

Corporate Tax Inversions and Expectations of Shareholder Value

An event study measuring share price reactions to announcements of U.S. multinational companies' intentions to re-domicile to lower tax-rate countries through mergers

Abstract

This paper aims to investigate the expected shareholder value effects of a corporate tax inversion where a U.S. multinational company re-domiciles to a lower tax-rate country via a merger deal, i.e. a merger inversion. Additionally, the study investigates whether differences in firm characteristics can explain variations in expected shareholder value effects. Shareholder value effects were defined as either value creation or value destruction, measured through cumulative abnormal share price returns over a three-day event window surrounding the announcement. First, an event study was performed to quantify the impact the inversion announcement has on the share price of the firm announcing its intention to invert, and compares this reaction against three different control groups. The results suggest that investors have positive expectations of shareholder value following an announcement of a corporate tax inversion conducted via a merger. Statistically significant average cumulative abnormal returns of 8.1% were found following the announcement. Data suggests that the expected shareholder value creation upon announcement is greater for merger inversions than for the control groups. Thereafter, a cross-sectional regression on the abnormal returns was performed. The regression consisted of seven variables which were found to explain approximately 60% of the variation in cumulative abnormal returns following the announcement of a merger inversion. Post-deal target ownership, ownership concentration, board independence, potential tax savings and R&D intensity and being in the healthcare sector were found to be positively correlated with abnormal share price returns, whereas a higher price-to-book ratio corresponded to a lower abnormal share price return.

Key words: Corporate tax inversions, expatriation, shareholder value, event study, tax domicile

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1. INTRODUCTION

Corporate tax inversions have been a large contributor to merger and acquisition (M&A) activity in recent years and have been the focus of extensive media attention (Marpelles and Gravelle 2014). A corporate tax inversion¹, also known as corporate expatriation, is the technical term for relocating a U.S. corporation's headquarters to a nation with lower taxes. This type of transaction is unique for U.S. multinationals, as the United States is one of few countries in the world that imposes double-taxation on foreign-source income. In an inversion, the U.S. based multinational restructures so that the U.S. parent is replaced by a foreign parent in order to lessen U.S. taxes. U.S. law requires that more than 20 percent of a combined company owned by target shareholders in order for an inverted company to avoid U.S. taxes on foreign earnings (Friel 2014). Additionally, 25 percent of the new company's employees, sales and assets must be located in the new country of incorporation in order for the company to be considered expatriated for tax purposes. The practical implication of U.S. tax laws is that U.S. corporations wishing to invert must do so via a merger where the new parent company is domiciled in a lower-tax country. By inverting, corporations can continue to have the majority² of its physical and human capital based in the U.S., but can avoid the U.S. double taxation on foreign-source income.

The Congressional Research Service has estimated that if corporate tax inversions are not stopped, the U.S. will lose \$19.7 billion in tax revenue over the next decade (Marples and Gravelle 2014). In his weekly address to the public on July 25th 2014, President Barack Obama said that a loophole that lets companies reduce U.S. taxes by moving their headquarters overseas is “*unpatriotic*” (Hudson 2014). Further, he explained that:

“Even as corporate profits are as high as ever, a small but growing group of big corporations are fleeing the country to get out of paying taxes. They’re keeping most of their business inside the United States, but they’re basically renouncing their citizenship and declaring that they’re based somewhere else, just to avoid paying their fair share.”

The U.S. Department of Treasury has stated that,

“...these transactions should be driven by genuine business strategies and economic efficiencies, not a desire to shift residence of the parent entity to a low-tax jurisdiction simply to avoid U.S. taxes” (U.S. Department of Treasury 2014).

The U.S. government has made regular efforts to stop corporate inversions from occurring, and the U.S. Treasury has announced that they will continuously examine ways to reduce the tax benefits of inversions.

¹ The terms corporate tax inversion, corporate inversion and inversion are used interchangeably in this paper.

² up to 75 percent

In contrast to this view, defendants of the corporate tax inversions claim that it is a necessary practice for an American company to remain competitive in the global economy (Fairchild 2014). It is apparent that the U.S. Government views announcements of a corporate tax inversion negatively, whereas defenders of corporate tax inversions see this practice as a means of being able to compete with foreign firms.

What is not apparent, however, is how investors view corporate tax inversions. This paper aims to answer this through the following research questions:

- 1) *What are the expected shareholder value effects upon the announcement of a corporate tax inversion where a U.S. multinational company re-domiciles through a merger to a lower tax-rate country?*
- 2) *Additionally, can differences in characteristics between the inverting firms explain variations in expected shareholder value effects?*

The corporate tax inversions investigated in this paper are limited to U.S multinationals that re-domicile via a merger. To avoid confusion, these will be referred to as merger inversions throughout the paper. Shareholder value effects are defined as the initial share price reactions to announcements of merger inversions. A positive share price reaction indicates expectations of shareholder value creation. Conversely, a negative share price reaction indicates expectations of shareholder value destruction. Thus, based on the stock market response, it can be determined whether or not investors expect corporate tax inversions to create value for the shareholders of the inverting firm.

1.1 OPERATIONALIZATION OF THE RESEARCH QUESTIONS

In order to answer the research questions, the study is divided into two parts: (1) an event study and (2) a cross-sectional regression of abnormal returns on firm characteristics that theoretically could impact the magnitude of the reaction to the inversion announcement.

The event study will be conducted to investigate the direction of shareholder value effects following the announcement of a merger inversion. To separate the inversion announcement effect from the effect following an M&A announcement, the merger inversions will be tested against three control groups. The comparisons between the merger inversions and the control samples allows for conclusions regarding the initial shareholder expectations on the value creation of the announcement of a merger inversion to be drawn. Together, the three control groups cover three different components of merger inversions. The three control groups are described briefly below.

The first control group is a sample of inversions that have reincorporates in a new country with no material change in its business and assets, and where the same existing shareholders own shares in the new foreign parent company. This type of corporate tax inversion, hereafter referred to as pure inversions, was previously the prevailing method of corporate inversions, but has been curtailed by changes in U.S. tax regulations. The comparison with the pure inversions aims to test

if there is a difference between how the two types of corporate tax inversions are valued by the market.

The second control sample consists of cross-border 100% acquisitions where the acquirer is a U.S. listed company. The purpose of this control group is to determine if shareholders value the announcement of a cross-border acquisition with an inversion differently than a cross-border acquisition without an inversion. Given that merger inversions are by default cross-border transactions, it is necessary to isolate the announcement of the inversion from the announcement of a cross-border acquisition.

The third control group consists of a sample of similar M&A deals with regard to time, size and industry, and is not restricted to U.S. acquirers. This control group aims to isolate the inversion component from the M&A component of the merger inversions.

Theoretical models often suggest that there should be an association between the magnitude of abnormal returns and characteristics specific to event observation (MacKinlay 1997). To investigate this association, a cross-sectional regression of abnormal returns on firm characteristics that theoretically could have an impact on the magnitude of the shareholder reaction to an inversion announcement will be conducted on the initial results of the event study. This will determine whether differences in characteristics between merger inversion firms can help explain variations in expected shareholder value effects of a corporate tax inversion.

The thesis is structured as follows. In Section 2, a review of the institutional background surrounding corporate tax inversions is presented. This includes a review of what a corporate inversion is and why corporations are inverting, as well as an overview of the anti-inversion legislations imposed by the U.S. government. In Section 3, a review of related literature and previous research is presented. Previous research is separated into three parts including research on tax avoidance and inversions, research on event studies and the efficient market hypothesis, and studies on the impact of firm characteristics. Thereafter, in Section 4, the method for the two parts of the study is described, and in Section 5 the data selection and collection process is presented. Moreover, Section 6 documents the results of the statistical tests, which are further analyzed in Section 7. Lastly, the study is summarized and concluded in Section 8, including a discussion of further research topics.

2. INSTITUTIONAL BACKGROUND

2.1 DEFINING CORPORATE TAX INVERSIONS

A corporate tax inversion is the technical term for the relocation of a U.S. corporation's headquarters to a nation with lower taxes (Fairchild 2014). In a corporate tax inversion, a U.S. company with substantial foreign operations inverts its ownership structure in such a way that the parent company is located in a foreign company with lower corporate taxes. The transaction aims at keeping the earnings from the company's overseas operations from being taxed in the U.S. In addition, the foreign parent can strip earnings from the U.S. subsidiary as deductible interest on the debt after an inversion (Martin 2014). The inversion only affects the taxation on foreign-based income; earnings generated by U.S. operations continue to be subject to U.S. taxation. In other words, it is only the taxation of non-U.S.-sourced income that is affected by an inversion.

