P: ISSN NO.: 2321-290X RNI : UPBIL/2013/55327 VOL-IV* ISSUE-II*October-2016
E: ISSN NO.: 2349-980X **Shrinkhla Ek Shodhparak Vaicharik Patrika**

Stock Splits and the Efficiency of the Indian Stock Market

Madhuchhanda Lahiri
Assistant Professor,
Deptt.of Economics,
P.N. Das College,
Palta, Parganas,
West Bengal

Abstract

The empirical evidence for predictability in common stock returns produce mixed results, even after many years of research. This paper makes inferences about the robustness of such tests by using both daily and weekly return data of the stocks listed on the National Stock Exchange of India and uses a set of different tests to check whether the existence of market efficiency in one form ensures the acceptance of the hypothesis in other also. Result of the Binomial Proportionality test Shows the return in the post-split effective period is significantly greater than the corresponding return of the particular stock in the pre-effective post-announcement period, even though the difference between pre-split announcement period return and the post-split announcement pre-effective period return is not statistically significant.Results obtained from the paired t- test, tests of the slope coefficients as well as sign test of both the test and control sample firms also support the findings of the earlier test. The paper concludes that there is ample scope for reaping abnormal profit by the Stakeholderson the basis of the stock split announcements of the firms after taking due consideration of the costs incurred in transaction. Consequently, the paper raises doubts about the semi-strong form efficiency of the Indian stock market.

Keywords: Stock Splits, Market Efficiency, Predictability, Stock Returns

Introduction

The empirical evidence for predictability in common stock returns produce mixed results, even after many years of research. This paper makes inferences about the robustness of such tests by using both daily and weekly data on stock prices and uses a set of different tests to check whether the existence of market efficiency in one form ensures the acceptance of the hypothesis in other also.

Stock markets in developing countries like India have emerged and are slowly expanding. The efficiency of a capital market can be judged in two senses: allocational efficiency and informational efficiency. A capital market is said to be informational efficient when stock prices fully reflect all available information, public as well as private. If the market is efficient, then any new information will be instantaneously impounded in stock prices and none can earn abnormal return on the basis of such information. Both internal and external factors can cause a change in the returns accruing to the firms and a study of these factors, the speed and time taken for impounding such information as well as their impact on security returns have generated considerable interest to all the stakeholders of the capital market. Market efficiency has an influence on the investment strategy of an investor because if the market is efficient, trying to pick up winners will be a waste of time. Consequently, adjustment to any new information is almost instantaneous and successive price changes will be random. Fama(1970) distinguishes between three levels of market efficiency on the basis of the content of the information sub-set namely, weak, semi-strong and strong forms. Each one is concerned with the adjustment of stock prices to one relevant information subset. The weak form of the hypothesis states that prices efficiently reflect all information contained in the past series of stock prices. In this case it is impossible to earn abnormal profit by using past stock price data. If by enlarging the information set to include all publicly available information (i.e, information on money supply, exchange rate, interest rates, announcement of dividends, annual / quarterly earnings, stock splits etc.) it is not possible for a market participant to make abnormal profits, then the market is said to be semi-strong form of efficient. If by increasing the information set further to include private/insiders' information, it is not possible for a market participant to make abnormal profits, then the market is said to be strong-form of efficient.

Review of Literature

Perhaps the first published study on efficiency test of stock split is by Dolley (1933). He examined the price effects of stock splits by studying normal price changes at the time of the split. Over the decades from the early 1930s until the late 1960s, the level of sophistication of event studies increased. The early empirical finance literature [Fama (1970) and (1991)] documents strong evidence in support of the semi- strong market efficiency hypothesis.In the late 1960s, seminal studies by FFJR (1969) introduced the methodology that is essentially still in use today. It was the first study to use the market model as the basis for testing the semi-strong version of the efficient market hypothesis by considering the logarithmic version of the market model and computing the difference (u_{jt}) between the observed return on the stock (R_{jt}) and the return obtained from their estimated equation ($\hat{R}_{jt}$) for the 29 months prior to a split and the 30 months after a split. Calculating the cross-sectional averages of the error terms for each month (m) as: Average Residual for month m: $\bar{U}m = \sum \hat{u}_{jm}/N_m$ where $\hat{u}_{jm}$ is the sample regression residual for security (j) in month (m) and Nm is the number of splits for which data are available in month (m) as well as the cumulative average residual $UmUm = \sum \bar{u}k$; $-29 \leq m \leq 30$ for the 60 months surrounding the split, the study by FFJR found Umto increase up to the month of the split, month 0, and to remain fairly stable for the next 29 months. Consequently, FFJR concluded that stock splits could be regarded as essentially bullish information and that the market impounded this information in a most efficient manner.

However, there has been a whole of body of empirical literature on the Efficient Market Hypothesis that find significant empirical results inconsistent with the EMH. S. Narayan Rao (1994) applied the linear version of the market model to examine the stock market response to corporate financial policies of (a) Dividend increase (b) Bonus issues and (c) Equity rights issue. However, unlike FFJR, he computed the daily abnormal returns for security 'i' from 10 days before to 10 days after the announcement (t = –10 to +10) and concluded that the timing and speed of response depends on the kind of announcement .Studies by Laknonishok and Lev (1987), McNichols and Dravid (1990) etc. constructed a 'Control Sample' – a sample consisting of firms which did not announce stock splits or stock dividends (SD) and tried to match certain features with those of the sample firms which had announced stock splits or stock dividends grouped under 'Test Sample'. A comparison of the average and median growth rates of the earnings and cash dividends for various pre-and post-split announcement periods between the test-sample firms and control sample firms revealed that the above-normal earnings growth of the splitting firms still persisted in the first post-split year (0 – 12) although the test – control difference (16.31% Vs 13.28%) in that year is considerably smaller than that in the pre-announcement years.The study by McNichols and Dravid contend that the firms that engage in announcement of stock splits and stock dividends have more favourable earnings forecast errors (5.2% of the Median analyst earnings forecasts Vs – 1.7% for the non-SD sample) and higher pre-split share prices than firms that do not ($ 38.88 Vs $ 26.76). Grinblatt, Masulis and Titman (1984) employed Mean–Adjusted Returns Methodology as developed by Masulis (1980). They compared the daily stock price returns on various days around the announcement with the average daily return for a subsequent benchmark period of forty (4 – 43) trading days. The study found the mean 2-day returns around the announcement date for the entire split and stock dividend sample of 1762 firms to be 3.41% and for 40 trading days (4 – 43) subsequent to the announcement to be 0.10%. The t-statistic indicated that the day 0 and day 1 return were significantly higher than the benchmark. The study by Ohlson and Penman (1985) tried to avoid the announcement effect of splits by focusing on returns following announcement but preceding the split date and comparing those to returns subsequent to the split date. The study found that the instances in which R_{22} was strictly greater than R_{12} to be extremely significant with the value of statistic 38.22 (assuming independences across observations).

