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DIVIDING TO CONQUER: STOCK SPLITS BEFORE MERGERS & ACQUISITIONS

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PREFACE AND ACKNOWLEDGEMENTS

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ABSTRACT

This paper examines whether US acquirers increase the value of their equity by conducting a stock split before announcing a merger or acquisition. Using a sample of 6782 US mergers and acquisitions, and 682 stock splits, that took place between January 2010 and March 2022, the study finds evidence that acquirers do indeed split their stock before announcing acquisitions. This is found to be more pronounced when the deal value is large. Furthermore, the results suggest that the timing of the pre-acquisition stock split is a crucial element for the acquirer to benefit from the stock split, with the ideal time between acquisition and stock split being 6-11 months. Conversely, no significant relationship is found between the method of payment and the likelihood of a stock split. Moreover, no relationship is established between the method of payment and the market perception of the stock split.

Keywords: Stock Splits, Mergers & Acquisitions, Value adjustment, Method of Payment, Market Perception, Equity Value, Timing

JEL Classification: G11, G14, G34

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CHAPTER 1 Introduction

Do US acquirers increase their equity value by conducting a stock split before announcing a merger or acquisition? It is frequently studied and generally confirmed that companies inflate earnings (or deflate costs) before engaging in M&A activities (Erickson & Wang, 1999; Alsharairi & Salama, 2012; Lu & Zhu, 2013; Gonçalves & Coelho, 2019; Karim et al., 2016; Botsari, 2020).

In addition, companies are found to use corporate events to achieve equity inflation before a merger & acquisition announcement (D'Mello et al., 2003; Kim et al., 2012). Furthermore, research has shown that firms' market capitalisation increases following stock split announcements (Kalay & Kronlund, 2010), which is beneficial for firms participating in a stock (for stock) merger or acquisition, as the stock can be used as a relatively cheap method of payment. This raises the question whether stock splits are used as a method to increase the equity value of firms prior to the announcement of such a consolidation move.

1.1 Existing literature

There are two main reasons that have been widely studied to reason the use of stock splits: investor signalling and the pursuit of an ideal trading range. In the case of investor signalling, management signals to outsiders its belief that the increase in share price and/or earnings is likely to be long-lasting. The pursuit of an ideal trading range, on the other hand, involves the belief that the split will reduce the share price to a range with improved liquidity and marketability (Powell & Baker, 1993; Ikenberry et al., 1996). Besides the abovementioned rationales, there is a third reason why share prices tend to rise after stock splits, namely the investor attention hypothesis. Through the execution of a split, the splitter gets increasing news coverage, which puts them on the radar of analysts and investors (Kesuma et al., 2021; Arbel & Swanson, 1993).

Finally, the use of splits to enhance value prior to M&A has received less attention and may be overlooked or mistaken for investor signalling (Guo et al., 2006). Therefore, this paper examines whether firms use stock splits prior to acquisitions, and under which circumstances they do so.

This research dates back over a decade and a half, during a period in which it was harder to gather data about companies. Moreover, the average quality of earnings was lower because of the relatively less stringent regulations (Agoes & Prayogo, 2017). That is, it was harder for investors to distinguish the difference between investor signalling and value manipulation than it is today. Meanwhile, the amount of less-informed retail investors has increased over time, the number of deals worldwide nearly doubled in a 10-year span, and stock splits resurged (Gurolla-Perez et al., 2022; Refinitv, 2022; Short, 2022).

The aforementioned developments show the necessity of new research on this topic, to more accurately reflecting current market dynamics.

1.2 Relevance

This research aims to contribute to the existing literature by investigating the use of stock split prior to mergers and acquisitions, with a particular focus on its implications and conditions. Hypothetically, this may help parties across the entire financial sector. First, both individual and institutional investors are able to more accurately value stocks as the research helps in assessing the true value of stocks. Moreover, it will enable the sell-side (i.e., target companies) in acquisitions to assess the actual value of a bid more accurately. Third, the presented practical implications will allow the buy-side (i.e., splitting acquirers) to fully capitalize the increase in equity value after the stock split, such that it can, for example, perfectly time the acquisition announcement. Last, as manipulation in capital markets is known to damage the efficiency and integrity of the financial sector, regulators might be obliged to protect the less-informed parties (Cumming et al., 2020).

1.3 Contribution to Existing Literature

Previous academic research reports mixed results regarding earnings reporting, and adjustments thereof, before mergers and acquisitions (Louis, 2004; Erickson & Wang, 1999). In addition, there is no consensus on the potential rationale behind the implementation of stock splits, especially prior to M&A announcements.

The mixed and lacking empirical results and the increasing importance of mergers and acquisitions, and stock splits demonstrate the need for further research to contribute to the discussion. As aforementioned, to date, to the best of my knowledge, only Guo et al. (2006) have investigated the use of stock splits for value manipulation prior to mergers and acquisitions.

In their paper, the authors try to distinguish the value manipulation hypothesis from the ideal trading range hypothesis and the investor signalling hypothesis. Specifically, they compare the short- and long-term performance of splitting acquirers (treatment group) to control groups. They further divide firms into sub-groups based on their quality of earnings (as measured by the level of accruals), hypothesising that companies with higher accruals are able to use stock splits as a value manipulation method as investors will increasingly mistake this for investor signalling.

In doing so, the authors overlook two things: first, the investor attention hypothesis, which suggests that splitting companies often experience increased short-term abnormal returns without sending credible return signals or having the stock in an ideal trading range as the stock receives more news coverage

(Kesuma et al., 2021). The increase in news coverage could also affect the long-term performance difference between non-splitting acquirers, splitting acquirers, and non-splitting non-acquirers, as splitters have already had a non-sustainable increase in their share price, which will eventually return to normal levels. Moreover, splitting acquirers have already witnessed recent news coverage at time of the split, diminishing the relative effect the acquisition announcement has on the increase in news coverage of the stock. Hence, it is expected that the news coverage does increase relatively less for splitting companies that execute an acquisition than for non-splitting companies executing an acquisition. Important to note is that this only holds for acquisitions that happened shortly after the stock splits.

Second, companies are found to increase their earnings and reduce their costs by increasingly using accruals after a split, as managers want to meet the increased market expectations as a consequence of the stock split (Chan et al., 2019), making the use of accruals as a proxy for the quality of earnings of these companies susceptible to endogeneity issues.

More specifically, this research makes a number of contributions to the existing literature. First, as mentioned, it uses an up-to-date dataset, which better reflects current and increasingly changing market conditions. Additionally, it combines the literature and research methods of Guo et al. (2006) and other literature (such as an improved asset pricing model) on stock splits and the usage of corporate events (in this paper “stock splits") prior to mergers and acquisitions, which will ensure quality methodology and (control) variables while allowing for an over-time comparison. Third, by not focusing on accruals and quality of earnings quality and by considering the investor attention hypothesis, this paper will become more resilient to endogeneity issues. Besides the difference in methodology and new data, this paper will investigate the ramifications of Guo et al.'s (2006) findings, which is completely novel. Particularly, it will explore the optimal timing of a stock split before consolidating moves, as well as whether the size and payment method of the deal are linked to the use of stock splits prior to acquisitions. In addition, it is researched whether the market perception of the stock split influences the corporate decisions during the acquisition afterwards.

1.4 Results

The first results do not provide evidence that companies that conduct stock splits are more likely to use shares as a payment method in the following acquisition than companies that do not conduct stock splits. Second, it is found that companies that split their stock typically announce larger acquisitions than companies that do not split their stock. Third, for companies to fully benefit from the stock split at time of the acquisition announcement, the ideal time between events is found to be 6-11 months. Fourth, there is no significant relationship found between the market perception of the stock split and the method of payment in the following acquisition. Last, acquiring companies are found to be more likely to split their stock than non-acquiring companies are.

1.5 Structure of the paper

The remainder of the paper is structured as follows: in Chapter 2, the existing literature on stock splits, value adjustments and mergers and acquisitions are analysed in order to formulate the hypotheses. Chapter 3 describes the data selection process, the matching method, and the descriptive statistics for the collected variables, after which the preliminary results are stated. Chapter 4 then discusses the methodology for each hypothesis, including the regression equations and the corresponding models. Chapter 5 discusses the results, and in Chapter 6 the paper is concluded and summarized.

CHAPTER 2 Literature Review

The upcoming chapter will commence by thoroughly examining the literature related to stock splits, including the underlying reasons and the impacts of these corporate actions. Following this, it will provide an overview of the literature on mergers and acquisitions, encompassing the consequences and yields of such consolidating moves. Subsequently, it will investigate value manipulation, value adjustments and when these typically occur, to ultimately integrate all these aspects and summarize the literature on the use of stock splits and other corporate actions as a means of value manipulation and adjustments before consolidating moves in order to form hypotheses in the last part of the literature review.

2.1 Stock Splits

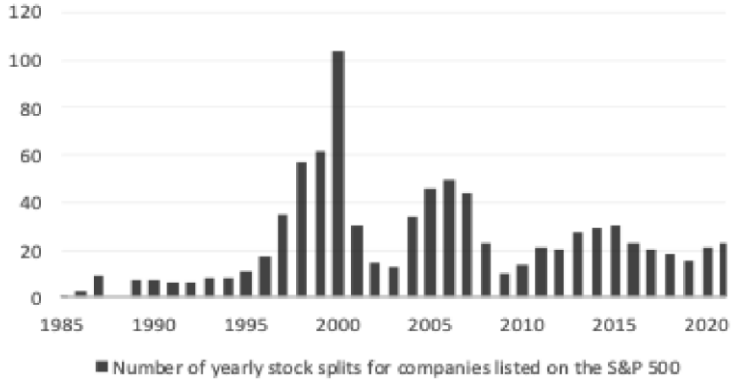
A stock split refers to a corporate action in which a company increases its number of shares outstanding by issuing more shares to existing shareholders in a certain ratio, typically 2:1, 3:1, or 4:1 but it can be as high as 20:1 (as Amazon's latest split). This results in a reduction in the price per share, which is offset by an increase in the number of shares issued and held by shareholders such that the total value does not contract. Important to note is that nothing changes on the balance sheet, cash flow statement, or income statement of a splitting company because of the split. (Berk & DeMarzo, 2019).

A much-discussed recent split is that of Tesla, which proceeded with a 5:1 stock split in August 2020, upon announcement, the stock price rose with 13 per cent (Waters & Kerr, 2020). However, when it announced a 3:1 split two years later, it had a detrimental impact on share value, as the closing price following the split was 2% lower (Siram & Singh, 2022), resulting in the question what causes these inconsistent movements in share prices.

2.1.1 Stock Split Activity

Stock splits have seen a high variety in popularity, the Dot-Com bubble witnessed the highest number of splitting firms that were listed on the S&P 500, which was seen to drastically decrease after it burst. A similar phenomenon can be noted during and after the financial crisis of 2008. The number of splitting companies listed at the S&P 500 has been lower since, but is getting back with popular demand (Jasinski, 2022; Short, 2022). Furthermore, as shown in Figure 2.1, and as noted by Fama et al. (1969), do stock splits tend to occur during economic booms.

Figure 1. S&P 500 stock splits, 1985-2021



2.1.2 Effects of Stock Splits

As discussed in paragraph 2.1.1, does a stock split itself not alter the income statement, nor the balance sheet. Contrary to this, the split is often seen to cause a positive effect on shareholder wealth. These commonly positive returns have been consistent over time, with literature ranging from the 1980s until now. For example, Grinblatt et al. (1984) witnessed a positive abnormal return of stock splits of 3.3% on the announcement day and the day after. Later, Ikenbarry et al. (1996) concluded that stock splits cause a five-day positive abnormal announcement return of 3.4%. Most recently, Titman et al. (2016) found that in the US in the two days surrounding the announcement day (t=-1,+1), share prices had a daily abnormal return of 3.3%, and an abnormal return of 7.9% in the month surrounding the announcement. Lastly, research by Nayak & Prabhala (2001) concluded that 70% of stock split announcements result in a positive change in share price. Often used event-windows to estimate abnormal announcement returns of stock splits is (t=-1,+1) for the short-term, and (t=-5,+5) for the longer short-term effects (Guo et al., 2006; Titman et al., 2016; Yustisia, 2018)

Guo et al. (2006) estimate these abnormal returns using the market model (subtracting the company's abnormal returns from the value-weighted daily market return). However, in the existing literature, abnormal returns around stock splits are mostly estimated using the Capital Asset Pricing Model (CAPM). This is because the market model does not incorporate the systematic risk of the company (as measured by the beta in the CAPM). For corporate events, abnormal returns are driven by firm-specific factors rather than market-wide factors, making the CAPM more viable (Asquith & Mullins, 1986; Biger & Page, 1994; Tosiriwatanapong et al., 2020; Dhar & Chhaochharia, 2008).

