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Testing the Efficiency of the Indian Stock Market in the Post-Reform Period

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Abstract

The scenario of productive and economic efficiency of an economy is governed to a large extent by the effective mobilization and distribution of savings into productive channels of investment. The extent, to which security prices would truly reflect the real worth and potentiality of the companies issuing the shares, reflects the market efficieny. Thus, the main objective of the paper is to test the efficiency of the Indian stock market in its semi-strong form on the basis of the publicly available information regarding stock splits after the introduction of the various financial sector reforms.

From a complete list of 313 stock split companies during the study period (1998-2005), the study excluded firms on the basis of certain criteria and categorised the remaining 69 firms as 'Test Sample'. A 'Control Sample' was also constructed by matching every company that had a stock split announcement with a company that belonged to the same industry but did not have any such announcements. Using a market model and weekly returns data, the study calculated the Abnormal Return for each week for both the test and control sample firms. Finally, Average Abnormal Returns and Cumulative Average Abnormal Returns were calculated at the end of each period. The significance of the AAR was tested using t-test and also both AAR and CAAR values were plotted graphically against time. The study found no significant stock price reaction of the test sample companies from the t-test analysis. However the CAAR curves for both the test and control sample firms show an increasing trend much before the announcement week which implies that the market is able to anticipate the event beforehand, thereby validating the Efficient Market Hypothesis. However the presence of a steep increasing trend in the periods subsequent to the announcement week points to the presence of learning lags in case of test sample firms which contradicts the Efficient Market Hypothesis.

Keywords: Market Efficiency, Stock Splits, Abnormal Return, Learning Lags.

Introduction

The scenario of productive and economic efficiency of an economy is governed to a large extent by the effective mobilization and distribution of savings into productive channels of investment. The securities market, by providing fair prices to various types of instruments, tries to suit to the diverse whims of a significant number of savers taking into consideration the liquidity, profitability and risk elements in their investments. The ability of the corporate sector to mobilise funds through capital markets depends on the efficient functioning of the stock exchanges. The extent, to which security prices would truly reflect the real worth and potentiality of the companies issuing the shares, reflects the market efficiency. The Efficient Market Hypothesis (EMH) states that stock prices reflect all available information so that prices are near their intrinsic value. Market efficiency has an influence on the investment strategy of an investor. One of the most important functions of the capital market is to canalise resources for productive use. It can perform this function effectively only if it is able to build up investors' confidence by ensuring that the expected return from an investment opportunity is commensurate with the risk associated with it both in the primary and the secondary markets. Of the three forms of market efficiency, defined by Fama (1970) namely, weak, semi-strong and strong forms, each one is concerned with the adjustment of stock prices to one relevant information subset. We concentrate on testing the semi-strong form efficiency of the Indian stock market. The market is said to be semi-strong form of efficient, if on the basis of the information set which includes 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.

Objectives of the Study

We know that from the late 1980s and more pronouncedly from the mid-90s, the Indian financial market underwent drastic changes with far-reaching and long-term implications. This led us to select the time period of our study from 1st April, 1998 to 31st March, 2005 that enabled us to gauge the effects of the initial changes which were initiated in the Indian stock market from later half of 1990s. The logic behind our choice of the study period spanning seven years in one of the most eventful periods in the history of the Indian financial market allowed us to examine the effects of the introduction of the electronic trading, more stringent disclosure norms, abolition of 'badla', introduction of rolling settlement, relaxation of foreign institutional investment (FII) inflows, etc on the efficiency of the Indian stock market. We have used the NSE Nifty index as a proxy for estimating market return while most of the earlier studies on the Indian stock market have used the BSE data. It should be noted in this connection that Nifty is more broad-based stock index than Sensex and volume of transaction in NSE is now significantly higher than that in BSE. Moreover, the introduction of electronic trading will have a profound effect on the extent to which the exchange will be able to reach out to the far flung corners of the country and this, in turn, may have an impact on the efficiency of the market. We have thus selected a sample of companies which were continuously listed on the NSE throughout our study period.

