Forward and Reverse Stock Splits:

A Test of Market Efficiency

Proposal: Senior Thesis Research, Finance

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Introduction

Stock splits were once a very common financial practice firms used to manipulate their stock price. However, there has been a decline in the occurrence of stock splits in recent years; in 2017, only two S&P 500 companies split their stock compared to 93 splits in 1997 (Eisen & Holm, 2017). In the past, firms used stock splits to lower stock price, making it more affordable for individual investors to invest directly. But, due to the rise in popularity of alternative investment vehicles and an increase in average household income, it is no longer necessary to control for such low prices (Minnick & Raman, 2014). Nevertheless, by studying the market's reaction to stock split announcements, it is possible to test market efficiency.

Firms can choose to conduct either a forward stock split or a reverse stock split. In the case of a forward split, the firm increases shares while proportionally decreasing stock price; a regular two-for one stock split occurs when the number of shares is doubled and the stock price is cut in half. For example, if an investor owned 100 shares of stock priced at $200 per share, the split would double the number of shares to 200 at a price of $100 each. A reverse split, one-for-two, operates in an opposite manner. Therefore, an investor holding 100 shares priced at $200 per share would receive 50 shares priced at $400 per share. Because the value of the investment in the firm remains the same, stock splits are merely a cosmetic change, but it is speculated that stock splits signal information about a firm's future cash flows (Mcnichols & Dravid, 1990).

Investors speculate that it is possible to earn above average returns by trading according to the public announcement of a stock split. Forward splits are seen as positive signals that the company is doing well and expects success in the future. However, reverse splits can be seen as a negative signal, accompanied by a decrease in stock price (Woolridge & Chambers, 1983). In a semi-strong form efficient market that reacts to all public information, it should not be possible

to earn above average returns on this type of public announcement (Fama, 19070). This study aims to determine the type of market efficiency displayed in the market by assessing the investor's ability to earn above average returns by reacting to stock split announcements.

Problem and Purpose

How will stock prices of firms that implement forward stock splits react to the split announcement? How will the firm's stock prices react to a reverse stock split? More specifically, how quickly does the market price react to one of these events?

The purpose of this study is to test market efficiency by studying how the risk adjusted rate of return for stocks react to forward or reverse stock split announcements. Two samples of 25 firms, one representing firms that did forward stock splits and one representing firms that did reverse stock splits, will be tested using the standard risk adjusted event study methodology from the finance literature. Market efficiency is tested by comparing risk adjusted rates of return of firms that perform forward stock splits to market returns, expecting a positive reaction. Similarly, risk adjusted rates of return for companies that implemented reverse stock splits will be compared to market returns, but, in this case, a negative reaction is expected. Ultimately, for both forward and reverse splits, market efficiency will be tested to see if the market exhibits weak, semi-strong, or strong form efficiency by examining the timing of the market's reaction to these events.

Literature Review

When performing a forward stock split, a firm increases the number of shares outstanding by replacing each outstanding share of stock with multiple shares, according to a specified formula; the increase in outstanding shares is also accompanied by a proportional decrease in price per share (Bacon & Greis 2008). According to signaling theory, firms use forward stock

splits to convey positive information about their future earnings, which is reflected positively in stock price (Huang, Liano, & Pan, 2006; Grinblatt, Masulis, & Titman, 1984). Alternatively, a reverse stock split involves decreasing the number of shares with an increase in stock price (Neuhauser & Thompson, 2016). Reverse stock splits occur much less frequently than forward splits because investors perceive them negatively, so firms only do them when they feel it is imperative. According to He and Wang (2012), there are three theories regarding why firms conduct reverse stock splits. First, firms are trying to move their stock price or the tick size, minimum price movement divided by tick size, into an optimal range. Firms may also perform a stock split as a signal to investors because it is a way to convey inside information about the organization. The procedure/structure hypothesis suggests that firms perform stock splits to take advantage of the structural phenomenon of the market, such as positive return between the announcement and ex-split day. In either case, when firms announce stock splits, investors form predictions about the future success of the company. Consequently, stock price is affected because investors trade on the basis of this public information. According to signaling theory, the announcement of a stock split will cause a change in stock price, even though the split is a cosmetic change. By measuring the market's reaction to a stock split, it is possible to test for market efficiency.

