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1	Title	Source	Subjects
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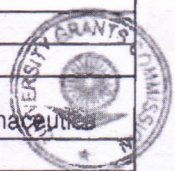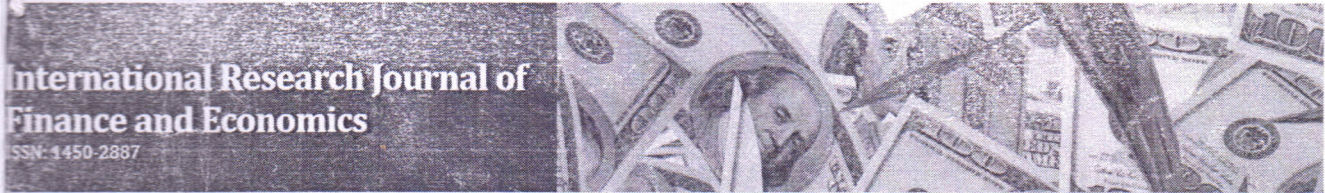
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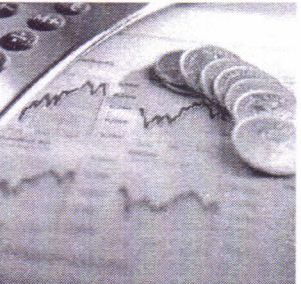
Testing the Semi-Strong form Efficiency of Indian Stock Market with Respect to Information Content of Stock Split Announcement – A study in IT Industry

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Abstract

An efficient market as a market in which price fully reflect all information. This means that no possibility exists of making sustainable excess returns and the prices follow a random walk. An efficient and integrated capital market is an important infrastructure that facilitates capital formation. The efficiency with which the capital formation is carried out depends on the efficiency of the capital markets and financial institutions. A capital market is said to be efficient with respect to corporate event announcement (stock split, buyback, right issue, bonus announcement, merger & acquisition, dividend etc) contained information's and its disseminations. How quickly and correctly the security prices reflect these event contained information's show the efficiency of stock markets. Present study is an attempt to test the efficiency of Indian stock market with respect to stock split announcement by IT companies.

Keywords: Stock split Announcement, Random Walk, Market Reaction/Stock Price
Reaction, Abnormal Returns, Announcement Period, Efficient Market,

Introduction

A capital market is said to be efficient with respect to an information item if the prices of securities fully impound the return implications of that item. In an efficient market, when a new information item is added to the market, its revaluation implications for security returns are instantaneously and unbiasedly impounded in the current market price. Several studies have empirically tested the reaction of security prices to the release of different information. Beaver (1968), Foster (1981), Ball and Brown (1968), Beaver, Clarke, Wright (1979) are some of the studies which find significant reaction in the

earnings information conveyed by splits during 1982-1989, a period of lower inflation and higher real economic growth. Results for 1982-1989 indicate that the market interprets stock splits as signals of subsequent earnings increase. **Elroy Dimson and Massoud Mussavian (1998),** in their study entitled, "A brief history of market efficiency", narrated that the efficient markets hypothesis is simple in principle but remains elusive. It is hard to profit from even the most extreme violations of market efficiency. The efficient markets model continues to provide a framework that is widely used by financial economists.