Thus, the main objective of the paper is to test the efficiency of the Indian stock market in its semi-strong form on the basis of the publicly available information regarding stock splits.

Hypotheses of the Study

There is only one broad-based single line hypothesis for undertaking this research study:

Under the strategy of the introduction of new economic policy measures in the Indian financial market, the stock returns obtained in the pre-announcement period is identical to the stock returns obtained in the post-announcement period and historical stock price data cannot be used for the purpose of future prediction i.e., the Indian stock market is efficient in its semi-strong form during the post-liberalisation period.

From this general hypothesis, we have formulated the following main testable hypotheses:

The Indian stock market is semi-strong form efficient i.e., no abnormal profit can be reaped by the investors in the Indian stock market on the basis of publicly available information regarding stock splits.

The Indian stock market is, in general, semi-strong form efficient in consideration to stock splits and it is not firm-specific.

The paper has been organised in the following way:

The first three sections have been devoted to the introductory analysis (section 1), literature survey (section 2) and database and methodology (section 3). Section 4 deals with the results obtained on testing the efficiency of stock market on the basis of the public announcement of stock splits using regression analysis. Section 5 is the concluding section which summaries the broad findings of the study with interpretations.

Literature Survey

This section reviews the methodology and major findings of the existing studies in the area of semi-strong form of stock market. Though semi-strong form of stock market efficiency can be tested from different angles but we concentrate only on those studies which enquire the effects of the announcement of stock splits.

In general, the tests are based on 'event study' methodology. The usefulness of such a study comes from the fact that given rationality in security market, the effect of an event will be reflected immediately in asset prices. Thus, the economic impact of the event can be measured using asset prices observed over a relatively short time period.

The first study to use the market model as the basis for testing the semi-strong version of the efficient market hypothesis was conducted by Fama, Fisher, Jensen and Roll (FFJR) in 1969. Using monthly returns data, they isolated the influence of the price actions that might be associated with splits by eliminating from the estimating process the data for the month in which the splits occurred as well as the data for fifteen months on each side of it. FFJR considered the logarithmic versions of the market model whereas S. Narayan Rao(1994) applied the linear versions of the market model to examine the stock market's response to corporate financial policies of a) dividend increase b) bonus issues and c) equity rights issue. Both of them calculated the difference between the observed return from their estimated return; Fama did so for 29 months prior to split to 30 months after a split while S. Narayan calculated it for 10 days before to 10 days after the announcement. Next, the studies calculated the cross-sectional averages of the error terms for each month as Average Abnormal Residual and Cumulative Average Abnormal Residuals.

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 and tried to match certain features like growth rates of earnings and cash dividends, announcement return prediction errors with those of the sample firms which had announced stock splits or stock dividends grouped under 'Test Sample'. Grinblatt, Masulis and Titman (1984) employed Mean-Adjusted Returns Methodology as developed by Masulis (1980) where they compared the daily stock price returns on various days around the announcement with the average daily returns for a subsequent benchmark period of forty (4-43) trading days. The study by Ohlson and Penman (1985) tried to avoid the announcement effect of splits by focussing on returns following announcement but preceding the split date and comparing those to returns subsequent to the split date.

On the basis of the graph of the cumulative average residual, FFJR found that it increased up to the month of the split but remained fairly stable for the

next 29 months. Consequently, they concluded that stock splits could be regarded as essentially bullish information and that the market impounded this information in a most efficient manner. However, the studies by S. Narayan Rao, Laknonishok and Lev, Grinblatt et al contradicted the above conclusions of FFJR. Also, the study by Ohlson and Penman (1985) found a statistically significant proportion of cases in which post-split announcement period returns are greater than pre-split announcement period returns. All the above studies, therefore, violated the semi-strong form of EMH.

