

The effect of large stock split announcements on prices
of U.S. High Technology stocks

By

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A research project submitted in partial fulfillment of the requirements for the degree
of Master of Finance

Saint Mary's University

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Date: September 17, 2014

Acknowledgements

I would like to thank Allah for giving me the strength to work hard and to finish the research project. I would also like to give a special thanks to Dr. Boabang for supervising and guiding my research paper. My special thanks go to my parents, my brother and sister, my relatives specifically Late Hz Bari Shah, Hz Lutfur Rahman Shah and Gedu Shah for supporting me financially during the period of my study. Finally, I would like to thank all the MFIN professors for their guidance and knowledge especially Dr. Rahaman and Dr. Mahmoud.

Abstract

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An empirical investigation in U.S. technology sector is done in this paper using event study methodology to find out existence of significant abnormal returns surrounding stock split announcements. The average abnormal return was not statistically significant, surrounding stock split announcements over the period 1995 to 2013. Abnormal return was highest on the day following stock split announcement period and then abnormal return dropped significantly every day. The result confirms the rapid adjustment of prices of U.S. high technology stocks to reflect the full effect of the stock split announcements. Most importantly, shareholders value enhances as market react positively for shorter trading days (-5, 0, +5) surrounding stock split announcement.

September 17, 2014

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Chapter 1

Introduction

The main objective of the paper is to investigate the market reaction to large stock split announcements in the technology sector of United States. Stock splits have been the most researched topic over the years, after publishing of classic paper “The adjustment of stock prices to new information” by Fama, Fisher, Jensen and Roll in 1969. Stock Split is a corporate decision which taken by the company that is trading in public. Stock splits aim to increase the number of shares outstanding while the market capitalization remains at the same level. Most common form of stock split is 2-for-1 (2:1). Each shareholder receives one additional share of stock for each one held originally. As a result, stock price of the firm will reduced to half and number of shares outstanding will increase into double. There can be different types of ratios like 3-for-1, 3-for-2, 4-for-1 etc. There are different reasons for a company to decide on stock splits. One reason is that stock price is all time-high or beyond the prices of other companies in the same industry. When this occurs, it is difficult for small investors to buy the company shares as share price is high. With stock split, the stock becomes cheaper and more attractive to small retail investors. Another reason can be that stock split gives more shares which can be useful for completing merger & acquisition.

Different hypotheses have been established about what the stock split announcements actually signal to the market. Most popular hypotheses are - signaling hypothesis, liquidity hypothesis and trading range hypothesis. Ikenberry, Rankine and Stice (1996) described the signaling hypothesis that manager declares stock splits to send informative messages to the market regarding value of the firm. Many papers confirm

the validity of the signaling hypothesis (for example, Asquith, Healy and Palepu (1989), Ikenberry et al (1996)). On the other hand, liquidity hypothesis, also known as optimal trading range hypothesis, seeks to move the price towards an optimal trading range. As a result, the stock becomes more affordable to the investors. Different researchers find the evidence in support of liquidity hypothesis (Baker and Powell (1993), Muscarella and Vetsuypens(1996), Lakonishok and Lev (1987)). Some other hypotheses are also developed over the years. Those are neglected firm hypothesis (Arbel and Swanson (1993)) and self-selection hypothesis (Ikenberry et al. (1996)).

Purpose of the paper

The objective of this paper is to figure out whether there exists abnormal returns in the period surrounding stock split announcements in the U.S. technology sector. Also, the paper investigates whether investors are able to earn abnormal profit from stock split announcements by U.S. technology firms. An empirical test will be done by using event study methodology and a powerful data analysis & statistical software named STATA will be used. A random sample of 102 U.S. firms is selected from NYSE and NASDAQ that announced 2-for-1 or 3-for-1 stock splits between the periods of 1995 to 2013. The sample covers all well-known U.S. technology firms and the study shows the effect of large stock split announcements on the firm's security prices. If an investor cannot earn abnormal profit from stock split announcement, we can conclude that security prices adjust quickly to the information content. If an investor can earn abnormal profit surrounding stock split announcement day, we are able to conclude that prices adjust slowly to the information content. Also, we are going to investigate whether the market thinks whether stock splits are value enhancing or value destroying activities through cumulative abnormal return analysis. If on average the market reacts positively to stock split announcements, then we can rationally conclude that stock

splits are value-enhancing activities. On the other hand, if market reacts negatively to stock split announcements, we can rationally conclude that stock splits are value destroying activities.

The result of the study will be very helpful for the investors whether they can earn abnormal profit surrounding stock split announcement in U.S. market. Recently, many Giant US technology companies like Apple, Google etc. has done stock splits during 2014. So stock split has become a common corporate action for the large firms. Investors really want to know what investors can gain from stock splits and what shareholders can expect from stock splits. Academic researchers and investors can be beneficial from this study.

Organization of the paper

The paper is organized into five chapters. In chapter 1 - introduction about the topic, main objective of the paper, rationale for choosing the topic etc. are discussed. In chapter 2 - Literature review on the topic, previous researches, various schools of thoughts and results are illustrated. In chapter 3 - sources of Data, sample size, methodology, steps in research, hypothesis testing, limitation in obtaining data etc. are showed. In chapter 4 - analysis and interpretation of the result, implication of result etc. are illustrated. In chapter 5 - summary of the findings, conclusion and recommendation are provided.

Chapter 2

Literature Review

Many researches have been done to know the market reaction to stock split announcement. Many researchers have mentioned that stock splits are purely cosmetic events and findings are still puzzling. Some researchers conduct research on the signal conveyed by stock split announcements to the market. Also, price and liquidity effects of stock splits are conducted by different researchers. Moreover, several researches are done on short term and long term performance after stock splits announcements.

2.1 Efficient Market Hypothesis

At the beginning, Fama, Fisher, Jensen and Roll (1969) conducted research on the adjustment of stock prices to new information. In their research, they tried to find out some unusual behavior in the rates of return on a split security in the month surrounding the split. They defined stock split as an exchange of shares where at least five shares are distributed for every four formerly outstanding shares. They choose 940 splits on New York Stock Exchange (NYSE) from 1927 to 1959. They used simple model and concluded that the U.S. stock market is efficient and stock prices adjust rapidly to the new information.

Ikenberry, Rankine and Stice (1996) investigated about what the stock split really signal. They discussed about signaling and trading range hypothesis. Their sample was 1275 two-for-one splits announced by NYSE and ASE firms between 1975 and 1990. They found positive market reaction splitting firm which consistent with signaling hypothesis. They discovered that five day announcement return of 3.38 percent and concluded that split convey favorable information. They also suggested

that long run performance is more favorable for small to medium sized firms. They showed that evidences are consistent with both signaling and trading range hypothesis and there can be third hypothesis which they refer as “self-selection” hypothesis. They argued that if manager choose to deliberately signal via a stock split, the market reaction observed in practice seems comparatively small.

Charest (1978) examined the risk and residual behavior of NYSE common stock splits from 1947 to 1967 period. He found that stock returns are volatile surrounding stock split announcement dates as average beta risk increases continuously. He claimed that NYSE is less efficient in current periods than previous periods in terms of publicly available stock split information.

Wulff (2002) found that significant abnormal return surrounding announcement day and execution day in Germany. Moreover, he discovered that abnormal returns are lower in Germany than in the U.S. around the announcement day of stock splits. Furthermore, he found evidence for signaling hypothesis but he could not find support for liquidity hypothesis.

Rozeff (1998) argued that signaling, liquidity and tick size theories do not apply to mutual fund splits. He found that mutual fund splits do not generate higher return after the splits. Also, he discovered that signaling and tick size motivates corporate managers to split common stocks but signaling and tick size are irrelevant to fund manager to make mutual fund splits.

Guo, Liu and Song (2008) documented the evidence that acquiring firm will more likely to split their stocks prior to stock split announcement dates when acquisition financed by stock and when there is possibility of large dealing. Also, they claimed

that some acquiring firm may announce stock splits to manipulate share price prior to stock swap acquisition to reduce the cost of acquisition.

2.2 Signaling Hypothesis:

Signaling hypothesis suggests that stock split announcement is done to send informative message to the market. Asquith, Healy and Palepu (1989) found that firm announce stock split after significant increase in earning and split announcement leads investor to increase their expectations that past earning increases are permanent. Also, they revealed that there are significant earnings increases in the four years before the stock split announcement. Moreover, they showed that firms that announce stock splits usually outperform the industries in the year prior to the split date. Furthermore, they argued that firms show significant earnings increases in the year of the split and after that, earnings are unrelated to the split announcement return. Finally, they concluded that earning information convey by stock splits.

Grinblatt, Masulis and Titman (1984) discovered that stock price on average react positively to stock dividends and stock split announcement. They showed that firm's stock price increases significantly on the announcement day. Also, they discovered that announcement and ex-date returns were larger for stock dividends than stock splits. Most importantly, they found significant positive abnormal return around the ex-dates of stock dividend and stock splits.

McNichols & David (1990) observed that management choice of split factor signal private information about firm's future earnings. Also, they suggested that price changes at stock split announcement are significantly correlated with split factors as there is strong statistical association between announcement return and split factors.