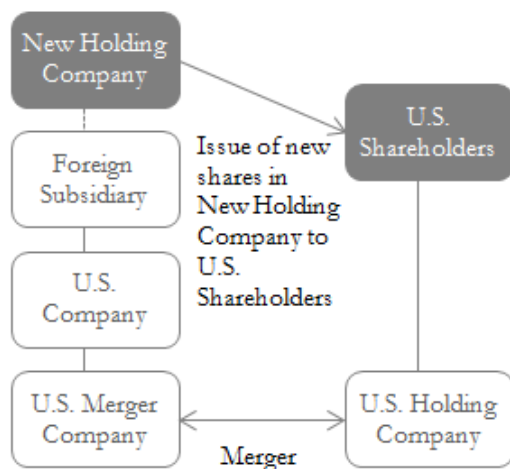
There are two main ways in which a company can re-domicile for tax purposes. The first is through a pure inversion, which is defined as when a corporation *"reincorporates in a new country with no material change in its business and assets, and the same existing shareholders own shares in the new foreign parent company,"* (Cortes et al 2014). In a pure inversion, the U.S.-domiciled corporation forms a new subsidiary in a country with a lower tax rate, and thereafter, the newly formed foreign-domiciled entity becomes the parent company of the firm's U.S. and foreign operations (Seide and Wempe 2003). The former parent company's shares are effectively converted to shares of the new foreign-domiciled parent. Minimal operational and physical location changes accompany the inversion. This form of inversion, however, was limited by the U.S. Treasury and the Internal Revenue Service (hereafter referred to as IRS) in June 2012. The anti-inversion regulations are described in Section 2.3.

The second method, which is the focus of this study, is to expatriate through a merger inversion. Whereas a pure inversion is a purely internal transaction, a merger inversion is an external transaction, involving a business combination with another entity. A merger inversion occurs when a U.S. company buys, or merges with, a foreign company with the intent to shift its tax domicile abroad. For the IRS to accept the merger as an inversion, the foreign group shareholders must own a minimum of 20 percent of the shares post-completion. Additionally, 25 percent of the sales, assets and employees of the new merged company must be located in the new country of incorporation. More details regarding these regulations are described in Section 2.3.

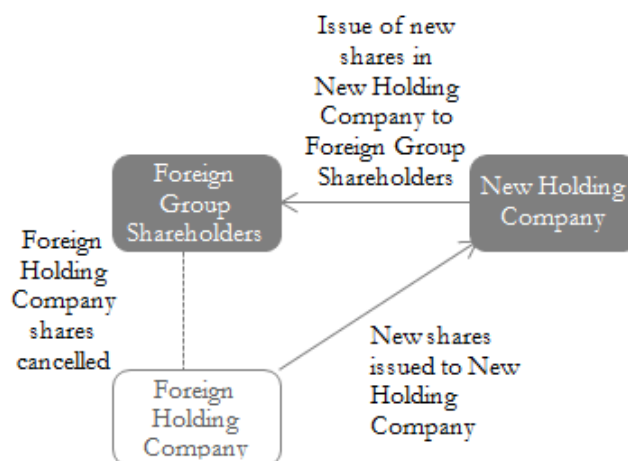
An illustration of how a merger inversion may be structured is provided on the following page.

Figure 1: Illustration of how a corporate tax inversion may be structured

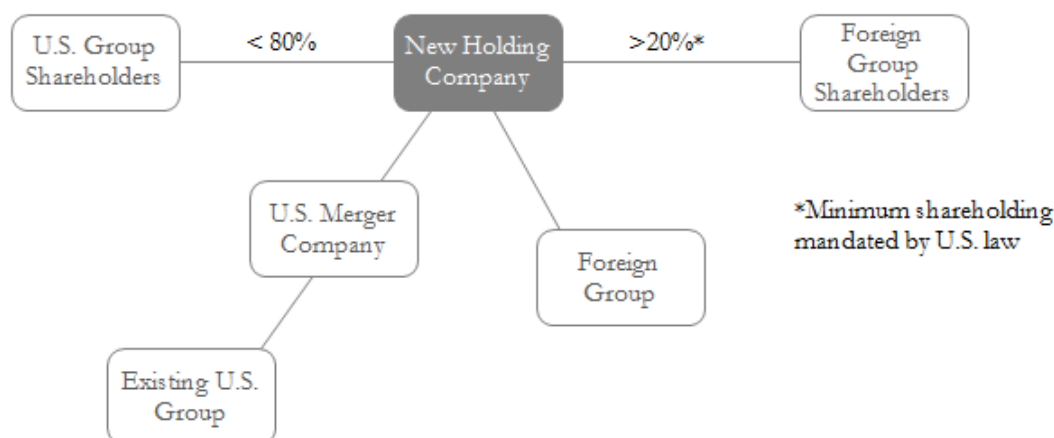
1. Acquisition of U.S. holding company



2. Acquisition of the foreign group



3. Post-completion structure



Source: Authors' own illustration, based on an illustration by Phelan et al. published in the International Tax Review on June 1st, 2014

A new holding company is formed in the new country of incorporation, and this holding company thereafter acquires both the U.S. acquirer and the non-U.S. target entity. New shares in the new holding company are issued to the existing U.S. shareholders. The existing U.S. holding company merges with a newly formed merger company. The foreign holding company shares are thereafter cancelled, and shares in the new holding company are issued to the foreign group shareholders. Post-completion, the former shareholders of both the U.S. acquirer and the target will hold the new foreign holding company's shares. The U.S. group shareholders own a maximum of 80 percent of the new holding company and the foreign group shareholders own a minimum of 20 percent, as mandated by U.S. tax law in order for the transaction to be classified as an inversion.

2.2 REASONS FOR UNDERGOING A CORPORATE TAX INVERSION

Steady declines in corporate tax rates around the world have left US companies at an increasing disadvantage (Kennedy 2014). Theoretically, the primary potential benefits of a corporate inversion are reductions in corporate tax burdens and financial statement effective tax rates. This largely results from the elimination of U.S. taxes on foreign-source income (Cortes et al 2014). Being domiciled in the U.S. puts U.S. multinationals at a competitive disadvantage as a result of the double-taxation on foreign-source income. U.S. tax rules dictate that U.S.-domiciled corporations are taxed on their foreign-source income. Thus, when a company remits earnings to the U.S. they are taxed an additional amount equivalent to the maximum U.S. corporate tax rate of 35% minus the foreign tax paid (Marples 2011). This double-taxation is what U.S.-based corporations aim to eliminate when expatriating to a foreign country (Desai and Hines 2002). By inverting, corporations can continue to be primarily U.S.-based from an operational standpoint, but can avoid the additional U.S. tax on foreign-source income (Seide and Wempe 2004).

Corporate executives have looked to inversion as a possible source of improved cash flow through tax savings, improved earnings via lower effective tax rates, and competitive advantage (Seide and Wempe 2003). The Office of Tax Policy at the U.S. Department of the Treasury (2002) states that, “*The decision to enter into the inversion may be dependent in many cases upon the immediate expected reduction in U.S. tax on income from U.S. operations.*” Consequently, the potential tax savings of an inverted firm is not limited to the elimination of U.S. tax on the firm’s foreign-source income, but may also include a reduction in the amount of U.S.-source income subject to U.S. taxation. The enhanced ability to shift income from the U.S. to lower-tax jurisdictions, i.e. income stripping, is an added benefit which makes corporate inversions attractive.

However, although an inversion is beneficial for shareholders in that it leads to lower taxes, there is no evidence that inverted firms perform better on the market than U.S.-domiciled multinationals (Drawbaugh 2014).

2.3 REGULATIONS AND ACTIONS AGAINST INVERSIONS

The IRS issued the first anti-inversion regulation in 1996. However, these regulations were narrow in scope and therefore rather ineffective in preventing tax inversions (Herzfeld 2014). In 2004, Congress amended the U.S. tax code, through the Job Creations Act, to make it painful for U.S. companies to invert. Section 7874 established that if the percentage ownership by the former shareholders of the U.S.-domiciled corporation is 80% or more after the inversion transaction, the new foreign-domiciled parent will be continue to be treated as a U.S. corporation for U.S. tax purposes, subjecting it to tax in the United States on its worldwide earnings (U.S. Code § 7874). Additionally, if they retain at least 60%, then an additional fee is charged on any appreciation in asset value when the company leaves the U.S. tax base (Martin 2014). This anti-inversion regulation reduced the number of corporate inversion transactions for a while until companies discovered a loophole known as the substantial business activities exception. Previously, companies expatriated to so-called tax-havens, such as Bermuda, where there is no corporate

tax. With changed tax regulations, companies instead began inverting into jurisdictions with lower corporate tax rates, such as UK and Ireland, in which they could claim they had substantial business activities. If this criterion of substantial business activities was fulfilled, Section 7874 did not apply (Herzfeld 2014).