2.1.3 Ideal Trading Range

The fact that shareholder wealth increases subsequent to stock splits prompts the inquiry into what factors contribute to this outcome, particularly given that there are no changes to companies' financial

statements. Rich literature has investigated this relationship and potential causes, one commonly cited reason is to bring the stock into an ideal trading range. This was first proposed by Copeland (1979), who suggested that lowering the trading price increases the marketability of the stock by making it easier and cheaper for investors - particularly retail investors - to buy the stock, as they may not be able to buy fractional shares or are only able to do so by paying higher brokerage fees. The author mentions that in this ideal trading range there is a trade-off between the aforementioned retail investors and larger investors who see reduced brokerage fees when shares are in a higher price range. Results from a survey of CFOs by Baker & Gallagher (1980) show that the benefits for smaller investors outweigh the disadvantages for larger investors, as after lowering share prices as the CFOs see that their stock is increasingly traded by a wider range of investors. In addition, Lamoureux & Poon (1987) and Desai et al. (1998) found that after stock splits, ownership increases along with the number of trades, especially for smaller investors. This is likely to be a consequence of the increased ease with which individual investors can diversify across multiple assets (Schultz, 2000; Baker & Powell, 1993; Dyll & Elliot, 2006).

Theory regarding share liquidity suggests that as trading volumes tend to increase share liquidity, the latter will follow the increase in the former and therefore stocks often exhibit higher liquidity after the split (Ikenberry et al., 1996; Goyenko et al., 2006). Maloney & Mulheran (1992) confirm the above theory by concluding that stock splits lead to more shareholders in absolute terms, higher dollar trading volumes, increased number of trades, and decreased institutional ownership.

No contradicting research can be found in terms of the marketability of stocks after splits. With regards to decreasing liquidity, contrary literature is found, as Conroy et al. (1990) reported that bid-ask spreads worsened following the split, indicating a decrease in liquidity. In addition, Copeland (1979) discovered that trading volumes decrease significantly after stock splits.

2.1.4 Investor Signalling

Second often cited reason for companies to execute a split is that investors may perceive the split announcement as a promising signal by management. This theory, introduced by Fama et al. (1969), proposes that management anticipates on future earnings growth, which typically ensures higher share prices. In addition, if the company's earnings and share price have sore in the recent past, investors may perceive that management expects this rise to be maintained for a longer period of time. Thus, the split reduces the degree of information asymmetry between managers and shareholders by indirectly disclosing future earnings expectations (Powell & Baker, 1993).

In line with this, Asquith et al. (1989) found that firms have a significant increase in earnings four years prior to the split, and that this increase in earnings is maintained for up to five years. Furthermore, Desai & Jain (1997) argue that the observed higher stock price after stock splits is related to the increased

dividends, which are likely to be maintained as management dislikes dividend cuts and solely lowers it in special circumstances (Fama et al., 1969).

Contrary to these findings, Karim & Sarkar (2016) argue that splitting firms are overvalued in the seven years surrounding the announcement of these splits, demonstrating how investors may misprice firms after a split due to their inability to perceive the real motives.

2.1.5 Investor Attention

Arbel & Swanson (1993) introduced a final, less regularly cited reason, which suggests that share prices may increase following a stock split announcement due to heightened investor attention. As the news is published, investors are increasingly exposed to the company name and act on it. Important to note is that this this attention gradually dissipates (Kesuma et al., 2021). While this may sound elementary and a sign of market inefficiency, an example of such investor irrationality is shown by Itzkowitz et al. (2015), who argue that early alphabet stocks have up to 22% higher turnover rates than later alphabet stocks, simply because stock information is presented in alphabetical order and investors are therefore more likely to encounter information about a company starting with an A than a Z.

2.1.6 Stock Split Influences

Guo et al. (2006) argue that a companies' decision to split its stock or not depends on a variety of factors, and although there is no consensus as to what influences this decision, the following indicators are included in the paper. First two being the size of a company and the share price. Larger companies, and companies with a higher share price are more inclined to split their stock. Last two factors are the degree of over- or undervaluation of a company and the prior stock price run-up.

2.1.7 Drawbacks

In addition to the aforementioned advantages and motives, it is important to note that there are certain drawbacks associated with stock splits. One such disadvantage is the cost incurred in the execution of a stock split, as it is usually necessary to engage the services of a financial institution to carry out the process. In addition, it is argued that the increased liquidity and marketability will increase volatility as more short-term investors are attracted to the stock (Jones et al., 1994).

2.2 Mergers & Acquisitions

Now the body of literature regarding stock splits is summarized, this chapter will dive into another corporate action, namely mergers & acquisitions.

There are two primary approaches that companies can utilize to achieve value creation, namely organic and inorganic growth. The former is growth achieved through internal means, such as the expanding of existing products or services into new markets. The latter being growth achieved through mergers and

acquisitions, which is usually achieved faster, while organic growth is deemed more sustainable (Agnihorti, 2014).

2.2.1 Type of Acquisitions

Mergers and acquisitions (M&As) refer to the consolidation of two or more entities. In a merger, two companies combine to form a new one, while in an acquisition, one company absorbs another, and the absorbed company ceases to exist as a separate entity (Gaughan, 2017). In literature and in the remainder of this paper, the two definitions are used interchangeably.

In addition, in finance a distinction is generally made between two types of takeovers: hostile and friendly ones. In the former, the board of directors of the target company is against the intended takeover. In the latter, they generally approve them takeover proposal and its implementation (Gaughan, 2017). Moreover, distinction is made between private and public mergers and acquisitions. Private mergers refer to the acquisition of a company that is not yet listed on a stock exchange, while this is the case in a public merger.

Different payment methods exist to set up a corporate takeover, these typically vary per type of takeover. In a friendly takeover, the acquiring company usually offers its own shares in a certain ratio to the target's shares, cash, or a combination of both. To orchestrate a hostile takeover, the acquirer can do so via a tender offer, in which the shareholders of the target company are offered to sell their shares for a certain premium. Another possibility is to persuade shareholders of the target company to vote its board of directors out, after which the new board approves the takeover bid, which is known as a proxy fight (Gaughan, 2017).

Looking into what influences the method of payment in acquisitions, previous research argues the following: the share price of the acquiror's stock is positively associated with the use of stock as a method of payment, while the opposite is true for cash payments (Harris & Raviv, 1998). Additionally, the degree of over- or undervaluation of a company is an important factor in determining whether the entity should use its stock as a method of payment (Vagenas-Nanos, 2018), a frequently used proxy for this is the B/M-ratio (book-to-market ratio), and the P/E-ratio (price-to-earnings ratio) (Basu, 1977; Jaffe et al., 1989; Fama & French, 1992). Finally, the relative size of the target company compared to the acquiror is also an important consideration in the choice of payment method (Zhang, 2001).

2.2.2 M&A Activity

Prior to the COVID-19 pandemic, the volume of mergers and acquisitions reached a record high, surpassing the levels seen during the internet boom (1999-2001) and the M&A boom (2004-2007). This

cycle was driven by the search for economic growth in a lower growth economic world, exceptionally low interest rates, and abundant financial resources (van de Pol, 2020).

There are several influences on the M&A activity in an economic region, and a large body of literature has shown that M&A activity increases during periods of economic growth, while less activity is observed in times of economic contraction (Chung & Pruitt, 1994). Another influence on M&A activity is the degree of competition in an industry, with more competition being positively related to consolidation activity (Aguilara & Dencker, 2004). In addition, the availability of (relatively inexpensive) financing and the pace of technological changes have been found to increase mergers & acquisition activity. Finally, political and regulatory uncertainty reduces M&A activity (Lubatkin, 1983).

2.2.3 M&A Returns

Although mergers and acquisitions are one of the most studied phenomena in economic literature, the results in terms of operating performance of companies appear to be mixed. A meta-analysis by Meckl & Röhrle (2016) shows these varying results, in the sample of 55.399 worldwide transactions, extracted from 33 academic studies, only 47.6 per cent of M&As were found to be successful, resulting in abnormal returns. The most commonly used time period to measure abnormal announcement returns is (t=-1,+1), as the same meta-analysis of Meckl & Röhrle (2016) showed.

Most used models for estimating these abnormal returns in mergers & acquisition are the 3/5-factor models. These models are extensions of the CAPM and are found to estimate abnormal returns more accurately around acquisition announcement than other typical models do (Fama & French, 1992; Fama & French, 2015; Brounen et al., 2004).

These conflicting findings have led to discussions regarding the motives behind M&A activity. Cited drivers include synergy creation, managerial self-interest, and managerial hubris. In finance, synergy refers to the phenomenon whereby combining companies are more profitable after the merger or acquisition compared to the profitability when they were separate institutes combined. Five possible creators of synergies are reducing threats, increasing of market power, reducing of costs, increasement financial possibilities, and creation of leverage capabilities (Calipha et al., 2010).

Second cited reason for M&A activity is managerial self-interest, which suggests that M&As may be driven by the desire of managers to pursue their own interests rather than maximizing shareholder value. In terms of consolidation, this means that managers undertake acquisitions to increase the size of the company, which leads to higher managerial compensation, while reducing shareholder value (Jensen & Meckling, 1976). The final reason cited is managerial hubris, which is management overconfidence,

e.g., management's unrealistic belief that they can manage the target firm more efficiently than the current management (Aktas et al., 2005).

(Abnormal) returns in mergers & acquisitions are found to be very volatile, with numerous factors influencing the results. First, the deal value affects abnormal returns, as the market reaction to larger deals is less positive than it is for smaller deals (Alexandridis et al., 2013). Additionally, acquirers with higher stock prices experience lower abnormal returns compared to acquirers that have lower stock prices (Ruback & Jensen, 2002). Third, the payment method influences acquiror abnormal returns as using the stock as method of payment signals to the market that management beliefs its own stock is overvalued. Fourth, does the revenue of the acquiror influence abnormal returns as larger acquirors are able to have more resources, and bargainging power (Adrade et al., 2001). Finally, the premium paid in the acquisition, calculated by subtracting the value of the target from the deal value, has a diminishing effect on the abnormal return. However, it should be noted that paying a premium in a merger or acquisition is not always viewed negatively by the market. In fact, it can sometimes be seen as a signal of potential synergies between the two companies involved in the deal. (Wansley et al., 1983).

2.3 Value Adjustments & Manipulation

Before examining whether stock splits are used to influence dynamics in mergers and acquisitions, it is important to determine if value adjustments and manipulation are widespread in economics and finance, and what drives them. These theories can then be applied to the analysis of the corporate events discussed in order to investigate their potential use for such purposes.

Capital markets have historically been plagued by information and earnings manipulation, the most infamous case being Enron Corporation in 2001. The company had used accounting loopholes to hide billions of bad debts while inflating the company's revenues. More recently, Wirecard AG retrograded from a promising fintech company, valued €24 billion at its peak, towards a company that was found to have deceived investors, regulators, auditors, and even its own employees (Storbeck, 2021). These cases illustrate the degree of information misalignment in financial markets between management and investors. However, although it is self-evident that the actions in these examples are illicit, information misalignment and value inflation can also occur when not being illegal – and it is important to stress the existence of this difference.

Furthermore, a general distinction is made between internal and external manipulation. Internal manipulation comes from within the company, for example from management. While external manipulation is done by outsiders, such as investors. This paper will focus on internal manipulation as the decision to split a share comes from within the company.

2.3.1 Internal Manipulation before Corporate Events

(Internal) earnings management can be done by manipulating accruals through certain accounting choices and estimated or benchmarks (Fieds et al., 2001; Habib, 2007). Since earnings are the sum of accruals and operating cash flows, earnings management can be done through altering either one, or a combination of both (Xu et al., 2007).

As an illustration, evidence is found that is consistent with management manipulating companies' activities to avoid reporting losses. Such manipulation of companies' activities includes price discounts to increase short-term sales, overproduction to reduce cost of goods sold, and decreasing discretionary spendings to improve margins. There is also evidence of manipulation activities in order to meet analysts' forecasts (Roychowdhury, 2006). Furthermore, Chi & Gupta (2009) argue that firm overvaluation is statistically and economically related to earnings manipulation by management.

In addition, Crocker & Slemrod (2008) find that executives whose compensation is contingent on reported earnings cannot have the incentive to both maximize profits and report those profits factually. In line with this, Bartov & Mohanram (2004) report that executives of public corporations inflate earnings prior to stock-option exercises and that the earnings of these corporations are lower in the post-exercise period. Moreover, they discover that the low earnings in the post-exercise period represent a reversal of the inflated earnings in the pre-exercise period.

A rich literature examines the use of share buybacks to increase stock prices in the short run. It is generally argued that, similar to stock splits, share repurchases send a positive economic signal to investors. For example, Chen et al. (2015) evaluate how managers use stock repurchase programs as a tool to induce short-term price increases. They find that a limited number of managers have indeed used stock buyback announcements as a tool to inflate their share prices.

2.3.3 Manipulation before M&A

Earnings management prior to mergers and acquisitions has been extensively studied. Among others, Gonçalves & Coelho (2019) find that for European firms, management manipulates reported earnings upwards before announcing a merger or acquisition to positively influence the firms equity value. The same was found by Alsharairi & Salama (2012) for a sample of US firms.

