

The Comparative Informational Efficiency of Stock Splits and Options

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This study investigates whether the split ratio (even or odd), as well as whether options are traded on a stock or not, result in abnormal returns on the announcement day of the stock split, and the days surrounding the announcement day. The findings provide evidence of abnormal returns for all stocks in the sample. Moreover, there is evidence of abnormal returns on the announcement day for both odd and even split ratios, but the abnormal return is slightly greater for the even split ratios. For optioned stocks, the findings suggest that there are abnormal returns, but they are less than the abnormal returns for non-optioned stocks. The results support the assertion that options, and derivatives in general, lead to more efficiency in the financial market.

INTRODUCTION

Stock splits have been analyzed many times over the past decades, but continue to be a puzzle to academicians and practitioners alike. A stock split effectively increases the number of equity shares outstanding, but has no effect on the proportion of shares held by stockholders. Thus, stock splits seem to be characterized by purely superficial changes. However, previous research has long shown that the market generally reacts favorably to stock splits, as well as stock split announcements. Grinblatt, Masulis and Titman (1984) show that in ‘clean’ splits, i.e., where no other firm-specific event occurs simultaneously with a split announcement, stock splits generate a positive abnormal return of about three percent on the announcement day, and another one percent abnormal return on the ex-day. Lamoureux and Poon (1987) find that stock splits result in an increase in the number of transaction and shares traded, which in turn increases the volatility of the price series. There is also an increase in trading volume around the announcement day and ex-day.

In terms of market efficiency, there are conflicting results from several previous studies. Charest (1978) found evidence of market inefficiency during the period surrounding the announcement month. Also, Millar and Fielitz (1973) found large average residuals during the announcement month and during the distribution, which pointed to market inefficiency. On the other hand, Fama, Fisher, Jensen and Roll (1969) found results to support market efficiency after analyzing the residuals from a market adjustment technique for each stock split. Likewise, Hausman, West and Largay (1971) found evidence to support market efficiency following research that showed no systematic price increases could be expected once news of the split had been made public.

Our study extends the previous research in a number of ways. First, we examine the effect of the split ratio (even or odd) on the returns around a stock split announcement. Second, we examine the effect of option listings on the returns around a stock split announcement. Third, we look at the implications for market efficiency in both the stock and options markets. Finally, we examine the results and the

implications for investors, stockholders and managers alike. The paper is developed as follows. In Section I, the leading theories/hypotheses surrounding stock splits are presented, followed by additional research on stock splits as well as studies examining stocks splits and the options market specifically. Section II presents a description of the sample and methodology used. In Section III, we present the empirical results. Section IV presents the conclusions and summary.

LEADING THEORIES/HYPOTHESES

Signaling Hypothesis

This is one of the leading theories that have emerged in the finance literature as an explanation of stock splits. It came out of the publication of the classic paper by Fama, et al. (1969). The signaling hypothesis states that managers declare stock splits to convey favorable private information about a firm's current value. Further, the hypothesis purports that it is effective only if it is costly for firms without favorable information to signal falsely. Managers are able to garner information about the future because of their acute knowledge of operating and investment issues. Thus, the signaling hypothesis links stock splits to future performance. Also, the existence of positive excess returns around split announcements is in line with this hypothesis (Grinblatt, et al. (1984), Asquith, et al. (1989), and McNichols and Dravid (1990)).

Trading Range Hypothesis

This is another leading theory in the finance literature, which also came out of the publication by Fama, et al. (1969). The trading range hypothesis says that splits return per-share prices to a preferred trading range (McNichols and Dravid, 1990). This usually arises because of a pre-split price run-up, and this hypothesis links stock splits more to past performance than to future performance. Brennan and Copeland (1988) suggest that firms do not split by a factor larger than is warranted by their stock price and private information. Easley et al. (2001) investigate different hypotheses about stock splits. Supporting the trading range hypothesis, they found that stock splits attract uninformed traders. Interestingly, they also found that informed trading increases, leading to no significant change in the information content of trades. The authors therefore concluded that there was no evidence to support the hypothesis that stock splits decrease information asymmetries.