In June 2012, the IRS put temporary regulations in place to curtail corporate tax inversions (IRS 2012). The main impact of the 2012 regulations is that a bright line test was applied to test whether a company qualified as having substantial business activities in a foreign country. This amendment required that 25 percent of the new company's employees, sales and assets had to be located in the new country of incorporation (IRS 2012). In practice, this amendment defined substantial business activities as when at least 25 percent of the new multinational entity's business activity is in the country of re-incorporation. As a result, U.S. corporations who wished avoid taxation began inverting by merging with established businesses abroad (Herzfeld 2014). This brought on a new wave of corporate inversions via business combinations, i.e. what this thesis refers to as merger inversions. Most inversions today involve a merger of a U.S. corporation with a smaller foreign corporation. A merger done properly allows the merged company to incorporate in a country with lower taxes (U.S. Department of Treasury 2014).

In May 2014, the bill S.2360: Stop Corporate Inversions Act of 2014 (113th Congress) was proposed. This bill aimed to impose a *“two-year moratorium on inversion transactions in order to give Congress the time to craft a permanent solution to stopping tax inversions,”* (Sen. Levin 2014). The bill would have made inversions very difficult to complete, and also penalize inversions retroactively. However, the bill did not pass Congress and was therefore not adopted. Instead, the U.S. Department of Treasury released a broad set of new rules as of September 22, 2014. Specifically, steps have been taken to both prevent certain techniques circumventing existing U.S. anti-inversion rules and to prevent the new foreign parent from tapping into earnings in offshore subsidiaries without triggering additional U.S. taxation (U.S. Department of Treasury 2014). These actions attempt to make inversion deals less economically appealing, and significantly diminish the ability of inverted companies to escape U.S. taxation. The new rules do not apply to companies that have already reincorporated.

There is some early evidence that the U.S. Treasury actions from September 2014 may deter some companies from inverting, but will not stop inversions from occurring. Four deals appear to have unraveled as a consequence of the Treasury action, while five deals are still pending and moving forward and three new deals have been announced (Martin 2014).

3 RELATED LITERATURE AND EXISTING RESEARCH

Before conducting the event study and corresponding cross-sectional regression, it is relevant to compile details on related literature and existing research. The section starts with an overview of research relating to tax avoidance and corporate inversions. Thereafter, literature on event studies on mergers and acquisitions and the efficient market hypothesis is summarized. Lastly, research relating to firm characteristics that may impact the magnitude of reaction to the merger inversion announcements is described.

3.1 PREVIOUS RESEARCH ON TAX AVOIDANCE AND INVERSIONS

This section summarizes previous research of three areas. Studies within the subject on tax avoidance are initially described, followed by existing research on corporate tax inversions are summarized. Thereafter, a review of research on M&A transactions involving tax haven countries is presented.

3.1.1 RESEARCH ON TAX AVOIDANCE

As a corporate tax inversion can be seen as a form of tax avoidance, it is of relevance to review literature on tax avoidance. In theory, news about tax aggressiveness could either boost or depress a firm's stock price. The following section summarizes existing research on the subject of tax avoidance.

There are two identified event studies that investigate the market reaction to announcements of tax-minimizing actions. The first is Hanlon and Slemrod (2009) who investigated the market reaction to news that a firm was involved in a corporate tax shelter. They found that, on average, a company's stock price declines when there is news about its involvement in tax shelters. However, the reaction to tax aggressiveness is found to be lower than that of other corporate misdeeds. The study also uncovers some evidence of cross-sectional variation in the returns. The stock price decline is found to be more negative for firms in the retail sector, suggesting that part of the reaction may be a consumer/taxpayer backlash. The reaction seems to be less negative for firms with a higher cash effective tax rate, indicating that the market interprets the news as a positive signal of tax aggressiveness. Thus, they determine that shareholders would prefer a company to be optimally aggressive by minimizing corporate tax payments net of the private costs of doing so. In short, their analysis suggests that tax shelter news is viewed as a negative event by the market, but also indicates that this negative reaction is not predominantly a reputation effect.

The second event study is Dhaliwal and Erickson (1998), which examined the wealth effects of changes in the tax treatment of specific transactions or companies undertaking specific tax-favored transactions. They investigated the market responses to court rulings about the amortization of intangible assets, a lower court's disallowance of the depreciation of certain intangible assets, and found a negative price reaction. They also examined the reaction following by the Supreme Court's reversal of such a decision and observed positive price reactions. Thus, they drew the conclusion that companies undertaking specific

tax-favored transactions were viewed negatively by the market.

In each of the studies above, news about tax avoidance is viewed as a negative event. However, how the event is viewed may be dependent on the governance of the firm. Desai and Dharmapala (2006) examined how investors value managerial actions designed solely to minimize corporate tax obligations. By using a proxy for tax avoidance, they determined that tax avoidance was positively related to firm value for well-governed firms, but insignificantly related to firm value for poorly-governed firms. They came to the conclusion that the evidence was consistent with agency costs mitigating the benefits to shareholders of corporate tax avoidance. In short, managerial actions taken to avoid taxes add value to well-governed firms, but add no value to poorly-governed firms.

According to Inger (2014), the tax avoidance continuum ranges from evasive tax reduction strategies to benign tax avoidance, and investors distinguish between methods of tax reduction in their valuation of tax avoidance. The impact of tax avoidance on firm value varies with tax risk, permanence of tax savings, tax planning costs, implicit taxes, and contrasts in disclosures of tax reduction in the financial statements.

Therefore, research indicates that whether or not tax avoidance in the form of corporate inversions is viewed positively or negatively by the stock market should be researched separately. This is addressed in the following section.

3.1.2 RESEARCH ON TAX INVERSIONS

Research on the subject of corporate tax inversions is very much limited to the existence of pure inversions to a tax haven country. Studies have concluded that corporate executives have looked to inversion as a possible source of improved cash flow through tax savings, improved earnings via lower effective tax rates, and competitive advantage. Drawing conclusions of how the market responds to announcements of inversions based on the results of these studies is, however, somewhat limited. The conclusions of the studies investigating pure inversions are summarized below.

Desai and Hines (2002) investigated the price response to inversion announcements by examining corporate inversions of existing U.S. multinationals occurring between 1993 and 2002. They concluded that inversions are motivated by firms trying to reduce US double taxation on foreign income. However, they found that the valuation increase of inverting companies cannot be explained by the tax savings on foreign income alone. Additionally, the authors found that the average market reaction to tax inversions is not statistically different from zero. They attributed this lack of response to the cost of inverting as well as future potential regulatory responses.

Cloyd et al. (2003) examined the market reaction to a board approval of inversion, using random approximation procedures. The authors found no evidence of a significant price reaction. They determined that the expatriation of U.S. companies to tax haven countries was not positively valued by the market and occasionally associated with negative announcement period returns.

Seida and Wempe (2003) examined inverting firms' cumulative abnormal returns (CARs) over three-day windows centered on the dates of both board and shareholder approval of inversion. Consistent with the findings of Desai and Hines (2002) and Cloyd et al. (2003), results from statistical tests provide no evidence that inverting firms, on average, earn abnormal returns around the time of board approval of the inversion. Seida and Wempe (2004) further explored aspects of inversions and found that the market reaction to shareholder approval is associated with several concurrent firm attributes that affect the magnitude of expected inversion-related tax savings.

Current research has not been able to detect a significant market reaction to the announcement of tax inversions. However, it is important to note that these studies have not researched merger inversions, which is the primary focus of this thesis. A subject closely related to merger inversions is cross-border acquisitions involving targets located in tax havens. The following section explores cross-border acquisitions involving tax havens.

3.1.3 RESEARCH ON CROSS-BORDER ACQUISITIONS INVOLVING TAX HAVENS

Most M&A studies have eliminated merger transactions that involve an inversion. However, two studies have been identified that investigated cross-border acquisitions involving tax havens. These are summarized in this section.

Cortes et al (2014) attempted to understand if expatriated American firms could both benefit from lower corporate taxation and conform to U.S. securities laws in such a way that they continued to be valued and treated like a U.S. firm. Their angle was that while the benefits of changing a firm's tax domicile in terms of lowering the firm's effective tax rate are well understood, the involved costs are not. The results of their study showed that publicly traded firms that undergo a corporate inversion often become foreign incorporated but continue to enjoy the full benefits of the U.S. securities laws. Thus, on the benefit side, firms have a lower effective tax rate expected. However, unexpected negative consequences are less analyst followings, a higher bid-ask spread on their stocks. Additionally, investors put a lower value on the cash that they retain.