Database and Methodology

The importance of any empirical studies is generally examined and valued by its database and methodology.

To test the semi-strong form of efficiency of the Indian stock market on the basis of regression analysis, from a complete list of 313 companies that had split during our study period (1998-2005), we excluded 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. 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 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. As daily data would not only mean a voluminous amount of data to be handled but would also increase the short–term volatility which may affect the efficiency of parameter estimation, so 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.

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 concluded that the residuals obtained from fitting the market model to about fifteen months of data on either side of the split date are serially correlated, which 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. 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 sixteen firms (Table1). Finally, we calculated the weekly return data of the stocks as $R_{jt} = \ln P_{jt} - \ln P_{jt-1}$; where P_{jt} is the price of the jth stock in the t^{th} week and for the Nifty 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 then fit the regression of the weekly rate of return provided by an individual security on the general market conditions as $R_{jt} = \alpha_j + \beta_j R_{mt} + u_{jt}$ where α_j and βj are the parameters that vary from security to security and u_{jt} is the random disturbance term. It is assumed that u_{jt} satisfies the usual assumption of OLS. Using the available time-series on R_{jt} and R_{mt}, least squares have been used to estimate α_j and β_j for each of the test and control firms on the basis of returns data for two years before the just preceding year of the stock split year. 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 16 test sample and control sample firms. On the basis of the evidences provided by Fama, Fisher, Jensen and Roll (1969) that the expected values of the residuals obtained from (1) are non-zero in the months close to the split, so that if these months were included in the sample, estimates of α and β would be subject to serious specification error. This condition compelled us to exclude one year of weekly price data on either side of the split date from the estimation of market line. Thus parameters were estimated on the basis of the weekly price data for two years before the just preceding year of the stock split year (Table 2).

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.

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

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

Abnormal Returns so computed are referred to as market adjusted returns [Brown and Warner (1985)]. Instead of concentrating on the Abnormal Returns obtained from the behaviour of individual stocks, we are 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). The behaviour of CAAR provides a picture of the average price behaviour of securities over time. Generally in efficient markets, the CAAR would hover around zero.

The significance of the AAR_k is tested using the t-test as follows:

$$\text{t-statistic} = AAR_k \sqrt{n} / s$$

where AAR_k is the Average Abnormal Return at time k, n is the number of stock splits in the sample and s is the standard deviation of Average Abnormal Returns.

Thus, to determine whether Average Abnormal Returns (AAR) and Cumulative Average Abnormal Return (CAAR) are significantly different from zero or if there is a visible graphical or statistical relationship between time and either AAR or CAAR, their values are plotted against the integral values of the weeks relative to the split announcement week (t = 0) for one year prior to and one year subsequent to t=0. A statistically significant trend in the CAAR would indicate market inefficiency.

Results

CAAR values at the end of each week around the announcement period (period zero) for the just preceding and the just succeeding years are depicted in Table 3 for the test sample firms and in Table 4 for the control sample firms. As is evident from Table 3, the CAAR for the test sample firms experienced an overall increase around the announcement period. This implies that the market reacts in a positive direction. In the absence of any impact, the CAAR would have been hovering around zero. But the steady increase in CAAR values in the pre-announcement period implies that the market was able to anticipate the event beforehand. The value of CAAR during the pre-announcement period ranged from -0.03 to 0.33 and in the post-announcement period it steadily increased from 0.35 to 1.10. In the announcement week the value of CAAR was 0.33. Similar pattern is observed for control sample firms. The CAAR values for the control sample firms also increase steadily throughout the study period although less steeply than the test sample firms. The ranges of CAAR during the pre- and post- announcement periods are respectively -0.01 to 0.23 and 0.26 to 0.50 (Table 4).