In line with this, Karim et al. (2016) find that management manipulates earnings when the method of payment is the acquirer's stock, while no such evidence is found when the method of payment is cash. In addition, Botsari (2020) states that firms do indeed inflate earnings prior to M&A transactions in order to increase the stock price. This overvalued stock can then be successfully used as a relatively cheap payment method in mergers and acquisitions. Furthermore, the degree of earnings management

is found to be positively related to the relative size of the merger, meaning that firms increasingly manage earnings before relatively larger deals (Erickson & Wang, 1999).

2.3.4 Stock Split Manipulation before Corporate Activities

A seasoned equity offering (SEO) refers to the issue of shares by a company that has already completed an initial public offering (IPO) on the equity market. As the company is already listed on a stock exchange, it is not the first instance that it raises funds through an equity offering (Berk & DeMarzo, 2019). It has been found that companies carry out stock splits prior to an SEO. As a result, split issuers are able to raise more funds while issuing the same number of new shares (D'Mello et al., 2003).

Similarly, Kim et al. (2012) investigate the use of stock splits as a manipulation tool prior to corporate events in the Korean stock market. In their research, corporate events include SEOs, the issuance of convertible bond, and the issuance of bonds with warrants. They find that splitting firms have a positive significant return around the announcement date. However, they find long-term performance to be greatly reduced post announcement. In addition, insiders' ownership decreases significantly after the stock split. Moreover, both are more likely to occur for firms with higher information asymmetry between management and shareholders. It is concluded that companies do indeed use stock splits as a method of value manipulation prior to corporate events in order to inflate stock prices.

2.3.5 Stock Split Manipulation before Mergers & Acquisitions

To the best of my knowledge, Guo et al. (2006) is the only paper, to date, that has examined the use of stock splits as a manipulation tool prior to merger & acquisition announcements. The authors conclude that there is little evidence to support the signalling theory and some evidence to support the ideal trading range theory, in their results. However, their findings do support the theory that some splitting acquiring firms do indeed use stock splits as a tool to the value of a company's equity prior to M&A announcements and that this effect is more pronounced when the acquisition is at least partially financed with equity.

The authors investigate this by first running a probit regression, in which the probability of a stock split is a binary dependent variable, and a binary M&A variable is found to have a positive significant effect, while controlling for various factors that have been found to potentially influence the probability of a stock split for certain companies[1]. It is concluded that the likelihood of a coming acquisition announcement is a significant factor in a firm's decision to split its stock.

[1] Depending on the specific regression, the controlling variables include log(size), log(stock price), B/M-ratio, prior 1-year return, and the stock price

In addition, the authors also test the value manipulation hypothesis by dividing firms into quantiles based on their accruals, using it as a proxy for quality of earnings. In doing so, they hypothesise that firms with lower quality of earnings can use stock splits as a manipulation tool more easily, as investors may mistake it for a credible signal from management due to the information asymmetry. The authors hypothesize that the market will detect the manipulation at announcement of the takeover, resulting in penalisation and lower returns around the announcement for splitting firms with lower quality of earnings, and lower returns in the long run. Although some results support the value manipulation hypothesis, one should be cautious with regards to endogeneity using this methodology for two main reasons:

1. In order to meet the increased market expectations following the stock split, firms are found to increase their earnings, and reduce their costs by using accruals. More specifically, firms move revenue and costs from different accounting periods such that the net income increases in the period subsequent to the split. This suggests that the higher accruals (the proxy for lower quality of earnings in Guo et al. (2006)) may be caused by the need to conform to market expectations, rather than the possibility of using the stock split as a manipulation tool (Chan et al., 2019).
2. The authors fail to identify higher share prices due to increased investor attention as a potential result of a stock-split. Therefore, the short-term abnormal returns around acquisition announcements of splitters may be lower than that of non-splitters because the relative increase in investor attention is lower for the former than for the latter. The splitters have already been analysed and reported on, which reduces the relative effect the new coverage has, resulting in less increased attention from investors. In addition, this may negatively affect the long-term abnormal returns for splitting and acquiring companies as these have had a non-sustainable increase in their stock price, which will normalise (Kesuma et al., 2021), something that non-splitting non-acquiring companies will not have.

Concluding, this paper will build further on the theory and methodology as used in Guo et al. (2006), including certain adjustments; i) no usage of accruals around stock splits; ii) the investor attention hypothesis is taken into consideration; iii) a preferred asset pricing model will be utilized. Besides potentially confirming the results from Guo et al. (2006), this paper will also dive into the practical implications and conditions of using a stock split prior to an acquisition announcement, which is completely novel.

Table 1. Meta-table of prior literature

Author(s) (Publication year)	Time period	Region	Method	Control variables	Results
Guo, Liu & Song (2006)	1980-2003	US	Probit regression	Log(size), log(stock price), B/M-ratio, prior 1-y return, stock price	M&A = 0.225 (0.000)
Kim et al. (2012)	1999-2009	Korea	T-test	n/a	5.801 (0.000)

2.4 Hypotheses Forming

Taking abovementioned literature into consideration leads to hypothesizing the following:

H1: Companies that conduct stock splits prior to acquisition announcements are more likely to use shares as a method of payment than companies that do not conduct stock splits

Based on research by Guo et al. (2006), this theory posits that firms are more inclined to split their stock if a subsequent purchase is (partially) financed by stock. The authors argue that acquirers using stock swaps have a 5.97% probability of issuing a stock split prior to the acquisition announcement, while all-cash acquisitions and combined offers have a 2.96% probability. Karim et al. (2016) provide further evidence on this, as their research concludes that firms only manage pre-acquisitions earnings if the subsequent deal is financed by shares. Furthermore, according to Botsari (2020), firms do manage earnings prior to mergers and acquisitions in order to boost their stock price because the overpriced stock can be utilized as a relatively inexpensive payment method in this particular transaction.

H2: Splitting acquirers are more likely to announce large acquisitions than acquirers that do not conduct stock split

As Erickson & Wang (1999) argue, firms adjust earnings upwards more before consolidating moves when the deal size is relatively large. Their conclusion holds only for stock-for-stock mergers. This is because earnings management (and stock splits) bear costs and risks, and therefore the benefits should outweigh the costs when used as a method to inflate earnings (or share prices). In addition, Guo et al. (2006) find that the probability of a company conducting a stock split prior to an acquisition increases from 5.16% when the deal value is above $50 million to 5.75% when the deal value is above $100 million.

H3: Splitting acquirers companies are more likely to use their stock as a method of payment when the market perception of the stock split is positive

In the event that the market responds positively to a stock split, leading to an increase in the stock price, companies are expected to tend to lean towards using their shares as a payment method since they have increased in price, becoming comparatively less expensive to other financing options. This hypothesis is consistent with Martin's (1996) and Boateng & Bi's (2014) studies, which indicate that the probability of using stock as a form of payment in acquisitions rises as the acquiring company's stock returns prior to the acquisition also increase.

H4: The timing of the stock split prior to the acquisition is a crucial element in order for the acquiror to benefit from the stock split

In order to fully capitalize the increased share price following the stock split, companies are expected to have a certain window in which they can successfully use their stock as a relative cheap method of payment, after which using the stock as a method of payments gets relatively more expensive. As described is the literature regarding the duration of outperformance of splitters varying, Titman et al. (2016) and Ikenbarry & Rannath (2002) find that this outperformance remains most pronounced for one year but describe that this outperformance gradually disappears. In addition, as Guo et al. (2006) researched, are companies expected to be penalized by the market if it perceives the stock split as a method to manipulate share prices. It is hypothesized that markets are more likely to expect so and act upon it if the acquisition announcement is done shortly after the stock split. Henceforth, it is expected that the ideal window to execute a stock split is not shortly after the stock split announcement, and also not less than a year after the announcement.

H5: Acquirers are more likely to have executed a stock split prior to the acquisition announcement than non-acquirers are during the same time period

Guo et al. (2006) find that acquirers are more likely than non-acquiring firms to split their stock 3-months prior to the acquisition announcement. The probability is 63-64% higher for acquirers than for non-acquiring firms.

CHAPTER 3 Data

This section describes the data gathering by stating the source, filtering criteria, and matching method of datasets. Descriptive figures are states throughout the chapter per different subset of data.

3.1 Data Gathering

As discussed, is the choice of time period a critical methodological decision. The chosen period should accurately reflect the current market dynamics, while ensuring that a substantial period of time is included in the dataset in order to collect sufficient data. Furthermore, the geographical location of the companies undergoing acquisitions and/or stock splits is another crucial factor to be considered in the methodology. The first constraint on the selection of data is that the primary location of acquirers (and splitters) should be the United States, to ensure an overtime comparison with the only paper on this topic, while at the same time being the most active M&A and most prominent market in the world. In terms of splits, the minimum split ratio should be 1.5:1 to ensure that the split is sufficiently compelling to the market and has sufficient impact on the share price. Third constraint is that the pre-acquisition stake should be max. 49% to ensure that the subsidiary (or acquired company) is not yet integrated into the acquirer, as this would mitigate the effects of the acquisition. Finally, the minimum deal value is chosen to be $5 million, this to remove less pronounced events.

The stock split sample is obtained from the Center of Research and Security Prices (CRSP), part of Wharton Research Data Services (WRDS). All split events announced between 1 January 2010 and 31 March 2022 are collected for companies listed on the New York Stock Exchange (NYSE) and NASDAQ. All corporate actions that are not (reverse) splits are removed from the dataset, leaving 2621 (reverse) stock splits. After removing reverse stock splits (1765 observations), 856 stock splits remain in the dataset. In addition, following Guo et al. (2006), splits with a ratio of less than 1.5:1 (0.5 additional shares per 1 current share) are removed from the dataset, leaving 682 observations. Table 3.1 visualises the number of stock splits per year.

Table 2. Number of stock splits, average, and median stock splits ratio per year

Announcement year	Number of stock splits	Average stock split ratio	Median stock split ratio
2010	51	3.8:1	2:1
2011	67	2.3:1	2:1
2012	57	2.3:1	2:1
2013	68	2.5:1	2:1
2014	61	2.5:1	2:1
2015	88	2.7:1	2:1
2016	43	3:1	2.6:1
2017	65	2.5:1	2:1
2018	43	2.4:1	2:1
2019	18	3.3:1	2:1
2020	39	3.3:1	2:1
2021	66	3.9:1	3:1
2022 (until 31 March)	16	2.4:1	2:1
Total	682	2.8:1	2:1

The M&A sample is drawn from Bureau van Dijk's (BvD) Zephyr M&A database, using the following search criteria: i) acquirer must be listed in the US on the NYSE or Nasdaq; ii) initial stake of acquirer max. 49%; iii) Acquisition announcement made between 1 January 2010 and 31 March 2022; iv) Deal value at least USD 5 million; v) Deal information should be provided, resulting in 6782 deals.

Table 3. Number of deals per year, average and median deal value, and method of payment

Announcement year	Number of deals	Average deal value ($m)	Median deal value ($m)
2010	455	711	112
2011	426	1072	106
2012	505	484	105
2013	446	548	115
2014	607	1099	119
2015	658	1397	89
2016	526	959	112
2017	596	925	133
2018	512	1527	215
2019	531	1556	120
2020	491	1264	161
2021	875	1010	254
2022 (until 31 March)	154	1291	154
Shares only	747	875	108
Shares partially	1758	1927	146
No shares	4277	743	135
Total	6782	1065	134

3.2 Descriptive Statistics

The M&A and stock split sheets are merged using the acquirer ticker with the constraint that the acquisition takes place max. 18 months after the stock split, a further constraint is that there should be sufficient (financial) data on the acquirer. The merger results in 86 acquiring splitters. The time between events is chosen to ensure sufficient depth of data. If the 12-month period of Guo et al. (2006) would be followed, the number of matches would decrease with 28%, remaining with only 62 stock splits in the 12-month period prior to the acquisition.

Table 4. Descriptive statistics full dataset

Variable	Obs.	Mean	Std. dev.	Min.	Max.	Pr(Skew.)	Pr(Kurt.)
Stock Split	4567	0.01	0.12	0	1	0	0
Deal Value ($m)	4567	1217	5147	5	160000	0	0
Acquiror Revenue ($m)	4567	8413	27679	-4	500343	0	0
Acquiror Market Cap ($m)	4543	34083	157152	0.5	2339018	0	0
B/M-ratio	4554	0.25	8.6	-12	62	0	0
Acq. Stock Price prior to Ann. ($)	4567	69.8	361	3.6	183	0	0
Relative Deal Value	4556	2.34	2.8	0	69	0	0
Deal Value >100m	4567	0.61	0.49	0	1	0	.
Method of Payment Shares	4567	0.32	0.47	0	1	0	.

For many variables, the natural logarithm will be used in regressions to mitigate the effects of outliers and influential observations, as most variables are non-normally distributed with extreme outliers, as can be seen in the Skewness and Kurtosis column in Tables 4 and 5. Outliers are not omitted to ensure the quality and sufficient depth of the data in the regressions. For example, Apple Inc. (AAPL) would be an outlier in terms of market capitalisation, while providing interesting insights into pre-M&A split behaviour as serial acquirer.