The other identified study was Col and Errunza (2013) where the valuation consequences of tax avoidance was investigated by examining an international sample of cross-border mergers that involve tax haven targets and/or acquirers over the period 1989 to 2010. Specifically, they estimated the stock price reaction to announcement of cross-border M&As for both the tax haven acquirers and targets. They state that tax motivations are most evident for firms selling to tax haven based acquirers and for acquirers that target tax haven firms. Col and Errunza (2013) predicted that expected value creation through such mergers should be a function of the expected tax savings and the announcement returns should reflect the present value of the expected net benefits to shareholders. The findings showed both the targets and the acquirers of tax haven firms receive significantly lower abnormal returns around the merger announcements relative to their counterparts in a control sample of non-tax motivated M&As. The evidence is consistent with the

agency costs from weaker disclosure and corporate governance laws as well as both consumer and taxpayer backlash that more than offset tax savings.

While Col and Errunza included inversions in their sample, this was a broader study on cross-border acquisitions to tax-haven countries, and did not investigate inversions independently. Thus, it can be determined that there is a gap in existing research in that limited studies exist on merger inversions.

3.2 EVENT STUDIES AND THE EFFICIENT MARKET HYPOTHESIS

The most statistically reliable evidence on whether a transaction creates value for shareholders comes from traditional short-window event studies (Andrade et al. 2001). An event study generally tries to investigate the return behavior of a sample of companies who experience a common type of event, and uses financial market data to measure the impact of this particular economic event on the market value of a company. The overall strategy is to measure the abnormal return of a security as a result of a specific event. The abnormal return is a direct measure of unexpected changes in security holders' wealth in connection to the incident. Event studies evaluate the extent to which stock prices react to a particular bit of news (Henderson Jr 1990). Within the context of this study, upon the inversion announcement, investors receive information regarding the existence of the inversion (Andrade et al. 2001). Investors react to the announcement by trading the share so that either the price goes upward, downward or remains the same.

The average abnormal stock market reaction at announcement is used to measure value creation or destruction (Andrade et al. 2001). Thus, the change in the equity value of firm observed due to stock market response to the announcement of merger and acquisition may be considered as a measure of the future discounted additional profits that they are expected to accrue as a consequence of the transaction. (Duso et al. 2010). Based on the stock market response observed during the announcement period, it may be concluded whether the transaction investigated creates value for shareholders or not.

In theory, what decides whether the share is traded upward, downward or remains the same is whether the investors expect the management to have achieved a net gain or a net loss. According to the theory of Efficient Market Hypothesis, investors are both rational and fully informed. As a result, any news relating to an event that affects the value of the stock will result in an instantaneous reevaluation of that stock (Fama 1970). Fama (1970) specifies three forms of an efficient market: weak, semi-strong and strong. An assumption of the semi-strong efficient market is made when conducting an event study (MacKinlay 1997).

Event studies can serve as a method of testing market efficiency. The market is efficient in the semi-strong form if stock prices respond immediately and correctly (in both magnitude and direction) on the announcement of new, publicly available information (Ball 1989). Systematically non-zero abnormal returns that persist after a particular type of corporate event are inconsistent with market efficiency

(Khotari and Warner 2006). Put simply, if the market is semi-strong form efficient, there should be no post-announcement drift. If the market is semi-strong form efficient, the market will incorporate the anticipated impact of the announcement directly, and it can be assumed that shareholder reactions to the announcement reflect the total shareholder effects of the transaction. Without this assumption, an event study can only explain expectations of the shareholders at that point in time of the announcement, but not conclude whether the transaction ended up creating or destroying shareholder value after its completion (Ang and Zhang 2004).

If the market is semi-strong form efficient, there should be no post-announcement drift. However, there may be valid explanations that explain a drift in an efficient market, e.g. transaction costs and costs of information (Bartov et al. 1998). Therefore one must be careful in drawing conclusions. Similarly, no observed drift does not necessarily imply that the market is semi-strong efficient. There may be cases where the response is immediate, but incorrect in terms of either magnitude or direction and therefore the market is not efficient despite showing signs that it is.

Event studies can offer a potentially powerful test of the valuation of investor taxes (Voget 2010). Within the area of tax, an ideal event should involve an economically significant change in tax rates, be unexpected by market participants, be permanent in nature, and not run concurrent with other tax or non-tax policy changes or other events that might affect share prices. Given that stock market reactions to merger and acquisitions announcements have historically appeared to be a good indicator of future success, an event study offers a method to study the valuation implications of a merger inversion. The shareholder reaction to the inversion announcements may help to predict the profitability of inversions. The observed abnormal returns can be said to reflect the unexpected “future economic rents” arising from the transaction. In other words, from the acquirer’s point of view, an abnormal return of zero reflects a fair rate of return on the merger investment (Andrade et al 2010).

3.3 STUDIES ON THE IMPACT OF FIRM CHARACTERISTICS

Theory states that there is often an association between the direction and magnitude of abnormal returns and characteristics specific to event observed (MacKinlay 1997). There is a significant body of literature analyzing which firm characteristics impact the success of mergers and acquisitions (Jensen and Ruback 1983), yet no previous research regarding the impact of firm characteristics on merger inversions has been found. This section documents firm characteristics that have shown to impact the value effects of mergers and acquisitions in previous studies. As there is no previous research regarding merger inversions, the theory in this section relates to studies on mergers and acquisitions in a broader sense.

Acquirers can improve value by sharing better institutional and corporate governance practices such as legal and accounting standards (Chari et al. 2009). There is evidence in existing research that cross-sectional variation exists returns, and that these returns can be predicted by governance characteristics in place at the time of the transaction (Brown et al. 2005). It has been found that it might be the case that

managers make investments that increase managerial value to shareholders without improving shareholders' returns (Shleifer and Vishney 1989). Additionally, shareholders of the acquiring firms will gain from efficiency enhancing mergers, but shareholders may lose value if mergers and acquisitions are motivated by hubris or agency considerations (Weston and Weaver 2001). Thus, it is of relevance to study the governance of firms undergoing a business combination merger.

Previous research also suggests that the size of the acquirer in relation to the size of the target is negatively associated with abnormal announcement returns (Moeller, et al., 2004). The results of this study showed that small acquirers had significantly higher cumulative average abnormal returns around mergers and acquisitions announcements than the larger acquirers. It was concluded that the results were consistent with the view that larger acquirers are more prone to hubris and have higher agency costs of managerial discretion. This is explained by the reasoning that the managerial hubris hypothesis becomes more pronounced in large firms (Roll, 1986). The intuition is that managers of large firms will be less careful in negotiating relatively small deals. Additionally, research on mergers and acquisitions has found that mergers seem to create value for shareholders overall, but the announcement period gains from mergers accrue entirely to the target firm shareholders (Andrade et al. 2001). Most of the shareholder expectations of value creation go to the target rather than the acquirer, and as such, the greater the post-target deal ownership, the higher is the likelihood of a positive reaction at announcement. This may be particularly true in the case of merger related inversions where there are few target firms available to meet the legal requirements of an inversion. American acquirers seeking to invert, i.e. reincorporating overseas for tax purposes, must generally find a target that is at least one fifth of its size. Thus, existing research combined with the legal requirements for an inversion would hypothesize that the relative size of the target, measured as post-target deal ownership, impacts the value effects of a merger and acquisition.

A number of studies suggest that the synergy motive for mergers and acquisitions is associated with positive wealth effects for acquirers (Berkovitch and Narayanan, 1993; Bradley et al., 1983; Dennis and McConnell, 1986). Synergies can be obtained from combining firms in the same industry sector (operational synergy), or arise when firms have different financial resources (financial synergy) or different managerial resources (managerial synergy) (Trautwein 1990). Taxes are potentially important in merger and acquisition activity because they have the potential of creating synergies by increasing tax planning opportunities (Voget 2011). Additionally, the international tax system affects cross-border acquisitions where a multinational is more likely to relocate its headquarters abroad if it is located in a parent country with high taxation of foreign-source income (Huzinga and Voget 2009). Research has shown that the perceived additional tax rate, as reflected in market pricing, closely resembles the additional statutory tax rate implied by the cross-border deal (Huzinga et al. 2012). In the case of merger inversions, the presence of tax savings can be seen as a financial synergy that could impact the reaction to the announcement of an inversion. Consequently it can be hypothesized that the higher the potential tax savings, the higher the resulting financial synergies through a lower tax cost, and therefore the higher reaction at announcement.

The market's valuation of a company has also been of interest in many studies. Several of these have determined that the price-to-book ratio is negatively associated with announcement returns (Sudarsanam and Mahate 2003; Tuch and O'Sullivan 2007). Additionally, R&D intensity has been found to have a positive and significant effect on cumulative abnormal returns of the acquiring firms around the announcement dates (Dutta et al. 2009). This implies that the market generally favors M&A deals by R&D intensive firm. Given that the inversions investigated in this thesis occur via a merger, it can reasonably be assumed that these variables are valued by the market in a similar manner.