Recent finance researchers have termed these as market efficiency anomalies rather than outright rejecting the EMH [Ball and Brown (1968), French (1980), Gibbons and Hess (1981), Keim and Stambaugh (1984), Rogalski (1984), Banz (1981), Reingamum (1983), Ariel (1987)]. They have found evidences of either the day-of-the week effect, weekend effect, size effect or January effect on stock returns. Some researchers also sought to focus on the return behaviour of the stocks rather than collecting evidences on the efficiency or inefficiency tests of the market. Prior findings from experimental psychology (Kahneman and Tversky 1982) have found that people tend to overreact to unexpected news events. This kind of general tendency of the investors in the stock market leads to overvaluation of the prospects of the company with good news and undervaluation of the prospects of the company with bad news. Consequently, investors readjust the prices of those stocks which were earlier considered to be the best by decreasing them and vice-versa. The occurrence of such price change phenomenon termed price reversal follows the overreaction effect which has been studied by a number of researchers [De Bondt and Thaler(1985, 1987); Atkins and Dyl(1990), Cox and Petersion(1994), Akhigbe, Gosnell andHarikumar (1998);Larson and Madura (2002)].The phenomenon of overreaction to unexpected corporate news, and vice-versa, shows that stock price tends to fall lower than it should according to its newly calculated fair value. This phenomenon is more apparent when unexpectedly bad news is announced [Mishkin and Eakins (2012)].

Aim of the Study

1. To study the reaction of the stock prices to the corporate information releases of stock split.
2. To draw a conclusion on the efficiency of the Indian stock market with regard to the Indian stock market.

Hypotheses

1. Corporate information releases on stock splits influence the share prices.
2. The Weekly Actual Average Return is not significantly different from the Weekly Expected Average Return of the stocks.

Database

A total of 183 sample companies listedon the National Stock Exchange of India was drawn from the Capitaline package, which undertook the policy of stock splits between April 1998 and March 2010. Companies were omitted because some were listed on the NSE after the beginning of the study period or if they split their stocks more than once during the study periodas well as alsodue to our inability to collect data on stock prices for some companies from the Capitaline package. This led to a final reduction in the size of our sample to 45 firms for the binomial proportionality test(Table 1). It is estimated that the average number of trading days between the announcement and effective dates of stock splits is 10.8222 days, the median is 7 days and the standard deviation is 9.11625 days.

To test the semi-strong form of efficiency of the Indian stock market on the basis of the regression analysis, from a list of 313 stock split companies during our study period, we exclude (a) firms belonging to the banking and public sector (since these firms' policy is dependent on GOI and RBI policies; (b) firms issuing bonus issues during the study period (as this will contaminate the effect of our event concerned i.e, stock splits); (c) firms having more than one split in the study period and finally, (d) firms not listed on the NSE prior to our study period. This left us with a list of 69 firms which was categorised as 'Test Sample'. In addition to the test sample, a 'Control Sample' was constructed by matching every company that had a stock split announcement with a company that belonged to the same industry but did not have a stock split or stock dividend or right issue announcement in the same financial year as that of their mate in the test sample. This provided us with quite a few companies eligible to be the control mate of a particular test sample firm. A control firm is chosen for each of the sample firm so as to make a comparison between the Average Abnormal Return (AAR) and Cumulative Average Abnormal Return (CAAR) values of a split and non-split firm.

We have considered total assets as a measure of size for choosing the 'control mate' of each test sample firm. For each of the split firms, a sample of non-split firms belonging to the same industry group was chosen, and their asset values were noted for each of the split year and the just preceding year. Then the firm which had the smallest average absolute difference in total assets with the test sample firm for the split year and the just preceding year was chosen as the control mate. Finally daily closing prices of all 69 test sample as well as control sample firms were collected from the Capitaline package for a total of four years - three years prior to and one year subsequent to the stock split. But data on weekly prices and not daily data is considered for regression analysis because daily prices for four years of 69 firms and their corresponding control mates would not only mean a voluminous amount of data to be handled but would also increase the short-term volatility of the data which may affect the efficiency of parameter estimation. Actually weekly prices were derived from the daily closing prices by considering the closing price of the last trading day of the stock in a given week, which was generally a Friday but could be any other day if Friday was a holiday or if trading was suspended for one or the other reasons. Weekly prices were also computed from the daily closing values of S&P CNX Nifty Index for the four-year period relative to each stock split announcement.

Parameters were estimated on the basis of weekly price data for two years before the just preceding year of the split following the empirical evidences provided by Fama, Fisher, Jensen and Roll (1969). They contended that the residuals obtained from fitting the market model to about 15 months of data on either side of the split date are serially correlated. This violation in the assumption of residual terms would lead to specification error in the parameter estimates. These arguments lead us to exclude one year of weekly price data on either side of the split date for the estimation purpose. Other earlier studies have also shown that stock splits are executed by firms that have enjoyed an unusual growth in earnings and stock prices in the recent past. Consequently, the return data for the last year before the stock split would have a high degree of serial correlation and parameter estimates on the basis of such data would be spurious.

However, unavailability of price data for the required four years for either test sample or the corresponding control sample firms or both reduced the sample size further to 16 firms – out of which 6 firms had price data for 3 years (i.e, having only 2 years of weekly pre-split price data). In this connection it is to be noted that we have decided arbitrarily that at least one year's pre-split price data is required for the estimation of parameters of the market model through regression).

Finally, we compute the weekly return data of the stocks from the weekly closing prices of the individual stocks as well as for the Nifty index. Defining P_{jt} as the price of the j^{th} security in the t^{th} week, we calculate the weekly return of the j^{th} security as $R_{jt} = \ln P_{jt} - \ln P_{jt-1}$ and for the index as $R_{mt} = \ln P_t - \ln P_{t-1}$ where P_t is the Nifty index value in the t^{th} week. This is done for both the test and control sample firms. We, thereafter, match the weekly dates of each test sample firm with that of its control sample mate by making the date difference to be zero in excel sheet. This enables us to bring parity in the weeks of the test and control sample firms relative to the split week. This is necessary for calculating and meaningfully comparing AARs and CAARs of the test and control sample firms.