Including target characteristic in the data sample would potentially give additional valuable insights, however, when including the availability of different target characteristics as a constraint, the sample size would drastically decrease as for certain smaller deals limited target information is available. Hence, to ensure sufficient depth of data, no such constraint is included.

Most of the variables presented are available directly from the Zephyr database, but (abnormal) returns are not, so these are calculated manually (in Microsoft Excel) for each specific stock. The Capital Asset Pricing Model (CAPM) is used because it is the most widely used tool for estimating the investment performance of specific stocks, is relatively easy to understand, and is the preferred model for stock splits (Asquith & Mullins, 1986; Biger & Page, 1994; Tosiriwatanapong et al., 2020; Dhar & Chhaochharia, 2008; Fama & French, 2004), as discussed in the literature review. The parameters needed to calculate abnormal returns are obtained from the Wall Street Journal, Refinitv and CRSP. The CAPM methodology is described in detail in the Methodology section.

Table 5. Descriptive statistics dataset stock splits & acquisition

Variable	Obs.	Mean	Std. dev.	Min.	Max.	Pr(Skew.)	Pr(Kurt.)
Stock Split Ratio	86	2.53	1.25	2	10	0	0
Date Difference (months)	86	8	5.70	0	18	0.67	0
Deal Value ($m)	86	2014	6406	5.6	39000	0	0
Acquiror Revenue ($m)	83	13169	46254	-1.4	365817	0	0
Acquiror Market Cap ($m)	86	87876	356267	41.8	2339018	0	0
B/M-ratio	86	0.76	1.13	0	7.0	0	0
Acq. Stock Price prior to Ann. ($)	86	49.6	33.2	3.6	183	0	0
Acq. Stock Price Run-up 1-year prior to acquisition announcement	86	0.01	0.15	-0.51	0.35	0	0.01
Relative Deal Value	86	0.12	0.19	0	1	0	0
Method of Payment Shares	86	0.31	0.47	0	1	0	0
Stock Split Abnormal Return (-1, +1)	80	1.8%	5.3%	-9.0%	27%	0	0
Stock Split Abnormal Return (-5, +5)	79	2.8%	7.6%	-27%	24%	0.05	0
Stock Split Positive Abnormal Return (-1, +1)	80	0.65	0.48	0	1	0.02	0
Stock Split Positive Abnormal Return (-5, +5)	79	0.79	0.42	0	1	0.0	0.62
Acquisition Abnormal Return (-1, +1)	81	0.0%	1.0%	-0.2%	3.6%	0.01	0.16

In order to test Hypothesis 5, it is not sufficient to compare acquirers with random non-acquiring firms, as both the decision to acquire and the decision to split shares depend on various factors; mainly share price, market capitalisation and industry (Guo et al., 2006). Therefore, companies are matched using a propensity score with a caliper based on a difference threshold. To be more specific, companies are first matched on the basis of their primary industry. Then, companies are matched based on their market capitalisation and share price at the time of the deal announcement (of the acquiring company). Thus, a company is searched for that has a similar market capitalisation and share price at the time of the acquiring company's acquisition announcement. The match is chosen such that there is a match on industry and the cumulative relative difference in market capitalisation and share price is less than 30%. If there is more than one match, the match with the smallest cumulative relative difference is selected. The matching method results in 358 acquiring firms and 358 matched non-acquiring firms. Firms for which no match is found are dropped.

The success of the matching method can be depicted from the descriptive statistics: the average market capitalisation of the acquiring firms is $4168 million, and the average market capitalisation of the non-acquiring firms is $4082 million. A similar difference can be observed for the share price, with the average share price of acquirers being $37.37. The share price of non-acquirers is slightly higher, averaging $38.16.

Table 6. Descriptive statistics matched dataset

Variable	Obs.	Mean	Std. dev.	Min.	Max.	Pr(Skew.)	Pr(Kurt.)
Stock Split	716	0.02	0.13	0	1	0	0
Merger & Acquisition	716	0.50	0.50	0	1	1	0
Price/Earnings	637	88.4	359	0	4600	0	0
Market Cap ($m)	716	4125	8639	9.93	52468	0	0
Stock Price ($)	716	37.8	31.1	0.40	191	0	0

3.3 Preliminary Findings

This section starts with general observations and whether they are in line with the existing literature, and then examines the preliminary results for each hypothesis, it is important, however, to note that these are only indicative results, as regression models and control variables potentially change the results.

The average abnormal return around stock splits (t=-1, +1) is +1.9%, which is in line with the existing literature. The abnormal returns are more pronounced when the measurement period is extended (t=-5, +5), namely +2.8% (Ikenbarry et al., 1996; Grinblatt et al., 1984; Nayak & Prabhala, 2021). Both results support the ideal trading range, investor signalling and investor attention hypotheses. The abnormal returns of mergers & acquisition appear to be negligible, with a mean of 0.0 for (t=-1,+1). This result is consistent with the meta-analysis of Meckl & Röhrle (2016), who found that 47.6% of acquisitions witness abnormal returns.

Furthermore, as can be seen in the correlation in Appendix B, the payment method shares are positively related to the relative deal value, which is in line with expectations, as a larger deal involves more sources of financing, and it consequently becomes increasingly difficult to use only cash as a payment method. Payment shares are negatively related to the acquirer’s market capitalisation, suggesting that larger companies are less likely to use shares as a payment method.

Examining the preliminary results for H1, it appears that there is negligible variance in the use of shares as payment method between Table 3.3 (the full dataset) and Table 3.4 (the dataset with splitting acquirers). The use of shares is observed to be more frequent in the dataset of acquisitions of splitting, and non-splitting companies, where shares are used in 32% of transactions. In the subset of only splitting acquirers, shares are used in 31% of the transactions. Therefore, based on this initial result, it can be concluded that there is no evidence to support hypothesis H1.

With regard to the initial findings for H2, a comparison is made between the average deal value across the datasets. It is observed that the average deal value within the full dataset is $1217 million, whereas it is almost twice as high in the dataset consisting only of splitting acquirers (i.e. $2014 million). Hence, sufficient preliminary evidence is found to support hypothesis H2.

For H3, it is found that the mean abnormal returns of splitting acquirers vary according to the payment method. The abnormal return 10 trading says surrounding the announcement of the split (t=-5, +5) is +3.7% when the company subsequently uses shares in the acquisition, while it is +2.4% when shares are not used as a payment method. A similar trend can be seen 2 trading days (t=-1, +1) around the stock split announcement, where the abnormal returns are +3.3% for acquirers using their shares in the upcoming acquisition and +1.2% when acquirers do not use shares as a payment method. Hence, support for H3 is found, as it indicates that the likelihood of using stock as a payment method in an acquisition does increase when the perception of the stock split is positive. When zooming into the binary variable stock split positive abnormal return (t=-1, +1) the relationship between using shares as method of payment and abnormal returns surrounding the stock split is negligible. 67% of firms that have used shares in the acquisition have seen abnormal returns when announcing the stock split, while 65% of companies that have not used shares as method of payment have had abnormal returns at stock split announcement. The relationship is more pronounced for (t=-5,+5), as 83% of companies that have used shares in the acquisition announcement have had abnormal return, compared to 74% for non-share acquisitions.

Differences are also found when looking at the timing of the stock split before the following acquisition. The optimal window between the two events seems to be 6-11 months, as the abnormal return 2 days around the acquisition announcement (t=-1, +1) is +0.2% when the time between events (TBE) is 0-5 months. The abnormal returns are +0.4% when the TBE is 6-11 months and 0% when the TBE is 12-18 months. These preliminary results support H4: although abnormal returns are positive for almost all TBE categories, they are most prominent for a TBE of 6-11 months. However, it was expected that abnormal returns would be lower, perhaps even negative, for acquisitions announced shortly after stock splits, as the market would interpret the split as value manipulation and act upon it. Furthermore, it was

expected that the increase in investor attention would be relatively less when both events happen shortly after each other.

Finally, on average, 2.2% of acquiring firms have conducted a stock split 18 months prior to the announcement of the deal, while only 1.1% of non-acquiring firms have split its stock. Thus, acquiring firms are 1.1 percentage points more likely to have performed a stock split, which in relative terms this means that acquiring firms are twice as likely to have executed a stock split as non-acquiring firms. These results are consistent with Guo et al. (2006) and support hypothesis H5.

CHAPTER 4 Method

This chapter will outline the regression equation with an explanation of all variables used for each hypothesis. The included control variables are extracted from the literature review and hence will only be shortly mentioned. In addition, the rationale for using the particular model for each hypothesis will be provided.

4.1 Method H1: Stock Split Effect on Method of Payment

H1: Companies that conduct stock splits prior to acquisition announcements are more likely to use shares as a method of payment than companies that do not conduct stock splits

$$logit\big(P(MoP = 1)\big) = \beta 0 + \beta 1(Split) + \beta 2 \log(SP) + \beta 3 \log\left(\frac{B}{M}\right) + \beta 4 \log(RDV) + \varepsilon$$

Where:

- $P(MoP = 1)$ is the probability of shares being used as a method of payment, logit() is the logistic function of this variable
- $\beta 0$ is the intercept
- *Split* is the binary explanatory variable of interest, noting 1 if the company conducted a stock split 18 months prior to the acquisition and 0 otherwise
- *SP* is the acquiror share price prior to acquisition announcement
- *B/M* is the acquiror B/M-ratio prior to acquisition announcement
- *RDV* is the relative deal value, i.e., deal value/acquiror market capitalization prior to acquisition announcement
- ε is the error term, representing the deviation of the actual value of the dependent variable from the predicted value

The coefficients β1, β2, β3 and β4 represent the change in the log odds of the dependent payment method variable associated with a one-unit increase in each independent variable, while holding all other variables constant. The coefficient of interest is β1, which measures the impact of stock split on the probability of using shares as method of payment, after controlling for the effects of the other variables in the model. If coefficient β1 is positive, conducting a stock split increases the likelihood of using shares as a method of payment. The intercept β0 represents the logarithm-odds of the dependent payment method variable when all independent variables are equal to zero.

For regression 1, a logit or probit model must be implemented as the dependent variable is binary. A logistic model is chosen because the coefficients are easy to interpret while providing useful insights

into the explanatory variables. Furthermore, probit regressions assume normality of the errors, which is not the case for the regression at hand. Finally, logit regressions tend to have lower variances, making them more stable and reliable for larger sample sizes. (N=4.266 for equation H1) (King & Zeng, 2001).

Although normality of variables is not a criterion in logistic regressions, it minimizes the effects of outliers, hence stabilizing the variances, improving the performance of the logistic regression model (Agresti, 2015). Therefore, logarithms are taken for all continuous variables, including the B/M-ratio. While it would be expected that the B/M-ratio variable is already scaled, and hence less non-normally distributed, this is not the case (as can be seen in Appendix D).

The control variables included follow from the literature review, more specifically what is known to influence the method of payment in mergers & acquisitions; i) The share price of the acquirer's stock; ii) the B/M ratio; iii) the relative deal value.

4.2 Method H2: Stock Split Effect on Deal Value

H2: Splitting acquirers are more likely to announce large acquisitions than acquirers that do not conduct stock splits

$$logit\big(P(DV100 = 1)\big) = \beta 0 + \beta 1(Split) + \beta 2 \log\left(\frac{B}{M}\right) + \beta 3 \log(MktCap) + \beta 4(MoP) + \Sigma[\beta k * Ind\ k] + \varepsilon$$

Where:

- $P(DV100 = 1)$ is the probability of the deal value to exceed is equal to \$100m, logit() is the logit function of this variable
- $\beta 0$ is the intercept
- *Split* is the binary explanatory variable of interest, which equals 1 if the acquiror executed a stock split 18-months prior to the acquisition announcement
- *B/M* is the acquiror B/M-ratio prior to acquisition announcement
- *MktCap* is the acquiror market capitalization prior to acquisition announcement
- *MoP* is a binary variable, which equals 1 if the method of payment is shares, and 0 otherwise
- Σ *Ind* represent the 158 binary independent variables indicating whether the acquiror is in a specific primary industry
- ε is the error term, representing the deviation of the actual value of the dependent variable from the predicted value

Interpretation of regression model H2 is similar as H1, β0 is the constant, or the logarithm-odds of the possibility of deal value being larger than $100m, when all other included variables are equal to 0. The coefficient of interest is β1, which indicates the impact of stock splits on the likelihood of the deal value being larger than $100m, if this coefficient β1 is significant, and larger than 0, variable split has a positive relationship with deal value larger than $100. B2, and β3 indicate the change in the logarithm-odds of the deal value being larger than $100m, when the corresponding variable (B/M, and MktCap) increases with one unit. Coefficient β4 measures the influence the method of payment has on the log-odds of the deal value being larger than $100m, as it is a binary variable, interpretation is similar as to β1. Finally, βk are the coefficients of the 158 binary variables $Ind\ k$, the variable notes 1 if the company is active in a specific industry, and 0 otherwise.