An attempt was made by **Kun Shin Im, Kevin E.Dow and Varun Grover (2001)** in their study entitled "Research Report: A Reexamination of IT Investment and the Market Value of the Firm – An event study methodology" to evaluate the effectiveness of information technology investments. In this study, the researcher examined the changes in the market value of the firm as reflected in the stock price in response to IT investment announcements. Reactions of price and volume were negatively related to firm size and became more positive over time. **Lukose Jijo and Narayanan Rao.S (2002)** in their study, "Market Reaction to Stock Splits – An Empirical Study", have examined the reaction of stock prices around the date of announcement of stock splits and ex-split date. It was found out that on the date of announcement, there was an abnormal return of 5.27 percent and on day +1, 2.42 percent. The result of abnormal returns around the ex-split day shows that much of the abnormal returns take place on day 0 (3.68%) and day +1 (2.04%). A study by **Partrick Dennis (2003)** investigated the stock splits and liquidity in the case of the Nastaq -100 Index Tracking Stock and found that the average daily turn over before the split was 23.95 percent and after the split was 22.81 percent. A "t" test for difference in mean failed to reject the hypothesis that the turnover before the split (the t-statistic is 0.8) comparing the number of traders before and after the split. It is apparent that there was a little less than twice as many traders after the split than before. A study entitled "Market Reaction to Stock Market Splits: Evidence from India" by **Amitabh Gupta and Gupta.O.P (2007)** maintains that stock splits are associated with positive abnormal returns around the announcement. By and large splits are found to improve the trading volume of shares and there was increase in the daily number of traders. But they do not increase the daily turnover and consequently the liquidity of stocks in India. At the end, the author concluded that the majority of shares which underwent split were trading at low market prices. It appears that reasons for a stock split by low priced companies could be explained by neglected firm hypothesis, which appears to be valid for the Indian stock market.

In India, studies on testing the semi-strong efficiency of stock market are few. These studies use CAR (Cumulative Abnormal Returns) Model. Only very few studies have used the SRV (Security Returns Variability) model. Most of the studies observed that the reaction by security prices took place prior to announcement of events. In some cases, reaction took place after announcement of events. An attempt is made in this study to test efficiency of Indian stock market with respect to stock split announcement taking the models already used in the above studies.

Statement of the Problem

Stock market, being a vital institution, facilitates economic development. It is true that so many parties are interested in knowing the efficiency of the stock market. The small and medium investors can be motivated to save and invest in the stock market only if their securities in the market are appropriately priced. The information content of events and its dissemination determine the efficiency of the stock market. That is how quickly and correctly security prices reflect these information show the efficiency of the stock market. In the developed countries, many research studies have been conducted to test the efficiency of the stock market with respect to information content of events. Whereas in India, very few studies have been conducted to test the efficiency of the stock market with respect to stock split announcements, even after these studies have been conducted with different industries with different period. Hence present study is an attempt to test the efficiency of the Indian stock market with respect

two information content of stock split announcements on IT (Information Technology) companies for particular period (2000-2007)

Scope of the Study

The present study tests the informational efficiency of the Indian Stock Market in the Semi- Strong Form of Efficient Market Hypothesis (EMH). The study covers seven financial years ranging from 2000-01 to 2006-07. The study is restricted to stock split announcement made by the IT companies during the study period. For some of the sample companies, the stock split information and / or the dates of announcement were not available. Finally, the total number of stock split considered for the study was 128 (43 companies).

Relevance of the Study

One major source of information that the investors can make use of valuation securities is corporate event announcement information. Corporate event announcement information and stock market efficiency are of greater interest to the investors, fund managers, analysts, planners, policy makers, and market regulators, accounting standard setters, researchers, the government, and the public in general. The present study is an attempt to test the efficiency of the Indian Stock Market with respect to information content of stock split announced by the IT companies in the Semi-Strong Form of EMH.

Objectives of the study

The objectives of the present study are as follows

1) To examine the information content of stock split announcement made by the Information Technology (IT) companies
2) To test the speed with which the stock split announcement information are impounded in the share prices of IT companies.
3) To suggest investment strategies for the investors, fund managers and analysts.