Methodology

Methods used for Binomial Proportionality Tests

It is seen from the review of literature that most of the studies including the pioneering work of

FFJR (1969) had focussed on the announcement effects associated with splits and their statistical analysis demonstrated that returns were above average prior to the splits. The present study deliberately tries to avoid the announcement effect of splits by focussing on returns following announcement date but preceding the effective date and compares them to both the returns prior to the split announcement date and returns subsequent to the split effective date.

Given the irrelevance hypothesis and the absence of announcement effects, the returns process should be unaffected by the occurrence of the split.

The basic null and alternative statistical hypothesis can be stated as

(i) $Var[\hat{R}_1] - Var[\hat{R}_{-1}] = 0$ (null)
$\neq 0$ (alternative)

for comparison of returns between the split announcement date and effective date with those prior to split announcement date.

(ii) $Var[\hat{R}_2] - Var[\hat{R}_1] = 0$ (null)
$\neq 0$ (alternative)

Comparison of returns between the announcement date and effective date with those subsequent to the split announcement date. Here, the length of the second period is equivalent to the first period for each split.

Following Ohlson and Penman (1984), the difference in variance expression can be simplified as it is found that squared mean daily returns are about $(1/10)^{th}$ of one percent in order of magnitude compared to the expected squared returns. Consequently, for daily returns we can write $Var[\hat{R}_k] = E[\hat{R}_k^2]$, k =1,2 and the hypotheses can be rewritten as

$E[\hat{R}_1^2] - E[\hat{R}_{-1}^2] = 0$ (null)
$\neq 0$ (alternative)

and $E[\hat{R}_2^2] - E[\hat{R}_1^2] = 0$ (null)
$\neq 0$ (alternative)

The expected squared returns approach is very useful as there is no need to estimate mean returns. This improves the power of subsequent tests at virtually no cost.

Given the plausibility of the null hypothesis on prior grounds, and the large size of the sample, a conservative statistical test can be used. One direct test simply estimates the binomial proportionality statistic

(i) $P\{\hat{R}_{-1}^2 > \hat{R}_1^2\} = 0.5$ (given null hypothesis)
$\neq 0.5$ (given alternative hypothesis)

and

(ii) $P\{\hat{R}_2^2 > \hat{R}_1^2\} = 0.5$ (given null hypothesis)
$\neq 0.5$ (given alternative hypothesis)

Here we match post- and pre-announcement returns as well as post- and pre- split effective returns for each stock split and tally the proportion of cases – pooled across splits and dates - in which $\hat{R}_{-1}^2$ exceeds $\hat{R}_1^2$ and $\hat{R}_2^2$ exceeds $\hat{R}_1^2$. The matching procedure across two periods is executed as follows:

Extensive earlier researches in India and abroad have confirmed the existence of the day-of-the-week effect whereby the last trading days of the week, particularly Friday, are characterised by positive returns while Monday, the first trading day of theweek , differs from other days, even producing negative returns [Gross (1973), Lakonishok and Lev (1982), Rogalski (1984), Keim and Stambaugh (1984) Harris (1986)] . However, the day-of-the-week effect in emerging stock markets particularly those of Asia have not been extensively studied. In India, a study by Poshakwale (1996) has confirmed the existence of the day-of-the-week effect in the Bombay Stock Exchange for the period 1987 to 1994. Consequently, in this study, we control for the day-of-the-week effect, while matching the stock returns under split. For each split of the common stock, the squared return for the first trading day following the announcement date in period 1 was matched with the squared return for the first same day of the week following the split effective date in period 2, the second squared daily return following the announcement date was matched with the squared return of the next same day of the week following the split date and so on until the day (in period 1) just prior to the split date came. The number of comparisons for each split is therefore basically equivalent to the number of trading days between the announcement and effective dates [but the number of comparisons is generally less than the total number of trading days between the announcement and effective dates as some returns data may be missing or on some date the trading may remain close on the NSE].

For matching the squared pre- and post-announcement returns, the squared return for the last trading day following the announcement but prior to the split effective date in the period 1 is matched with the squared return for the first same day of the week just prior to the split announcement date in the period (-1); the second last daily squared return for the period 1 between the announcement and effective date is matched with the squared return for the second same day-of-the-week just prior to the split announcement date in period 1 and so on; until the date of announcement of the split is reached . Here, also the number of comparisons for each split is equal to or less than the number of trading days between the announcement and effective dates.

Finally, we test the statistical significance of the probability estimates $P\{\hat{R}_{-1}^2 > \hat{R}_1^2\}$ and $P\{\hat{R}_2^2 > \hat{R}_1^2\}$ by using the Binomial Proportionality test. The simple binomial test statistic is $z = (p_0 - p)/\sqrt{(pq/n)}$ where p_0 = observed probability, p = expected probability = 1/2 , q = 1-p = 1/2 and n = number of comparisons.

Methods used for Regression Analysis Test

EMH studies typically use a residual analysis as the regression of security returns on market returns over time is a satisfactory method for abstracting from the effects of general market conditions on the rates of return of individual securities The analysis involves estimating the coefficients of the market model during a time period when stock returns are expected to be in equilibrium. This study use only the pre-event period parameter estimates in the residual analysis – parameters are estimated on the basis of *ex-post* weekly rates of return of the individual securities for

two years before the just preceding year of the stock split.

Defining P_{jt} as the price of the j^{th} security in the t^{th} week, we calculate the weekly return of the j^{th} security as $R_{jt} = \ln P_{jt} - \ln P_{jt-1}$. We, then, fit the regression of the weekly rate of return provided by an individual security on the general market conditions as

$R_{jt} = \alpha_j + \beta_j R_{mt} + u_{jt}$ ---------- (1)

Where R_{mt} is the market rate of return for the week (t) proxied by the weekly Nifty Index return; α_j and β_j are the parameters that vary from security to security and $u_{jt}$is the random disturbance term which satisfies the usual assumptions of the linear regression model

Using the available time-series on R_{jt} and R_{mt}, least squares have been used to estimate α_j and β_j in (1) for each of the test sample and control sample firms. Now if a firm undertakes stock split in a period experiencing abnormal returns, then this behaviour of the firm would be reflected in the disturbance term. Consequently, we find the Abnormal Return for the j^{th} stock in the t^{th} week is

$AR_{j,t}$= Actual Return of the j^{th} stock in week t – Estimated Return of the j^{th} stock in week t.