Self-Selection Hypothesis

The self-selection hypothesis is referred to in the Ikenberry, et al. (1996) publication. It suggests that the signaling and trading range hypotheses are not mutually exclusive. Managers use stock splits to move security prices into a specific trading range; however, the decision to split is based on their expectations about the firm's future performance. They go on to say that pessimistic managers are less likely to undertake a stock split, fearing that any future decline in a firm's stock price could result in the price falling below the acceptable trading range. Given this backdrop, a stock split can be interpreted by the capital market as a sign of management's optimism about the future.

Other Research

Lin et al. (2009) analyze a large sample of stock splits. The authors found that, following stock splits, trading increases and liquidity risk decreases, suggesting a fall in trading costs and the cost of equity capital. They surmise that there are "nontrivial economic benefits from liquidity improvements, with less liquid firms benefiting more from stock splits". Lyrouti et al. (2006) investigate whether a stock split is still considered a policy that creates value for the underlying firm. Like many researchers, they found evidence of a positive market reaction at the stock split announcement. They also found an increase in liquidity, which supports the liquidity hypothesis in explaining the reasoning behind stock splits. Gray et al. (2003) investigate the effects of stock splits on the liquidity of the stock market. The authors found that quoted bid/ask spreads fall and market volume increases, but not by as much as they expected given the

size of the split factor. Overall, they found that stock splits increase investor trading costs and perhaps more importantly, market quality falls significantly.

Copeland (1979) examined the liquidity effects of stock splits using two measures of liquidity – the changes in the proportional share volume of trading, and the changes in transaction costs as a percent of value traded. He found non-stationarities in trading behavior follow stock splits. He also found that volume increases less than proportionately, and brokerage revenues increase by at least 7.1% following stock splits. Further, he found that post-split bid-ask spreads increase significantly as a percentage of the value of the stock, and there is a permanent decrease in relative liquidity following the split.

Ohlson, et al. (1987) analyzed the empirical behavior of stock-return volatilities prior to, and subsequent to, the ex-dates of stock splits. Their findings indicate that there is, on average, about a 30% arbitrary increase in the return standard deviations following the ex-date. Moreover, they found that the increase holds for both daily and weekly data, and it is permanent. Interestingly, there were no explanatory variables, such as institutional frictions, affecting price observations identified. The authors view the findings as being essentially inconsistent with the notion of ‘rational pricing’. In addition, the theory of an informationally efficient market, in which ‘prices respond immediately and in an unbiased way to new information’, was found to be inconsistent with an essentially ‘arbitrary’ increase in return variances.

McNichols and Dravid (1990) conducted tests of the hypothesis that managers signal their private information through their choice of split factor. Their tests were based on the trading range hypothesis, which suggests that managers prefer their firms’ shares to trade in a specific trading range. They found evidence that firms signal their private information about future earnings by their choice of split factor. They also found that price changes at stock dividend and split announcements are significantly correlated with split factors, holding other factors constant, and with earnings forecast errors. The authors purport that these correlations imply that management’s choice of split factor signals private information about future earnings and that investors revise their beliefs about firm value accordingly.

Schulz (2000) examined the effect of stock splits on tick size, and stocks being promoted or sponsored. He found that there are many small orders subsequent to splits, and the overwhelming majority of these orders are buys. He also found that splits could expand the shareholder base if they increase revenues for market making. These market-making profits could be passed back to brokers who promote the stock. Therefore, market making seems to be more profitable following splits. Schulz also found that effective spreads increase for all trade sizes for almost all stocks. These increases in effective spreads appear to be accompanied by modest declines in some of the costs of making markets. His findings appear consistent with splits providing increased incentives to promote a stock.

STOCK SPLITS AND THE OPTIONS MARKET

There are certain advantages inherent in the options market. According to Black and Cox-Rubenstein, an options portfolio allows over and above the allowable margin rate in the stock market. Also, better borrowing and lending rates are enjoyed in the options markets, and participants are not subjected to the short sale restrictions that are part of the stock market. Ross (1976) and Hakansson (1982) found that options play a key role in increasing the general efficiency of the asset market by giving investors more choices. In fact, John, Koticha and Subrahmanyam (1993) found that informed traders prefer the options market because options are generally felt to be a much better avenue for speculative purposes. Kumar, Sarin and Shastri (1998) noted that the increase in public information in the market as a result of option listings decreases information asymmetry, decreases the spread, increases liquidity and decreases the variance of the pricing error, all of which contribute to improving efficiency in the underlying market.