The CAAR curves for the test and control sample firms are plotted respectively in Fig 1 in the same plane. In case of both type of firms, an increasing trend is noticed much before the announcement week (week 0). This implies that the market is able to anticipate the event before hand, which highlights the efficiency of the market. The figure also shows that the CAAR curve for the test sample firm rises more steeply than the control sample firm in both the pre- and post-announcement period but the gap between them widens in the latter period. Another important point that comes to the fore is that the CAAR curve is the steepest in the immediate period after announcement for the test sample firms which continues to increase steadily in the next one year of post-announcement period studied, but the effect is much subdued in case of control sample firms. The CAAR curve of the control firm even starts falling after about twenty-one weeks (i.e., after about five months) from the initial week of split announcement. The presence of a steep increasing trend in the periods subsequent to the announcement week points to the presence of learning lags in case of test sample firms. The CAAR curve which declines marginally for the non-split firms, points to the fact that the initial overreaction of the market is followed by a marginal correction.

Conclusion

From the above mentioned findings of the study, it can be concluded that the Indian stock market is not efficient in its semi-strong form. Though the market is able to predict the occurrence of an event before hand, but it fails to completely impound the relevant information by the event announcement date. Further there exists the presence of learning lags and so price adjustments continue even well after the public announcement of the event. This provides enough scope for the average investor to beat the market and reap abnormal profit even after adjusting for the transaction costs associated with the process. Therefore, to establish efficiency in the Indian stock market the policy makers should make appropriate efforts so that market players become well informed regarding the market and market instruments and none can have monopoly access to any relevant information which must be impounded in the market quickly and accurately.

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Table - 1
List of Test Sample[a] and Control Sample[b] Firms used for Regression Analysis

Company Name		Split Announcement Date
Sample Firm Control Firm	Amtek Auto Sundaram Clayton	15.10.04
Sample Firm Control Firm	PRICOL Ltd. SiemensVDO	07.07.04
Sample Firm Control Firm	Ashok Leyland Ltd. Eicher Motors	20.07.04
Sample Firm Control Firm	Indian Hume Pipe Visaka Inds.	24.08.04
Sample Firm Control Firm	Madras Cement Dalmia Cement	06.11.03
Sample Firm Control Firm	Berger Paints Snowcem	24.08.04
Sample Firm Control Firm	Gammon India Hindustan Const.	15.03.05
Sample Firm Control Firm	Subhas Projects IRD Cem.	19.11.04
Sample Firm Control Firm	LG Balakrishnan Flex Enginnering	09.12.03
Sample Firm Control Firm	Aftek Infosys Hexaware	20.01.04
Sample Firm Control Firm	Balrampur Cinni Shakthi Sugars	23.03.05
Sample Firm Control Firm	Glenmark Pharma J.B.Chem & Pharma.	23.10.03
Sample Firm Control Firm	Aurbindo Pharma Cadila Health	23.10.03
Sample Firm Control Firm	Cipla Cadila Health	11.05.04
Sample Firm Control Firm	Unichem Labs. Natco Pharma	16.03.04
Sample Firm Control Firm	Wockhardt Cadila Health	28.04.04

Notes:

a: Test Sample implies a sample consisting of NSE-listed firms announcing stock splits within our period of study.

b: Control Sample implies a sample consisting of firms that did not have a stock split announcement within the study period but matched with those firms announcing splits in terms of certain characteristics (see text).

Table 2
List of 16 NSE-listed Companies that Split their Stocks between 1st April, 1998 and 31st March, 2005 and their Control Mates along with their respective Alphas and Betas.