Hypothesis of the study

The following hypotheses are to be tested in this study

1) Stock split announcement contained information's are not relevant for the valuation of stocks.
2) Stock split announcement has no significantly influence in the stock prices of IT companies.
3) The Indian stock market is informationally not efficient where the stock split announcement contained information's are not impounded instantaneously and rightly in the stock prices of IT companies

Sample Selection

The study intends to cover the all the IT companies listed in Bombay Stock Exchange (BSE). Out of all the companies brought under Information Technology listed in the BSE as on 30 December 2007 (as per the PROWESS database), only 43 companies (128 splits) which satisfy the following criteria were selected.

i. The companies, which find a place in the list A and B1 of the Bombay Stock Exchange (BSE) are selected. The reason for selecting the list A and B1 is to ensure active trading,
ii. Availability of the dates of announcement of stock split, and
iii. Availability of stock split information

Sources of Data

The information regarding adjusted share price, Stock split information, dates of stock split announcements, and values of BSE 500 were obtained from "PROWESS" published by CMIE. Other relevant information are also obtained from the BSE website (http://www.bseindia.com/)books, and journals.

Tools used for the Analysis:

a. Daily returns

The daily returns were calculated for both individual securities as well as Market Index using the following equation

$$R_{i,t} = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100 \tag{1.0}$$

Where,

$R_{i,t}$ = Returns on Security i on time t.

P_t = Price of the security at time t

P_{t-1} = Price of the security at time $t-1$

b. Security Returns Variability

SRV model is used to know the reaction of the market. Symbolically, the model is

$$SRV_{i,t} = \frac{AR^2_{i,t}}{V(AR)} \tag{1.1}$$

Where,

$SRV_{i,t}$ = Security Returns Variability of security i in time t

$AR^2_{i,t}$ = Abnormal returns on security i on day t

$V(AR)$ = Variance of Abnormal Returns during the announcement period

Abnormal Returns (AR) under **market-adjusted abnormal returns** is calculated using by the equation as below;

$$AR_{i,t} = R_{i,t} - R_{m,t} \tag{1.2}$$

Where,

$AR_{i,t}$ = Abnormal returns on security i at time t

$R_{i,t}$ = Actual returns on security i at time t

$R_{i,m}$ = Actual returns on market index, which is proxied by BSE 500, a weighted average index of 500 companies published by BSE, at time t.

Thus daily actual returns over the announcement period (31days) were adjusted against their corresponding market returns.

Average Security Returns Variability (ASRV)

The $SRV_{i,t}$ so calculated for all the stock split announcement are averaged to find the Average Security Returns Variability ($ASRV_t$) by using the following equation.

$$ASRV_t = SRV_{i,t} \times (1/n) \tag{1.3}$$

Where,

$ASRV_t$ = Average Security Returns Variability at time t

$SRV_{i,t}$ = Security Returns Variability i security at time t

n = Number of stock split in the sample

C. Average Abnormal Returns:
The Average Abnormal Returns is calculated by the equation given below

$$AAR_t = \frac{1}{n} \sum_{t=1}^{n} AR_{i,t}$$

(1.5)

Where,

AAR_t = Average Abnormal Returns on day t

$AR_{i,t}$ = Abnormal Returns on security i at time t which is calculated by using the equation (1.2)

D. Cumulative Abnormal Returns (CAR)
The CAR is calculated as

$$CAAR_k = \sum_{t=1}^{k} AAR_t$$

(1.7)

Where,

- $CAAR_k$ = Cumulative Average Abnormal Returns for the kth period. Hereafter, it is referred to as CAR,
- AAR_t = Average Abnormal Returns of sample stock split at time t which is calculated by using the equation (1.5)

E. T-Test

i). The significance of reaction in security prices ($ASRV_t$) is tested by using the T- statistics as follows:

$$t_{stat} = (ASRV - 1) \times \sqrt{n} / s$$

(1.4)

Where, n is the number of quarters in the sample and s is the Standard Deviation of abnormal returns.

ii). The significance of the AAR_t is tested using the t-test as follows;

$$t_{stat} = AAR_t \times \sqrt{n} / s$$

(1.6)

Where, AAR_t is the Average Abnormal Returns on time t, n is the number of stock split in sample and s is the Standard Deviation of Average Abnormal Returns.