Based on the associations between firm characteristics and value outlined above, different firm-specific variables have been selected to perform the cross-sectional regression on abnormal returns. This is described in detail in Section 3.3.

3.4 CONTRIBUTION TO EXISTING RESEARCH

Limited research exists on the subject of the value creation of inversions, particularly on the stock market reaction to announcements of inversions. Previous studies on the stock market reaction to corporate inversion announcements have been conducted on the firms inverting before the amendments to the U.S. tax regulations. In these instances, merger-related inversions were not taken into consideration and were excluded from the samples. Additionally, a review of the literature has shown that no existing research has focused on corporate inversions that occurred after the new legislation rules in 2004. Thus, when inversions have been investigated, the majority of studies on them have been limited to the presence of pure inversions, which is a type of inversion which has been curtailed through regulations.

A review of existing research has also shown that merger inversions have been excluded from most other M&A studies on cross-border mergers. While Col and Errunza included inversions in their sample, this was a broader study on cross-border acquisitions to tax-haven countries, and they did not investigate inversions independently. Thus, it can be determined that there is limited research on merger inversions.

Based on the review of previous research, it is apparent that there is a gap in existing literature. Given the debate in media about the legitimacy of U.S. multinationals undergoing a merger inversion, and the efforts made by the U.S. Government to stop them from occurring, the shareholder expectations of the value creation to inversions is a highly relevant subject. This study contributes to existing research on merger inversions by measuring the expectation of shareholder value effects by investors at the point of announcement. To the authors' knowledge, this is the first event study that examines the share price reactions to announcements of U.S. multinational companies' intentions to re-domicile to lower tax-rate countries through mergers. Additionally, this study aims to explain what firm characteristics impact the magnitude of the shareholder reactions to corporate inversion announcements.

4 METHODOLOGY

The research questions will be answered in two parts. Initially, an event study is performed to quantify the impact the announcement of a merger inversion has on the share price of the firm announcing its intention to invert. The event study measures the expectation of shareholder value effects by investors at the point of the merger inversion announcement, and thereafter compares this with the impact of three different types of control sample announcements. This is conducted by testing and running four individual regressions. The comparisons between the merger inversions and the control samples allows for conclusions regarding the initial shareholder expectations on the value creation of the announcement of a merger inversion to be drawn.

The second part of the study consists of a cross-sectional regression on the abnormal returns of the merger inversions. The regression will be run on firm characteristics that theoretically may have impacted the magnitude of the announcement. This attempts to determine whether differences in firm-specific characteristics between the merger inversion firms can help explain variations in expected shareholder value effects of a corporate tax inversion.

This section begins with an explanation of the statistical tests and assumptions of the event study. Thereafter, a description of how the cross-sectional regression on abnormal returns is conducted follows.

4.1 EVENT STUDY METHODOLOGY

The outline of the event study is comprised of a model for calculating normal and abnormal returns, an assessment of the estimation window and event window, and a testing procedure. This section describes the steps of the event study in detail. A concise overview of the set-up for the event study is provided in Table 1 below.

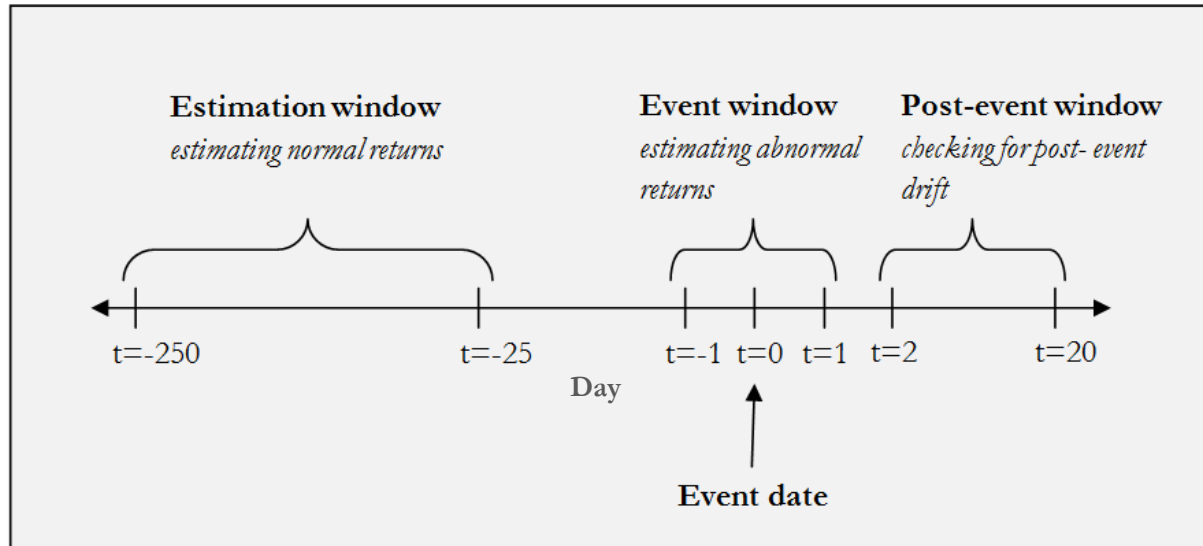
Table 1: Set-up of the event study

SET-UP	CHOSEN METRICS
Normal performance model	Market Model
Abnormal return metric	Cumulative Abnormal Return (CAR)
Estimation window (trading days)	(-250;-25)
Event window (trading days)	(-1;1)
Post-event window (trading days)	(2;20)
Testing procedure	Hypothesis testing – both parametric and non-parametric tests
Significance level	1%, 5%, 10%

The rationale for the set-up, the underlying assumptions and how the steps of the event study are performed is provided throughout this section. First, the model for calculating normal and abnormal

returns is described. Second, the choices concerning the estimation window is addressed with the event date and event window following thereafter. A summarizing illustration of the set-up including the estimation window, event window and the event date is provided in Figure 2 below.

Figure 2: Illustration of the event study set-up



Source: Authors' own illustration

The figure above illustrates the event study set-up for the thesis. t represents the number of days in relations to the event date. The announcement occurs at the event date, Day 0, where $t = 0$. Normal returns are estimated by the Market Model using data from the estimation window. Thereafter, abnormal returns are determined in over the event window and post-event window using the results of estimated Market Model. Abnormal returns are calculated by the metric of cumulative abnormal returns (CAR) over the event window. The post-event window is used to check for a post-event drift, i.e. if the full effect is captured over the event window, in the extension to the analysis (Section 7.4).

The event study methodology section ends with a description of the steps included in the testing procedure, including the hypotheses and the parametric and non-parametric tests performed.

4.1.1 MODEL FOR CALCULATING NORMAL AND ABNORMAL RETURNS

There are several approaches to calculating normal returns in an event study, the most common of which is a one-factor model, known as the market model. Generally, "*the gains from employing multi-factor models for event studies are limited,*" (MacKinlay 1997), and therefore, the one-factor market model will be used in this study.

The market model is assumes a stable linear relationship between the market return and the security return (Campbell et al. 1997). It relates the return of a given security to the market portfolio return. The normal return is estimated by a linear regression based on ordinary least squares (OLS). When estimating normal performance, it is necessary to estimate α_i (the intercept) and β_i (the coefficient of the independent variable). A separate regression for each company of the day-to-day differences in stock returns as well as

the differences in day-to-day market returns over the estimation window is performed. These estimated parameters are then used to calculate abnormal returns over the event window.

For any security i we have:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

$$E(\varepsilon_{it}) = 0$$

$$\text{var}(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2$$

Where,

R_{it} = the rate of return of company i on day t

α_i and β_i = the intercept and slope estimators

R_{mt} = return of the market index on day t

ε_{it} = zero mean disturbance term

R_{it} and R_{mt} represent the period- t returns on security i and the market portfolio respectively, where ε_{it} is the zero mean disturbance term. Alpha (α) and beta (β) are predicted by an ordinary least squares (OLS) regression in the estimation period.

The market return is calculated as:

$$R_{mt} = \frac{P_{mt} - P_{mt-1}}{P_{mt-1}} \quad (2)$$

Where,

P_{mt} = closing price of the market index on day t

P_{mt-1} = closing price of the market index on day $t-1$

A measure of abnormal returns is necessary to assess the announcement's impact on share prices. The abnormal returns are the ex post returns less the normal returns of the firms over the event window (Campbell et al. 1997). In other words, the abnormal return is the difference between the realized return and the expected return.