2.3 Liquidity Hypothesis:

Liquidity hypothesis is form of an optimal trading range hypothesis suggest that firms tend to move their share price back to the optimal level when they think that their share price has gone up substantially.

Baker and Powel (1993) argued that the motive of stock splits is moving the stock price into a better trading range, followed by improving trading liquidity. They showed in their paper that mean preferred trading range of stock split firm is from \$20 to \$35 and the range differs significantly between firms with small (<2-for-1) versus large (\geq 2-for-1) stock splits.

Muscarella and Vetsuypens (1996) stated that market rewards those firms who make their stock more accessible to the investors. They conducted research on stock splits to find out signaling or liquidity in the case of ADR “solo splits”. They found the evidence that liquidity improves following the ADR solo splits and after such split, total volume and the number of trades increase significantly.

Lakonishok and Lev (1987) suggested that stock splits are mainly aimed at restoring stock prices to a normal range. They claimed that in case of stock splits, price correction motive is strongly supported by evidence than the signaling motive.

2.4 Neglected firm Hypothesis:

Arbel and Swanson (1993) found that the magnitude of the announcement effect at the time of the announcement (event day 0 and +1) is greater for information-poor stocks than for information-rich stocks. Also, they discovered that during post announcement period, market price adjustment is rapid for information-rich stocks than information-poor stock. Finally, they suggested that the degree of market

anticipation of stock splits announcement is directly related to the amount of information available for the stock.

Wulff (2002) argued that abnormal returns around the announcement day are negatively related to firm size, not liquidity.

2.5 Stock splits post announcements Return

Byun and Rozeff (2003) measured the post-split announcement of 12747 stocks splits from 1927 to 1996. They claimed that the market inefficiencies in long term as the presence of significant abnormal return which sensitive to time period, method of estimation and sampling. Also, their result showed that buyer and seller of stock splits do not earn abnormal return significantly different from zero.

Boheme and Danielson (2007) got the conflicting result with Byun and Rozeff (2003). Boheme and Danielson (2007) explore the relationship between stock split and subsequent long term return during 1995 to 2000. They argued that firms do not display post-split positive abnormal returns. Also, they found no long term abnormal return following the ex-date.

Ohlson and Penman (1985) found that investors usually concern with absolute price changes than percent changes in price. Also, they suggested that over reaction occur for low priced stock (conversely in case of high-priced stock). Moreover, they showed that thirty percent increase in return of standard deviation subsequent to ex-date.

Desai and Jain (1997) showed that market do not display full effect of stock split announcement in the month of announcement. They found positive drift following stock splits and negative drift following reverse stock splits. They claimed that abnormal returns are higher for those firm that initiate dividends with stock splits.

Also, they explained that long run abnormal returns are negatively correlated with firm size. Above all, they found the evidence that stock split announcement partly signals an increase in dividend.

Summary of Literature Review

Different hypotheses like efficient market hypothesis, signaling hypothesis, liquidity hypothesis, neglected firm hypothesis etc. are developed based on what stock splits actually signal to the market. Some previous studies showed that market is efficient and security prices adjust quickly to the information content. Some research showed that stock splits convey favorable information. Some researcher argued that firm do not display post splits positive abnormal return. Others claimed that there is present of market inefficiency in long term. Some hypothesis may not be related to market reaction on stock splits ex-day. There is enough evidence that acquiring firms may do stock splits to lower the cost of acquisition. Abnormal returns surrounding stock split announcement are differ from country to country. This paper will find out whether investor can earn abnormal return surrounding stock split announcement dates. This paper will also test the consistency of the result of previous researches.

Chapter 3

Data, Sources & Methodology

3.1: Objective of the empirical test

The objective of the paper is find out whether there is an existence of abnormal return surrounding stock split announcements in U.S technology sector. Also, the paper examines whether market reacts differently to stock split announcements from one period to another period.

3.2: Data Sources

Data for this research is collected from Bloomberg terminal, finance.yahoo.com, Wharton Research Data Services (WRDS) and Center for Research in Security Prices (CRSP). A randomly selected sample of 102 U.S. technology companies from the NYSE and NASDAQ that have announced stock splits during the period of 1995 to 2013. The stock split ratios selected are 2-for-1 and 3-for-1 as these ratios are comprehensively used by most researchers for stock split research. Stock splits announcement dates of 102 sample technologies companies have been collected from Bloomberg database. The historical daily stock price return and market return surrounding the announcement date is collected from daily return files of the Center for Research in Security Prices (CRSP) database by using WRDS account.

3.3: Methodology

Objective is to figure out whether there is existence of abnormal returns in period surrounding the announcement day of stock splits. So an event study should be done to determine the impact of stock split announcements on stock price of the company.

Fama et al. (1969) showed conventional methodology for event study. Later, Campbell, Lo and MacKinlay (1997) defined steps for the event study:

Step 1: Define the event and establish the event window

Step 2: Establish firm selection criteria

Step 3: Calculate normal and abnormal returns for securities in the sample set

Step 4: Estimate model parameters using data in an estimation window

Step 5: Conduct tests

Step 6: Present empirical results

Step 7: Interpret results and draw inferences and conclusions

3.4: Steps in Research

The data in this research paper consist of announcement dates of stock split firms, firms historical price return, market index return etc. are collected from Bloomberg and CRSP database. The event study is to be done by following procedures:

1. The event is stock split announcement. At the beginning, event study analysis will be done around -5, 0, +5 where -5 is the five trading days prior to the stock splits announcement, 0 is the day of the announcement, and +5 is five trading days after the stock split announcement. Then, event study analysis around -10, 0, +10 and -20, 0, +20 will also be done to check the consistency of the result. The estimation window is -31 to -120. A market model is going to be used to estimate the normal return in the estimation window.

2. Stock split announcement dates for the sample 102 NYSE and NASDAQ technology firms are collected from Bloomberg database from 1995 to 2013. Daily stock return of sample companies and daily market index return from 1994 to 2013 are collected from CRSP database. A board based stock index is usually used for the market portfolio. In this paper, CRSP value weighted index are going to be used as it has been one of the popular choice for getting market portfolio return.
3. After having the data, normal returns are calculated. Brown and Warner (1980) suggested three model of normal return – mean adjusted return model, market adjusted return model, market and risk adjusted return model. One of the popular and simple asset-pricing models is the Market Model. In the Market Model, it is assumed that market return is the only factor that can fully explain the variation in return of an individual asset. Also, market model assumes that there is a stable linear relationship between market return and security return. Campbell et al. (1997) defined that market model is a statistical model that related the return of any given security to the return of the market portfolio (p.155).

The market model for security i and observation t in event time is

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

Where

R_{it} is return to stock i , in period t

R_{mt} is the return to the market portfolio in period t

α_i is the intercept parameter in the market model

β_i is the slope parameter in the market model

ε_{it} are the residual (random) returns, which are assumed independent normally distributed with the mean zero and standard deviation.

4. The estimation window observation can be expressed as a regression system

$$\hat{R}_{it} = \alpha_i + \beta_i \hat{R}_{mt}$$

Where

\hat{R}_{it} is normal return on the stock i , in period t

α_i is the intercept parameter in the market model

β_i is the slope parameter in the market model

\hat{R}_{mt} is the return to the market portfolio in period t

Abnormal Return: Abnormal returns (AR_{it}) are calculated to find the difference between the estimated normal returns in estimation window and the actual returns on event window. Also, abnormal return is the derivation from the actual return. It can be calculated by following:

$$AR_{it} = R_{it} - \hat{R}_{it}$$

where

AR_{it} is the abnormal return on the stock i at time t

R_{it} is the actual return on stock i at time t

\hat{R}_{it} is normal return on stock i at time t

Average Abnormal Return: Average abnormal returns (AAR) are calculated to measure the effect of the sample for the each day of event period by

$$AAR_t = \sum_{i=1}^N \frac{AR_{it}}{N}$$

Where

AAR_t is average abnormal return on the stock at time t

AR_{it} is abnormal return on the stock at time t

N is number of stocks in sample

Cumulative Abnormal Return: Cumulative Abnormal Return (CAR) is calculated for each sample to determine cumulative effects over time from the start of the testing period to any given event period date t by following:

$$CAR_t = \sum AR_{it}$$

5. Hypothesis testing

Testing for significance: We are going to find out whether the average abnormal return for every stock different from zero. The null hypothesis of the test is that the average abnormal return of the stock is zero. The alternative hypothesis is that the average abnormal return of the stock differs from zero. If we find absolute value is greater than 1.96 from the test, then we can say that the average abnormal return for that stock is significantly different from zero at the 5% level. The normal distribution where mean = 0 and Standard deviation = 1 and 95% of the distribution lies between ± 1.96 .

H_0 = Average abnormal returns of the stock is zero or $AAR_t = 0$

H_1 = Average abnormal returns of the stock is not equal to zero or $AAR_t \neq 0$

t statistic can be calculated as

$$\text{t-statistic} = \frac{AAR_t}{sd/\sqrt{N}}$$

Where

AAR_t is average abnormal return at time t

sd is the abnormal return standard deviation

N is number of days in event window

Testing across all events : Now, Cumulative Abnormal Return (CAR) for all companies as a group are going to be calculated to test across all events. A regression will be run using robust standard errors. The p value from the regression will show the significance of cumulative return across all companies. If p value from the regression is less than 5% or .05, we can reject the null hypothesis. Also, a bootstrap is to be done to see if there is any difference in return on event window.