How does all this relate to stock splits? Reilly and Drzycimski (1981) suggested that around stock split announcements, as well as the actual day of the stock split, the added leverage from options could translate a small profit on the stock into a much larger percent profit on the option. Also, the Black-Scholes option pricing model assumes a positive relationship between the variability of stock return rates and the option value of that stock. Moreover, Bar-Yosef and Brown (1977) and Ohlson and Penman

(1983) documented that there is increased volatility during the period around stock splits. Therefore, if we accept the view that volatility does increase after stock splits, then this could translate into an increase in the option value. The implication is that investors may be able to buy options right before a split announcement, and sell right after when there is an increase in prices due to the announcement. One caveat, however, is that it would be prudent to factor in transaction costs, and depending on the level of these transaction costs, any perceived profits might quickly disappear.

SAMPLE AND METHODOLOGY

The starting point of our sample is all firms listed on the American Stock Exchange (AMEX), the New York Stock Exchange (NYSE) and the NASDAQ that have had a stock split during the period 2000 to 2004. From this group, we omit all firms that have split their stock more than once during this period to avoid any conflicts in our analysis. Finally, all firms in the sample must have CRSP data available for at least 250 days around the announcement of the stock split.

TABLE I
DATA DESCRIPTION

The sample consists of firms listed on the NYSE, NASDAQ and AMEX that had stock splits during the period 2000 to 2004. The sample meets the following criteria: (a) the firm has had only one split during the sample period, and (b) the firm must have CRSP data for 250 days around the split announcement.

Year	NYSE	NASDAQ	AMEX	Even Split Ratio	Odd Split Ratio	Options	No Options
2000	40	113	9	132	30	101	61
2001	22	33	1	28	28	25	31
2002	16	43	6	39	26	28	37
2003	23	55	5	48	35	39	44
2004	44	61	6	67	44	62	49
Total	145	305	27	314	163	255	222

The resulting sample comprises a total of 477 firms of which 145 are listed on the NYSE, 305 are listed on the NASDAQ, and 27 are listed on the AMEX. In terms of the split ratio, there are 163 firms in the sample that had an odd split ratio (e.g. 3:2 stock split), and 314 firms had an even split ratio (e.g. 2:1 stock split). Finally, there are 255 firms in the sample that trade options on the underlying stock, and 222 firms that do not have options traded. We present a distribution through calendar time of our entire sample in Table I.

Stock price reactions to stock splits are examined via event study methodology using Eventus software. First, an event study is done on the entire sample, and then subsequent event studies are done on sub-samples to determine the stock price reactions to stock splits in these sub-samples.

EMPIRICAL RESULTS

Event Study Results – Entire Portfolio

Table 2 presents the results for the entire portfolio of companies using both the value and equally weighted indexes of the market model. The findings indicate that there are abnormal returns present on the days leading up to a stock split announcement as well as 2 days after. On the announcement day, the abnormal return is 1.52% for the equally weighted index, and 1.56% for the value-weighted index. These

results are statistically significant. On the days following the announcement, the findings indicate that even though there are abnormal returns up to 2 days after the announcement, the abnormal returns are not long lasting and quickly become negative. This suggests that the market adjusts quickly, which points towards market efficiency.