Limitation of the Study

The following are the limitation of the present study

1) The present study is confined to only one event announcement (Stock split)
2) This study is restricted with only IT industry
3) All the limitations of the tools used are applicable to this study

Analysis of the Study

The analysis has been done in the following way to empirically test the informational efficiency of the Indian capital market with special reference to the shares of selected IT Companies.

a. Analysis of Average Security Returns Variability (ASRV or SRV)
b. Analysis of Abnormal Returns (AAR)
c. Analysis of Cumulative Abnormal Returns (CAR)

Analysis of ASRV for Stock Split Announcement

Table-1 explains the value of ASRV and t-value to stock split announcement. It is clearly understood from the above table that the ASRV on day 1 was 1.10 and the highest value of ASRV during 31 days

of announcement was on day 7 (1.39). The ASRV was significant at 1 percent level on day +14 only. But at the same time, it was (ASRV) significant at 10 percent level on day -13, -6, -4, 7, 9 and day 12. During the post stock split announcement (+1 to +15), majority of days, ASRV yielded a value greater than one, i.e, during the day 1,3,4,5,7,8,9,10,12 and 15 with value of 1.10, 1.04, 1.10, 1.05, 1.39, 1.13, 1.30, 1.07, 1.29 and 1.09. It is observed from the above analysis that the highest ASRV in pre announcement period was on day -13 with a value of 1.37. Further, in pre announcement period, the ASRV was greater than one on days -14, 13, -12, -9, -5 and day -2 with a value of 1.06, 1.37, 1.19, 1.14, 1.13 and 1.07 respectively. It is clearly understood from the above analysis that the market positively received the information content of stock split announcement during the post announcement period. It is interesting to note that the value ASRV has been more than one consistently for 10 days (day+1to day +10) during the post announcement period except on day 2 and 6. According to the present study, stock split announcement has immediate reactions in the security prices of IT companies. Hence investors are advised to take immediate decision (whether to buy or sell) at the time of companies' coming up with stock split announcement. The above analysis reveals the fact that the market has absorbed the stock split announcement information around the announcement days. In short, the stock split announcement contained information relevant for valuation of securities price of IT companies. Hence the hypothesis -1 entitled "Stock split announcement contained information's are not relevant for the valuation of stocks" is rejected.

Table 1:   Result of ASRV and t – Value for Stock Split Announcement

Day	ASRV	t – value
-15	0.85	-0.91
-14	1.06	0.33
-13	1.37	1.47@
-12	1.19	0.95
-11	0.98	-0.14
-10	0.96	-0.20
-9	1.14	0.71
-8	0.98	-0.11
-7	0.92	-0.60
-6	0.81	-1.21@
-5	1.13	0.76
-4	0.81	-1.38@
-3	0.94	-0.44
-2	1.07	0.41
-1	0.99	-0.04
0	0.91	0.77
1	1.10	0.51
2	0.92	-0.45
3	1.04	0.25
4	1.10	0.70
5	1.05	0.35
6	0.87	-0.74
7	1.39	1.35@
8	1.13	1.08
9	1.30	1.55@
10	1.07	0.32
11	0.99	-0.05
12	1.29	1.35@
13	0.94	-0.39
14	0.71	-2.89*
15	1.09	0.47

Source: PROWESS corporate data base
*-1%   **-5%   @-10%

Figure-1.1. shows the ASRV of stock split announcement. It is clearly understood from the above figure that there was sharp variation in the ASRV on day 7, 8 and day 9, followed by minor variation in the post announcement period. The results indicate the fact that the market was using the stock split information for valuation of information technology companies' stocks.