H_0 = Average abnormal returns is zero or $AAR_t = 0$

H_1 = Average abnormal returns is not equal to zero or $AAR_t \neq 0$

6. Cumulative Abnormal Return(CAR) Analysis:

We are going to find mean of cumulative abnormal return for the years 1995 to 2013. If mean of cumulative abnormal return are positive over the years, we are going to conclude that stock splits are value-enhancing activities. On the

other hand, if mean of cumulative abnormal returns are negative over the years, we can rationally conclude that stock splits are value destroying activities. Also, we are going to find CAR for different years and try to figure out why market reacts differently to stock split announcements in one period to another period. A graphical presentation is going to be done for CAR analysis.

7. Data Analysis and Statistical Software:

We are going to use STATA for event study. As data is huge, STATA is right statistical software to do the event study. The STATA do file and raw results will be provided into the Appendix section of the paper.

3.5: Limitation of the Study

The main limitation of the study is that the study is restricted to only technology sector of U.S. Also, the study is going to be done on the technology firms who have announced 2-for-1 or 3-for-1 stock splits from 1995 to 2013. It is difficult to find stock split announcement dates for only technology firm of U.S in one database. So, 102 firms from US technology sector are selected as the sample size. Moreover, long term performance of the firm after stock splits will not be observed in this study. Only short term performance surrounding stock split announcements will be conducted in this study.

Chapter 4

Analysis & Results

The objective of the paper is to examine whether there is an existence of abnormal return surrounding stock split announcements in U.S. technology sector. In this chapter, the results from the empirical test are going to be presented and the event study analysis is going to be done. As mentioned in the earlier chapter, the sample size is 102 technology U.S. firms from NYSE and NASDAQ that announced 2-for-1 or 3-for-1 stock splits during 1995 to 2013. The data analysis & statistical software named STATA is used to run the regression. All stock returns and market returns are normally distributed. At first, testing for significance is done to test whether average abnormal return is significant or not for any single stock. Then, testing across all events is done by calculating cumulative abnormal return (CAR) for all companies considering in a group. The chapter shows the result from the 11 days event window (-5, 0, +5), 21 days event window (-10, 0, +10) and 41 days event window (-20, 0, +20). The estimation window is -120 to -31 trading days.

4.1: Testing for Significance

At the beginning, a test for significance is done for the single stock surrounding stock split announcement dates from 1995 to 2013 using -5, 0, +5 event window. The null hypothesis is that the average abnormal return of the single stock is equal to zero or $AAR_t = 0$. The alternative hypothesis is that the average abnormal return of the single stock differs from zero or $AAR_t \neq 0$. From the following table, it is found from the test result that no stock has absolute value greater than 1.96. So we do not reject the null hypothesis. Also, we conclude that average abnormal return for any single stock

is equal to zero at 5% significance level. So there is no existence of significant abnormal return for any single stock surrounding stock split announcement dates in U.S. technology sector.

Table 4.1

Testing for significance for single stock

company_id	event_date	year	cumulative_abnormal_return	Test
10107	Jan-16	2003	-0.0470546	-0.2211494
10147	May-03	2000	-0.07551	-0.305573
10302	Aug-31	1995	-0.1744295	-0.579821
10401	Jan-30	1998	-0.1267499	-0.5662087
10696	Nov-21	2013	0.000376	0.0051674
10909	May-27	2011	-0.0336136	-0.2746874
11154	Sep-15	1997	-0.018379	-0.076042
11481	Dec-10	2009	-0.2358462	-0.7699805
11896	Nov-18	1999	-0.1372887	-0.4955219
12036	Jan-30	1998	0.067674	0.2834521
12490	Jan-26	1999	-0.0742021	-0.2114935
14593	Nov-02	2005	-0.0029531	-0.011324
14702	Mar-20	2002	0.0542119	0.3560775
15579	Sep-18	1997	0.0188023	0.0741971
20117	Apr-10	1996	0.1943575	0.4598923
20512	Jul-11	2001	-0.017035	-0.069849
22921	Apr-01	1996	0.0248562	0.1903842
30648	Aug-19	1999	0.0025205	0.0078962
31077	Oct-04	2002	-0.2122582	-0.4326918
50623	Mar-12	1997	-0.054847	-0.229052
50788	Apr-03	1998	-0.0370596	-0.2582351
51369	Mar-20	1998	0.0495168	0.1089075
53110	Apr-28	2006	0.0214336	0.0607272
53480	Aug-01	2008	-0.0056026	-0.0355523
60871	Feb-16	2000	0.3373561	0.8058357
61241	Jul-19	2000	-0.1791349	-0.414192

company_id	event_date	year	cumulative_abnormal_return	Test
64961	Jul-24	2000	0.1564042	0.6515362
64961	Jul-28	2011	0.0424566	0.2041867
66384	Feb-05	1997	-0.104474	-0.3089108
74500	Oct-22	1997	0.0551363	0.0775438
75510	Mar-17	2005	0.0721051	0.323972
75577	Jul-13	2000	0.1144097	0.2930365
75603	Feb-06	1995	0.1578739	0.5650684
75607	Oct-20	2004	0.1091552	0.2697678
75654	Jul-29	2013	0.0646153	0.2960498
75912	Dec-02	1998	0.0692565	0.1810945
76076	Aug-02	2000	0.0085152	0.0262571
76584	Jul-21	2000	-0.0808045	-0.1483187
77178	Jul-13	2004	-0.0346392	-0.359122
77235	May-13	1996	0.3760782	0.9043367
77357	Aug-20	2003	-0.002653	-0.025003
77630	Aug-03	2004	0.0133316	0.0286589
78139	Jul-01	1999	0.0296895	0.0988323
78975	May-17	2006	0.0125984	0.0560371
79265	Oct-25	2007	0.1375228	0.3078552
79499	Feb-28	2001	-0.0280253	-0.0376789
79628	Apr-25	1995	0.0501043	0.1785782
79678	Nov-07	2008	-0.0593475	-0.0882726
79698	Jan-25	1996	0.0568179	0.1624365
79879	Jan-03	2000	0.0800208	0.1019452
80233	May-25	2006	0.163311	0.428846
80236	Jan-24	2000	0.0294797	0.0424493
80266	Feb-02	2006	0.0480936	0.376516
80316	Apr-03	1998	-0.0273911	-0.07275
80362	May-15	2006	0.0438434	0.1398652
80791	Oct-13	2003	-0.0952333	-0.3742437
80943	Nov-09	1995	-0.0798393	-0.1488622
80957	Jan-28	1997	-0.1815009	-0.6473959
81162	May-25	2000	-0.0679585	-0.0972026
81621	Sep-13	1999	-0.0645809	-0.1056385

company_id	event_date	year	cumulative_abnormal_return	Test
82546	Dec-13	2010	0.0099836	0.0879633
82618	Jan-21	2004	-0.1240129	-0.2489733
82618	Jan-21	2004	-0.1240129	-0.2489733
82686	Jan-19	2000	0.1068796	0.1776745
82762	Aug-05	1996	0.1530053	0.2606888
83124	Jan-21	1999	0.0221626	0.0554045
83186	Sep-26	2000	0.1326607	0.5860112
83405	Jan-06	2011	0.026238	0.1526003
83621	May-14	2007	0.0651866	0.4030049
84320	Mar-17	1998	-0.1816189	-0.5017006
84519	Aug-15	2000	0.1726294	0.4749417
85040	Sep-13	2007	0.0471115	0.0707932
85522	Nov-10	2000	0.0234863	0.0356024
85631	Nov-18	2004	0.0551197	0.2218248
85710	Oct-25	1999	0.1034211	0.178292
85753	Nov-11	1999	-0.1490425	-0.3182399
86158	Sep-17	2007	0.0204815	0.0910521
86881	Nov-29	2000	-0.0377239	-0.0624032
86964	Jul-25	2007	0.0887008	0.1962455
87075	Apr-25	2006	0.0704606	0.2172999
87167	Nov-22	1999	-0.1483744	-0.2496901
87696	Sep-19	2000	0.0950757	0.1798673
88458	Jan-20	2004	-0.2074744	-0.461331
88664	Jan-29	2001	0.0592847	0.1347585
88742	Jun-20	2007	0.0784732	0.4779007
88786	Aug-15	2013	-0.0030436	-0.0067766
89685	Oct-27	2005	0.0838308	0.365792
89685	Oct-27	2005	0.0838308	0.365792
91485	Oct-21	2010	0.0984822	0.2302363
92940	Jul-11	2013	-0.0941125	-0.3377978
93132	Apr-27	2011	0.0517455	0.1146116

4.2: Testing Across all Events

4.2.1: 11 days event window

The event window is -5, 0, +5 where -5 is the five trading days prior to the stock splits announcement, 0 is the day of the stock splits announcement, and +5 is five trading days after the stock split announcement. It can be seen in the graph below that there is existence of positive abnormal return surrounding stock split announcement dates on -1, 0, +1. After +1 trading days of stock splits announcement, average abnormal return drops significantly. The increase of abnormal return in the day before stock split announcement day can be explained by information leakage in U.S. technology sector.