TABLE 2
EVENT STUDY RESULTS – ENTIRE PORTFOLIO
 Panel A – Market Model, Equally Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.24%	2.232*
-4	0.35%	1.794*
-3	0.38%	1.959*
-2	0.17%	0.933
-1	0.72%	3.838*
0	1.52%	9.047*
+1	1.33%	8.678*
+2	0.19%	2.067*
+3	-0.19%	0.027
+4	-0.06%	-0.027
+5	-0.19%	-0.006

Panel B – Market Model, Value Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.28%	2.281*
-4	0.41%	1.813*
-3	0.49%	2.265*
-2	0.26%	1.220
-1	0.76%	3.832*
0	1.56%	9.005*
+1	1.37%	8.613*
+2	0.18%	1.851*
+3	-0.24%	-0.182
+4	-0.07%	-0.271
+5	-0.17%	-0.096

Event Study Results - Even/Odd Stock Split Ratios

The findings in Tables 3 and 4 indicate that when our sample is divided between even (e.g. 2:1) and odd (e.g. 3:2) stock split ratios, there is an abnormal return on the days preceding the stock split announcement, on the announcement date, as well as following the announcement. However, this abnormal return is greater for the sample comprising even stock split ratios. The mean abnormal return for the group of even stock split ratio is 1.70%, and for the group of odd split ratios, the mean abnormal return is about 1.19%. The results are very similar using both an equally weighted and a value-weighted index, and are statistically significant. The findings also suggest that even though there is a possibility of an abnormal return on the day after the announcement date, it is short lived and any abnormal return quickly decreases. This indicates a fairly rapid adjustment in stock prices. Also, this is consistent with prior research, which says that stock prices adjust quite quickly after a stock split announcement. We also

examined whether there is a statistical difference between the mean of the two groups and found that the means of the two groups are not statistically different from each other. This suggests that the type of split ratio does not impact the abnormal returns on the announcement date. We deduce, therefore, that the split ratio chosen by managers is used primarily to bring the stock price within a specific trading range that they deem optimal for the firm.

TABLE 3
EVENT STUDY RESULTS – EVEN STOCK SPLIT RATIOS

Panel A – Market Model, Equally Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.07%	1.651*
-4	0.24%	0.594
-3	0.53%	2.089*
-2	0.29%	1.689*
-1	0.20%	2.020*
0	1.70%	7.206*
+1	1.40%	6.784*
+2	0.18%	1.737*
+3	-0.30%	-0.688
+4	-0.25%	-0.621
+5	-0.39%	-0.595

Panel B – Market Model, Value Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.14%	1.712*
-4	0.35%	0.726
-3	0.66%	2.355*
-2	0.44%	2.037*
-1	0.31%	2.215*
0	1.77%	7.264*
+1	1.48%	6.939*
+2	0.18%	1.526
+3	-0.35%	-0.913
+4	-0.25%	-0.823
+5	-0.33%	-0.542

TABLE 4
EVENT STUDY RESULTS – ODD STOCK SPLIT RATIOS

Panel A – Market Model, Equally Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.55%	1.525
-4	0.55%	2.235
-3	0.12%	0.458
-2	-0.07%	-0.738
-1	1.70%	3.750*
0	1.19%	5.474*
+1	1.20%	5.427*
+2	0.21%	1.125
+3	0.02%	0.994
+4	0.31%	0.809
+5	0.19%	0.810

Panel B – Market Model, Value Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.56%	1.524
-4	0.51%	2.087*
-3	0.19%	0.612
-2	-0.08%	-0.729
-1	1.61%	3.473*
0	1.15%	5.323*
+1	1.14%	5.104*
+2	0.19%	1.049
+3	-0.05%	0.947
+4	0.27%	0.671
+5	0.11%	0.582

Event Study Results - Options/No Options

In Tables 5 we present the results for firms that have announced stock splits and have options traded. Panels A and B present the results for the equally weighted and value weighted index, respectively. We see that there the mean abnormal return on the announcement day is 1.11% for the equally weighted index and 1.18% for the value weighted index. When we examine the results for firms that have no options being traded (Table 6), we found that the mean abnormal return on the day of the stock split announcement is 2.10% for both the equally and value weighted indexes. These results are consistent with Reilly and Gustavson (1981) who found that short-run returns are very good for investors who learn of split announcements, and acquire options positions quickly. We purport that the mean abnormal return is lower in the group that has options traded because of the speculation that is likely to occur in the options market as a result of the additional leverage. It is important to note here that after checking for the statistical difference between the means of the two groups, we found that there was a difference. These results are very important for informed investors who can use the options market to take advantage of any abnormal return around a split announcement.