Figure 1.1: Average Security Return Variability of Stock Split Announcement
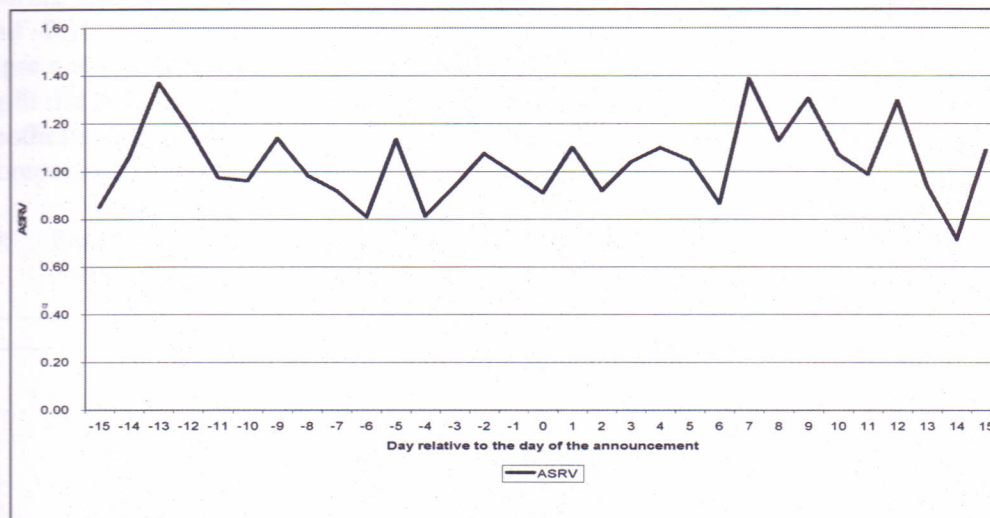
From the overall analysis of **Table -2,** it could be understood that the average value of ASRV during the period of 31 days was 1.04. That is, the average ARV (1.04) during 31 days surrounding stock split announcement was greater than one. During the period of 15 days prior to announcement day 0 (from day -15 to day -1), the average ASRV was 1.01 while the average ASRV during the period of 16 days (from day 0 to day 15) was 1.06. The value of ASRV during 7 days period i.e. three days before and three days after the stock split announcement (-3 to +3) was neutral (i.e. 1). But during the period of 15 days (from day -7 to day +7), the average ASRV was also the same (i.e. 1.00). From the above analysis, it is clearly understood that there were some fluctuations in the share price during the post stock split announcement and the value of ASRV during this period was above one. This fluctuation took place around the announcement days. It means that the IT shares effectively captured the stock split announcement information around the announcement days.

Table 2: Average Value of ASRV for Stock Split Announcement

PERIOD	ASRV
FROM DAY -15 TO DAY +15	1.04
FROM DAY -15 TO DAY -1	1.01
FROM DAY 0 TO DAY +15	1.06
FORM DAY -3 TO DAY +3	1.00
FROM DAY -7 TO DAY +7	1.00

Source: Computed from Table-1

Analysis of Average Abnormal Returns for Stock Split Announcement

Table-3 depicts the analysis of average abnormal returns along with t-test for stock split announcement of IT companies. It is clearly understood from the above table that there was no significant abnormal returns almost all the days (from day -15 to day +15) surrounding the stock split announcement i.e., the value of abnormal returns was below one almost all the days. It is clear from the t-test analysis that stock split announcement did not generate any significant reaction in the security prices of IT companies at all the three levels – 10 percent, 5 percent and 1percent levels. The value of AAR during

pre stock split announcement ranged from -0.07 to 0.44. The highest AAR during pre announcement period was on day -8, followed by days -12, -7, -6 and -10 with ARR value of 0.44, 0.30, 0.16, 0.12 and 0.10. The lowest abnormal returns during pre announcement period was on day -15, -4, -3, -13 and -2 with ASRV value of -0.35, -0.32, -0.28, -0.23 and -0.10 respectively. During the post announcement period, the value of AAR ranged from -0.46 to 0.28. The highest AAR was on day 11, followed by days 3, 4, 1 and day 2, with AAR value of 0.28, 0.17, 0.15, 0.11 and 0.09 respectively. The lowest AAR during these periods was on day 15, 13, 9, 14 and day 7 with AAR value of -0.46, -0.23, -0.20, -0.18 and -0.10 respectively. It is clearly understood from the above analysis that the value of AAR during pre and post announcement period was less than 1. It reveals the fact that the announcement of stock split did not meet with significant reactions in the security prices of sample IT companies. Hence the hypothesis -2 entitled, "Stock split announcement has no significant reaction in the security prices of IT companies" is accepted.