$= R_{j,t} - \hat{R}_{j,t}$

$= R_{j,t} - (\alpha_j + \beta_j R_{mt}) = \hat{u}_{j,t}$.

Instead of concentrating on the Abnormal Returns obtained from the behaviour of individual stocks, the study is concerned with the behaviour of companies undertaking split in the market as a whole. So we seek to infer about the abnormal returns from the cross-sectional averages of the estimated regression residuals in the weeks surrounding split dates.

Defining week 0 as the week in which split has occurred, week (+1) as the week just succeeding the split week and week (-1) as the week just preceding the split week, we define Average Abnormal Return for any week (k) [where k = ...-2,-1,0,1,2, ...] as:

$$AAR_k = \sum_{j=1}^{N_k} AR_{j,t} / N_k$$

Here N_k is the number of firms that undertake splits in the week 0 and $AR_{j,t}$is as calculated before.

The Cumulative Average Abnormal Returns around the announcement week is then calculated as

$$CAAR_t = \sum_{k=-Np}^{N_r} AAR_k$$

The CAAR has been calculated at the end of each time period i.e, each week. The time periods begin one year before the 'event' (-Np) and end one year after the 'event' (N_r).

Using the values of AAR and CAARs, the study uses a number of tests to judge the existence of semi strong form efficiency in the Indian stock market.

A linear trend line has been estimated for the CAAR and tested for a statistically significant slope coefficient. The CAARs are regressed against the integer values of the week relative to the announcement week for the whole two-year period.

$CAAR_t = g + ht + \varepsilon_t$

The t-statistic of the slope coefficient [i.e., $\hat{h}/SE(\hat{h})$] indicates the statistical significance of the slope coefficient. However, this regression analysis may suffer from auto-correlation problem in the error term. In such case, the least square estimates are unbiased and consistent but not efficient. In the presence of auto-correlation (to be detected by D-W statistic) we have applied Cochrane-Orcutt two-step procedure to solve it.

If the information around the event of stock split announcement becomes new and significant in relation to the market price of the firm's stock, then it can be expected that there will be significant difference in the weekly Actual Average Returns (week -54 to week +55) and the weekly Estimated Average Returns (week -54 to week +55). If a significant risk adjusted difference is observed, then the alternative hypothesis is supported that this type of information, in fact, significantly increases stock prices. To statistically test for a difference in the weekly Actual Average Returns (for the firms over the time periods, week -54 to week +55) and the weekly Estimated Average Returns (for the firms over the time periods, week -54 to week +55), a paired t-test has been conducted inthe study:

$t = \bar{d} / (s/\sqrt{n})$

which follows t- distribution with (n-1) d.f.

where n = number of pairs of observations of AARs and EARs,

$s^2 = \sum_{i=1}^{n} (d_i - \bar{d})^2/(n-1)$ is the variance of the

and $\bar{d} = \sum d_i / n$ (i=1,2,…,n)

and difference $d_i = AAR_i - EAR_i$

All the tests performed so far are parametric in nature, in that the specific assumptions have been made about the distribution of abnormal returns. Alternative non-parametric approaches, which are free of specific assumptions concerning the distribution of returns for event studies, like the sign test or the rank test can be used. We use the non-parametric sign test to check whether positive abnormal returns do, in fact, follow stock split announcement. A sign test, which is based on the sign of the abnormal return, requires that the abnormal returns (or more generally CAAR) are independent across securities and that the expected proportion of positive abnormal returns under the null hypothesis is 0.5. The basis of the test is that under the null hypothesis it is equally probable that the CAAR will be positive or negative, whereas the alternative hypothesis is that there exists a positive abnormal return associated with a given event. Then the hypotheses can be stated as: H_0 : p = 0.5 and H_a : p > 0.5 where $p = Pr(CAAR_t > 0)$. We calculate the test statistics J as:

$J = [(N^+ / N) - 0.5] \sqrt{N} / 0.5 \sim N(0, 1)$

Where N^+ = Number of cases where CAAR is positive.

N = Total number of cases.

A weakness of the sign test is that it may not be well-specified if the distribution of CAAR is skewed leading to the fact that the expected proportion of positive abnormal returns may not be equal to one-

half even under the null hypothesis (however, this problem is prominent for daily returns and not for weekly returns).

Empirical Results

Binomial Proportionality Tests

Table 2 illustrates the industry-wise break-up of split stocks. It is noticed that the maximum number of share splits are from computer and software industry followed by pharmaceutical industry which may be due to the soaring prices of these industries' shares. The representation from ten major industries and seven minor industries shows that stock split is an accepted policy action by Indian firms irrespective of the industry type.

Table 3 shows the ratio-wise (i.e., extent of) stock split in different categories. Categorisation into three groups A, B and C is made here based on the split ratio. Category A includes the firms which went for a split with less than 1:5 ratios, category B includes those firms that had a split ratio between 1:5 and 1:9, and firms with a split ratio of 1:10 and above are included in category C.

Based on 477 daily return comparisons, there are 268 cases in which squared return in the post-split effective period (R_2^2) is greater than the squared return in the post-split announcement period (R_1^2) i.e, the probability $P(R_2^2 > R_1^2)$ = 268/477 = 0.56184486. On comparing the pre-split and post-split returns, we find that there are 243 cases in which the squared return in the pre-split announcement period (R_{-1}^2) is greater than the squared return in the post-split announcement period (between split effective date and split announcement date) i.e, $P(R_{-1}^2 > R_1^2)$ = 243/466 = 0.52145923. Assuming independence across observations, the related simple binomial z-statistic for $P(R_2^2 > R_1^2)$ is √477 (0.56184486-0.5) 2 = 2.701424261 and for $P(R_{-1}^2 > R_1^2)$ is √466 (0.52145923 – 0.5) 2 = 0.926482218. Though there might be some time-series interdependence for a given split and similarly some cross-sectional interdependence for a given date, yet most of the observations are observed as independent. Since these constitute the majority of the observations, a z-statistic based on the independence assumption can be accepted. We find that the result is statistically significant at 5% level for $P(R_2^2 > R_1^2)$ while for $P(R_{-1}^2 > R_1^2)$ it is insignificant. Thus in more than 56% cases, return in the post-split effective period is significantly greater than the corresponding return of the particular stock in the pre-effective post-announcement period. Even though the pre-split announcement period return is also greater than the post-split announcement, pre-effective period return in more than 52% cases but the result is not statistically significant.

