and undertake split only to bring down the stock prices to a lower and better trading range, the rational investors are most likely to interpret the split as the signalling of favourable information about the firms.

As, in case of our country, stock split has a history of mere two decades where it was introduced in the year 1999, the number of existing studies on the split in Indian context is also not plenty and most of such studies have examined market reaction associated with announcement or/and execution of stock splits. Again empirical evidence on liquidity effect of split is mixed with some studies showing improvement in post-split liquidity while some others showing reduction or no change in liquidity following split. Moreover, impact of any price-sensitive corporate event may not be identical in different markets and different time period. For all these, in the present study, a modest attempt has been made to examine the validity of liquidity hypotheses of stock split in Indian stock market by analysing changes in liquidity following ex-split day using daily data for one month before and after the split.

Review of Existing Literature on Liquidity Effect of Stock Split

Empirical studies examining liquidity effect of stock split conducted in the context of various stock markets abroad as well as in context of Indian stock market have documented mixed evidence. The majority of the studies on liquidity effect of stock split undertaken abroad have observed that liquidity of stocks has improved in post-split period [Ohlson and Penman (1985), Amihud and Mendelson (1986), Dravid (1987), Lakonishok and Lev (1987), Lamoureux and Poon (1987), Conroy et al. (1990), McNichols and Dravid (1990), Dubofsky (1991), Maloney and Mulherin (1992), Ikenberry et al. (1996), Muscarella and Vetsuypens (1996), Angel (1997), Mukherji et al. (1997), Desai et al. (1998), Schultz (2000), Dennis and Strickland (2003), Reboredo (2003) and many others] while some others have documented adverse or no effect of split on liquidity of stocks [Copeland (1979), Murray (1985), Defeo and Jain (1989), Dravid (1989), Conroy et al. (1990), Gray (1990), Arnold and Lipson (1997), Gray et al. (1999), Lipson (1999), Easley et al. (2001), Goyenko et al. (2005), etc.]. The empirical evidence on liquidity effect of stock split is also mixed for our country with majority of studies documenting improvement of liquidity in post-split period [Lukose PJ and Rao (2002), Dash and Gouda (2007), Gupta and Gupta (2007), Mishra (2007), Pavabutr and Sirodom (2008), Joshipura (2009), Alex et al. (2011), Ray (2011), Chakraborty (2012), Pooja (2013), Thirunellai (2014), etc.] while some others reporting reduction or no change in liquidity following splits [Choudhary and Chaudhary (2009), Joshipura (2013), Rajesh (2013), etc.].

Trading range or liquidity hypothesis is also supported by survey-based studies both from India [Mehta et al. (2011)] and abroad [Dolley (1933), Baker and Gallagher (1980), Baker and Powell (1993), Baker et al. (1995), Schultz (1997), etc.]. The survey evidences on managers' motives behind splits reveal that a vast majority of respondents regard stock split as a useful tool to lower stock prices, broaden the ownership base and improve marketability and liquidity of stocks by making the stocks attractive to small and retail investors.

Objectives of the Study

The present study has been undertaken to investigate empirically the impact of stock split on short-term liquidity of stock. More specifically, the objectives of the present study are:

- To examine changes in daily trading volume of sample stocks in the post-split period; and
- To examine changes in daily number of trades of sample stocks in the post-split period.

Data Base and Methodology

Initially, all the 1106 splits executed by BSE listed companies during the period from introduction of split in Indian stock market (i.e., 14th June, 1999) to 31st March, 2017 have been identified from 'Capitaline' and 'Prowess' database packages. Thereafter, the firms which announced any other price-sensitive corporate events, like, earnings announcement, dividend announcement, announcement of bonus issue, right issue, buy back of shares, merger, acquisition, etc. within one month before and one month after the ex-split date, for which daily data on trading volume and number of trades for one month before and after split were not available and for which ex-split date could not be identified have been excluded from the initially identified firms which reduced the number of split to 572 representing 26 broad industries of the economy. A sample of 30 splits (as it is considered as a large sample in statistical sense and its sampling distribution of sample mean approximately follows normal distribution [Stutely (2003); Saunders et al., (2011)]) has been chosen thereafter from 572 splits by selecting one split from each industry and remaining 4 from the rest using simple random sampling without replacement method of sampling to make the sample representative of all the industries of the economy. All the required data for the sample firms like, ex-split date (the date on and from which split becomes effective and splitted stock is traded on split-adjusted reduced prices), daily data on trading volume and number of trades have been collected primarily from 'Capitaline' and 'Prowess' database packages.