Table 3: Result of Average Abnormal Return and t-value of Stock Prices for Stock Split Announcement of IT Companies

Day	AAR	T – value
-15	-0.35	0.33
-14	-0.05	0.03
-13	-0.23	0.20
-12	0.30	0.27
-11	0.09	0.08
-10	0.10	0.08
-9	0.12	0.09
-8	0.44	0.41
-7	0.16	0.14
-6	0.12	0.09
-5	0.08	0.07
-4	-0.32	0.30
-3	-0.28	0.25
-2	-0.10	0.08
-1	-0.07	0.05
0	0.13	0.10
1	0.11	0.09
2	0.09	0.08
3	0.17	0.14
4	0.15	0.12
5	0.03	0.01
6	0.09	0.08
7	-0.10	0.08
8	-0.05	0.03
9	-0.20	0.17
10	-0.03	0.01
11	0.28	0.24
12	0.03	0.01
13	-0.23	0.20
14	-0.18	0.15
15	-0.46	0.42

Source: Computed from "PROWESS" a corporate database

*-1%   **-5%   @-10%

Figure-3.1 graphically represents the AAR of stock split announcement. It is clearly understood from the above figure that there has been no significant reaction in the security prices of sample IT companies for stock split announcement because the AAR curve for stock split announcement falls below one throughout the study period. The result reveals the fact that the market not using the stock split announcement information for valuation of IT companies' stocks.

Figure 3.1: Average Abnormal Return of Stock Split Announcement
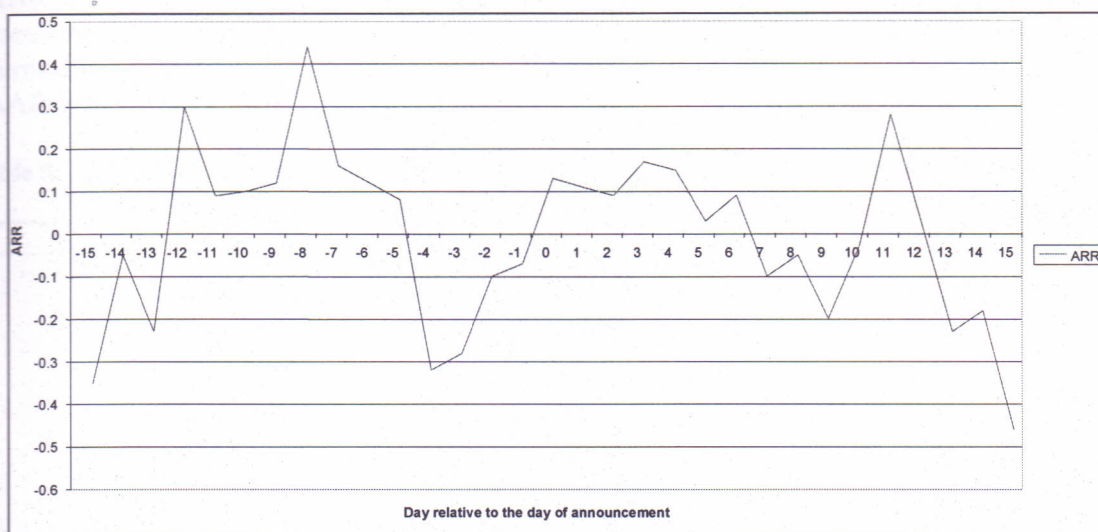
The average of abnormal returns for stock split announcement of IT companies is given in Table-4. The abnormal return during the announcement period for 31 days (from day -15 to day +15) was 0.01. While the average abnormal returns during the post announcement period of 15 days (from day 0 to day +15), was 0.01.