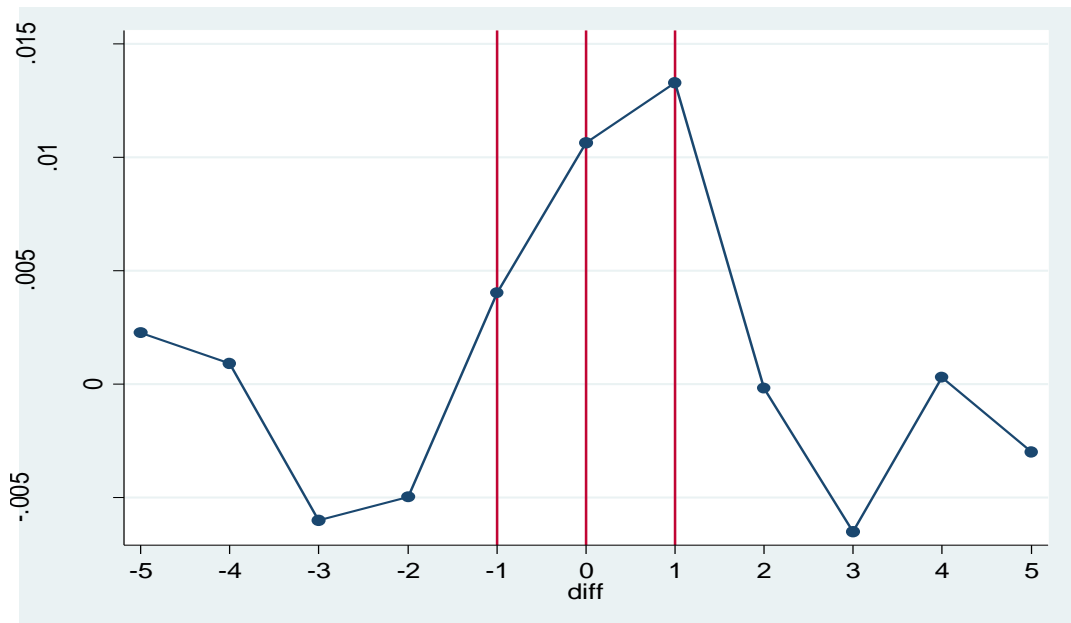


Figure 4.1

(Mean) abnormal return for 11 days events window

Hypothesis testing across all events:

Cumulative abnormal return (CAR) is calculated for all companies as a group to test across all events. A regression is run using robust standard error by STATA. It is found from the following table that p-value is much greater than .05 or 5%. So we do not reject the null hypothesis and we conclude that average abnormal return is zero surrounding stock splits announcement dates or $AAR_t = 0$. That means, security prices adjust quickly to the information content in U.S. technology sector.

Table – 4.2

Linear regression – 11 days event window

```
Linear regression                                Number of obs =      91
                                                F( 0,    90) =    0.00
                                                Prob > F      =      .
                                                R-squared     =  0.0000
                                                Root MSE     =  .10924
```

cumulative~n	Robust				
	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
_cons	.010795	.011451	0.94	0.348	-.0119543 .0335443

Bootstrap results

A bootstrap test is done to deal with uncertainty in parameters and measure of accuracy to sample estimates. It is easily seen from the table below that the bootstrap result is consistent with previous regression. P value is greater than .05 so that we do not reject the null hypothesis and we conclude that average abnormal return is not significant surrounding stock split announcement dates in U.S. technology sector.

Table – 4.3

Bootstrap Results – 11 days event window

```

Bootstrap results          Number of obs   =      91
                          Replications     =     5000

      command: bootcumret
      boottest: r(cumret)
    
```

	Observed Coef.	Bootstrap Std. Err.	z	P> z	Normal-based [95% Conf. Interval]	
boottest	.010795	.0114395	0.94	0.345	-.0116259	.0332159

Cumulative Abnormal Return (CAR) analysis from year 1995 to 2013 for 11 days event window

Table – 4.4

Cumulative abnormal return – 11 days event window

	Mean	Std. Err.	[95% Conf. Interval]	
cumulative_abnormal_return	.0115684	.0011384	.0093369	.0137999

From above table, it is found that mean cumulative abnormal return for 11 days event window is .0115684 or 1.16% from 1995 to 2013. As mean of cumulative abnormal return is positive during the period, we can say that market reacts positively toward stock splits announcements in U.S. technology sector. As a result, we can rationally

conclude that stock split announcements in U.S technology Sector are value enhancing activities for the shareholders for 11 days event window.

Cumulative Abnormal Return graph

The following graph confirms that cumulative abnormal returns are positive after stock splits announcements for 11 days event window.

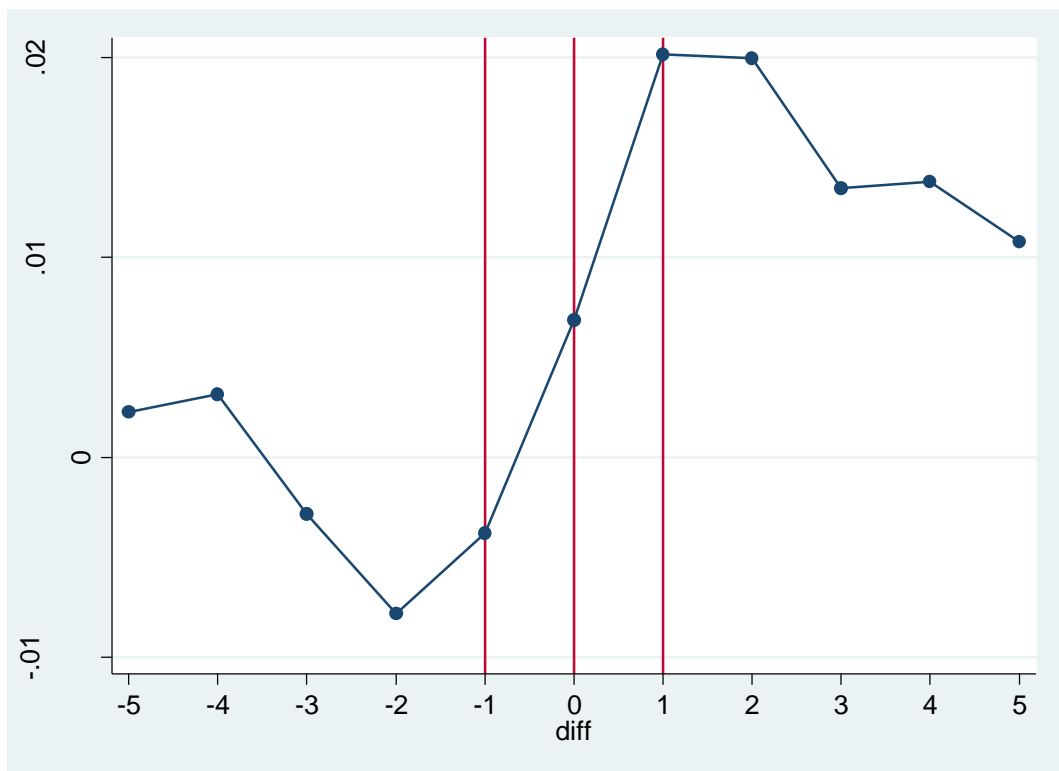


Figure 4.2

Cumulative abnormal return for 11 days events window

4.2.2: 21 days event window

Now, we change the event window to -10, 0, +10 where -10 is the ten trading days prior to the stock splits announcement, 0 is the day of stock splits announcement, and +10 is ten trading days after the stock splits announcement. The graph indicates that

the presence of positive abnormal return on surrounding stock split announcement dates is only in the day before announcement, announcement day and the day after the stock splits announcement.

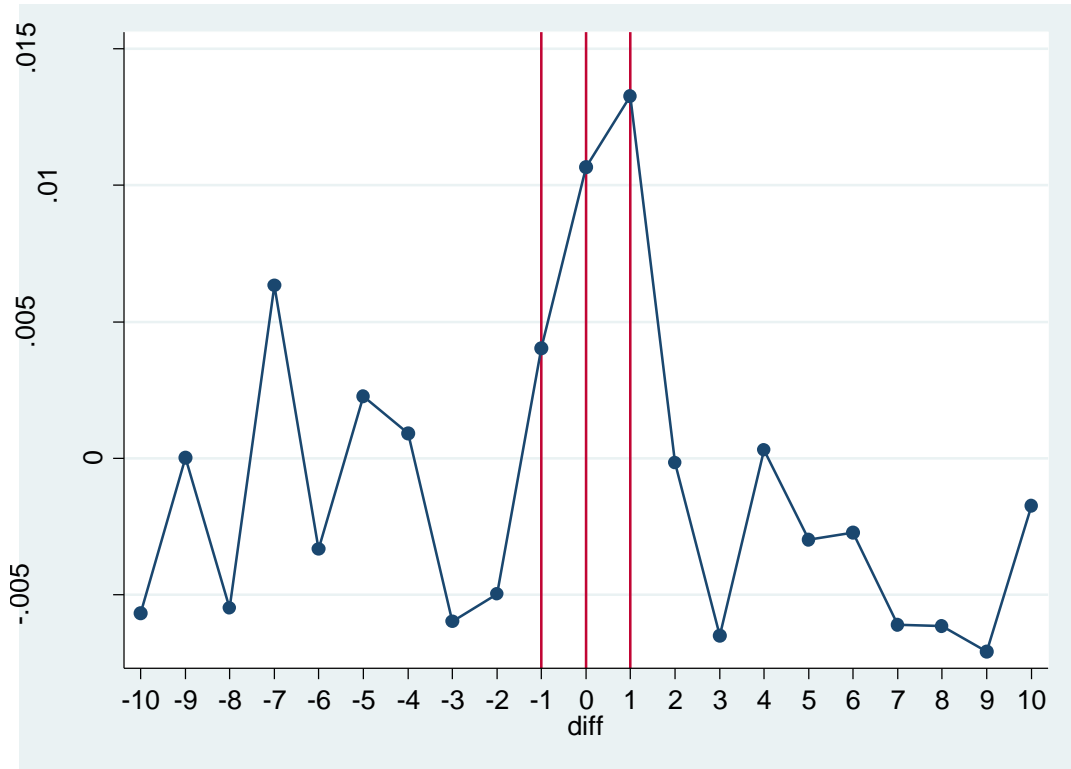


Figure 4.3

(Mean) abnormal return for 21 days events window

Hypothesis testing across all events:

By running the regression of cumulative abnormal return by STATA, we have found in the next table that p value is much greater than .05 or 5%. So we do not reject the null hypothesis. Then, we conclude that average abnormal returns are equal to zero or $AAR_t = 0$. Also, we confirm that security prices adjust quickly to the information content. This result is consistent with 11 day events window result.

Table – 4.5

Linear regression – 21 days event window

```

Linear regression                                Number of obs =      91
                                                F( 0,    90) =    0.00
                                                Prob > F      =      .
                                                R-squared    =  0.0000
                                                Root MSE    =  .16791
    
```

cumulative~n	Robust				
	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
_cons	-.0212411	.0176014	-1.21	0.231	-.0562094 .0137271

Bootstrap Results

Bootstrap test is again done to see the accuracy of the result from previous regression. 5000 replication is used and the results are consistent with the linear regression. P value is more than 5% and we do not reject the null hypothesis. Thus, we conclude that security price adjust quickly after stock splits announcements in U.S technology market for 21 days trading period.

Table – 4.6

Bootstrap Results – 21 days event window

```

Bootstrap results                                Number of obs    =      91
                                                Replications     =    5000
    
```

```

command: bootcumret
boottest: r(cumret)
    
```

boottest	Observed	Bootstrap	z	P> z	Normal-based	
	Coef.	Std. Err.			[95% Conf. Interval]	
boottest	-.0212411	.0176795	-1.20	0.230	-.0558923	.01341

Cumulative Abnormal Return (CAR) analysis from year 1995 to 2013 for 21 days event window

Table – 4.7

Cumulative abnormal return – 21 days event window

	Mean	Std. Err.	[95% Conf. Interval]	
cumulative_abnormal_return	-.0193808	.0016527	-.0226204	-.0161412

The mean cumulative abnormal return for 21 days event window is -.0193808 or -1.94% from 1995 to 2013. As mean of cumulative abnormal return is negative during the period for 21 days event window, we can say that U.S. technology market reacts negatively toward stock splits announcements for 21 days trading period. So, we reasonably conclude that stock split announcements in U.S. technology Sector are value destroying activities for shareholders during 21 trading day period.

Cumulative Abnormal Return

It can be seen in the graph below that cumulative abnormal return increases during announcement day and drops consistently +1 trading day after stock splits announcements. Also, cumulative abnormal return is highest on the next day after stock split announcements.

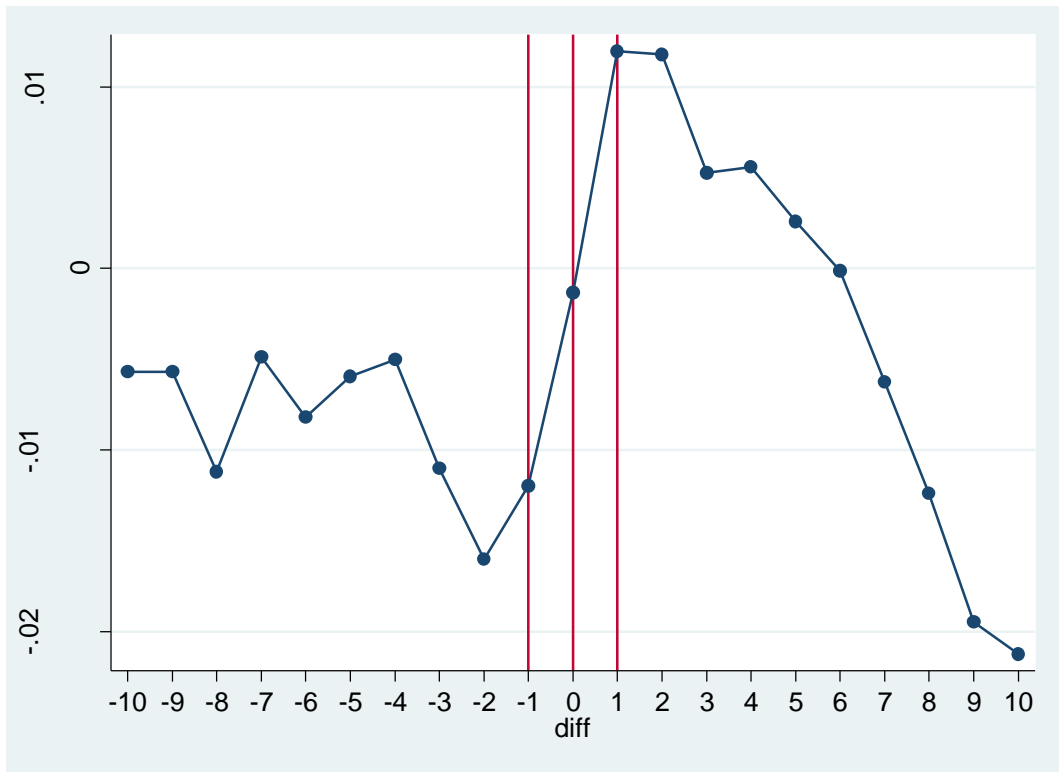


Figure 4.4

Cumulative abnormal return for 21 days event window

4.2.3: 41 days event window

We extend the event window more to -20, 0, +20 where -20 is the twenty trading days prior to the stock splits announcement, 0 is the day of the stock splits announcement, and +20 is twenty trading days after the stock splits announcement. The following graph demonstrates that the presence of positive abnormal return on surrounding stock split announcement dates is in -1, 0, +1 trading days. Also, there is an increase in abnormal return at +20 trading day.

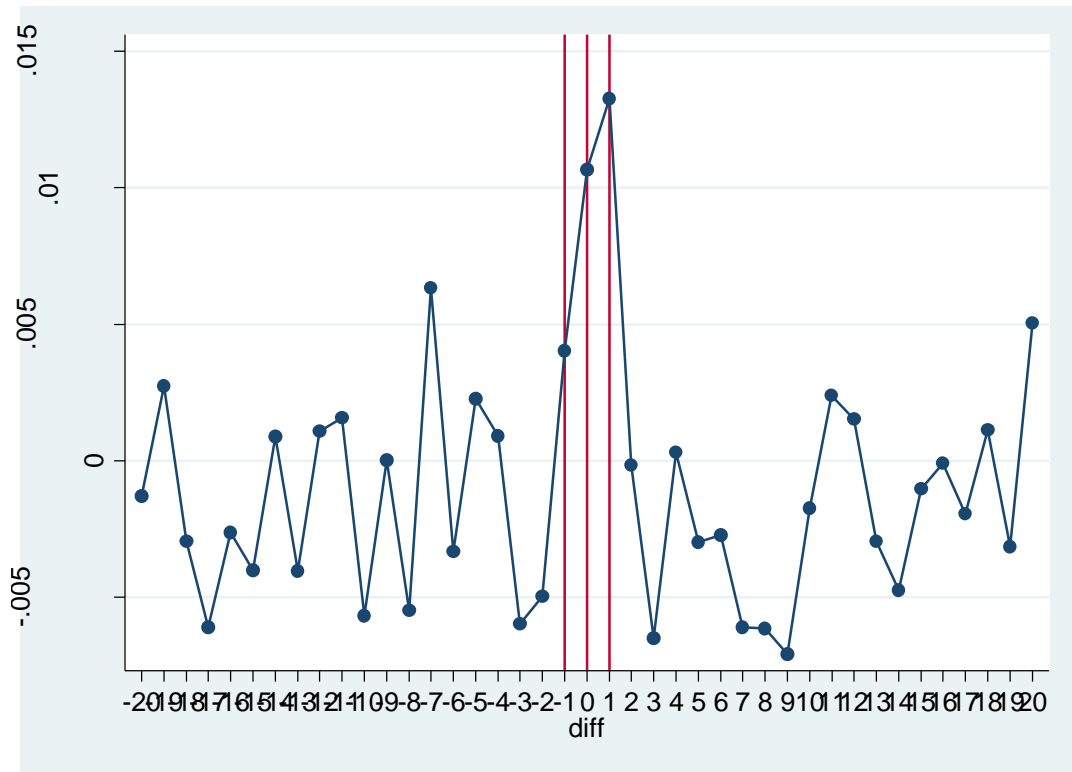


Figure 4.5

(Mean) abnormal return for 41 days event window

Hypothesis testing across all events:

The result is interesting as we can see in the following table that p value is very close to .05 or 5% for 41 days event window. But p value is more than 5%. Therefore, we do not reject the null hypothesis at 5% significance level and we can conclude that average abnormal returns are equal to zero or $AAR_t = 0$. Also, absolute value is not greater than 1.96. Hence, we conclude that security prices adjust quickly surrounding stock split announcement dates in U.S technology sector.