Liquidity means the ease of converting any asset into cash at minimal loss. There are a number of parameters for measuring liquidity of stocks like, number of shareholders, trading volume, number of trades, average volume per trade, bid-ask spread, time required to transact, depth, breadth and resiliency, transaction cost, etc. among which the most important determinant of liquidity of stocks in the secondary market is the number of shareholders. Again, a number of empirical studies [Demsetz (1968), Copeland (1979), Lamoureux and Poon (1987), etc.] have documented that the number of transactions/trades per unit of time and traded volume (i.e., the number of shares transacted) are positively correlated with the number of shareholders. Besides, a large number of empirical studies conducted in the context of stock markets abroad [Copeland (1979), Lakonishok and Lev (1987), Desai et al. (1998), Liu (2000), Elfakhani and Lung (2003), Elliott and Warr (2003), Jog and Zhu (2004), Leung et al. (2005), etc. to name a few] as well as almost all the studies in India have used trading volume or/and number of trades or their variants like, average volume per trade, market volume ratio, relative volume, etc. as the measures of liquidity.

For these reasons, two measures of liquidity namely, trading volume and number of trades have been considered for the study to analyse liquidity effect of stock split. In order to examine the short-term liquidity effect of split, the behavior of trading volumes and number of trades for 30 trading days following the split execution date has been compared with those for 30 days preceding the split execution date. For that purpose, trading volume of the first trading day (day +1) in the post-split period (i.e., on execution day) has been matched with trading volume of the last day in the pre-split period (day -1), trading volume of day immediately following the day +1 (day +2) has been matched with that of the day immediately preceding the day -1 (day-2) and trading volumes of all other days in the post-split period until day +30 have been matched with those of pre-split period in similar manner. For the measure number of trades, the similar procedures have been followed. Thus, for the purpose of comparison, 30 pairs of observations have been considered for each of the liquidity measures. As the number of outstanding shares increase proportionately with the split factor (i.e., number of shares outstanding after the split/number of shares outstanding before the split) in the post-split period, the post-split trading volumes have been adjusted by dividing the daily trading volumes by the respective split factors to make the pre and post-split trading volume comparable.

Statistical significance of differences between the pre-split and post-split liquidity measures have been tested by performing paired-t tests. But, as we have observed from the results of Kolmogorov-Smirnov tests that distributions of trading volumes as well as number of trades deviate significantly from normality (results are not reported here), we have also applied a non-parametric Wilcoxon signed-rank test to arrive at conclusive inference on the liquidity effect associated with stock split. While applying the matched pair tests, change has been defined as the post-split minus pre-split for each measure and hence a positive change implies increase in post-split period and negative change indicates the opposite.