Table 4: Average Value of Average Abnormal Returns of Stock Prices for Stock Split Announcement

PERIOD	AAR
FROM DAY -15 TO DAY +15	-0.01
FROM DAY -15 TO DAY -1	0.01
FROM DAY 0 TO DAY +15	-0.01
FORM DAY -3 TO DAY +3	0.01
FROM DAY -7 TO DAY +7	0.02

Source: Computed from table -3

The following are the outcome of foregoing discussion
- The stock split announcement contained information's are useful for valuing the securities of IT companies
- It companies stocks are reached heavily only during post stock split announcement (day 1 to day 15). It indicates the fact that Indian stock market has well received the stock split announcement information after its announcement.
- Apart from the sharp reaction on day 7,9 and 2 there have been reaction during the pre announcement period and post announcement period. The pre announcement reactions show that the market is able to capture the stock split announcement information before its announcement. However, the post announcement reaction shows that the market is not able to capture the stock split information fully immediately.
- As the market reacts to the stock split announcement, the Indian stock market may be said to be informationally inefficient in the semi-strong form. However, it is not perfectly efficient of course; no market can be expected to be perfectly efficient.

Analysis of Cumulative Average Abnormal Returns for Stock Split Announcement
Cumulative Average Abnormal Returns (CAAR) of share price for Stock Split Announcement is given in Table- 5. On the day of announcement (day 0), the value of CAAR was at 0.14. The value of CAAR during the pre announcement period ranged from -0.63 to 0.78. The highest value of CAAR during the

pre announcement period was recorded on day -5 followed by day -6, -7, -4, -8 and -3. The values of CAAR during these days were 0.78, 0.70, 0.58, 0.46, 0.42, and 0.18 respectively. During the post announcement period, the value of CAAR ranged from -0.16 to 0.78. The highest cumulative abnormal returns during the post announcement period was recorded on day 6 followed by day 5, 7, 4 and 8 with CAAR value of 0.78, 0.69, 0.68, 0.66 and 0.63.

Table 5:   Result of Cumulative Average Abnormal Returns for Stock Split Announcement

Day	CAAR
-15	-0.35
-14	-0.4
-13	-0.63
-12	-0.33
-11	-0.24
-10	-0.14
-9	-0.02
-8	0.42
-7	0.58
-6	0.7
-5	0.78
-4	0.46
-3	0.18
-2	0.08
-1	0.01
0	0.14
1	0.25
2	0.34
3	0.51
4	0.66
5	0.69
6	0.78
7	0.68
8	0.63
9	0.43
10	0.4
11	0.68
12	0.71
13	0.48
14	0.3
15	-0.16

**Source:**   Computed from "PROWESS" a corporate database
            *-1%   **-5%   @-10%

The lowest CAAR during this period was recorded on day 15, followed by days, 1, 14, 2 and 10 with value of -0.16, 0.25, 0.30, 0.34 and 0.40. From the above analysis, it is inferred that stock split announcement might have had unfavourable information (negative), and hence investors reacted negatively to the stock split announcement. This shows the fact that the Indian stock market was able to analyse the stock split announcement information and use it for revision of security prices.

Figure-5.1 shows the curve of cumulative average abnormal returns of share price for stock split announcement. The curve of CAAR for stock split announcement fluctuated violently during the announcement period of 31 days. It is clearly understood from the figure 6.2.1 that the curve of CAAR for stock split announcement was rising and falling steeply. It is clear from the above figure that the Indian stock market reacted according to the information content of stock split announcement.