The results are consistent with other findings of Reilly and Gustavson (1981), which suggest that average returns are minimal or slightly negative after the announcement is made. Also, the results seem to be consistent with Stephan and Whaley (1990) who concluded that prices of stocks with options traded adjust to new information more quickly and efficiently than do stock prices with no options traded. This is evident by the lower mean abnormal return that we got for the group with options traded. Moreover, Jennings and Starks (1990) and Skinner (1990) found that the prices of non-optioned stocks take longer to adjust to announcements than the prices of optioned stocks. The results from this study seem to indicate that non-optioned stocks do indeed to take longer to adjust to the stock split announcement.

TABLE 5
EVENT STUDY RESULTS – OPTIONED STOCK
 Panel A – Market Model, Equally Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	-0.20%	0.041
-4	0.37%	1.260
-3	0.38%	1.839*
-2	-0.11%	0.234
-1	-0.16%	0.139
0	1.11%	5.226*
+1	0.85%	4.055*
+2	-0.14%	-0.086
+3	-0.22%	-0.451
+4	-0.06%	0.267
+5	-0.49%	-1.022

Panel B – Market Model, Value Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	-0.12%	0.037
-4	0.46%	1.347
-3	0.49%	2.086*
-2	0.01%	0.562
-1	-0.14%	0.053
0	1.18%	5.200*
+1	0.91%	4.058*
+2	-0.19%	-0.442
+3	-0.29%	-0.645
+4	-0.11%	-0.004
+5	-0.55%	-1.421

TABLE 6
EVENT STUDY RESULTS – NON-OPTIONED STOCK
 Panel A – Market Model, Equally Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.85%	3.410*
-4	0.32%	1.288
-3	0.39%	0.859
-2	0.56%	1.170
-1	1.97%	5.782*
0	2.10%	7.832*
+1	2.00%	8.646*
+2	0.67%	3.303*
+3	-0.13%	0.576
+4	-0.05%	-0.358
+5	0.23%	1.201

Panel B – Market Model, Value Weighted Index

Day	Mean Abnormal Return	Patell Z
-5	0.86%	3.489*
-4	0.34%	1.216
-3	0.50%	1.041
-2	0.61%	1.225
-1	2.03%	5.875*
0	2.09%	7.798*
+1	2.01%	8.542*
+2	0.72%	3.390*
+3	-0.18%	0.480
+4	-0.02%	-0.425
+5	0.35%	1.533

SUMMARY AND CONCLUSIONS

Event study methodology is used in the study to develop a number of findings. First, as has been found in a number of previous studies, positive abnormal returns are indeed present around the stock split announcement day. The main objective of this study, however, is to look more closely at stock splits, and specifically, how the split ratio chosen by managers as well as whether the firm has options traded or not impact the abnormal returns. Our findings indicate that abnormal returns are present on the announcement day for both even splits and odd split ratios. However, the mean abnormal return is slightly greater for the even split ratios. More importantly, there is no statistical difference between the means of the two groups, which leads us to believe that managers choose the split ratio based on a pre-determined trading range for the stock. The trading range hypothesis is one of the main theories cited for splitting a stock, and we find here that there is no significant difference in terms of the impact on the abnormal returns. As such, we find strong evidence for the trading range hypothesis.

The analysis on the optioned and non-optioned stock announcing splits shows some very interesting results. The mean abnormal return on the announcement day for stocks with no options traded is greater than the mean abnormal return for stocks that have options traded. This result may be important for a number of reasons. First, on the announcement of a stock split, informed investors may use the options market for speculative purposes to gain an abnormal return. The increased leverage that is characteristic of the options market may facilitate that process. Second, the results point to the possibility of the options market leading the stock market, and the quicker adjustment of stock prices of optioned stocks as opposed to non-optioned stocks. However, the results seem to be consistent with research by Hyland, Sarkar and Tripathy (2003) who found that options increase the informational efficiency of the stock market. New information is quickly reflected in stock prices, and in most cases, we observe a significant reduction in any abnormal return after the announcement day.

It is also important to note that transactions costs have not been taken into account here. Looking at the mean abnormal returns for the different groups, and assuming transaction costs of about 2%, investors may not benefit greatly, if at all, from investing around stock split announcements.

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