The concept of an informationaly efficient market, in which 'prices respond instantaneously and in an unbiased fashion to new information', is obviously inconsistent with the statistically significant return differences that exists in the pre- and post-stock split effective period. However the present study is unable to definitely and consistently conclude about the inefficiency of the stock market as the differences between returns in the pre-split and post-split announcement periods are not statistically significant.

Regression Analysis

In this section, the average abnormal return (AAR) and cumulative Average Abnormal Return (CAAR) at the end of each time period i.e, a week for both the test and control sample firms have been calculated (the list of test and control sample firms given in Table 4). The first sub-section deals with the paired t-test results of the hypothesis testing of significant differences between the Actual Average Weekly Returns and the Expected Average Weekly Returns for both the test and control sample firms. A linear trend line was fitted to the weekly CAAR values for the test and control sample firms for the just preceding pre-split year and the just succeeding post-split year relative to the announcement year and the statistical significance of the slope coefficients noted and compared in the next sub-section Finally, sub-section deals with the sign test results of the weekly CAAR values of the test and control sample firms for testing the null hypothesis that the positive or negative abnormal returns are equally probable in case of an efficient market.

Paired T-Test Based on AAR

If the market reacts to the announcements of stock split, it would be expected that there remains a significant difference in the Weekly Actual Average Returns and the Weekly Expected Average Returns. The paired t-test is conducted to statistically test for such a difference of returns separately for the test and control sample firms over the period from -54th to +54th week. From the tabulated results in Table 5 we get a t-value of 5.359063 for the test sample firm and 0.003329 for the control sample firms. The insignificant value of t-statistics for the control sample firms establishes the fact that there is no statistically significant difference between the actual and expected average returns over our study period of two years divided equally on either side of the split announcement week. In contrast, the test sample shows a statistically significant result at 1% level of significance, which leads to the conclusion that there exists difference in the Weekly Actual Average Returns and Weekly Expected Average Returns. The results thus negate the null hypothesis of no differences between the above two return values thereby supporting the significance of the stock split information around the event date.

Test on Slope Coefficient based on CAAR

Regressing the CAARs for both the test and control sample firms against the integral values of the week relative to the announcement week (i.e., estimation of linear trend on CAAR) for the whole two-year period provided us with two sets of constant and slope estimates along with their corresponding values of t- statistic (Table 6). The slope coefficient for the test firm is 0.010 while for control firms it is 0.005. The t-statistic values for both the sets of sample firms show that the estimates are highly significant which, in turn, implies market inefficiency.

Sign Test

As the sign test on the cumulative average abnormal returns for both the test and control sample firms is based on the premise that the expected proportion of the acceptance of null hypothesis is 0.5

but this hypothesis holds only if the distribution of CAAR is not skewed, so we construct the frequency distribution of the CAAR of both the test and control sample firm and from therein we plot the histogram. Next, we draw the normal curve to check the skewness of the CAAR series. We find that the distribution of CAARs for both the test and control sample firm is not skewed (however, the drawings of the respective figures are not reported here). Consequently, the sign test can be safely applied in our study. Noting the number of cases where CAAR is positive for both test sample ($N^+ = 106$) and control sample firms ($N^+ = 106$), we find that the test statistics (J*) for both of them is 9.72531841 which is found to be significant at one percent level. Therefore, the null hypothesis that 'it is equally probable that the CAAR will be zero or negative following a split announcement' is rejected and the alternative hypothesis that there is a positive abnormal return associated with the given event (here stock split) is accepted. So the sign test supports the findings derived earlier.

Conclusion

The study checks the semi-strong form efficiency of the Indian stock market on the basis of publicly available information regarding stock splits for the continuously listed NSE stocks using daily as well as weekly price data and a host of tests on the basis of the binomial proportionality tests it has been found that there exists a statistically significant return difference between the pre- and post-split effective period but the return differences between the pre- and post- split announcement period is not statistically significant. Nonetheless, the concept of an informationally efficient market in which prices respond instantaneously and in an unbiased fashion to new information is obviously inconsistent with the presence of significant return differences between these periods.

Unlike other studies which uses the regression analysis on the average abnormal returns (AAR)and cumulative average abnormal returns (CAAR) of the test and control sample firms to show the differences and severity in the effects of trend values of both these two categories of sample firms over time, the present study in contrast, uses the AARs and CAARs for Paired t-test, sign test to infer whether there indeed exist any differences in the pre- and post- announcement period returns of these two categories of sample firms. The Paired t-test shows thepresence of significant difference in the Weekly Actual Average Returns and Weekly Expected Average Returns for the test sample firms in sharp contrast to the insignificant differences between the above two sets of values for the control sample firms. This amply supports the presence of significant reaction to stock split around the event date. Presence of significant trend values when the CAARs of the test and control sample firms are regressed against the integral values of the week (relative to the announcement week) also implies market inefficiency. The result of the sign test also supports the conclusions derived from the above tests and points that there exists a positive return following a split announcement for both the categories of firms. Thus it can be concluded that the Indian stock market is not semi strong form efficient on the basis of the sample of firms selected from the NSE for the period of our study.

References

1. Akhigbe, A.; Gosnell, T. and Harikumar, T.(1998): Winners and losers on NYSE: A Re-Examination Using daily Closing Bid-Ask Spreads, Journal of Financial Research,21.
2. Alexander,J; Goff, D and Peterson, P. (1989): Profitability of a Trading Strategy based on Unexpected Earnings, Financial Analysts Journal, Vol.45 (July/ Aug).
3. Ariel, R.A.(1987): A Monthly Effect on Stock Returns, Journal of Financial Economics, 18.
4. Atkins, Allen B., and Dyl, Edward, A.(1990): Price Reversal, Bid-Ask Spreads, and Market Efficiency, Journal of Financial and Quantitative Analysis, 25.
5. Bachelier,L.J.B.A. : The´orie de la spe´culation, Paris: Gauthier-Villars. Reprinted in P. H. Cootner (ed.), The Random character of Stock Market, Cambridge, Mass., M.I.T. Press, 1964.
6. Ball,R. and Brown, P. (1968): An Empirical Evaluation of Accounting Income Numbers, Journal of Accounting Research, Vol.6 (Autumn).
7. Banz, W.(1981): The Relationship Between Return and Market Value of Common Stock, Journal of Financial Economics, 9.
8. Brennan,M.J. and Copeland, J.E. (1988): Stock Splits, Stock Prices, and Transaction Costs, Journal of Financial Economics, Vol.22.
9. Ball, R. and Watts, R. (1972): Some Time Series Properties of Accounting Income Numbers, Journal of Finance, Vol.27.
10. Cootner, P.H. (1962): "Stock Prices: Random Vs Systematic Changes", Industrial Management Review, Vol.3, No. 2. (Spring).
11. ---------(1964): Editted. The Random Character of Stock Market Prices, Cambridge: MIT Press.
12. Cooper, R.V.L. (1974): Efficient Capital Markets and the Quantity Theory of Money, Journal of Finance, (March).
13. Cox, D.R., and Peterson, D. R.(1994): Stock Returns following Large One-Day Declines: Evidence on Short- Term Reversals and Longer – Term Performance, Journal of Finance, 49.
14. Chan, K.C.;Gup,B.E. and Pan,M. (1992): An Empirical Analysis of Stock Prices in Major Asian Markets and United States, The Financial Review, Vol.27, No.2, (May).
15. Copeland, T. (1979): Liquidity Changes following Stock Splits, Journal of Finance, Vol.34.
16. Chan,L.; Jegadeesh, N. and Lakonishok, J. (1996): Momentum Strategies, Journal of Finance, Vol.51.
17. Chan, W.S. (2003): Stock Price Reaction to News and No News: Drift and Reversal after Headlines, Journal of Financial Economics, Vol.70.
18. Cross,F. (1973): The Behaviour of Stock Prices on Fridays and Mondays, Financial Analysts' Journal, Vol. 29, (November/December).