Apart from the binary independent variable, logarithms are used to ensure that the independent variables are less non-normally distributed, while also reducing the influence of outliers. As for H1, this is done not only for the absolute variables, but also for the B/M ratio, as this stabilizes the variances. For the same reasons as H1, a logistic regression is utilized.

For H2 the included control variables are depicted from existing literature on influences of deal values; i) B/M ratio is included to measure how undervalued or overvalued the acquirer is; ii) market capitalisation is included to measure the size of the acquirer; iii) method of payment is included as cash deals tend to be smaller than stock deals; iv) industry of the acquiror was last found to influence the acquisition size.

4.3 Method H3: Market Perception Effect on Method of Payment

H3: Splitting acquirers are more likely to use their stock as a method of payment when the market perception of the stock split is positive

$$logit\big(P(MoP = 1)\big) = \beta 0 + \beta 1(\text{ARS}) + \beta 2\log(DV) + \beta 3\log(SPR12) + \beta 4\log\left(\frac{B}{M}\right) + \varepsilon$$

Where:

- $P(MoP = 1)$ is the probability of shares being used as a method of payment, logit() is the logit function of this variable
- $\beta 0$ is the intercept
- *ARS* is the variable of interest, a dummy variable of abnormal returns of the stock surrounding the stock split, noting 1 if the abnormal returns are positive, 0 otherwise
- *DV* is the deal value

- *SPR12* is the acquiror stock price run-up 12-months prior to acquisition announcement
- *B/M* is the acquiror B/M-ratio prior to acquisition announcement
- ε is the error term, representing the deviation of the actual value of the dependent variable from the predicted value

In which the abnormal returns of stocks are calculated using the Capital Asset Pricing Model (CAPM):

$$(ER)i = Rf + \beta i\ (ER)m - Rf\ )$$

Where:

- $(ER)i$ = Expected return of the stock
- Rf = Risk-free rate (10-year US treasury rate)
- βi = Beta of the stock
- $(ER)m - Rf)$ = Market risk premium

The abnormal returns are the differences between the expected return of the investment over the specific time period, minus the actual returns of the investments. Calculated with the following time periods:

- 1-trading-day around the event (=t-1, t+1), following Guo et al. (2006); Titman et al. (2016)
- 5-trading-days around the event (=t-5, t+5), following Chern et al. (2008)

More specifically, in the model, the 10-year US bond treasury rates are used as a proxy for the risk-free rate, while the S&P 500 index is used as a proxy for the market returns.

For the calculation of cumulative abnormal returns, this paper does not follow Guo et al. (2006), who estimate abnormal returns by using the market model. As discussed in the literature review is the CAPM more viable to assess abnormal returns of stock surrounding stock splits (Asquith & Mullins, 1986; Biger & Page, 1994; Tosiriwatanapong et al., 2020; Dhar & Chhaochharia, 2008). Therefore, following these papers, the Capital Asset Pricing Model is utilized.

As in H1 and H2, the regression coefficients β1, β2, β3, and β4 show the variation in the log-odds of the dependent variable when variables increase by one unit, ceteris paribus. The coefficient of interest in regression 3 is β1, which shows the effect of abnormal returns surrounding a stock split on the method of payment in the subsequent acquisition. If this coefficient is significantly positive, the market perception of stock splits has a positive effect on the likelihood of using stocks as method of payment in the subsequent acquisition. A logistic model is used to estimate the relationship between the different values for the same reasons as mentioned in H1 & H2, except for the size of the sample, which is

substantially lower for H3. All variables are non-normally distributed, hence they are transformed using logarithms, as it stabilizes the variances.

While the dependent variable (method of payment) is the same as in the regression equation for H1, some adjustments are made in the control variables as the variable of interest, abnormal returns surrounding stock split (ARS), is different from that in H1. Since ARS is found to be correlated with relative deal value (RDV, i.e., deal value / acquiror market capitalization), the abnormal returns will affect the market capitalisation of the splitting companies, reducing the relative deal value. To minimize this potential multicollinearity, the logarithm of the absolute deal value (DV) is used as a proxy. A similar reasoning can be applied as to why the one-year stock price increase prior to the takeover is included in the regression instead of the stock price prior to the takeover announcement. Although the stock price increase is correlated with abnormal returns, the time period for ARS (3-10 days) differs highly from the 1-year stock price run-up, making the correlation between both variables minimal.

4.4 Method H4: Time Between Events Effect on Abnormal Acquisition Returns

H4: The timing of the stock split prior to the acquisition is a crucial element in order for the acquiror to benefit from the stock split

$$Log(ARA) = \beta 0 + \beta 1(TBE) + \beta 2\log(DV) + \beta 3\log(SP) + \beta 4(MoP) + \beta 5\log(Rev) + \varepsilon$$

Where:

- *ARA* are the abnormal returns of the stock 2-days surrounding the acquisition announcement
- $\beta 0$ is the intercept
- *TBE* is a categorial variable indicating the time between events, noting 0 if this is 0-5 months, 1 if this is 6-11 months and 2 if this is 12-18 months. In the regression, there are two binary variables incorporated, C1 noting 1 if the TBE is 6-11 months, C2 noting 1 if the TBE is 12-18 months, both binary variables are 0 if TBE is 0-5 months
- *DV* is the deal value
- *SP* is the acquiror stock price prior to announcement
- *MoP* is a binary variable noting 1 if the method of payment is shares, 0 otherwise
- *Rev* is the acquiror's operating revenue
- ε is the error term, representing the deviation of the actual value of the dependent variable from the predicted value

In which the abnormal returns of stock, as in hypothesis 3, are calculated using the Capital Asset Pricing Model (CAPM). As stated, are for mergers & acquisitions the 3/5-factor models found to be more accurate, however, the CAPM without factors is used to ensure comparability across variables, i.e. with stock split abnormal returns.

Given that a linear regression is employed to assess the relationship, the manner in which the regression model and its results are interpreted differs from that of a logistic regression. B0 is the intercept and indicates the value of log(ARA) in logarithmic terms when all explanatory variables are equal to 1. Subsequently, e raised to the power of the intercept is the value of the dependent variable when all independent variables equal 1. The coefficient of interest is β1, which represents the change in log(ARA) associated with a one-unit increase in the variable TBE, that is, moving from the base category of 0-5 months to either the 6-11 months or 12-18 months categories. B2, β3, β5 represent the change in the expected value of log(ARA) associated with a one percent increase in the logarithm of the corresponding explanatory variables (deal value, acquiror share price, and acquiror revenue). E.g., if the coefficient is 1.5 and the corresponding explanatory variable would change by one percent, the dependent variable would change by 1.5 percent. B4 represents the difference in the expected value of the dependent variable between transactions paid in shares (i.e. MoP=1) or in cash.

An ordinary least squares regression is used to assess the relationship between the inter-event period and the abnormal returns around the takeover announcement, as the dependent variable is continuous. After winsorizing the explanatory variables and taking their logarithms, a linear relationship is found between the explanatory variables and the dependent variable and hence a linear regression model is most fit.

The dependent variable (ARA) is taken as a logarithm because the returns are highly volatile; taking the logarithm reduces the volatility, making it normally distributed. It also stabilises the variance of ARA, which is desirable for the quality of the regression.

For the independent variables, the included factors are depicted from the existing literature on abnormal announcement returns of acquisitions; i) deal value; ii) B/M ratio is included as proxy for over- or undervaluation of acquirors; iii) method of payment; iv) operating revenue of the acquirer is included as a proxy for the size of the company.

4.5 Method H5: Mergers & Acquisitions Effect on Stock Splits

H5: Acquirers are more likely to have executed a stock split prior to the acquisition announcement than non-acquirers are during the same time period

$$logit(P(Split = 1)) = \beta 0 + \beta 1(MA) + \beta 2 \log(SPR18) + \beta 3 \log(SP) + \beta 4 \log(MktCap) + \beta 5(P/E) + \varepsilon$$

Where:

- $P(MoP = 1)$ is the probability of a company to execute a stock split, logit() is the logit function of this variable
- $\beta 0$ is the intercept
- *MA* is a binary variable indicating 1 if a company announced an acquisition, 0 otherwise
- *SPR18* is the acquiror stock price run-up 18-months prior to the date of the acquisition announcement
- SP is the acquiror share price prior to the date of the date of the acquisition announcement
- *MktCap* is the acquiror market capitalization prior to the date of the acquisition announcement
- *P/E* is the price/earnings ratio prior to the data of the acquisition announcement
- ε is the error term, representing the deviation of the actual value of the dependent variable from the predicted value

As a logistic model is again utilized to assess the relationship between the likelihood of a company splitting its stock and the likelihood of a company announcing an acquisition, the interpretation of this model is similar as to H1, H2, and H3. The coefficient of interest is β1, if this is found to be significant and positive, acquiring companies are more likely to split its stock in the 18-month period prior to the acquisition announcement. Like other regression equations used, logarithms are taken to ensure that the independent variables are less non-normally distributed, while also reducing the influence of outliers. This logarithmizing is done for all variables except P/E, as this variable is not as skewed as the other variables are.

The explanatory variables included are similar to those in Guo et al. (2006). One adjustment is made: instead of the B/M ratio, P/E (price/earnings) is included, as the B/M ratio is not available for non-acquirers. P/E is also widely used as a proxy for the over- or undervaluation of companies (Basu, 1977; Jaffe et al., 1989).

CHAPTER 5 Results

This chapter will discuss the results per hypothesis of the models described in Chapter 4 Method. Additionally, actions to avoid multicollinearity, potential non-linearity and heteroscedasticity will be elucidated.

5.1 Result H1: Stock Split Effect on Method of Payment

H1: Companies that conduct stock splits prior to acquisition announcements are more likely to use shares as a method of payment than companies that do not conduct stock splits

To test the first hypothesis, method of payment shares is used as a binary dependent variable with stock split as a binary explanatory variable. The results, as can be found in Table 7, show that the stock split variable is positively related to the likelihood of using shares as a method of payment, although the coefficient is not statistically significant in any of the three models presented (p-values are 0.105, 0.120, and 0.150, respectively). Therefore, we cannot reject the null hypothesis and cannot conclude that there is difference in the use of shares as a method of payment between companies that conduct stock splits prior to acquisition announcements and those that do not. Stock split has a coefficient of 0.586 in the first regression, representing the expected change in the log odds of method of payment shares associated with a one-unit change in the dummy explanatory variable, holding everything else constant. The specific interpretation of the coefficient is calculated as: $e^{0.586}$ =1.79, indicating that a company that has performed a stock split is 1.79 times more likely to use shares as a payment method than a company that has not performed a stock split, all else being equal. A possible reason for the low p-value could be the small proportion of companies in the sample that have carried out a stock split (1.4%), further research can potentially improve the research by using a more balanced sample of firms.

While a similar relationship is found as Guo et al. (2006), and Karim et al. (2016) find, the results do not confirm their research as the coefficients are not significant. Guo et al. (2006) researched the same with a different time period and more observations, reducing the standard deviation, which may explain the difference in significance. Karim et al. (2016) argue that companies do only manage pre-earnings if the subsequent deal is financed by shares. In line with the discussed literature are the relative deal value, the acquiror's book-to-market ratio, the deal value and the acquiror's market capitalisation indeed found to have a significant relationship with the method of payment in acquisitions, furthermore the economic relationship is the same as in the discussed literature. In regression 2, the absolute deal value is included to check the robustness of the regression. It is worth noting that the Pseudo R-squared decreases significantly in regression 2, indicating a model in which the independent variables explain the variation in the dependent variable less well. This suggests that the relative deal value (i.e., deal value / acquiror

market capitalisation) should be included, which is not the case for regression 2. In regression 3, both variables are included separately.

$$logit\big(P(MoP = 1)\big) = \beta 0 + \beta 1(Split) + \beta 2\log(SP) + \beta 3\log\left(\frac{B}{M}\right) + \beta 4\log(RDV) + \varepsilon$$

Table 7. Logistic regression of what determines Method of Payment in Acquisitions

This table examines whether the likelihood of using stock as a method of payment in an acquisition changes when a company has conducted a stock split in the 18-month period prior to the acquisition announcement. The regression is run with various other explanatory variables, which does not alter the results of the regression substantially for the variable of interest. MoP stands for method of payment and takes a value of one when the method of payment is shares, for the split variable, the variable takes a value of one when the acquiror has executed a stock split, SP is the share price of the acquiror, B/M-ratio is the book-to-market ratio of the acquiror. RDV stands for Relative deal value and is calculated by dividing the deal value by the market capitalization of the acquiror, DV is the absolute deal value, while MktCap is the market capitalisation of the acquiror.