Table – 4.8

Linear regression – 41 days event window

```
Linear regression                                Number of obs =      91
                                                F( 0,    90) =    0.00
                                                Prob > F      =      .
                                                R-squared     =  0.0000
                                                Root MSE     =  .20441
```

cumulative~n	Robust		t	P> t	[95% Conf. Interval]	
	Coef.	Std. Err.				
_cons	-.0399034	.0214283	-1.86	0.066	-.0824744	.0026676

Bootstrap Results

The result from bootstrap test confirms the accuracy of the previous linear regression result. The p value is slightly greater than .05 and we do not reject the null hypothesis at 5% significance level. As we increase the event window, the p value gets closer to .05 or 5%. So, we conclude that price adjust quickly to the stock split announcements in U.S technology sector.

Table – 4.9

Bootstrap Results – 41 days event window

```
Bootstrap results                                Number of obs    =      91
                                                Replications     =    5000

command: bootcumret
boottest: r(cumret)
```

boottest	Observed	Bootstrap	z	P> z	Normal-based	
	Coef.	Std. Err.				[95% Conf. Interval]
boottest	-.0399034	.0213886	-1.87	0.062	-.0818242	.0020174

Cumulative Abnormal Return (CAR) analysis from year 1995 to 2013 for 41 days event window

It is revealed in the following table that mean of cumulative abnormal return for 41 days event window is -.0398819 or -3.99%. For longer event window like 41 trading days, market reacts negatively to the stock split announcements in U.S. technology sector. As a result, we rationally conclude that stock splits announcement is value destroying activities for longer period like 41 trading days in U.S. technology sector.

Table – 4.10

Cumulative abnormal return – 21 days event window

	Mean	Std. Err.	[95% Conf. Interval]	
cumulative_abnormal_return	-.0398819	.0018761	-.0435593	-.0362044

Cumulative Abnormal Return

The following graph displays that cumulative abnormal returns are negative surrounding stock split announcement dates (-20, 0, +20). It is confirmed that the stock split information adjusts rapidly in U.S. technology sector.

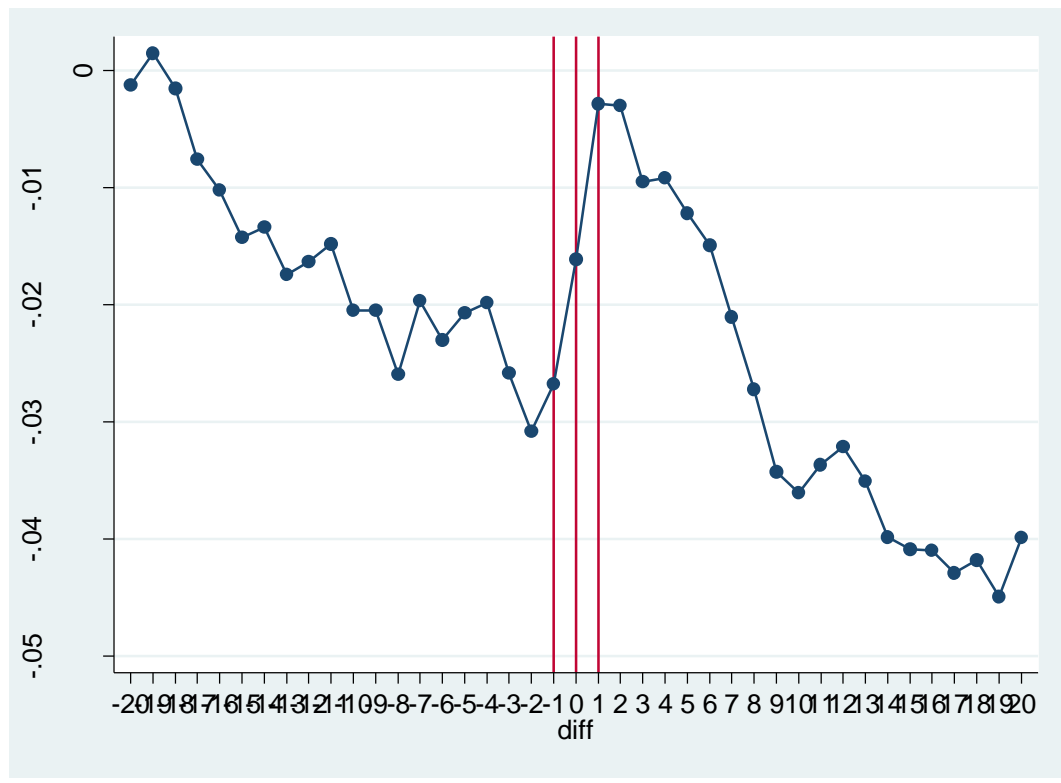


Figure 4.6

Cumulative abnormal return for 41 days events window

4.3: Summary of analysis, consistency and implication of the results

After running regression in Stata and analyzing data, we have found some important results from the event study analysis. There is no existence of significant abnormal return for any single stocks surrounding the stock split announcements. Hence, average abnormal return for any single stock is not significant in U.S technology market during 1995 to 2013. By testing across all events, it is found in this study that average abnormal return equal to zero or $AAR_t = 0$ at 5% significance level for 11 days event window, 21 days event window and 41 days event window. One important observation of the study is that average abnormal returns are differs from zero or

$AAR_t \neq 0$ for 41 days event window at 10% significance level. That means, it is possible to reject the null hypothesis at 10% significance level.

Furthermore, we have obtained mean value of cumulative abnormal return (CAR) from 1995 to 2013 for 11 days event window, 21 days event window and 41 days event window. We have found that mean of cumulative abnormal return (CAR) is positive or 1.16% for 11 days event window during 1995 to 2013. Thus, U.S. technology market reacts positively toward stock splits announcements for shorter trading days. We rationally conclude that stock splits announcements are value enhancing activities for shareholders in U.S technology market for shorter period like 11 trading days. On the other hand, we have found negative mean value of cumulative abnormal return (CAR) -1.94% for 21 days event window and -3.99% for 41 days event window. This result suggests that market reacts negatively toward stock splits announcements for longer trading days in U.S technology sector. Alternatively, we conclude that stock splits announcements are value destroying activities for shareholders in U.S. technology market for longer trading days such as 21 trading days and 41 trading days.

This result confirms that shareholders value enhances surrounding stock splits announcements day in U.S. technology market. Also, the paper confirms that average abnormal returns are not significant surrounding stock splits announcement day. That establishes that security prices adjust quickly to the information content in U.S. technology sector. The result of this paper is consistent with the findings of Fama et al. (1969), Bellemore & Blucher (1959) and Grinblatt et al. (1984). For example, Fama et al. (1969) concluded that U.S. market is efficient and stock prices adjust quickly to the new information. They also confirmed that stock splits cannot increase

investor's expected return unless inside trading information related to splits are available. They showed that investor cannot profit by buying the stock after the announcement dates or after the effective dates of the splits. This paper also establishes that security prices adjust quickly to the stock splits announcements in U.S. technology sector and there is no existence of significant abnormal return surrounding stock split announcements. Similarly, Grinblatt et al. (1984) found that security prices react positively toward stock splits announcements. In this paper, the result also shows that shareholders' value enhance toward stock split announcements for shorter period. This paper confirms both efficient market hypothesis and signaling hypothesis in U.S. technology sector. Moreover, Bellemore & Blucher (1959) confirmed that in long run, the success of investors depend on the welfare of the corporations where they invest. This paper discovers that it is difficult to earn abnormal profit for investors surrounding stock splits announcement dates for shorter trading days.

Chapter 5

Conclusion & Recommendation

Stock split announcements are very common corporate action for public companies around the world. Recently, Apple, one of the world's most dominated U.S. based technology companies, announced surprising 7-for-1 stock splits that have increased some psychological boost to the share price and attracted many retail investors. People are eager to know how stock splits announcements can be benefited to the investors and shareholders. This paper is designed to see the effect of large stock splits announcements on prices in U.S. high technology stock. The purpose has been to find out whether there is existence of abnormal return surrounding stock splits announcements in U.S. technology sector. A random sample of 102 U.S. technology firms is selected from NYSE and NASDAQ that announced 2-for-1 or 3-for-1 stock splits announcements during 1995 to 2013. An empirical test is done using event study methodology. The result for single firms from the event study analysis shows that no single firms from sample has generated significant abnormal return surrounding stock splits announcement during 1995 to 2013. It proves that stock prices of the U.S. technology firms adjust quickly after stock splits announcements. So it is difficult to generate significant abnormal return from any high technology stocks surrounding stock split announcements. This result shows quick information adjustment in security prices because U.S. technology sector is one of world's most analyzed and invested sector by analysts and investors. An empirical test is also done to test across all events by using event study methodology. It is tested for 11 days event window, 21 days event window and 41 days event window. Average abnormal return is not significant for 11 days trading window, 21 days trading window and 41 days trading window. So it is difficult to generate abnormal return surrounding stock

splits announcement day in U.S. technology sector. Also, this paper have found that mean value of cumulative abnormal return (CAR) are positive for only 11 days event window but mean value of cumulative abnormal return (CAR) is negative for both 21 days trading window and 41 days trading window. It establishes the fact that U.S. technology market have reacted positively toward stock splits announcements in U.S. technology market for 11 trading days during 1995 to 2013. But U.S. technology market have reacted negatively toward stock splits announcement for longer trading days like 21 trading days or 41 trading days. So it can be rationally concluded that stock splits announcements are value enhancing activities for shareholder for shorter trading days but value destroying activities for longer trading days surrounding stock splits announcement.