19. De Bondt, W. and Thaler (1985): Does the Stock Market Overreact? Journal of Finance, Vol.40.
20. ---------(1987): Financial Decision-making in Markets and Firms: A Behavioural Perspective. In: Jarrow, R. et al. (Eds.), Handbooks in OR and MS, Vol.9, Elsevier, Amsterdam.
21. Enders, W. (1995): Applied Econometric Time Series, John Wiley and Sons, Inc., US.
22. Pilotte, E. (1997): Earnings and Stock Splits in the Eighties, Journal of Financial and Strategic Decisions, Vol.10, No.2.
23. Fama, E. : (1970): A Review of Theory and Empirical Work, Journal of Finance, Vol 26, (May).
24. ----------(1991): Efficient Capital Markets II, Journal of Finance, Vol.46, No.5.
25. ----------(1995): Random walks in Stock Market Prices, Financial Analysts Journal, (January/February).
26. ----------(1998): Market Efficiency, Long-Term Returns, and Behavioural Finance, Journal of Financial Economics (September).
27. Fama, E.; Fisher,L.; Jensen, M. and Roll, R. (1969): The Adjustment of Stock Prices to New Information, International Economic Review, Vol.10, (February).
28. Gibbons, M.R., and Hess, P.(1981): Day of the Week Effects and Asset Returns, Journal of Business, 54.
29. Granger, C.W. and Morgenstern, D. (1963): The Special Analysis of New York Stock Market Prices, Kyklos.
30. Grossman, S.J. and Stiglitz, J.E. (1980): On the Impossibility of Informationally Efficient Markets, American Economic Review,Vol.70.
31. Gujarati, D. (1988): Basic Econometrics, Second Edition, McGraw-Hill Book Company.
32. Grinblatt, M.; Masulis, R. and Titman, S. (1984): The Valuation Effects of Stock Splits and Stock Dividends, Journal of Financial Economics, Vol.13, (December).
33. Harris (1986): A Transaction Data Study of Weekly and Intradaily Patterns in Stock Returns, Journal of Financial Economics, Vol.16.
34. Jegadeesh, N. and Titman, S. (1993): Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, Journal of Finance, Vol.48.
35. Jaffe, J. and Westerfield, R. (1985): The Weekend Effect in Common Stock Returns: International Evidence, Journal of Finance, Vol.40.
36. Jaffe, J.; Keim, D.B. and Westerfield, R. (1989): Earnings Yields, Market Values and Stock .Returns, Journal of Finance, Vol.44.
37. Jegadeesh, N. (1987): Predictable Behaviour of Security Returns and Tests of Asset Pricing Models, Ph.D. Dissertation, Columbia University.
38. ---------(1988): Seasonality in stock Price Mean Reversion: Evidence from the US and the UK, Working Paper, UCLA.
39. Kahneman, D., and Tversky, A.(1982): Intuitive Prediction; Biases and Corrective Procedures in D. Kahneman, P. Slovic and A Tversky (eds), Judgement under Uncertainity: Heuristic and Biases (New York, NY: Cambridge University Press).
40. Keim, D.B. and Stambaugh, R. (1984): A Further investigation of the Week-End Effect in Stock Returns, Journal of Finance, Vol.30.
41. Keim, D.B. (1988): Stock market Regularities: A Synthesis of the Evidence and Explanations, in: E. Dimson, ed. Stock Market Anomalies, Cambridge University Press, Cambridge.
42. Larson, S.J., and Madura, J.(2003): What Drives Stock Price Behaviour Following Extreme One-Day Returns, Journal of Financial Research, 26.
43. Lo, A.W. (1997): Market Efficiency: Stock Market Behaviour in Theory and Practice, Vols. 1 and 2, Cheltenham, UK, Edward Elgar Publishing Co.
44. Lo, A.W. and MacKinlay, K.C. (1988): Stock market Prices Do Not Follow Random Walk, Evidence from a Simple Specification Test, Review of Financial Studies, Vol.1.
45. ----------(1997): The Econometrics of Financial Markets, Princetown University Press, Princetown , NJ.
46. ---------- (1998): A Non –Random Walk Down Wall Street,Princetown University Press, Princetown , NJ.
47. Lakonishok, H.J. and Levy,M. (1982): Week-End Effects on Stock Returns: A Note, Journal of Finance, Vol.37.
48. Loughan, T. and Ritter, J.R. (1995): The New Issues Puzzle, Journal of Finance, Vol.50.
49. Ma, Y., Tang, Alex P., and Hasan, T.(2005): The Stock Price Overreaction Effect: Evidence on Nasdaq Stocks, Quarterly Journal of Business and Economics, 44, No. 3/4.
50. Moore, C. (1964): Some Characteristics of Changes in Common Stock Prices, in P.Cootner (ed.): The random Character of Stock Market Prices, Cambridge ,Mass.,M.I.T. Press.
51. Mohanty, P. (1997): EPS: Its Forecasting and its Relationship with Stock Returns, Unpublished Doctoral Dissertation, IIM, Bangalore.
52. Masulis, M.(1980a): Stock Repurchase by Tender Offer: An Analysis of the Causes of Common Stock Price Changes, Journal of Finance, Vol.35.
53. ---------(1980b): The Effects of Capital Structure Change on Security Prices: A Study of Exchange Offers, Journal of Financial Economics, Vol.8.
54. ----------(1983): The Impact of Capital Structure Change on Firm Value: Some Estimates, Journal of Finance, Vol.38.
55. Muscarella, C.J. and Vetsuypens, M.R. (1996): Stock Splts: Signalling or Liquidity? The Case of ADR 'Solo Splits', Journal of Financial Economics, Vol.42.
56. McNichols, M. and Dravid, A. (1990): Stosk Dividends, Stock splits and Signalling, the Journal of Finance, Vol.XLV, No.3, (July).
57. Obaidullah, M. (1990a): Stock Prices Adjustment to Half-Yearly Earnings Announcements – A Test of Market Efficiency, Chartered Accountant, Vol.38.