Analysis and Discussion

The results of paired-t test for differences between the pre-split and post-split trading volumes for each sample firm taking 30 trading days from each period are presented in Table-1 which shows the values of test statistic along with other descriptive statistics of the variables concerned. From Table-1 it is observed that out of the total 30 sample firms, difference between pre and post-split trading volumes are statistically significant for 25 (83.33%) firms. Among the 25 significant differences, 19 (63.33%) differences are positive implying that trading volumes of shares of 63.33% of the splitted firms have increased significantly while those have decreased for 5 (16.67%) firms in the post split period. No significant difference is observed for 6 (20%) firms which indicates that there is no effect of split on trading volume and hence on liquidity for those splitted stocks. Thus, the results document that for majority of the sample firms liquidity of shares as measured by trading volume of shares has enhanced significantly after the splits and it has worsen or remained unchanged only for 16.67% and 20% of the sample firms respectively. But, as the distribution of daily trading volume deviates significantly from the properties of normal distribution, we have verified the significance of observed differences by employing non-parametric Wilcoxon signed-rank test, the results of which are summarised in Table-2. It is evident from Table-2 that the results of non-parametric test are in agreement with the parametric test in all major aspects. Daily trading volume of shares has increased significantly in the post-split period for 17 (56.67%) sample firms which are slightly (only 2) less than that found by parametric test. It is also evident that almost all the sample firms for which significant improvements in trading volumes have been observed, have very high proportion of positive differences in the 30 pairs of comparison. The average trading volumes have decreased significantly for 5 (16.67%) firms (also found the same by the previous test) while remained unchanged for 8 (26.67%) firms (only 2 more than that found in previous test). Thus, there exist a favourable impact of stock split on trading volume of shares and hence on liquidity of stock in short-term period of 30 trading days following ex-split date.

Table 3 presents the results of paired-t test concerning changes in number of trades in the post-split period compared to pre-split period of 30 trading days for each of the sample firms from which it is observed that the number of trades has increased significantly in the post-split period for 19 (63.33%) sample firms rejecting the null hypothesis of equal mean number of trades in pre and post-split periods at high level of significances (barring a few, all are significant at 1% level). Among the 30 sample firms, number of trades has decreased for 4 firms in the post-split month which constituting only 13.33% of the total sample firms. For 7 (23.33%) sample firms, however, no significant change in the number of trades in the post-split month has been observed indicating that there is no influence, either favourable or adverse, of stock split on trading frequency of these spitted stocks in the post-split month. Thus, like trading volume, the number of trades on the spitted shares has also increased significantly for majority of the sample firms providing additional support for short-term improvement in liquidity of shares in the post-split month. Like daily trading volume, the Kolmogorov-Smirnov test rejects the normality of daily number of trades series and hence we have conducted Wilcoxon signed-rank test additionally to verify the significance of observed behavior of number of trades around the ex-split date, the results of which are presented in Table-4. From Table-4, it is seen that the non-parametric Wilcoxon signed-rank test, like parametric test, also strongly documents significant increase in number of trades after the splits for majority of the spitted firms. The number of trades has increased significantly for 60% (18) of the sample firms in the post-split period of 30 days compared to matched 30 days in the pre-split period. The number of trades has declined after the splits for only 4 firms constituting only 13.33% of total sample firms while for 8 (26.67%) sample firms no significant change between the pre-split and post-split number of trades has been observed. Thus, regarding changes in number of trades following splits, the findings demonstrate that splits lead to significant increase in daily number of trades of the spitted firms after the splits.

Conclusion

Empirical findings of the study document that for majority of sample firms stock split leads to improvements in post-split liquidity in the month following split as measured by most commonly used measures of liquidity, namely daily trading volume and daily number of trades. The findings, thus, lend support to the well-documented liquidity hypothesis of stock split in Indian context as well as to the findings of most of the earlier studies conducted in the context of stock market of our country. The observed increased number of trades for the spitted stocks in the post-split period also indirectly indicates that splits make the stocks more attractive to small and retail investors who generally trade in a small quantities compared to institutional investors.

Table 1: Results of Paired-t Test for Short-Term Changes in Trading Volume following Splits

Sample Firm	Post-split Average Trading Volume	Pre-split Average Trading Volume	Mean of Paired Differences	Standard Error of Mean of Paired Differences	Degrees of Freedom	t-statistic
1	77575.13	117470.80	-39895.70	11820.15	29	-3.375*
2	148521.80	71121.33	77400.43	18871.39	29	4.101*
3	158475.2	74163.37	84311.83	44688.72	29	1.887***
4	387776.60	452470.70	-64694.10	48042.84	29	-1.347
5	17295.64	9231	8064.64	3524.08	29	2.288**
6	742.51	232.50	510.01	136.37	29	3.740*
7	205892.70	277181.20	-71288.50	15503.79	29	-4.598*
8	1728.89	109.20	1619.69	831.37	29	1.948***
9	3059	2072.40	986.60	575.94	29	1.713***