Company Name		Split Announcement Date	Alpha	Beta
Sample Firm Control Firm	Amtek Auto Sundaram Clayton	15.10.04	$3.00775*(10)^{-4}$ 0.014295	0.144871 0.711178
Sample Firm Control Firm	PRICOL Ltd. SiemensVDO	07.07.04	0.010499 0.005096	-0.047299 0.177418
Sample Firm Control Firm	Ashok Leyland Ltd. Eicher Motors	20.07.04	0.007006 0.19561	0.752193 0.871341
Sample Firm Control Firm	Indian Hume Pipe Visaka Inds.	24.08.04	0.016946 0.009086	0.330607 0.727480
Sample Firm Control Firm	Madras Cement Dalmia Cement	06.11.03	-0.002534 -0.003789	0.085537 0.022760
Sample Firm Control Firm	Berger Paints Snowcem	24.08.04	$4.37881*(10)^{-4}$ -0.006641	0.225193 0.365424

Sample Firm Control Firm	Gammon India Hindustan Const.	15.03.05	0.015427 0.008059	0.304554 0.239926
Sample Firm Control Firm	Subhas Projects IRD Cem.	19.11.04	-0.008123 0.004196	0.686017 0.039149
Sample Firm Control Firm	LG Balakrishnan Flex Enginnering	09.12.03	0.006847 -0.008911	-0.110622 1.036613
Sample Firm Control Firm	Aftek Infosys Hexaware	20.01.04	-0.009259 -0.009237	0.243762 0.896758
Sample Firm Control Firm	Balrampur Cinni Shakthi Sugars	23.03.05	0.006774 0.006599	0.633354 1.666961
Sample Firm Control Firm	Glenmark Pharma J.B.Chem & Pharma.	23.10.03	6.95139*(10)-4 0.004001	0.178085 0.273620
Sample Firm Control Firm	Aurbindo Pharma Cadila Health	23.10.03	-0.007789 -0.003637	0.360021 -0.012938
Sample Firm Control Firm	Cipla Cadila Health	11.05.04	-0.003986 -2.18117*(10)-4	-0.051471 -0.131142
Sample Firm Control Firm	Unichem Labs. Natco Pharma	16.03.04	-0.001428 0.006082	0.326983 -0.388515
Sample Firm Control Firm	Wockhardt Cadila Health	28.04.04	-6.36304*(10)-4 0.001319	-0.096739 0.001319

Table 3
Estimated Values of CAAR[a] for the Test Sample Firms for Different Pre- and Post-Announcement Weeks

Week (relative to split announcement week)	CAAR
-54	00
-53	-0.02
-52	-0.03
-51	-0.03
-50	-0.02
-49	0.00
-48	0.05
-47	0.03
-46	0.03
-45	0.03
-44	0.04
-43	0.05
-42	0.09
-41	0.10
-40	0.12
-39	0.13
-38	0.16
-37	0.17
-36	0.17
-35	0.19
-34	0.18
-33	0.19
-32	0.19
-31	0.21
-30	0.17
-29	0.19
-28	0.19
-27	0.18
-26	0.19
-25	0.19
-24	0.22
-23	0.21
-22	0.22
-21	0.21
-20	0.24
-19	0.25
-18	0.23
-17	0.28
-16	0.30
-15	0.30
-14	0.30
-13	0.31
-12	0.33
-11	0.33
-10	0.33
-9	0.36
-8	0.33
-7	0.34
-6	0.37
-5	0.38
-4	0.36
-3	0.34
-2	0.30
-1	0.33
0	0.35
1	0.38
2	0.42
3	0.44
4	0.45
5	0.49
6	0.46
7	0.52
8	0.57
9	0.56
10	0.56
11	0.58
12	0.60
13	0.62
14	0.62
15	0.61
16	0.65
17	0.68
18	0.67
19	0.67
20	0.69
21	0.70
22	0.67

23	0.69
24	0.72
25	0.77
26	0.77
27	0.76
28	0.76
29	0.78
30	0.81
31	0.83
32	0.83
33	0.86
34	0.86
35	0.88
36	0.91
37	0.92
38	0.93
39	0.93
40	0.96
41	0.98
42	0.95
43	0.96
44	0.96
45	0.96
46	0.98
47	0.98
48	1.00
49	0.99
50	1.02
51	1.07
52	1.10
53	1.06
54	1.05
55	1.03

***Keys*:**

a: CAAR implies Cumulative Average Abnormal Return and is calculated as

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

the time periods begin one year before the event ($-N_p$) and end one year after the event (N_r); AAR_k is the Average Abnormal Return in the period k.