Fama (1970) categorizes market efficiency into three forms: weak form efficient, semi-strong form efficient, and strong form efficient. Weak form efficiency states that it is impossible for investors to earn above average economic returns based on all historical information (Fama, 1970; Jensen 1978). Random walk theory is found to support weak form efficiency in numerous studies because it states that historical trends are not useful in predicted future stock price movement (Fama, 1965; Levy, 1967, Fama & Boume, 1966). If the market proves to be weak

form efficient, it is then tested for semi-strong form efficiency, which states investors should not be able to earn excess returns based on all public information (Fama, 1970; Bacon & Greis, 2008; Jensen, 1978). For example, investors should not be able to earn excess returns on the public announcement of a stock split because the market will react too quickly and efficiently. Lastly, strong form efficiency suggests the market reacts to all relevant information, both public and private (Fame, 1970). If this is true, it could reflect evidence of illegal insider trading based on private information. However, in reality there is not much evidence to support strong form efficiency (Rozeff and Zaman, 1988).

At what level of efficiency does the market react to the public announcement of stock splits? In the case of a stock split announcement, weak form efficiency would only take past information into consideration, detracting from its relevance in this scenario. Likewise, strong form efficiency would include private information, which would not be available in a public announcement. Thus, this study focuses on semi-strong form efficiency and the ability of investors to gain an above normal return by reacting to public information. If the market reacts in a semi-strong form efficient manner, the stock prices should reflect all public information and eliminate the opportunity to capitalize on this information.

Methodology

This study will test for semi-strong form market efficiency using the standard risk adjusted event study methodology in the finance literature. Two samples of stocks will be analyzed, one representing firms that performed a forward stock split and one representing firms that performed a reverse stock split. For this study, all of the stock return information for both samples will be collected from Yahoo! Finance; historical data, such as the return of the S&P

500 over the event period, will also be collected from Yahoo! Finance. The date of the stock split announcement will represent day 0 in the analysis. The final analysis will be conducted by:

1. Obtaining the historical stock prices of the samples firms and S&P 500 Index for the event study duration of -180 days to +30 days. The event period is defined as day -30 to +30, with day 0 being the date of the stock split announcement.
2. Holding period returns of the S&P 500 Index (R_M), and the sample firms (R) will be calculated for each day of the study using the following formula:

$$\textbf{Current Daily Return} = \frac{\textbf{(current day close price- previous day close price)}}{\textbf{previous day close price}}$$

3. Using the holding period returns, a regression analysis will be performed for each sample with the actual daily return for each company as the dependent variable and regressing it on the corresponding S&P 500 Index, the independent variable. The regression will be performed over the pre-event period (day -180 to -30) to obtain the intercept, alpha, and the standardized coefficient, beta, for each firm.
4. To calculate the normal expected returns, the risk-adjusted method (market model) will be used. The expected returns for each stock, for each day of the event period will be calculated using the formula:

$$\textbf{E(R)= alpha+ Beta } (R_m)$$

5. Then, the excess return will be calculated as:

$$\textbf{ER= actual return – E(R)}$$

6. Average Excess Returns will be found for each day by averaging the Excess Returns for each firm on a given day.

$$\textbf{AER= Sum of Excess Returns/n}$$

N= number of sample firms

7. In addition, cumulative AER will be calculated by adding the AERs for each day of the event period, days -30 to +30.
8. For the event period, graphs of AER and CAER will be plotted to show their movement over time.

In order to test for semi-strong form market efficiency in response to stock splits, this study presents the following hypotheses:

Forward Stock Splits

$H1_0$: The risk adjusted rate of return of the stock price of the sample firms is not significantly positively affected by the forward stock split on the announcement date.

$H1_1$: The risk adjusted rate of return of the stock price of the sample firms is significantly positively affected by the forward stock split on the announcement date.

$H2_0$: The risk adjusted rate of return of the stock price of the sample firms is not significantly positively affected by the forward stock split around the announcement date as defined by the event period.

$H2_1$: The risk adjusted rate of return of the stock price of the sample firms is significantly positively affected by the forward stock split around the announcement date as defined by the event period.

Reverse Stock Splits

$H1_0$: The risk adjusted rate of return of the stock price of the sample firms is not significantly negatively affected by the reverse stock split on the announcement date.

$H1_1$: The risk adjusted rate of return of the stock price of the sample firms is significantly negatively affected by the reverse stock split on the announcement date.

$H2_0$: The risk adjusted rate of return of the stock price of the sample firms is not significantly negatively affected by the reverse stock split around the announcement date as defined by the event period.

$H2_1$: The risk adjusted rate of return of the stock price of the sample firms is significantly negatively affected by the reverse stock split around the announcement date as defined by the event period.

Quantitative Tests and Results

Conclusion

Timeline for Completion

- Summer of 2018: Literature Review and Data Collection
- Fall of 2018: Continued Data Collection and Preliminary Testing
- Spring of 2019: Hypothesis testing, evaluate findings, draw conclusions, and write up research

Proposed Examining Committee

- Dr. Adkins
- Dr. Contat
- Dr. Waller

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