58. ---------(1991): Stock Market Efficiency in India: A Statistical Inquiry, Chartered Financial Analyst, July.
59. ----------(1991): The Price-Earnings Ratio Anomaly in Indian Stock Markets, Decision, Vol.18, No.3.
60. Praetz, P.D. (1982): The Distribution of Share Price Changes, Journal of Business, (January).
61. Panas, E. (1990): The Behaviour of the Athens Stock Prices, Applied Economics, Vol.22.
62. Poshakwale, S. (1996): Evidence on the Weak-Form Efficiency and the Day-of-the Week-Effect in the Indian stock Market, Finance India, Vol.10, No.3.
63. Rao, N. and Mukherjee, K. (1979): Random Walk Hypothesis: An Empirical Study, Arthaniti, Vol. XIV.
64. Reinganum, M.R.(1983): The Anomalous Stock Market Behaviour of Small Firms in January: Empirical Tests for Tax-Loss Selling Effects, Journal of Financial Economics, 12.
65. Rogalski, R. (1984): New Findings Regarding Day-of-the-Week Return over Trading and Non-Trading Periods, Journal of Finance, Vol.39.
66. Rao, S.N. (1994): The Adjustment of Stock Prices to Corporate Financial Policy Announcements, Finance India, Vol.8, No.4.
67. Rao, K.C. and Manickaraj, M. (1993): Information Content of Financial Statements and Equity Stock Prices in India, Finance India, Vol.7, No.2.
68. Sharma, J.L. and Kennedy, R.E. (1977): A Comparative Analysis of Stock Price Behaviour on the Bombay, London and New York Exchanges, Journal of Financial and Quantitative Analysis, September.
69. Stambaugh, Robert F.(1999): Predictive Regressions, Journal of Financial Economics, 54.
70. Solnik, B. and Bousquet, L. (1990): Day-of-the-Week-Effect on the Paris Bourse, Journal of Banking and Finance, Vol.14.
71. Srinivasan, R. (1997): Security Price Behaviour Associated with Rights Issue – Related Events, ICFAI Journal of Applied Finance, Vol.3, No.1.
72. Worthington, A.C. and Higgs, H.O. (2006): Evaluating Financial Development in Emerging Capital Markets with Efficiency Benchmarks, Journal of Economic Development, Vol.31.

Table 1

Sample of Companies[a] used for Binomial Proportionality Test

1	ACC
2	Elgi Tread India Limited
3	Suven Life Science
4	Wockhardt
5	Bajaj Hindustan
6	PRICOL
7	SKF India
8	HindustanSanitaryware
9	LG Balakrishnan and Brothers
10	DSJ Communications
11	Nicholas Piramal
12	Sun Pharma
13	Unichem Laboratories
14	Asahi India Glass
15	MICO
16	TVS Motor Company
17	Madras Cement
18	D-Link
19	Carborundum
20	Subhash Projects
21	Sona Koyo Steering
22	Shanthi Gears
23	Berger Paints
24	Cipla
25	Ashok Leyland
26	Balaji Telefilms
27	Sundaram Fasteners
28	Dr. Reddy's Labs
29	Dynacons Systems
30	Rupangi Impex
31	Havell'sIndia
32	MIRC Electronics
33	Glenmark Pharma
34	Aurobindo Pharma
35	Jindal Stainless
36	Aftek Infosys
37	VikasWsp
38	FDC Limited
39	Panacea Biotec
40	Jagsonpal Pharma
41	Morepen Labs
42	Jubilant Organ
43	KPIT Cummins
44	Balrampur Chini
45	Surana Telecom

Table 2

Industry-wise Details of Stock Splits Companies[a]

Industry	Number of Firms	Percentage[b]
Auto & Auto Ancillaries	10	7.09
Chemicals	08	5.67
Construction	11	7.80
Computers-Hardware & Software	26	18.44
Diversified	18	12.77
Engineering	11	7.80
Entertainment	11	7.80
Pharmaceuticals	21	14.89
Textiles	06	4.26
Others	19	13.48
Total	141	100.00

Notes

1. Percentage of firms belonging to a particular industry out of the total number of firms that announced stock splits within our study period.
2. Excluding firms as mentioned in text.

Table 3

Categorisation of Firms Based on Stock Split Ratio

Category	Stock Split Ratio	Number of Firms	Percentage
A	Less than 1:5	28	19.86
B	Between 1:5 & 1:9	46	32.62
C	1:10& above	67	47.52
Total		141	100.00

Table 4
List of Test Sample[a] and Control Sample[b] Firms used for Regression Analysis

Company Name	
Sample Firm Control Firm	Amtek Auto Sundaram Clayton
Sample Firm Control Firm	PRICOL Ltd. SiemensVDO
Sample Firm Control Firm	Ashok Leyland Ltd. Eicher Motors
Sample Firm Control Firm	Indian Hume Pipe VisakaInds.
Sample Firm Control Firm	Madras Cement Dalmia Cement
Sample Firm Control Firm	Berger Paints Snowcem
Sample Firm Control Firm	Gammon India Hindustan Const.
Sample Firm Control Firm	Subhas Projects IRD Cem.
Sample Firm Control Firm	LG Balakrishnan Flex Enginnering
Sample Firm Control Firm	Aftek Infosys Hexaware
Sample Firm Control Firm	BalrampurCinni Shakthi Sugars
Sample Firm Control Firm	GlenmarkPharma J.B.Chem&Pharma.
Sample Firm Control Firm	AurbindoPharma Cadila Health
Sample Firm Control Firm	Cipla Cadila Health
Sample Firm Control Firm	Unichem Labs. NatcoPharma
Sample Firm Control Firm	Wockhardt Cadila Health