Variable	(1)	(2)	(3)
	MoP	MoP	MoP
Constant	3.132***	0.889	3.223***
	(0.000)	(0.356)	(0.000)
Split	0.586	0.618	0.624
	(0.105)	(0.120)	(0.150)
Log(SP)	0.721***	0.518***	
	(0.000)	(0.000)	
Log(B/M)	0.555***	0.889***	0.524***
	(0.000)	(0.000)	(0.000)
Log(RDV)	1.973***		
	(0.000)		
Log(DV)		1.276***	1.889***
		(0.000)	(0.000)
Log(MktCap)			0.447***
			(0.000)
Observations	4281	4278	4278
Pseudo R-Squared	0.204	0.080	0.196

P-values in parentheses
*** p<0.01, **p<0.05, * p<0.1

5.1.1 H1 Model Diagnostics

In order to avoid possible multicollinearity, it is checked whether the independent variables are more correlated than the typical threshold of 0.7, which is not the case, as can be seen in the Appendix. In addition, the variance inflation factor is computed, which does not exceed 5. The residuals from the above regression are non-normally distributed, but there is a significant improvement in normality compared to the regression in which the explanatory variables are taken without logarithms, thus taking logarithms minimises the systematic errors and biases in the model, the distribution of the residuals can be found in the Appendix. Furthermore, non-normality is no criterion in logistic regressions and therefore of no issue. Finally, to check for potential endogeneity, different control variables are used and compared, reducing the potential bias from endogenous variables.

5.2 Result H2: Stock Split Effect on Deal Value

H2: Splitting acquirers are more likely to announce large acquisitions than acquirers that do not conduct stock splits

Hypothesis 2 is answered by means of a logistic regression in which the acquisition size (> $100m) is the binary dependent variable, and the explanatory variable of interest is the stock split. The hypothesis that acquirers that conduct stock splits are more likely to announce large acquisition than those that do not is accepted as there is a significant relationship between stock split and acquisition size for all three regressions (p-values of 0.025, 0.011, and 0.031). The coefficient of stock split is 2.386 in regression 1 and varies between 2.138 and 2.577 in the other regressions. The interpretation is, as for H1, calculated by $e^{2.386}$ =10.89, i.e. a company that carried out a stock split in the 18 months prior to the acquisition announcement has 10.89 times the odds of announcing an acquisition of greater than or equal to $100m, all else being equal.

These results are in line with Erickson & Wang (1999), who argue that firms are more inclined to manipulate their value upwards when the deal size is relatively large. It also confirms results by Guo et al. (2006), who find that the likelihood of a company conducting a stock split before an acquisition announcement is higher when the absolute deal value is larger.

All included independent variables (acquiror B/M-ratio, method of payment, acquiror market capitalisation, acquiror revenue, and industry) are significant at the 1% level, confirming the existing literature on variables that are significantly related to deal values as the economic relationship is consistent: the acquiror market cap, and acquiror revenue have a positive relationship with the acquisition size, as larger companies also participate in bigger deals. Acquiror B/M-ratio has a negative

relationship with acquisition size, indicating that undervalued companies announce larger deals. Regression 1 has the highest Pseudo R-squared, indicating that the explanatory variables in this model best predict the variance of acquisition size, all regressions explain a moderate proportion of the variation in the dependent variable as can be depicted from the Pseudo R-squared values.

$$logit\big(P(DV100 = 1)\big) = \beta 0 + \beta 1(Split) + \beta 2 \log\left(\frac{B}{M}\right) + \beta 3 \log(MktCap) + \beta 4(MoP) + \Sigma[\beta k * Xk] + \varepsilon$$

Table 8. Logistic regression of what determines Acquisition size

This table examines whether the likelihood of a large acquisition (>$100m) in an acquisition changes when a company has conducted a stock split in the 18-month period prior to the acquisition announcement. The regression is run with various other explanatory variables. DV100 stands for Deal Value >$100m and takes a value of one when the deal value is larger than, or equal to, $100m. The Split variable is a dummy variable that notes a value of 1 when a company has executed a stock split. B/M-ratio is the book-to-market ratio of the acquiror, MktCap stands for the market capitalisation of the acquiror while the MoP is a binary variable noting 1 if the method of payment in the acquisition is (partly) shares, Rev is the revenue of the acquiror, and Σ Ind being the 158 industry variables, noting 1 for one of the 158 different variables if the acquiror is in a specific industry.

Variable	(1)	(2)	(3)
	DV100	DV100	DV100
Constant	0.002***	0.002***	0.004***
	(0.000)	(0.000)	(0.000)
Split	2.386**	2.577**	2.138**
	(0.025)	(0.011)	(0.031)
Log(B/M)	1.947***	0.952	2.030***
	(0.000)	(0.173)	(0.000)
Log(MktCap)	2.430***		2.330***
	(0.000)		(0.000)
MoP	3.021***	3.030***	3.261***
	(0.000)	(0.000)	(0.000)
Log(Rev)		2.223***	
		(0.000)	
Σ Ind	.***	.***	
	(0.000)	(0.000)	
Observations	4119	4016	4278
Pseudo R-Squared	0.305	0.290	0.261

P-values in parentheses
*** p<0.01, **p<0.05, * p<0.1

5.2.1 H2 Model Diagnostics

In addition, the same methods as for H1 are used to check whether the independent variables have a correlation that exceeds the conventional threshold of 0.7. However, as shown in the Appendix, there are no problems with multicollinearity. Moreover, as in H1, the residuals of the regressions show a non-normal distribution, as this is no criterium for a logistic regression this is considered to be not an issue. Nevertheless, the regression that includes logarithmic transformations shows an improvement over a model that uses the explanatory variables without such transformations. As a result the undesired systematic errors and biases within the model are reduced.

5.3 Result H3: Market Perception Effect on Method of Payment

H3: Splitting acquirers are more likely to use their stock as a method of payment when the market perception of the stock split is positive

In line with hypothesis 1 and 2, a logistic regression model is used for hypothesis 3 to analyse the effect of abnormal returns around stock splits on the method of payment in shares. Hypothesis 3 is not accepted as none of the regressions finds a positive significant relationship between abnormal returns around stock splits and the method of payment in the following acquisition, which is noteworthy, as the (t=-5,+5) abnormal returns of stock splits are higher (+3.7%) for acquirers that use shares as method of payment, than for acquirers that do not use shares of method of payments (+2.4%). For (t=-1,+1), the differences are more pronounced as the stock split abnormal returns for acquirers that employ shares as a payment method in the following acquisition is +3.3%, whereas those who did not use shares experienced stock split abnormal returns of +1.2%.

It is remarkable that the coefficient of Log(ARS (-1, +1)) is lower than Log(ARS (-5, +5)), indicating that the method of payment in the acquisition is more related to the abnormal returns of the acquisition announcement for longer period of times than for shorter period of times. A possible reason possibly as companies are more easily able to profit from the higher share price if the abnormal returns persist longer, which is as expected and in line with research by Martin's (1996), and Boateng & Bi's (2014), who find that the likelihood of companies using shares in acquisitions increases as the company's stock price has risen over the past period. The positive coefficients for Log(ARS) in every regression is also consistent with Martin's (1996), and Boateng & Bi's (2014).

Explanatory variables Log(DV), and Log(B/M) have significant positive relationships with the payment method, which is in line with expectations. The stock price (run-up) does not have a significant relationship with the method of payment and is even negative for the regression 1, which is contrary to the aforementioned literature. The R-squared is highest for regression 4, indicating that this regression

best predicts the variances of the dependent variable with the explanatory variables. Regression 4 includes the year of the acquisition to capture the year fixed effects, however, no relationship is found.

$$logit\big(P(MoP = 1)\big) = \beta 0 + \beta 1(\text{ARS}) + \beta 2\log(DV) + \beta 3\log(SPR12) + \beta 4\log\left(\frac{B}{M}\right) + \varepsilon$$

Table 9. Logistic regression of what determines Method of Payment for Splitting Companies

This table examines whether the likelihood of using stock as a method of payment in an acquisition changes for splitting companies when the market perception of the stock split was positive. The regression is run for two periods of measuring abnormal returns (-1, +1) and (-5, +5), both in trading days. ARS is a binary variable, noting 1 if the abnormal returns are positive, 0 otherwise. Various other explanatory variables are incorporated, such as Year fixed effects, which does not alter the results of the regression substantially for the variables of interest. As can be seen in the table below, does the effect of the abnormal returns on method of payment depends on the period of measurement. MoP stands for method of payment and takes a value of 1 when the method of payment is shares, ARS (-1,+1) and (ARS (-5,+5) stands for abnormal returns around the stock split are measured using the Capital Asset Pricing Model with the measurement window in days in parentheses. B/M-ratio is the book-to-market ratio of the acquiror, DV stand for the absolute deal value, SPR12 notes the 12-month stock price run-up of the acquiror prior to the deal. B/M is the book-to-market ratio of the acquiror while Year captures the Year fixed effects.

Variable	(1)	(2)	(3)	(4)
	MoP	MoP	MoP	MoP
Constant	0.0167	0.008**	0.001***	0.001***
	(0.035)	(0.029)	(0.000)	(0.000)
ARS	1.374		1.423	
(t=-1, +1))	(0.694)		(0.668)	
ARS		3.078		3.742
(t=-5, +5))		(0.371)		(0.337)
Log(DV)	1.835**	1.811**	1.851**	1.852**
	(0.021)	(0.027)	(0.022)	(0.025)
Log(SPR12)	-0.712	0.734	0.672	0.679
	(0.358)	(0.401)	(0.295)	(0.309)
Log(B/M)	2.929**	2.652**	-2.636**	2.357*
	(0.014)	(0.024)	(0.031)	(0.053)
Year			1.170	1.186
			(0.302)	(0.282)
Observations	39	39	39	39
Pseudo R-Squared	0.227	0.241	0.247	0.264

P-values in parentheses
*** p<0.01, **p<0.05, * p<0.1

5.3.1 H3 Model Diagnostics

In addition to using a binary independent variable, logarithms are used to increase the normality of the explanatory variables while reducing the influence of outliers. Furthermore, there is no evidence of multicollinearity as the correlation between the independent variables is below the typical threshold of 0.7. The residuals for regression 2 are found to be normally distributed, indicating little systematic error in the model.

5.4 Result H4: Time Between Events Effect on Abnormal Acquisition Returns

H4: The timing of the stock split prior to the acquisition is a crucial element in order for the acquiror to benefit from the stock split

Using a linear regression, the impact of the timing of a stock split on the abnormal returns in acquisition announcements is examined. H4 is accepted, as significant differences are found for different times between events and their relationship with abnormal returns. The results indicate that abnormal returns are highest when the time between events is 6-11 months, which is significant at the 5% level. This result is consistent with expectations as a high TBE would minimize the benefits of the previously executed stock split, reducing the abnormal returns in the acquisition. Additionally, the market is expected to interpret a low TBE as value manipulation, possibly punishing the firm for doing so, resulting in low, perhaps even negative, abnormal acquisition returns. Hence, the theory of Guo et al. (2006) is confirmed, especially as the abnormal returns are lowest when the TBE is shortest. Furthermore, potentially the investor attention hypothesis is confirmed, as the relatively less increased intention for a shorter TBE would results in lower abnormal returns, compared to a longer TBE (which has a relatively larger increase in investor attention). The results are also in agreement with the research of Titman et al. (2016) and Ikenbarry & Rannath (2002), who observed that stocks tend to outperform for up to a year before the effect diminishes. Thus, companies should make the acquisition announcement not too long after the stock split in order to fully capitalize the benefits.

The coefficient of 1.026 for the variable TBE 6-11 in regression (1) indicates that, holding all other variables constant, a TBE of 6-11 months leads to an increase in the natural logarithm of abnormal returns of 1.026 units compared to a TBE of 0-5 months. Therefore, the abnormal returns will increase by a factor of $e^{1.026} - 1 * 100$, or would lead to an increase in the abnormal returns of approximately 178.9% compared to a TBE of 0-5 months. It is remarkable is that Log(Rev) has a negative coefficient, as a positive coefficient is expected. Furthermore, Log(DV) appears to have no relationship with log(ARA) which is also contrary to existing literature. The coefficients of log(SP) and MoP are in line with existing literature as they are negative.

$$Log(ARA) = \beta 0 + \beta 1(TBE) + \beta 2\log(DV) + \beta 3\log(SP) + \beta 4(MoP) + \beta 5\log(Rev) + \varepsilon$$

Table 10. Linear regression of what determines abnormal returns in acquisition announcements

This table examines what influences abnormal returns in acquisition announcements. More specifically, it is analysed whether the period between stock split announcement and acquisition announcement affects the abnormal returns in the acquisition. Dependent variable Log(ARA) (t=-1,+1) is the Abnormal Returns two days surrounding the acquisition announcement. TBE 6-11 is a binary variable noting 1 if the time between events is 6-11 months, TBE 12-18 is a binary variable noting 1 if the time between events is 12-18 months, if the time between events is 0-5 months, both binary variables will note 0. DV stands for deal value, SP is the share price of the acquiror. MoP stands for Method of Payment and notes 1 if shares are used as payment method in the acquisition announcement, 0 otherwise. Rev stands for revenue, which is of the acquiror. Continuous variables are winsorized at 5-95% level.