For each security, denoted as i , and time unit, denoted t , the abnormal return can be written as:

$$AR_{it} = R_{it} - E(R_{it}|X_t), \quad (3)$$

Where AR_{it} , R_{it} and $E(R_{it}|X_t)$ are the abnormal, actual and expected normal returns respectively for the time period t , and X_t is the conditioning information regarding the normal return model. The expected return is the return “that would be expected if the event did not take place,” (MacKinlay 1997).

The realized return is readily available as the change in closing price of a security for the desired time unit or trading frequency.

Actual daily stock returns are calculated as follows:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \quad (4)$$

Where,

P_{it} = closing price for security i on day t

P_{it-1} = closing price for security i on day $t-1$

Calculating the abnormal returns requires the model of normal returns to be defined. Normal returns are captured in the estimation window, described in the following section.

Using the market model as the normal performance model, the abnormal returns are calculated as follows:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \quad (5)$$

Where,

AR_{it} = the rate of abnormal return of company i on day t

R_{it} = the rate of return of company i on day t

α_i and β_i = intercept and slope estimators

R_{mt} = the return of the market index on day t

When the event window extends over several days, the abnormal returns must be aggregated over the days in event window to measure the total impact on shareholder value. The cumulative abnormal returns over the event window are calculated by summing the abnormal returns across all observations.

$$CAR_{i(t,t+k)} = \sum_{t=day-1}^{t+k} AR_{it} \quad (6)$$

Where,

CAR = cumulative abnormal returns

t = first day in the event window

k = number of days in the event window

Next, the average abnormal returns and the average cumulative abnormal returns are calculated.

Average abnormal returns on day t are calculated as:

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (7)$$

Average cumulative abnormal returns over the days t to $t+k$ are thereafter calculated as:

$$\overline{CAR}_{(t,t+k)} = \sum_{t=day-1}^{t+k} \overline{AR}_t \quad (8)$$

4.1.2 ESTIMATION WINDOW

The parameters of the normal performance model are estimated using a data subset known as the estimation window. The estimation window is defined as the time period prior to the event window where the normal returns are estimated. The estimation window should be representative of normal conditions of the stock and not contaminated with uncorrelated events (Aktas et al. 2007).

Typically, a value of $n = 250$ days is chosen to correspond approximately to the number of trading days in a calendar year (Corrado 2011). To ensure that the event itself does not influence the estimates of the normal performance parameters, the event window is not included in the estimation window. Also, in order to ensure that there is not any information leakage that could affect the normal return estimations, the estimation window ends 25 days before the event date.

4.1.3 EVENT DATE AND EVENT WINDOW

The choice of event date is essential for estimating the event window (MacKinlay 1997). The most relevant date regarding the event of the merger inversions, cross-border acquisitions and the M&A transaction control group is the announcement date, as this is the first time the market is exposed to details of the event. For pure inversions, the event date is the date of the board approval of the inversion. The event window is defined as the time under which new information associated with the event is incorporated in the price (McWilliams and Siegel 1997). It is common practice to define the event window to be greater than the specific area of interest, as this permits the periods surrounding the event to be examined (Serra 2002).

However, event studies are most accurate immediately after an event. The longer the period of time, the greater the uncertainty regarding the reason for potential share price changes. In accordance with this viewpoint, the event window should be tight around the event, minimizing the impact of other noise. In order to capture the entire effect of the event, the event window is defined to range from one day before the event to one day after the event.

4.1.4 TESTING PROCEDURE

The method of hypothesis testing will be applied to investigate the significance of average cumulative abnormal returns in the four following tests:

1. Test if the average cumulated abnormal returns of merger inversions is statistically different from zero
2. Test if the difference in average cumulated abnormal returns of merger inversions and pure inversions is statistically different from zero
3. Test if the difference in average cumulated abnormal returns of merger inversions and cross-border acquisitions is statistically different from zero
4. Test if the difference in average cumulated abnormal returns of merger inversions and control sample of similar M&A deals in terms of industry is statistically different from zero

The statistical tests and corresponding hypotheses tested are summarized in Table 2 below.

Table 2: Hypotheses for each of the tests in the event study

	TEST			
	(1) MINV	(2) MINV vs PINV	(3) MINV vs CBA	(4) MINV vs CTRL
NULL HYPOTHESIS	$H0_1: \widehat{CAR}_{MINV} = 0$	$H0_2: \widehat{CAR}_{MINV} - \widehat{CAR}_{PINV} = 0$	$H0_3: \widehat{CAR}_{MINV} - \widehat{CAR}_{CBA} = 0$	$H0_4: \widehat{CAR}_{MINV} - \widehat{CAR}_{CTRL} = 0$
ALTERNATIVE HYPOTHESIS	$H1_1: \widehat{CAR}_{MINV} \neq 0$	$H1_2: \widehat{CAR}_{MINV} - \widehat{CAR}_{PINV} \neq 0$	$H1_3: \widehat{CAR}_{MINV} - \widehat{CAR}_{CBA} \neq 0$	$H1_4: \widehat{CAR}_{MINV} - \widehat{CAR}_{CTRL} \neq 0$

Description: This table summarizes the hypothesis for all four tests. Both the null hypothesis and alternative hypothesis are presented. MINV stands for merger inversions. PINV stands for pure inversions. CBA stands for 100% cross-border acquisitions where the acquirer is a U.S. listed company that does not involve an inversion. CTRL stands for the control sample of M&A deals similar in size and industry but without inversion. CAR is the average cumulative abnormal return aggregated over the event window.

In order to test the above hypotheses, four regressions are run, one for each test. All regressions will be corrected for heteroscedasticity. The estimation models for the regressions performed are:

$$\text{Test 1: } \widehat{CAR}_{-1,1} = \hat{\beta}_0 + \varepsilon_i$$

$$\text{Test 2: } \widehat{CAR}_{-1,1} = \hat{\beta}_1 + \hat{\beta}_2 MINV_i + \varepsilon_i$$

$$\text{Test 3: } \widehat{CAR}_{-1,1} = \hat{\beta}_3 + \hat{\beta}_4 MINV_i + \varepsilon_i$$

$$\text{Test 4: } \widehat{CAR}_{-1,1} = \hat{\beta}_5 + \hat{\beta}_6 MINV_i + \varepsilon_i$$

Where $\widehat{CAR}_{-1,1}$ is the estimated CAR following the announcement. MINV is a dummy variable taking the value 1 if the observation, i , is a merger inversion and 0 otherwise. $\hat{\beta}_0$ is the estimated average CAR for merger inversions. $\hat{\beta}_1$ is the estimated average CAR for pure inversions and $\hat{\beta}_2$ is the estimated difference in average CAR between merger inversions and pure inversions. $\hat{\beta}_3$ is the estimated average CAR for control group of cross-border acquisitions and $\hat{\beta}_4$ is the estimated difference in average CAR between merger inversions and cross-border acquisitions. $\hat{\beta}_5$ is the estimated average CAR for the M&A control group and $\hat{\beta}_6$ is the difference in average CAR between merger inversions and the M&A control group.

As a hypothesis regarding the direction of any potential relationship was not established, the view of a neutral relationship will be substituted as a null hypothesis and will be tested against the double-sided alternative that the relationship is either positive or negative. Significance levels of 1 percent, 5 percent and 10 percent have been selected to be able to reject the null hypothesis. The interpretation if the null hypotheses are rejected is described in Table 3.

Both parametric and non-parametric tests can be applied to event studies. The parametric t-test is the most commonly applied because it is both simple and easy to interpret. However, parametric tests are subject to the five Gauss-Markov assumptions³ (Thatcher et al. 2005). If the assumptions hold, the power of a parametric test is larger than a non-parametric test. When such assumptions do not hold, a non-parametric test is superior. The principal advantage of non-parametric tests is that the return does not have to follow a normal distribution. In accordance with most research literature, an event study should include both types of tests (MacKinlay 1997). Although each test has good traits, parametric and non-parametric tests should be used in conjunction with each other, rather than in isolation (Brown and Warner 1985). The use of both parametric and non-parametric test allows the researcher to check the robustness of the parametric test (MacKinlay 1997). This is particularly true when dealing with the potential problem of violated assumptions. The robustness is also strengthened by adjusting for heteroscedasticity when running the regressions.

As the most common parametric test for an event study is a simple t-test (Serra 2002), t-tests will be used in the study. In the first test, whether the average cumulative abnormal return of merger inversions is zero will be tested against the double-sided alternative that it is not equal to zero. Additionally, whether the average cumulative abnormal return of merger inversions is different from the three control samples will be tested again double-sided alternatives that the abnormal returns are different (Tests 2-4).

The most common types of non-parametric tests used in event studies are sign tests and rank tests (MacKinlay 1997). In this study, the Sign test and the Wilcoxon signed-rank test are conducted to test if the mean of cumulated abnormal return of merger inversions is statistically different from zero. The Mann-Whitney *U* (also known as the Wilcoxon sum-rank) and the Median test are conducted to test if the average cumulated abnormal return of merger inversions is statistically different from the three control samples (pure inversions, cross-border acquisitions and similar M&A deals without inversions).