Table 5
Estimated Results on Paired t-test* for the Differences between Weekly Actual Average Returns and Weekly Estimated Average Returns for the Test and the Control Sample Firms

Week	d_i(test)[a]	d_i(control)[b]
-55	0.0057619	0.00226757
-54	-0.0062734	0.00142505
-53	-0.0026548	0.00530801
-52	-0.0097749	0.00393746
-51	0.020206	0.0027505
-50	0.0343765	0.00447612
-49	0.0228782	0.00607797
-48	-0.0019647	0.00702736
-47	0.0144901	0.00645967
-46	0.0126905	0.00576227
-45	0.005888	0.00606698
-44	0.0110773	0.0072394
-43	0.0470677	0.00358695
-42	0.013923	0.00340176
-41	0.0371731	0.00768417
-40	0.0109255	0.00332162
-39	0.0243802	0.00604843
-38	0.0075147	0.00231977
-37	0.0267321	0.0059646
-36	0.0093241	0.00851769
-35	0.0027509	0.00163343
-34	0.0050575	0.00564685
-33	0.0103622	0.00554396
-32	0.0244014	0.00442909
-31	-0.0229902	0.00125545
-30	0.0066969	-0.00212022
-29	-0.0010326	0.00082802
-28	-0.0006326	0.00455963
-27	0.0101548	0.00804984
-26	-0.002713	0.00506754
-25	0.0320009	0.00250086
-24	0.0049624	0.00360891
-23	0.022447	0.0088743
-22	0.0066903	0.00259145
-21	0.0038429	0.00326952
-20	0.01608	-0.00138946
-19	-0.0032216	0.00462499
-18	0.0409336	0.00577774
-17	0.0319811	0.00235013
-16	-0.0096527	-0.00085462
-15	0.0008527	0.00418715
-14	0.0144629	0.00548102
-13	0.0284363	0.0020073
-12	0.0003849	0.00119664
-11	0.0099687	0.00476266
-10	0.039269	0.00764259
-9	-0.0081928	0.00631914
-16	-0.0096527	-0.00085462
-15	0.0008527	0.00418715
-14	0.0144629	0.00548102
-13	0.0284363	0.0020073
-12	0.0003849	0.00119664
-11	0.0099687	0.00476266
-10	0.039269	0.00764259
-9	-0.0081928	0.00631914
-8	0.0002905	0.0020082
-7	0.017896	0.00249754
-6	0.032791	0.00417211
-5	-0.0342562	0.00438171
-4	-0.0153383	0.00134336
-3	-0.0005883	0.00171866
-2	-0.211123	0.00479482
-1	0.0536883	0.00594331
0	0.0195061	0.00014611
1	0.0259275	0.00067282
2	0.0506692	0.0055192
3	0.0211394	0.00863564
4	0.0452149	0.00387585
5	-0.0193127	0.00193427
6	0.0362873	0.00272156
7	0.0680048	0.00728072
8	0.0026395	0.00537889
9	-0.0038315	0.00168203
10	0.0167494	-0.00463228
11	0.0122153	0.0028547
12	0.0254262	0.00343079
13	0.167794	0.0050765
14	-0.0140303	0.00197219
15	0.0343832	-0.00094884
16	0.0381042	0.0085512
17	-0.000981	0.00449069

18	-0.0006522	0.00273268
19	0.0252875	0.00114066
20	0.0307489	0.0074949
21	-0.0083515	0.0052268
22	-0.0116281	-0.0003655
23	0.0291321	0.00285425
24	0.0342668	0.00382607
25	0.0315202	0.00514862
26	0.0082187	-0.00081272
27	0.0261486	0.00067528
28	0.0235031	-0.00337271
29	0.0332539	0.00636361
30	0.0245539	0.00047642
31	-0.0104311	0.00411451
32	0.0275022	0.00192265
33	0.0195563	0.00422048
34	0.0289707	0.00873871
35	0.0275956	0.00798311
36	0.020393	-0.00011694
37	0.0210903	0.00342923
38	0.0100226	0.00641117
39	0.0059734	0.00160776
40	0.0371233	0.00013988
41	-0.0097483	0.00372454
42	0.0012643	0.00388763
43	0.0101463	0.00322072
44	-0.0056488	0.00104464
45	-0.0036318	-0.00614907
46	0.0133652	0.00205217
47	0.0261283	0.004943
48	-0.0033484	0.00741298
49	0.0169929	0.00867537
50	0.0501661	0.00398112
51	0.0540664	0.00676671
52	-0.0208839	0.0048027
53	-0.0149218	0.00330362
54	0.0059991	-0.00658652

KEYS

1. d_i(test) implies differences between weekly actual average returns and weekly estimated average returns for the test sample firms.
2. d_i(control) implies differences between weekly actual average returns and weekly estimated average returns for the control sample firms.

Note

*Paired t-test is conducted for the differences between the weekly actual average returns (AAR) and weekly estimated average returns (EAR) for the test and the control sample firms by using $t = \bar{d} / (s/\sqrt{n})$ which follows t-distribution with (n-1) d.f. Here, n = number of pairs of observations of AARs and EARs; $s^2 = \sum(d_i - \bar{d})^2 / (n-1)$ is the variance of the differences di = AARi – EARi and $\bar{d} = \sum d_i / n (i = 1,2, \ldots\ldots, n)$.

Week (-54) implies fifty-four week before split announcement week while week (+54) implies fifty-four week after announcement and so on.

Table 6

Regression Estimates of the CAAR[a] Values of TEST[b] and CONTROL[c] Firms against the Integral Values of the Week Relative to the Split Week

Type of Firm	Estimates		Statistic on Slope Coefficient		DW[#]
	Intercept	Slope Coefficient	t-Stat	Significance	
Test Firms	0.480	0.010*	70.393	.000	1.83
Control Firms	0.236	0.005*	37.816	.000	1.89

KEYS

1. CAAR implies Cumulative Average Abnormal Return which is calculated as in text.
2. Test firms refer to those firms that have undergone split in the study period.
3. Controlfirms refer to those firms that have not undergone split in the study period but match with their test mates in terms of certain characteristics (see text).

#: DW implies Durbin-Watson test statistic calculated to check the presence or absence of autocorrelation problem.

Notes

CAARs are regressed against the integer values of the week relative to the announcement Week (t=0) for one year prior to and one year subsequent to the announcement week by fitting a linear trend line: **$CAAR_t = a + bt + \varepsilon t$**

* implies coefficient is significant at 1% level.