Variable	(1) Log(ARA)	(2) Log(ARA)	(3) Log(ARA)	(4) Log(ARA)
Constant	-4.077***	-4.080***	-4.877***	-4.306***
	(0.008)	(0.007)	(0.000)	(0.004)
TBE 0-5	*Reference Category*	*Reference Category*	*Reference Category*	*Reference Category*
TBE 6-11	1.026**	1.030**	0.987*	1.040**
	(0.050)	(0.043)	(0.068)	(0.045)
TBE 12-18	0.639	0.638	0.565	0.636
	(0.229)	(0.223)	(0.356)	(0.227)
Log(DV)	0.007		-0.019	-0.021
	(0.964)		(0.881)	(0.886)
Log(SP)	-0.314	-0.309		-0.235
	(0.514)	(0.501)		(0.607)
MoP	-0.274	-0.268	-0.189	
	(0.558)	(0.542)	(0.670)	
Log(Rev)	-0.078	-0.075	-0.106	-0.077
	(0.544)	(0.502)	(0.386)	(0.543)
Observations	42	42	42	42
R-Squared	0.142	0.142	0.132	0.133
Adjusted R-Squared	0.104	0.116	0.089	0.093

P-values in parentheses
*** p<0.01, **p<0.05, * p<0.1

5.4.1 H4 Model Diagnostics

As the relationship between the dependent and independent variables must be linear for a linear regression, which was not the case prior to alterations, the logarithms of the continuous variables are taken, and the variables are winsorized (at 0.05 level) to reduce the influence of outliers. The errors of the model are checked for heteroskedasticity, which is not found as the current residuals are normally distributed (can be perceived in Appendix C).

5.5 Result H5: Mergers & Acquisitions Effect on Stock Splits

H5: Acquirers are more likely to have executed a stock split prior to the acquisition announcement than non-acquirers are during the same time period

Using a logistic model and a matched sample, it is examined whether acquiring firms are more likely to use stock splits than non-acquiring firms. The companies are matched using a propensity score with a caliper based on a difference threshold. To be more specific, acquirors and non-acquirers had to have an exact match on industry, while the cumulative difference between market capitalisation and share price is allowed to be no higher than 30%. There is sufficient evidence found that supports the notion that acquiring firms are indeed more likely to announce stock splits 18 months prior to the event date than non-acquiring firms, as all regressions (with various controlling variables) are significant at an alpha level of 10%. The corresponding p-value ranges from 6.4% to 8.5%.

For regression 1, the results and coefficients indicate that an acquirer has 4.294 higher log odds of executing a stock split than non-acquiring companies are, or that the probability of executing a stock split 18-months prior to the event date is 73.08 ($e^{4.294}$) times higher for firms that have announced an acquisition at the event date than firms that have not announced an acquisition at the event date.

Notable is that there is no significant relationship found between P/E, and log(stock price) and stock splits, but all other included variables have a significant relationship with stock splits as a binary variable. For example, a one-unit increase in log(18-month stock price run-up) increases the log odds of implementing a stock split by 3.75. However, all signs of the variables are consistent with the existing literature and therefore economically significant

$$logit(P(Split = 1)) = \beta 0 + \beta 1(MA) + \beta 2 \log(SPR18) + \beta 3 \log(SP) + \beta 4 \log(MktCap) + \beta 5(P/E) + \varepsilon$$

Table 11. Logistic regression of what determines Stock Splits

This table examines whether the likelihood of companies having executed a stock split depends on whether companies are announcing an acquisition in the 18-month period after the stock split. The regression is run with various controlling variables. Dependent variable Split is a binary variable noting 1 if a company has executed a stock split, 0 otherwise. M&A is a binary variable noting 1 if the company is an acquirer, 0 otherwise. SPR18 is the 18-month stock price run-up prior to the acquisition. SP is the share price, MktCap stands for market capitalisation, and P/E stands for price/earnings, all of the acquiror.

Variable	(1) Split	(2) Split	(3) Split
Constant	0.001***	0.001***	0.001***
	(0.000)	0.000	0.000
MA	4.294*	3.818*	4.388*
	(0.072)	(0.085)	(0.064)
Log(SPR18)	3.745***	3.549***	3.756***
	(0.001)	(0.002)	(0.001)
Log(SP)	1.100	0.973	
	(0.891)	(0.968)	
Log(MktCap)	3.103***	3.333***	3.161***
	(0.003)	(0.002)	(0.001)
P/E	0.989		0.989
	(0.309)		(0.308)
Observations	435	468	435
Pseudo R-Squared	0.274	0.251	0.274

P-values in parentheses
*** p<0.01, **p<0.05, * p<0.1

5.5.1 H5 Model diagnostics

As discussed in the methodology are the logarithms taken for non-binary variables to increase the normality, for the P/E this was not necessary as that variable is not as skewed. In addition, the errors are not normally distributed, indicating that there may exist a pattern in the residuals of the regression. However, the normality of the errors is already improved compared to the regression without logarithms of explanatory variables. Moreover, normality of residuals is no condition for the use of logistic regressions. All correlations and residuals can be founded in Appendix C. There is no influential multicollinearity found for the explanatory variables, including for Log(SP) and Log(SPR18). While for these, based on theory, there would potentially be multicollinearity issues. Important to note is that the SP and the MktCap appear to have a high correlation (just over 0.7). In regression (3), it is checked whether the results are consistent if one of these variables is omitted, which is the case. It is hence concluded that the multicollinearity does not influence the regression results and conclusion.

CHAPTER 6 Conclusion

6.1 Summary of Results

Do US acquirers increase their equity value by conducting a stock split before announcing a merger or acquisition?

Using a sample of US stock splits, and mergers and acquisitions from January 2010 to March 2022, this paper finds evidence that supports that US acquirers do increase their equity value by conducting a stock split before announcing a merger or acquisition. This is found to be more pronounced when the deal value is large (>$100 million). Furthermore, to fully benefit from the increased share price, the ideal time between the acquisition and the stock split is 6-11 months.

First, using a subset of data on acquisitions in the United States, including whether the companies had split their stock, it analyses the circumstances under which circumstances acquirers are likely to split their stock.

It is hypothesised that firms that split their stock prior to the announcement of the acquisition would be more likely to use stock as a form of payment than firms that did not split their stock. The first hypothesis is rejected as no significant relationship is found between the payment method and the likelihood of a stock split. It is important to note, however, that although no significant relationship is found, the economic relationship is consistent with, for example, Guo et al. (2006). In addition, Karim et al. (2016) conclude that firms are more likely to manage earnings upwards when the subsequent acquisition is stock-financed. Therefore, it would be interesting to re-examine this relationship with a more balanced sample of firms and more depth of data.

The study then examines whether acquirers that split their stock are more likely to announce large acquisitions than acquirers that do not split their stock. A significant positive relationship is found, suggesting that acquirers are indeed more likely to split their stock prior to a relatively large acquisition than to a smaller one. More specifically, if a company has split its stock within the 18 months prior to announcing an acquisition, it is 10.89 times more likely to announce an acquisition valued at $100 million or more than a non-splitting acquirer, all else equal.

Then, the practical implications are explored using a unique dataset of acquirers that have undergone a stock split, which has not been previously examined in existing literature. For this, it is first analysed whether splitting acquirers are more likely to use their stock as a payment method when the market perception of the stock split is positive (i.e., if the abnormal returns surrounding the stock split were

positive), although the indicative results showed that abnormal returns of the stock splits are on average higher for firms using stock as method of payment (+3.7% for t=-5,+5, and +3.3% for t=-1,+1), than for those using non-shares (2.4% for t=-5,+5, and +1.2% for t=-1,+1), no significant supporting results are found. However, the coefficient of abnormal returns surrounding stock split for (t=-1,+1) is lower than for (t=-5,+5), indicating that the relationship between the method of payment and abnormal returns of the stock split is stronger when the abnormal returns persist for a longer period of time, which is consistent with the existing literature (Martin's, 1996; Boateng & Bi's, 2014).

The study then provides further valuable insights by investigating whether the timing of the stock split prior to the acquisition is a crucial element for the acquiror to benefit from the stock split. The findings demonstrate that the abnormal returns of acquisition announcements are highest when the time between stock split and acquisition announcement is 6-11 months, and lowest when the time between the events is 0-5 months. This is consistent with Guo et al (2006), who argue that the market punishes the firm for value manipulation, which is when the time between the events is low. The results are also consistent with Titman et al. (2016), and Ikenbarry & Rannath (2002), who find that stocks tend to outperform for up to a year following a stock split, after which the outperformance diminishes. Therefore, in order to take advantage of the higher share price, companies should avoid delaying the acquisition for too long. Companies are expected to have abnormal acquisition announcement returns of 178.9% for a TBE (time between events) of 6-11 months, compared to a TBE of 0-5 months.

Finally, acquirers are matched with non-acquirers, based on their industry, market capitalisation, and stock price. Using this matched sample, it is analysed whether acquirers are more likely to have carried out a stock split prior to the acquisition announcement than non-acquirers are during the same period. The results confirm this hypothesis, as it is found that the probability of executing a stock split is 73.08 times higher for acquirers, than for non-acquirers, everything else equal.

Table 12. Summary table of results per hypothesis

Hypothesis	Result
H1: Companies that conduct stock splits prior to acquisition announcements are more likely to use shares	Not accepted (p=0.105)
H2: Splitting acquirers are more likely to announce large acquisitions than acquirers that do not conduct stock splits	Accepted (0.025)
H3: Splitting acquirers are more likely to use their stock as a method of payment when the market perception of the stock split is positive	Not accepted (p=0.694 and p=0.371)
H4: The timing of the stock split prior to the acquisition is a crucial element in order for the acquiror to benefit from the stock split	Accepted (p=0.050)
H5: Acquirers are more likely to have executed a stock split prior to the acquisition announcement than non-acquirers are during the same time period	Accepted (p=0.072)

6.2 Relevance

This paper is highly relevant across the entire financial sector. First, it can help investors by more accurately valuing investment opportunities, preventing them from overpaying for splitters as they are more easily able to distinguish investor signalling from value manipulation. Second, the sell-side in acquisitions will have a better ability to assess the true value of a bid of a splitter with greater accuracy, allowing them to get the fair value for their company. The buy-side, on the other hand, can fully capitalize the increase of equity value after a stock split when using the practical implications as stated in this paper. Important to note is, however, that there is a trade-off between the investors, the buy-, and sell-side, as it is in essence a zero-sum game. Therefore, the party that is best able to utilize the research presented in this paper will benefit the most, while (one of) the remaining parties will incur the cost. The importance of this research for policy makers is also highlighted by this trade-off. When one the presented groups is unable to assess the true value of splitters prior to acquisitions, it might need to be protected by the serving regulators in the country of interest. This as manipulation in capital markets is known to damage the efficiency and integrity of financial markets.

6.3 Limitations and Further Research

This study has a number of limitations that could guide further research on this rarely studied topic. Firstly, only a small percentage (1.4%) of all acquirers have split their shares, so a more balanced sample of splitters would improve the quality of the results, reducing the potentially present selection bias. This

more balanced sample, in combination with using other data sources, could reduce the measurement error, making the result more robust. Secondly, including target characteristics as control variables in the regressions could improve the explanatory power of the results, by reducing the number of omitted variables that could influence the outcome. However, due to the limited availability of data sources for this study, this was not feasible. Therefore, future studies could aim to collect more comprehensive data on target characteristics, enabling the inclusion of such variables as controls. Third, one potential limitation of this study is the possible presence of simultaneity bias. To address this, future studies could consider using instrumental variables or structural equation modelling, this could help reducing the potentially present bias and therefore improve the validity of the results.

Fourth, future research could contribute to the discussion by evaluating results across countries or continents, thus allowing comparisons between different geographical regions. This would also provide an opportunity to investigate what limits the ability to benefit from stock splits prior to takeovers, for example by looking at market characteristics and legislation. Fifth, it would be interesting to assess the industry differences and which industries are more suitable for the use of pre-acquisition stock splits, as the results suggest that there are significant differences. Sixth, it would be worthwhile to evaluate the differences over time. As the results are consistent with Guo et al. (2006), it would be interesting to assess whether the benefits of stock splits prior to M&As or the frequency of stock splits changed after certain changes in regulations and market dynamics.