This paper only examines whether there is existence of abnormal return surrounding stock split announcement dates and whether stock split announcement is a value enhancing activities for shareholders for shorter period. This paper do not examines these factors for longer periods after stock splits. Further research should be done to see what happens to security prices after stock splits or ex-date in U.S. technology sector. Also, researcher can find out whether there is an existence of abnormal return surrounding ex-date of stock splits in U.S. technology sector. Moreover, academic researcher can be interested in whether U.S. technology sector is efficient in longer time period after stock splits to figure out the consistency with the study of Byun & Rozeff (2003) and Boheme & Danielson (2007).

To conclude, one thing is determined from this study that the adjustment of security prices is rapid surrounding stock splits announcement dates in U.S. technology sector. It is difficult to earn abnormal trading profit for investors surrounding stock splits announcement dates. It is confirmed that abnormal return and cumulative abnormal

return increases during the stock splits announcement day. One of the most important observations of this study is that abnormal return and cumulative abnormal return is highest on the next day of stock split announcement date and then abnormal return drops significantly every trading day. Finally, shareholder's value enhances in shorter trading period (-5, 0, +5) surrounding stock split announcement date in U.S. technology sector. Now, investors and shareholders can take proper decision regarding investment in high tech stocks of U.S. surrounding stock split announcement.

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Appendix

Stock Split Announcement Data

Announcement Date	Ticker	Company name	Split Ratio	effective date	Permno	Permco
11/2/2005	AAPL US	Apple Inc	Amount: 2 for 1	02/28/2005	14593	7
9/19/2000	EXAR US	Exar Corp	Amount: 3 for 1	10/20/2000	87696	7670
03/17/2005	ADBE US	Adobe Systems Inc	Amount: 2 for 1	05/24/2005	75510	8476
12/13/2010	ADVS US	Advent Software Inc	Amount: 2 for 1	01/19/2011	82546	14129
08/15/2013	AFOP US	Alliance Fiber Optic Products Inc	Amount: 2 for 1	09/17/2013	88786	40978
05/14/2007	ANSS US	ANSYS Inc	Amount: 2 for 1	05/06/2007	83621	14744
11/07/2008	ATVI US	Activision Blizzard Inc	Amount: 2 for 1	08/09/2008	79678	12499
04/28/2006	BMI US	Badger Meter Inc	Amount: 2 for 1	06/16/2006	53110	20250
05/27/2011	CERN US	Cerner Corp	Amount: 2 for 1	06/27/2011	10909	8786
07/29/2013	CGNX US	Cognex Corp	Amount: 2 for 1	09/17/2013	75654	10256
09/17/2007	CTSH US	Cognizant Technology Solutions Corp	Amount: 2 for 1	10/17/2007	86158	16167
05/25/2006	DAKT US	Daktronics Inc	Amount: 2 for 1	06/23/2006	80233	12843
12/10/2009	EBIX US	Ebix Inc	Amount: 3 for 1	5/1/2010	11481	9312
07/25/2007	FFIV US	F5 Networks Inc	Amount: 2 for 1	08/21/2007	86964	16561
11/21/2013	FISV US	Fiserv Inc	Amount: 2 for 1	12/17/2013	10696	8598
10/25/2007	FLIR US	FLIR Systems Inc	Amount: 2 for 1	11/12/2007	79265	12214
04/27/2011	FTNT US	Fortinet Inc	Amount: 2 for 1	2/6/2011	93132	53286
05/17/2006	INTU US	Intuit Inc	Amount: 2 for 1	7/7/2006	78975	12011
04/25/2006	JCOM US	j2 Global Inc	Amount: 2 for 1	05/25/2006	87075	16665
12/15/1999	INAP US	Internap Network Services	Amount: 2 for 1	1/10/2000	87236	17158
8/1/2008	MCRS US	MICROS Systems Inc	Amount: 2 for 1	6/2/2008	53480	2829
7/11/2013	MDSO US	Medidata Solutions Inc	Amount: 2 for 1	12/17/2013	92940	53159
1/12/2004	NCR US	NCR Corp	Amount: 2 for 1	01/24/2005	19537	21241
10/27/2005	NIHD US	NII Holdings Inc	Amount: 2 for 1	11/22/2005	89685	43910
1/3/2000	JDSU US	JDS Uniphase	Amount: 2 for 1	3/13/2000	79879	12583
1/6/2011	PLCM US	Polycom Inc	Amount: 2 for 1	5/7/2011	83405	14567
07/13/2004	QCOM US	QUALCOMM Inc	Amount: 2 for 1	08/16/2004	77178	11253
2/2/2006	QLGC US	QLogic Corp	Amount: 2 for 1	3/3/2006	80266	12884
07/28/2011	QSII US	Quality Systems Inc	Amount: 2 for 1	10/27/2011	64961	5703
8/11/2007	RSTI US	Rofin-Sinar Technologies Inc	Amount: 2 for 1	6/12/2007	83961	14973
10/21/2010	RVBD US	Riverbed Technology Inc	Amount: 2 for 1	9/11/2010	91485	51210
05/15/2006	SCSC US	ScanSource Inc	Amount: 2 for 1	6/6/2006	80362	12933
09/13/2007	SLP US	Simulations Plus Inc	Amount: 2 for 1	2/10/2007	85040	15534
01/21/2004	SNDK US	SanDisk Corp	Amount: 2 for 1	02/19/2004	82618	14105
11/2/2013	TRMB US	Trimble Navigation Ltd	Amount: 2 for 1	03/21/2013	76230	10691
7/4/2004	YHOO US	Yahoo! Inc	Amount: 2 for 1	12/5/2004	83435	14521
06/20/2007	SHEN US	Shenandoah Telecommunications Co	Amount: 3 for 1	08/20/2007	88742	40213
4/10/1996	ACXM US	Axiom Corp	Amount: 2 for 1	12/11/1996	20117	6702

Announcement Date	Ticker	Company name	Split Ratio	effective date	Permno	Permco
02/16/2000	ADI US	Analog Devices Inc	Amount: 2 for 1	03/16/2000	60871	282
11/18/2004	ADSK US	Autodesk Inc	Amount: 2 for 1	12/21/2004	85631	7623
10/13/2003	ADTN US	ADTRAN Inc	Amount: 2 for 1	12/16/2003	80791	13252
07/13/2000	ALTR US	Altera Corp	Amount: 2 for 1	11/8/2000	75577	9735
03/20/2002	AMAT US	Applied Materials Inc	Amount: 2 for 1	04/17/2002	14702	194
11/10/2000	AMCC US	Applied Micro Circuits Corp	Amount: 2 for 1	10/31/2000	85522	15854
7/19/2000	AMD US	Advanced Micro Devices Inc	Amount: 2 for 1	08/22/2000	61241	211
07/21/2000	ATML US	Atmel Corp	Amount: 2 for 1	08/28/2000	76584	10860
11/29/2000	BRCD US	Brocade Communications Systems Inc	Amount: 2 for 1	12/22/2000	86881	16546
9/2/2000	BVSN US	BroadVision Inc	Amount: 3 for 1	03/14/2000	83630	14750
7/11/2001	CACI US	CACI International Inc	Amount: 2 for 1	7/12/2001	20512	727
02/19/1996	CAMP US	CalAmp Corp	Amount: 2 for 1	03/25/1996	20670	6689
4/3/1998	CBR US	Ciber Inc	Amount: 2 for 1	1/4/1998	80316	12924
08/15/2000	CIEN US	Ciena Corp	Amount: 2 for 1	09/19/2000	84519	15321
4/1/1996	CKP US	Checkpoint Systems Inc	Amount: 2 for 1	02/23/1996	22921	871
08/19/1999	COHU US	Cohu Inc	Amount: 2 for 1	09/27/1999	30648	20470
7/1/1999	CPWR US	Compuware Corp	Amount: 2 for 1	1/3/1999	78139	11860
2/2/1998	CSC US	Computer Sciences Corp	Amount: 2 for 1	03/24/1998	11439	22277
8/2/2000	CSCO US	Cisco Systems Inc	Amount: 2 for 1	03/23/2000	76076	10486
01/21/1999	CSGS US	CSG Systems International Inc	Amount: 2 for 1	8/3/1999	83124	14393
8/3/2004	DWCH US	Datawatch Corp	Amount: 2 for 1	12/4/2004	77630	11545
4/3/1998	ESL US	Esterline Technologies Corp	Amount: 2 for 1	04/21/1998	50788	20671
01/30/1998	GMT US	GATX Corp	Amount: 2 for 1	2/6/1998	12036	20773
09/13/1999	HLIT US	Harmonic Inc	Amount: 2 for 1	10/15/1999	81621	13739
01/26/1999	IBM US	International Business Machines Corp	Amount: 2 for 1	05/27/1999	12490	20990
11/22/1999	ICGE US	ICG Group Inc	Amount: 2 for 1	12/13/1999	87167	16702
03/17/1998	IGTE US	iGATE Corp	Amount: 2 for 1	04/13/1998	84320	15238
02/28/2001	INOD US	Innodata Inc	Amount: 2 for 1	03/26/2001	79499	12347
01/25/1996	IT US	Gartner Inc	Amount: 2 for 1	1/4/1996	79698	12457
Announcement Date	Ticker	Company name	Split Ratio	effective date	Permno	Permco
01/29/2001	JKHY US	Jack Henry & Associates Inc	Amount: 2 for 1	5/3/2001	88664	7864
05/25/2000	MCRL US	Micrel Inc	Amount: 2 for 1	06/28/2000	81162	13462
01/16/2003	MSFT US	Microsoft Corp	Amount: 2 for 1	02/18/2003	10107	8048
3/12/1997	MTSC US	MTS Systems Corp	Amount: 2 for 1	3/2/1998	50623	3083
11/9/1995	MTSN US	Mattson Technology Inc	Amount: 2 for 1	10/16/1995	80943	13337
11/18/1999	MXIM US	Maxim Integrated Products Inc	Amount: 2 for 1	12/22/1999	11896	9698
9/2/2000	NEWP US	Newport Corp	Amount: 3 for 1	1/6/2000	57534	3179
10/27/2005	NIHD US	NII Holdings Inc	Amount: 2 for 1	11/22/2005	89685	43910
01/20/2004	OVTI US	OmniVision Technologies Inc	Amount: 2 for 1	02/18/2004	88458	37949
09/15/1997	PLAB US	Photronics Inc	Amount: 2 for 1	2/12/1997	11154	9010
12/2/1998	PTC US	PTC Inc	Amount: 2 for 1	9/3/1998	75912	10408