The Wilcoxon signed-rank test is a double-sided test that considers both the sign and magnitude of abnormal returns. It does not assume normality or infer the value of any population parameter (Wilcoxon 1945). The Sign test accounts for skewness in security returns, and tests three different alternatives: two one-sided alternative and one double-sided alternative (Cowan 1992).

The Mann-Whitney *U* test is a non-parametric test of the null hypothesis that two populations are the same against an alternative hypothesis that a particular population tends to have larger values than the other. It tests the null hypothesis that data in the two respective samples are from continuous distributions with equal medians, against the alternative that they are not. The Mann-Whitney *U* test has greater

³ First, expected value of the error term, or the abnormal return in this case, is zero. Second, there is no correlation between the abnormal returns. Third, all the abnormal returns are homoscedastic, i.e. have the same variance. Fourth, the abnormal returns and the actual returns are independent. Fifth, the abnormal returns follow a normal distribution.

efficiency than the t-test on non-normal distributions, and is nearly as efficient as the t-test on normal distributions. This test is particularly useful when the two samples tested against each other are independent and have different number of observations (Mann and Whitney 1947).

Lastly, the Median test performs a non-parametric k-sample test on the equality of medians. It tests the null hypothesis that the k samples, the inversion sample compared to each individual control sample, were drawn from populations with the same median. Chi-squared test statistics are computed both with and without a continuity correction (Heckert 2011).

4.1.5 INTERPRETATIONS OF THE EVENT STUDY

The event study is comprised of four different regressions. The first regression relates to the direction of shareholder value effects following announcement of the acquisition and inversion, the second will compare the reaction to the merger inversion announcement to the populations of pure inversions, and the third relates to the difference in shareholder effects between an inversion and non-tax motivated cross border acquisition. The fourth regression compares the impact of announcements to a merger inversion to a control sample of similar sized deals in the same industries without an inversion. The initial expectations are measured as the cumulative abnormal returns (CAR) during the three days surrounding the announcement (i.e the day before, the day of and the day after the announcement). The regressions and tests performed are summarized in Table 3.

Table 3: Summary of alternative hypothesis and interpretation if null hypothesis is rejected

TEST	ALTERNATIVE HYPOTHESIS	ANALYSIS IF NULL HYPOTHESIS IS REJECTED
(1) MINV	$MINV \widehat{CAR}_{-1,1} \neq 0$	The expected shareholder value effects upon the announcement of merger inversions is positive/negative (i.e value creation or value destruction)
(2) MINV vs PINV	$MINV \widehat{CAR}_{-1,1} \neq PINV \widehat{CAR}_{-1,1}$	Expectations of shareholder value effects differ upon announcement of merger inversions and pure inversions
(3) MINV vs CBA	$MINV \widehat{CAR}_{-1,1} \neq CBA \widehat{CAR}_{-1,1}$	Expectations of shareholder value effects differ upon announcement of merger inversions and the control sample of cross-border acquisitions of 100% where the acquirer is a U.S. listed company
(4) MINV vs CTRL	$MINV \widehat{CAR}_{-1,1} \neq CTRL \widehat{CAR}_{-1,1}$	Expectations of shareholder value effects differ upon announcement of merger inversions and the M&A control group of similar deals in terms of size and industry

Description: The above table describes the four statistical tests included in the event study. The alternative hypotheses are presented along with the analyses of the test results if the null hypothesis is rejected. MINV stands for merger inversions. PINV stands for pure inversions. CBA stands for U.S. acquirer 100% cross-border acquisitions that do not involve an inversion, and CTRL stands for the control sample of M&A deals similar in size and industry but without inversion. CAR is the average cumulative abnormal return aggregated over the event window.

The analysis of the result of Test 1 is that the direction (positive or negative) of the cumulative abnormal return indicates whether shareholders expect merger inversions to lead to shareholder value creation or shareholder value destruction. The analysis of Test 2 is that a statistically significant difference in cumulative abnormal returns indicates that shareholders expect either pure inversions or merger inversions to have a greater shareholder value effect. The interpretation of Test 3 is that a statistically significantly different cumulative abnormal return indicates that shareholders expect cross-border acquisitions with or without an inversion to be more shareholder value creating. Similarly, the analysis of Test 4 is that a statistically significant difference in cumulative abnormal returns indicates that shareholders expect either merger inversions or the M&A control group to have a greater shareholder value effect.

4.1.6 CONTROLLING FOR ESSENTIAL ASSUMPTIONS

The event study methodology is based on several underlying assumptions. One assumption is that the event should not be anticipated by the market. Another is that there is no other event occurring within the studied event window that may cause an abnormal return. Additionally, there should be no bias in the sample (Henderson Jr 1990). While these assumptions are difficult to validate, they have been taken into consideration in the data selection process of the samples as well as the chosen performed tests. As previously mentioned, the combination of the parametric and non-parametric tests should control for any biases. Thus, the assumptions underlying the models are considered to be fulfilled.

Additionally, as stated in Section 3.2, a semi-strong form efficient market is often assumed in an event study. This assumption is necessary in order to draw conclusions of shareholder value effects following an announcement. However, the presence of market efficiency is not required to interpret the results of this thesis. Rather, the event study results will document the expected shareholder value effects by investors at the point of announcement. The validity of the market efficiency assumption with regards to inversion announcements, and the implications of the results in the presence or lack of market efficiency will be discussed in Section 7.4.

4.2 CROSS-SECTIONAL REGRESSION ON ABNORMAL RETURNS

Regardless of the interpretations of the results of an event study, the cumulative average performance over many firms can hide substantial cross-sectional differences (Brown et al 2005). To investigate the association between abnormal returns and firm characteristics, a cross-sectional regression of abnormal returns on characteristics of interest is conducted on the initial results from the short-run event study on merger inversions. The cross-sectional regression aims to investigate whether there are any explanatory variables that can explain why the observed reactions at announcement occur. In other words, the focus of the second part of the study is to determine if there are any differences between the observations that influence the impact of the event, and can explain the variation in the individual cumulative abnormal returns on the merger inversion announcements. This section begins with a motivation for the selection of firm characteristics in the cross-sectional regression. Thereafter the model is defined, and the statistical tests and their interpretations are detailed.

The firm characteristics of interest included in the cross-sectional regression on abnormal returns of the merger related inversion sample are based on the documented associations of firm characteristics and shareholder value, described in Section 3.3. Existing research has shown that the size of the target compared to the size of the acquirer is a variable that impacts shareholder value effects of a merger. The post-deal target ownership is one way of measuring this relative size of the target firm, and is therefore identified as a relevant characteristic to test. Two variables are identified to test for the relationship between corporate governance and shareholder value – ownership concentration and board independence. A high ownership concentration may reduce the manager–owner agency conflict.

Additionally, high board independence means that it is less likely that decisions are made based on the managers' best interests instead of the shareholders' interests. Similarly, R&D intensity, financial synergies through additional tax savings and the price-to-book ratio are firm characteristics which previous research has shown may affect the value of a merger, and are therefore included as variables to test in the cross-sectional regression.

Additionally, it is identified in Appendix 2 that 56% of the observations in the merger inversion sample are transactions within the healthcare sector. As a result, it is of interest to test if this inversion-dominating sector results in different shareholder expectations than other industries.

Based on these relationships, the following variables have been selected to be included in the cross-sectional regression of abnormal returns:

- (1) *Post-deal target ownership*: the percentage the target company owns of the merged company.
- (2) *Ownership concentration*: the percentage of shares owned by the ten largest shareholders out of the total number of shares issues.
- (3) *Board independence*: the percentage of non-executive directors out of the total number directors.
- (4) *Healthcare*: whether or not the company undergoing an inversion is in the healthcare sector.
- (5) *Potential tax savings*: the potential reduction in tax expenditure by removing the double taxation imposed by the U.S. Government. This is a proxy approximated by the value of foreign tax rate differential as reported in the effective tax reconciliation in the companies' annual reports.
- (6) *R&D intensity*: the R&D expenditure over operating cash flow.
- (7) *Price-to-book*: The price-to-book ratio of the company undergoing an inversion two days prior to the announcement.