10	16556.58	7339.37	9217.227	5374.35	29	1.715***
11	4391.17	214.83	4176.33	1974.56	29	2.115**
12	1921.28	1645.20	276.08	965.15	29	0.286
13	7951.89	2223.93	5727.95	3242.96	29	1.766***
14	7127.25	5100.77	2026.48	754.06	29	2.687*
15	231083.50	280533.70	-49450.20	35000.90	29	-1.413
16	1675.13	192.27	1482.87	656.35	29	2.259**
17	4314.89	682.23	3632.65	1684.84	29	2.156**
18	78.06	31.70	46.36	17.36	29	2.670**
19	355.27	1038.90	-683.63	181.00	29	-3.777*
20	3872.81	1970.07	1902.75	1067.20	29	1.783***
21	38968.73	9848.20	29120.53	16598.47	29	1.754***
22	18008.25	17211.03	797.22	3722.83	29	0.214
23	5606.42	12732.50	-7126.08	4776.44	29	-1.492
24	304.25	73.170	231.09	134.098	29	1.723***
25	1971.12	616.80	1354.32	513.04	29	2.640**
26	456.40	592.27	-135.87	111.05	29	-1.224
27	22146.66	10216.23	11930.43	3947.35	29	3.022*
28	49144.83	289983.60	-240839	72177.80	29	-3.337*
29	8681.55	3519.40	5162.15	2747.34	29	1.879***
30	6520.33	14249.60	-7729.27	3888.86	29	-1.988***

Note: *, ** and *** imply significance at 1%, 5% and 10% levels respectively.

Table 2: Results of Wilcoxon Signed-rank Test for Short-term Changes in Trading Volume following Splits

Sample Firm	No of Pairs	No. of Positive Differences (Post – Pre)	No. of Negative Differences (Post - Pre)	No. of Ties	Standardized z-statistic	Acceptance /Rejection of Null Hypothesis
1	30	8	22	0	-2.910*	Rejected
2	30	25	5	0	3.754*	Rejected
3	30	24	6	0	3.219*	Rejected
4	30	12	18	0	-1.286	Accepted
5	30	22	8	0	2.437**	Rejected
6	30	24	6	0	3.322*	Rejected
7	30	5	25	0	-3.610*	Rejected
8	30	28	1	1	4.682*	Rejected
9	30	19	11	0	1.748***	Rejected
10	30	22	8	0	3.096*	Rejected
11	30	22	8	0	3.363*	Rejected
12	30	14	16	0	0.051	Accepted
13	30	23	7	0	3.240*	Rejected
14	30	21	9	0	2.705*	Rejected
15	30	9	21	0	-1.491	Accepted
16	30	20	9	1	2.173**	Rejected
17	30	17	13	0	1.224	Accepted
18	30	22	7	1	3.082*	Rejected
19	30	10	20	0	-2.581*	Rejected
20	30	16	14	0	0.710	Accepted

21	30	29	1	0	4.762*	Rejected
22	30	17	13	0	0.792	Accepted
23	30	7	23	0	-2.314**	Rejected
24	30	20	10	0	2.232**	Rejected
25	30	19	11	0	2.386**	Rejected
26	30	14	16	0	-0.854	Accepted
27	30	20	10	0	2.828*	Rejected
28	30	3	27	0	-4.042*	Rejected
29	30	26	4	0	3.075*	Rejected
30	30	13	17	0	-1.532	Accepted

Notes: *, ** and *** indicate significance at 1%, 5% and 10% levels respectively.

Null Hypothesis of Median Difference between Post and Pre-split trading volume equals to zero.