Announcement Date	Ticker	Company name	Split Ratio	effective date	Permno	Permco
10/25/1999	POWI US	Power Integrations Inc	Amount: 2 for 1	11/23/1999	85710	15890
07/24/2000	RFMD US	RF Micro Devices Inc	Amount: 2 for 1	08/28/2000	64961	5703
01/21/2004	SNDK US	SanDisk Corp	Amount: 2 for 1	02/19/2004	82618	14105
08/20/2003	SNPS US	Synopsys Inc	Amount: 2 for 1	09/24/2003	77357	11361
10/20/2004	SYMC US	Symantec Corp	Amount: 2 for 1	1/12/2004	75607	10224
01/30/1998	T US	AT&T Inc	Amount: 2 for 1	03/20/1998	10401	20103
03/20/1998	TER US	Teradyne Inc	Amount: 2 for 1	1/9/1999	51369	21731
10/22/1997	TSRI US	TSR Inc	Amount: 2 for 1	11/18/1997	74500	4456
04/25/1995	UTEK US	Ultratech Inc	Amount: 2 for 1	11/5/1995	79628	12440
2/5/1997	WDC US	Western Digital Corp	Amount: 2 for 1	4/6/1997	66384	4879
8/5/1996	WSTL US	Westell Technologies Inc	Amount: 2 for 1	10/6/1996	82762	14179
05/13/1996	WTT US	Wireless Telecom Group Inc	Amount: 2 for 1	05/29/1996	77235	11157
1/24/2000	DSPG US	DSP Group Inc	Amount: 2 for 1	3/2/2000	80236	12846
9/26/2000	DST US	DST Systems Inc	Amount: 2 for 1	10/20/2000	83186	31782
01/28/1997	AZPN US	Aspen Technology Inc	Amount: 2 for 1	3/3/1997	80957	13398
2/6/1995	CRUS US	Cirrus Logic Inc	Amount: 2 for 1	07/18/1995	75603	10210
01/19/2000	CTXS US	Citrix Systems Inc	Amount: 2 for 1	02/17/2000	82686	14201
10/4/2002	CUB US	Cubic Corp	Amount: 3 for 1	1/5/2002	31077	20541
08/31/1995	CY US	Cypress Semiconductor Corp	Amount: 2 for 1	1/11/1995	10302	8222
5/3/2000	EMC US	EMC Corp	Amount: 2 for 1	6/5/2000	10147	8093
9/18/1997	TXN US	Texas Instrument Inc	Amount: 2 for 1	11/24/1997	15579	21737
11/11/1999	VRSN US	VeriSign Inc	Amount: 2 for 1	12/7/1999	85753	15940
1/24/1999	XRX US	Xerox Corp	Amount: 2 for 1	2/24/1999	27983	21945
07/19/2000	EXTR US	Extreme Networks Inc	Amount: 2 for 1	08/25/2000	86822	16466

Stata Code for testing for significance and testing across all events:

*Step 1: Preparing the dataset, estimation and event window:

```

use eventdates, clear

gen year=year(event_date)

sort company_id event_date

tempfile event_dates1

quietly save `event_dates1', replace

bysort company_id: gen eventcount=_N

bysort company_id: keep if _n==1

sort company_id

keep company_id eventcount

```



```

tempfile eventcount

quietly save `eventcount', replace

clear

use stockdata, clear

/*gen year=year(date)*/

sort company_id date

tempfile crsp_data

quietly save `crsp_data', replace

sort company_id

merge m:1 company_id using `eventcount'

tab _merge

keep if _merge==3

drop _merge

expand eventcount

drop eventcount

sort company_id date

by company_id date: gen set=_n

sort company_id set

tempfile crsp_data_new

quietly save `crsp_data_new', replace

use `event_dates1', clear

by company_id: gen set=_n

sort company_id set

tempfile event_dates1_new

quietly save `event_dates1_new', replace

use `crsp_data_new', clear

merge m:1 company_id set using `event_dates1_new'

tab _merge

```

```

drop _merge

egen company_id1 = group(company_id set)

sort company_id1 date

by company_id1: gen datenum=_n

by company_id1: gen target=datenum if date==event_date

egen tempdate=min(target), by(company_id1)

drop target

gen diff=datenum-tempdate

by company_id1: gen event_window=1 if dif>=-5 & dif<=5

egen count_event_obs=count(event_window), by(company_id)

by company_id1: gen estimation_window=1 if dif<-31 & dif>=-120

egen count_est_obs=count(estimation_window), by(company_id)

replace event_window=0 if event_window==.

replace estimation_window=0 if estimation_window==.

drop if count_event_obs<11

drop if count_est_obs<30

drop if estimation_window==0 & event_window==0

*Step 2: Estimating Normal Performance using a Market Model

gen predicted_return=.

egen id=group(company_id1)

sum id, detail

scalar id_N=r(max)

local i=1

while `i'<=id_N {

    display "Estimating normal performance for firm: " `i'

    quietly reg ret vwretd if id==`i' & estimation_window==1

    predict p`i' if id==`i'

    replace predicted_return=p`i' if id==`i' & event_window==1

    drop p`i'

    local i=`i'+1

}

```

***Step 3: Abnormal and Cumulative Abnormal Returns**

```
sort id date  
  
gen abnormal_return=ret-predicted_return if event_window==1  
  
by id: egen cumulative_abnormal_return=sum(abnormal_return)
```

***Step 4: Testing for Significance**

```
sort id date  
  
by id: egen ar_sd = sd(abnormal_return)  
  
gen test =(1/11)*(cumulative_abnormal_return/ar_sd)  
  
list company_id cumulative_abnormal_return test if dif==0  
  
outsheet company_id event_date cumulative_abnormal_return test using 11day.csv if dif==0, comma names
```

***Step 5: Testing Across All Events**

```
reg cumulative_abnormal_return if dif==0, robust  
  
preserve  
  
collapse (mean) abnormal_return, by(dif)  
  
tway scatter abnormal_return dif if dif>=-5 & dif<=5, xlab(-5(1)5) c(1) xline(-1) xline(0) xline(1)  
  
restore  
  
* bootstrap to see if there is any difference in return one-day before and one-day after the event date:  
  
capture program drop bootcumret  
  
program define bootcumret, rclass  
  
    reg cumulative_abnormal_return if dif==0  
  
    return scalar cumret=_b[_cons]  
  
end  
  
bootstrap boottest=r(cumret), reps(5000) saving(boot_diffret, replace): bootcumret  
  
save event_study_file2006, replace  
  
log close  
  
mean cumulative_abnormal_return  
  
mean abnormal_return  
  
preserve  
  
collapse (mean) abnormal_return, by(dif)  
  
gen cumulative_abnormal_return = sum(abnormal_return)  
  
tway scatter cumulative_abnormal_return dif if dif>=-5 & dif<=5, xlab(-5(1)5) c(1) xline(-1) xline(0)  
xline(1)
```