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APPENDIX A Variable Names

Table 13. Overview of variables and abbreviations used

Abbreviation	Variables	Definition
Dependent variables		
MoP	Method of Payment Shares	Binary variable equal to 1 if the Method of Payment is (partially) Shares, 0 otherwise
DV100	Deal Value >100m	Binary variable equal to 1 if the Deal Value exceeds $100m, 0 otherwise
ARA	Acquisition Abnormal Returns	The Abnormal Returns of the Acquiror surrounding the Acquistion Announcement, calculated using CAPM (in %)
Split	Stock Split	Binary variable equal to 1 if Coimpany announced a Stock Split
Independent variables		
Stock	Stock Split	Binary variable equal to 1 if the Acquiror executed a Stock Split 18-months prior to the Acquistion
SP	Acq. Stock Price prior to Ann.	Share Price of the Acquiror prior to the Acquistion Announcement (in $)
M&A	Merger & Acquistion	Binary variable equal to 1 if the company Announced an Acquisition in the 18-Month period post-Stock Split
B/M	Acquiror B/M-ratio	Book-to-Market-ratio of the Acquiror prior to the Acquistion Announcement
P/E	Price/Earnings	Price over Earnings ratio
RDV	Relative Deal Value	Deal Value/Market Capitalization of the Acquiror prior to the Announcement
MktCap	Acquiror Market Cap	Market Capitalization of the Acquiror prior to the Announcement (in $m)
Xk	Industry	Binary variables equal to 1 if the acquiror is active in the specific industry, 0 otherwise
ARS	Abnormal Returns Stock Split	Binary variable equal to 1 if the Abnormal Returns of the Acquiror surrounding the Stock Split Announcement is positive, calculated using CAPM (in %)
DV	Deal Value	Deal Value (in $m)
TBE	Time Between Events	Binary variables equal to 1 if the Time Between Stock Split and Acquistion falls into specific range (0-5, 6-11 and 12-18 months)
Rev	Acquiror Revenue	Operating Revenue of the Acquiror prior to the Acquisition Announcement (in $m)
Year	Acquisition Year	Year in which the acquisition was announced
SPR 12	Acq. Stock Price Run-up 12-months prior to acq. ann.	Increase in the Acquiror's Stock Price 12-months prior to the acquistion announcement
SPR 18	Acq. Stock Price Run-up 18-months prior to acq. ann.	Increase in the Acquiror's Stock Price 18-months prior to the acquistion announcement

APPENDIX B Correlations

Table 14. Overview of variances between variables in the total dataset

Correlations	Stock Split	Deal Value	Acquiror Revenue	Acquiror Market Cap	B/M-ratio	Acq. Stock price prior to ann.	Relative Deal Value	Deal Value>100m	Method of Payment Shares
Stock Split	1								
Deal Value	0.02	1							
Acquiror Revenue	0.03	0.22	1						
Acquiror Market Cap	0.05	0.16	0.55	1					
B/M-ratio	-0.02	-0.01	-0.02	-0.05	1				
Acq. Stock price prior to ann.	0.00	0.02	0.02	0.020	0.04	1			
Relative Deal Value	-0.02	0.02	-0.05	-0.04	0.20	-0.01	1		
Deal Value>100m	0.03	0.18	0.17	0.12	-0.3	0.03	0.00	1	
Method of Payment Shares	-0.03	0.11	-0.11	-0.07	-0.04	-0.01	0.20	-0.04	1

Table 15. Overview of variances between variables in the splitting acquirers subset

Correlations	Stock plit ratio	Date difference (in months)	Deal value ($m)	Acquiror revenue ($m)	Acquiror market cap ($m)	B/M-ratio	Acq. Stock price prior to ann. ($)	Deal value/ acquiror market cap	Method of Payment Shares	Stock split abnormal return (-5,+5)	Stock split abnormal return (-1,+1)	Acquisition abnormal return (-1,+1)	Acq. Stock Price Run-up prior to acq. ann.
Stock Split Ratio	1												
Date Difference	-0.12	1											
Deal Value	-0.02	0.06	1										
Acquiror Revenue	0.26	0.09	0.11	1									
Acquiror Market Cap	0.46	0.00	0.08	0.89	1								
B/M-ratio	-0.05	0.06	-0.09	-0.08	-0.13	1							
Acq. Stock price prior to ann.	0.10	0.01	0.06	0.30	0.24	-0.20	1						
Relative Deal Value	-0.18	0.07	0.20	-0.11	-0.13	0.12	-0.1	1					
Method of Payment Shares	-0.05	-0.04	0.15	-0.05	0.07	0.28	-0.27	0.17	1				
Stock Split Abnormal Return (-5,+5)	0.15	-0.08	-0.05	0.23	0.26	0.03	0.11	0.18	0.09	1			
Stock Split Abnormal Return (-1,+1)	0.05	0.05	-0.03	0.20	0.19	0.02	-0.06	0.07	0.18	0.65	1		
Acquisition Abnormal Return (-1,+1)	-0.05	-0.13	0.00	0.11	0.07	0.04	-0.15	0.27	-0.06	0.14	-0.10	1	
Stock Price 12-month Run-up prior to acq. ann.	-0.01	0.02	-0.09	-0.02	0.05	0.01	-0.13	-0.03	0.12	0.00	0.00	0.19	1

Table 16. Overview of variances between variables in matched sample of acquirers and non-acquirers

Correlations	Stock Split	Merger & Acquisition	Stock Price 18-month Run-up prior to acq. ann.	Price/Earnings	Acquiror Revenue	Acquiror Stock Price
Stock Split	1					
Merger & Acquisition	0.014	1				
Stock Price 18-month Run-up prior to acq. ann.	0.078	0.003	1			
Price/Earnings	-0.028	0.018	-0.023	1		
Acquiror Revenue	-0.109	0.055	-0.060	0.101	1	
Acquiror Stock Price	0.123	-0.041	0.007	-0.024	0.010	1

APPENDIX C Supporting Regression Results

Graph 2. Residuals of Regression H1

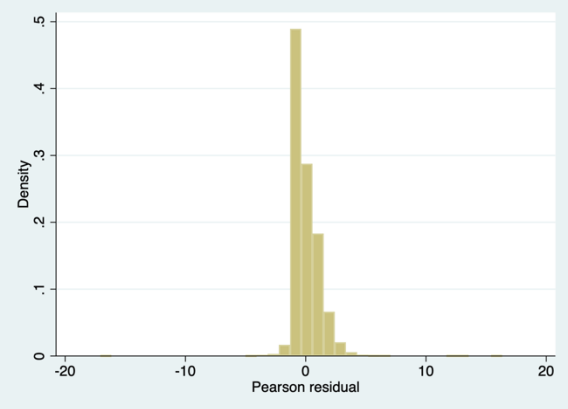


Table 17. Correlations of Regression H1

Correlations	Method of Payment Shares	Stock Split	Acq. Stock price prior to ann.	Log(B/M-ratio)	Log(Relative Deal Value)
MoP	1				
Split	-0.024	1			
Log(SP)	-0.242	0.022	1		
Log(B/M)	-0.020	-0.028	-0.129	1	
Log(RDV)	0.374	-0.007	-0.270	0.500	1

Graph 3. Residuals of Regression H2

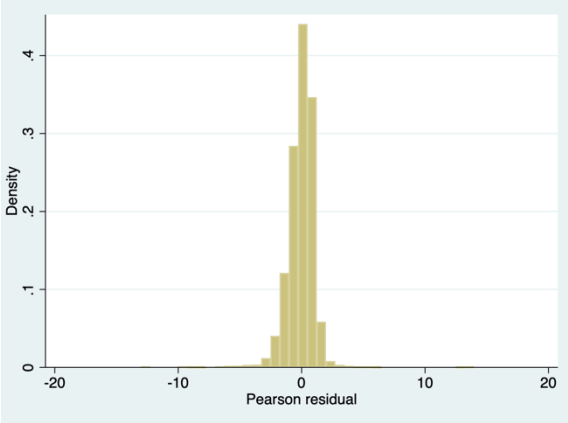


Table 18. Correlations of Regression H2

Correlations	DV100	Split	Log(B/M)	Log(MktCap)	MoP
DV100	1				
Split	0.041	1			
Log(B/M)	0.008	-0.030	1		
Log(MktCap)	0.452	0.043	-0.439	1	
MoP	-0.013	-0.025	-0.016	-0.285	1

Graph 4. Residuals of Regression H3

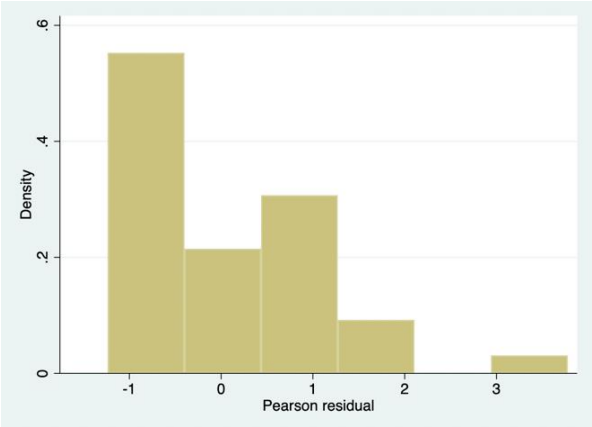
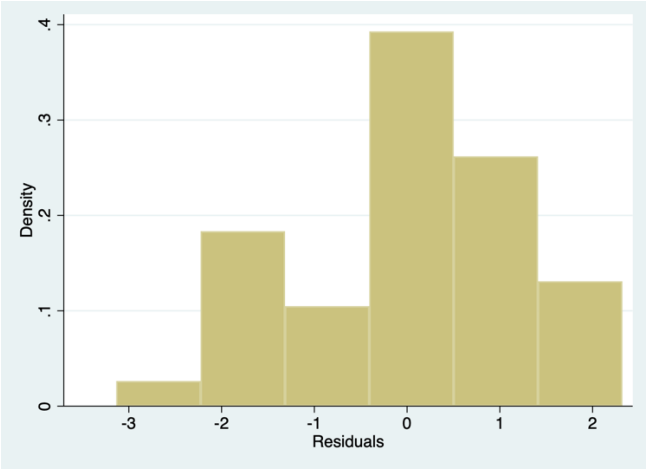


Table 19. Correlations of Regression H3

Correlations	MoP	Log(ARS (t=-1,+1))	Log(DV)	Log(SPR12)	Log(B/M)
MoP	1				
ARS (t=-1,+1)	0.299	1			
Log(DV)	0.320	-0.209	1		
Log(SPR12)	-0.020	-0.053	-0.075	1	
Log(B/M)	0.387	0.268	-0.251	0.005	1

Graph 5. Residuals of Regression H4




```
swilk resid

                    Shapiro-Wilk W test for normal data

    Variable |   Obs        W           V          z       Prob>z
-------------+--------------------------------------------------
       resid |    42     0.97088     1.195      0.376     0.35337
```

Table 20. Correlations of Regression H4

Correlations	Log(ARA)	Log(DV)	Log(SP)	MoP	Log(Rev)
Log(ARA)	1				
Log(DV)	-0.076	1			
Log(SP)	-0.107	0.443	1		
MoP	-0.091	0.228	0.164	1	
Log(Rev)	-0.165	0.595	0.517	0.052	1

Graph 6. Residuals of Regression H5

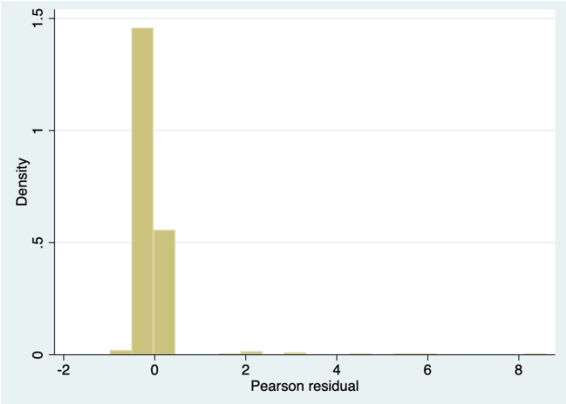
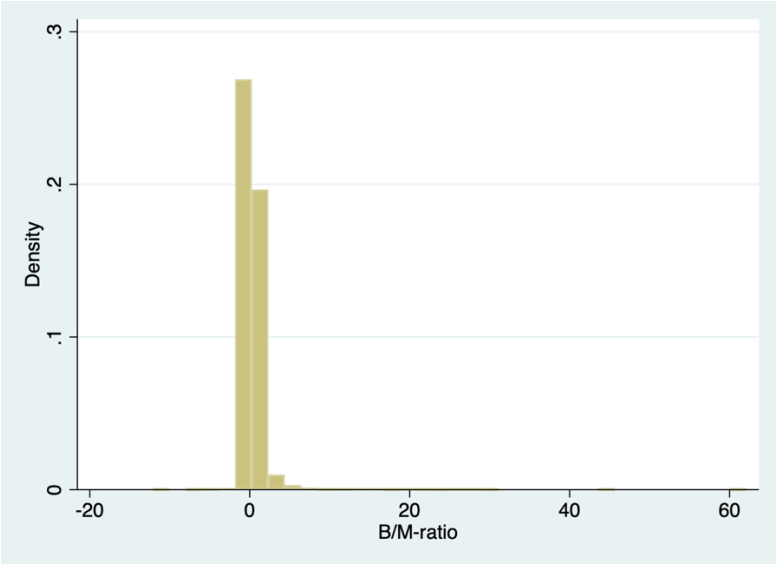


Table 21. Correlations of Regression H5

Correlations	Split	MA	Log(SPR18)	Log(SP)	Log(MktCap)	P/E
Split	1					
MA	0.063	1				
Log(SPR18)	0.111	0.006	1			
Log(SP)	0.086	0.031	0.012	1		
Log(MktCap)	0.143	0.035	-0.044	0.708	1	
P/E	-0.039	0.022	0.040	0.023	-0.028	1

APPENDIX D Normality of Variables

Graph 7. Distribution of B/M-ratio



Graph 8. Distribution of log(B/M-ratio)