-54 implies fifty-four weeks before the split announcement week and so on.

+54 implies fifty-four weeks after the split announcement week and so on.

Table - 4

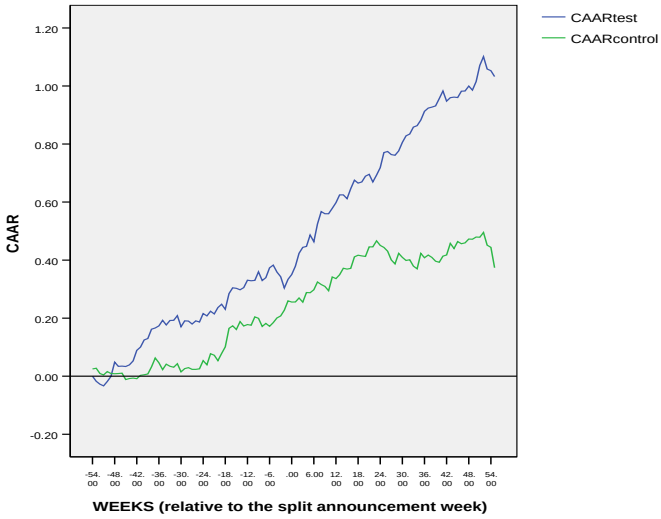
Estimated Values of CAAR[a] for the Control Sample Firms for Different Pre- and Post-Announcement Weeks

Week (relative to split announcement week)	CAAR
-54	.03
-53	.03
-52	.01
-51	.00
-50	.02
-49	.01
-48	.01
-47	.01
-46	.01
-45	-.01
-44	-.01
-43	-.01
-42	-.01
-41	.00
-40	.00
-39	.01
-38	.03
-37	.06
-36	.05
-35	.02
-34	.04
-33	.03
-32	.03
-31	.04
-30	.01
-29	.03
-28	.03
-27	.02
-26	.02
-25	.03
-24	.05
-23	.04
-22	.08
-21	.07
-20	.05
-19	.08
-18	.10
-17	.16
-16	.17
-15	.16
-14	.19
-13	.17
-12	.18
-11	.18
-10	.20
-9	.20
-8	.17
-7	.18
-6	.17
-5	.18
-4	.20
-3	.21
-2	.23
-1	.26
0	.26
1	.26
2	.27
3	.26
4	.29
5	.29
6	.30
7	.32
8	.32
9	.31
10	.29
11	.34
12	.34
13	.35
14	.37
15	.37
16	.37
17	.41
18	.42

19	.41
20	.41
21	.45
22	.45
23	.47
24	.45
25	.44
26	.43
27	.40
28	.39
29	.42
30	.41
31	0.40
32	0.40
33	0.38
34	0.37
35	0.42
36	0.41
37	0.42
38	0.41
39	0.40
40	0.39
41	0.41
42	0.42
43	0.46
44	0.44
45	0.46
46	0.46
47	0.46
48	0.47
49	0.47
50	0.48
51	0.48
52	0.50
53	0.45
54	0.44
55	0.37

Keys: Same as in Table 3.

Figure 1
Graphical Comparison of the Cumulative Average Abnormal Returns of the Test and Control Sample Firms over Different Pre- and Post-Announcement Weeks



Notes:

Time has been measured on the horizontal axis from 54 weeks prior (-54) to the announcement week (week=0) to 54 weeks after the announcement (+54)

Cumulative Average Abnormal Return for the test sample firms (splitting firms) is measured on the vertical axis by the BLUE LINE

Cumulative Average Abnormal Return for the control sample firms (non-splitting firms) is measured on the vertical axis by the GREEN LINE