Figure 5.1: Cumulative Average Abnormal Return of Stock Split Announcement
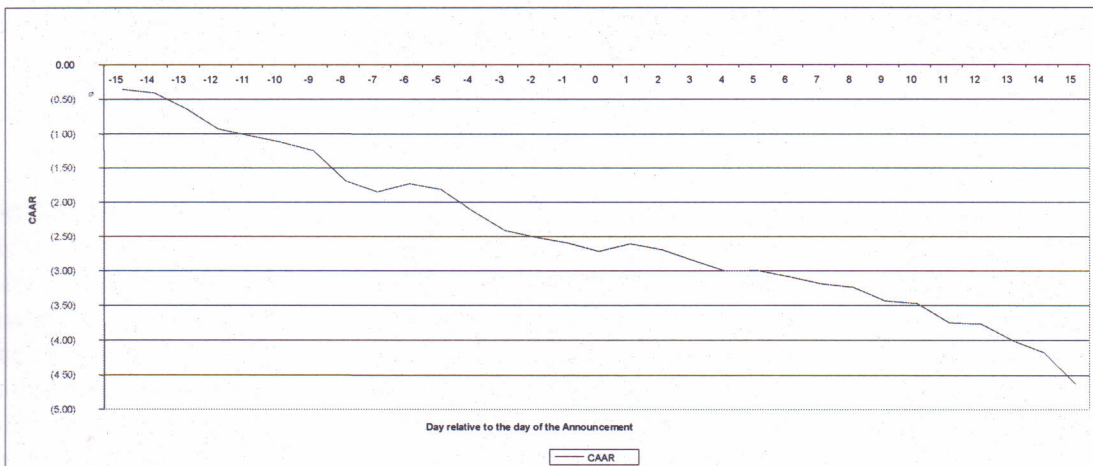
The average value of CAAR (cumulative average abnormal returns) for stock split announcement is given in the **Table 6** It is clear from the above table that the average value of CAAR during the period of 31 days surrounding the announcement (from day -15 to day +15) was 0.28. During the pre announcement period (from day -15 to day-1), the average of CAAR was 0.07. Further, the average of CAAR during the post announcement period (day 0 to day +15) was 0.47, which is the highest average during the study period. The value of CAAR for 7 days period (from day -3 to day +3) was 0.22, which is the lowest average during the study period. At the same time, the value of CAAR during the period of 15 days announcement (from day -7 to day +7) was 0.46. It is clear from the above analysis that market did not receive the stock split announcement information for revising the security prices of sample IT companies during pre and post announcement period because the average value of CAAR was below one throughout the study period. The results shows that, though the Indian stock market was able to analyse the stock split announcement information, and use it for revision of security price, there was delay in their reaction. It is concluded from the above analysis that the results that the Indian stock market uses the stock split announcements contained information for valuation of securities and the market was efficient in impounding the events announcements information. Hence the hypothesis -3, entitled "The Indian stock market is informationally not efficient where the stock split announcement contained information's are not impounded instantaneously and rightly in the stock prices of IT companies" is rejected.

Table 6:   Average Value of Cumulative Average Abnormal Returns for Stock split

Period	ARR
From Day -15 To Day +15	0.28
From Day -15 To Day -1	0.07
From Day 0 To Day +15	0.47
From Day -3 To Day +3	0.22
From Day -7 To Day +7	0.46

Source: Computed from Table-5

From the above discussion of abnormal returns and cumulative abnormal returns the following notable points are derived

- The stock split announcement contained information made by the sample IT companies are useful for valuing the securities
- For stock split announcement the market was react quickly during post split announcement

- The reaction was extended to up to +15 days for stock split announcement by IT companies
- Information of stock split announcement can be used by the investors for making abnormal returns at any point of the announcement period, through the strategy of short selling.

Conclusion

This study has empirically examined the informational efficiency of Indian stock market with regards to stock split announcement released by the information technology companies. The result of the study showed the fact that the security prices reacted to the announcement of stock splits. The reaction took place for a very few days surrounding day 0, remaining days it was extended up to +15. Thus one can conclude from the forgoing discussion that the Indian stock markets in respect of IT companies in general are efficient, but not perfectly efficient to the announcement of stock split. This can be used by investors for making abnormal returns at any point of the announcement period.

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