Table 3: Results of Paired-t Test for Short-term Changes in Number of Trades following Splits

Sample Firm	Post-split Average Trading Volume	Pre-split Average Trading Volume	Mean of Paired Differences	Standard Error of Mean of Paired Differences	Degrees of Freedom	t-statistic
1	7630.23	6313.57	1316.67	905.71	29	1.454
2	2312.80	865.10	1447.70	230.40	29	6.283*
3	1387.33	893.47	493.87	180.38	29	2.738*
4	18147.87	11199.70	6948.17	1627.53	29	4.269*
5	1564.60	374.37	1190.23	241.95	29	4.919*
6	22.27	2.50	19.77	3.92	29	5.049*
7	884.73	859.17	25.57	64.46	29	0.397
8	11.53	7.57	3.97	2.53	29	1.567
9	31.00	18.23	12.77	5.34	29	2.390**
10	131.10	134.47	-3.37	24.06	29	-0.140
11	29.47	11.00	18.47	5.92	29	3.118*
12	4.03	13.57	-9.53	4.79	29	-1.991***
13	90.07	46.93	43.13	23.55	29	1.831***
14	142.20	76.40	65.80	16.42	29	4.007*
15	14183.87	16405.53	-2221.67	1286.94	29	-1.726***
16	6.03	2.93	3.10	1.02	29	3.047*
17	43.17	6.87	36.30	8.64	29	4.199*
18	7.33	1.77	5.57	2.03	29	2.738*
19	21.83	31.73	-9.90	8.97	29	-1.104
20	27.97	10.63	17.33	3.68	29	4.715*
21	470.27	183.80	286.47	36.40	29	7.869*
22	197.67	34.73	162.93	12.35	29	13.191*
23	199.63	687.17	-487.53	135.66	29	-3.594*
24	20.90	9.37	11.53	5.95	29	1.939***
25	15.30	4.20	11.10	3.10	29	3.586*
26	26.50	19.17	7.33	4.23	29	1.736***
27	1348.33	443.63	904.70	184.39	29	4.907*
28	65.33	370.43	-305.10	59.85	29	-5.098*
29	3.93	8.53	-4.60	4.08	29	-1.126
30	47.63	39.27	8.37	10.30	29	0.812

Note: *, ** and *** mean significance at 1%, 5% and 10% levels respectively.

Table 4: Results of Wilcoxon Signed-rank test for Short-term Changes in Number of Trades following Splits

Sample Firm	No of Pairs	No. of Positive Differences (Post – Pre)	No. of Negative Differences (Post - Pre)	No. of Ties	Standardised z-statistic	Acceptance /Rejection of Null Hypothesis
1	30	16	14	0	1.162	Accepted
2	30	29	1	0	4.576*	Rejected
3	30	22	8	0	3.096*	Rejected
4	30	23	7	0	3.507*	Rejected
5	30	28	2	0	4.679*	Rejected
6	30	25	1	4	4.420*	Rejected
7	30	14	16	0	-0.247	Accepted
8	30	16	13	1	1.590	Accepted
9	30	18	11	1	2.066**	Rejected
10	30	15	15	0	-0.596	Accepted
11	30	22	7	1	3.125*	Rejected
12	30	8	19	3	-1.925***	Rejected
13	30	18	12	0	1.471	Accepted
14	30	22	8	0	3.343*	Rejected
15	30	9	21	0	-2.170**	Rejected
16	30	20	7	3	2.798*	Rejected
17	30	26	4	0	4.021*	Rejected
18	30	22	4	4	3.303*	Rejected
19	30	13	17	0	-0.288	Accepted
20	30	22	5	3	3.929*	Rejected
21	30	28	2	0	4.700*	Rejected
22	30	30	0	0	4.782*	Rejected
23	30	5	25	0	-4.247*	Rejected
24	30	18	10	2	2.107**	Rejected
25	30	22	5	3	3.715*	Rejected
26	30	18	11	1	1.644***	Rejected
27	30	26	4	0	4.247*	Rejected
28	30	2	28	0	-4.474*	Rejected
29	30	13	12	5	-0.633	Accepted
30	30	14	15	1	0.973	Accepted

Notes: *, ** and *** indicate significance at 1%, 5% and 10% levels respectively.

Null Hypothesis of Median Difference between Post and Pre-split number of trades equals to zero.

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