Thus the cross-sectional regression model is:

$$\widehat{CAR}_{-1,1} = \beta_0 + \beta_1 \cdot TargetOwn_i + \beta_2 \cdot OwnershipConc_i + \beta_3 \cdot BoardInd_i + \beta_4 \cdot Healthcare_i + \beta_5 \cdot TaxSav_i + \beta_6 \cdot RDintensity_i + \beta_7 \cdot PricetoBook_i + \varepsilon_i$$

where,

$TargetOwn_i$ = Post-deal target ownership for each observation, i

$OwnershipConc_i$ = Ownership concentration for each observation, i

$BoardInd_i$ = Board independence for each observation, i

$Healthcare_i$ = Dummy variable taking the value of 1 if it is within the healthcare sector

$TaxSav_i$ = Potential tax savings for each observation, i

$RDintensity_i$ = R&D intensity for each observation, i

$PricetoBook_i$ = Price-to-book-ratio for each observation, i

The statistical tests and interpretations of each variable in the cross-sectional regression are summarized in the Table 4 below. Each of the seven variables are tested against a null hypothesis that the null hypothesis that the variable does not have an impact on the abnormal return of a merger inversion announcement. Thus, if the null hypothesis is rejected, the variable tested has either a positive or a negative effect on the direction and magnitude of the abnormal share price return following a merger inversion announcement

Table 4: Statistical tests and interpretations of the variables included in the cross-section regression

VARIABLE	ALTERNATIVE HYPOTHESIS	ANALYSIS IF NULL HYPOTHESIS IS REJECTED
Post-Deal Target Ownership	$\beta_1 \neq 0$	The variable tested has a positive/negative effect on the direction and magnitude of the abnormal share price return following a merger inversion announcement
Ownership Concentration	$\beta_2 \neq 0$	
Board Independence	$\beta_3 \neq 0$	
Healthcare	$\beta_4 \neq 0$	
Potential Tax Savings	$\beta_5 \neq 0$	
R&D Intensity	$\beta_6 \neq 0$	
Price-to-Book Ratio	$\beta_7 \neq 0$	

Description: This table summarizes the hypotheses for the cross-sectional regression. The alternative hypothesis for each variable is presented along with the analysis if the null hypothesis can be rejected. Post-deal target ownership is the percentage the target company owns of the merged company after the inversion. Ownership concentration is the percentage of shares owned by the ten largest shareholders out of the total number of shares issues. Board Independence is the percentage of non-executive directors out of the total number directors. Healthcare is a dummy variable taking the value of 1 if the transaction is within the healthcare sector, and 0 otherwise. Potential tax savings is a proxy for the potential reduction in tax expenditure by removing the double taxation imposed by the US Government, approximated by the value of foreign tax rate differential as reported in the effective tax reconciliation in the companies' annual reports. R&D intensity is defined as the R&D expenditure over operating cash flow. Price-to-Book of the company undergoing an inversion is calculated as the market value over the book value two days prior to the announcement.

The regression will be corrected for heteroscedasticity. The coefficient of an explanatory variable represents its contribution to CAR. The coefficients of the cross-sectional regression will be tested at 1 percent, 5 percent and 10 percent levels of significance using a double-sided parametric t-test. Thereafter, the results of the cross-sectional regression on the abnormal returns of the merger inversion sample will be analyzed to determine whether or not the variables tested can explain the variation in the observed abnormal returns.

5 DATA - SELECTION, COLLECTION & PROCESSING

The following section provides a description of how data for the merger inversions and the three control samples were selected. Furthermore, the data collection process for both the event study and the cross-sectional regression is described in detail. The descriptive statistics and properties of the data are subsequently addressed. The section ends with a discussion regarding the quality and validity of the data collected.

5.1 DATA SAMPLE SELECTION

This section details the process of selecting the data samples. Initially, the primary data of the merger inversion sample is explained. Thereafter, the control sample data selections are described individually.

5.1.1 MERGER INVERSION SAMPLE SELECTION

The merger inversion sample consists of the 25 inversions that have been completed or announced⁴, via a merger, since the Job Creations Act of 2004, selected using the Bloomberg Professional Service Terminal. All of these were announced between 2010 and 2014. There are five inversions that occurred through a merger prior to 2004. These have not been included in the merger inversion sample because they do not meet the current criteria set out by the IRS and thus do not fulfill the definition of a merger inversion as described in section 2.1. They are not comparable given that the Job Creations Act of 2004, along with its amendments, changed the requirements for how to expatriate.

For the full list of observations, see Appendix 1.

5.1.2 SELECTION OF FIRST CONTROL GROUP - PURE INVERSIONS

As previously addressed, the first control group consists of a sample of pure inversions. The pure inversion control group was, similarly to the merger inversions sample, selected using the Bloomberg Professional Service Terminal. An initial sample of 25 transactions was identified. However, six of these were not considered comparable to the other pure inversions since they occurred after the Job Creations Act of 2004, and expatriated using the substantial business activities exception. These were therefore excluded from the sample, giving a selection of 19 observations. The transactions in the sample took place between 1982 and 2002, and is consistent with that of both Cloyd et al. (2003) and Desai and Hines (2002), enforcing the validity of the sample. Four of these observations, however, presented data loss due to the share price information not being available in Thomson Reuters Datastream, hereafter referred to as Datastream. Consequently, the pure inversion control group consists of a sample of 15 pure inversions.

⁴ i.e. not yet completed but still pending as of September 15th, 2014

5.1.3 SELECTION OF SECOND CONTROL GROUP - CROSS-BORDER ACQUISITIONS

The cross-border acquisitions control group was selected via the database Zephyr. In order to make the control comparable to the merger inversion sample, the control group was selected using the following selection criteria:

Criteria in Zephyr:

(1) Cross border deals: US Acquirer	45,955
(2) Time period: 2010 – current date (completed- confirmed)	3,131
(3) Listed acquirer	1,961
(4) Deal type: Acquisition or Merger	1,691
(5) Percentage of stake: acquired stake 100%	286
(6) Deal value: known	219

These 219 cross-border acquisitions were then filtered in excel, corrected for information leakage, overlapping transactions and missing data, illiquid stock and too few trading days. The selection filtering is shown below.

Filtering in Excel

(7) Information leakage: rumor date = announced date	211
(8) Overlapping transactions	201
(9) Stock price info not available in Datastream	193
(10) Illiquid stock	187
(11) Too few trading days prior to event for estimation window	182

This resulted in a control sample of 182 cross-border acquisitions of 100% where the acquirer is a U.S. listed company.

5.1.4 SELECTION OF THIRD CONTROL GROUP – SIMILAR M&A TRANSACTIONS

The third control group consists of similar M&A deals in terms of size and industry and was selected via the Bloomberg Professional Service Terminal. In order for the control group to be comparable to the merger inversions, the following criteria were used for the selection:

(1) Deal status: completed	433,634
(2) Dates: announced 2010 – 2014	128,155
(3) Deal term: percent sought 100%	71,913
(4) Deal type: M&A	71,886
(5) Public/Private: Public acquirer	38,798
(6) Deal size: USDm 500 – 60,000	1,660

These 1,660 observations were thereafter sorted by industry. The deals relating to the same industry as the merger inversion sample were selected. The industries present and their weight in the merger inversion sample are presented in Appendix 2. The industries were classified according to Bloomberg's Business Intelligence Primary Industry classification.

The observations included in either the merger inversion sample or the cross-border merger sample were removed from the sample. Additionally, deals with too few observations for the estimation window or where there were overlapping deals within the event or estimation window were excluded.

After the above described adjustments, this resulted in the following observations per industry:

Pharmaceuticals:	40
Semiconductors:	13
Cable/Satellite:	10
Specialty chemicals:	8
Insurance:	26
Electrical equipment:	21
Oil drilling:	4
Oil & gas services:	6
Restaurants:	4
Medical devices & equipment	14
Healthcare supply chain:	19
3D printing:	0
Fruit farming:	0

This resulted in a total number of 161 observations in the M&A control sample.

5.2 DATA COLLECTION

This section details the data collection process for both the event study and the cross-sectional regression.

The data collection process for the event study begins with the retrieval of daily returns. The daily closing share prices for each observation have been extracted from Datastream for every trading day over the pre-event window to the post-event window. The extracted share prices from Datastream are those that have been adjusted for corporate actions including dividends, repurchases and stock splits. The daily returns have thereafter been calculated using these retrieved daily closing share prices in accordance with equation 4 as detailed in Section 4.1.1. Similarly, the daily price index for the market index is extracted from Datastream. The market index used for all observations is the MSCI Country Index for the acquirer. The MSCI country indices are value weighted indices of free float-weighted market capitalization returns. The securities included are free float adjusted, classified in accordance with the Global Industry Classification Standard (GICS®), and screened by size, liquidity and minimum free float (MSCI 2014). As such, the

merger inversion sample and the first two control samples all use the MSCI US Index as the market index. It is only for the transactions in the M&A control group where the acquirer was not a U.S. company that another country MSCI Index has been used. Deal-specific information, such as deal value and announcement dates, has been extracted from either Zephyr or Bloomberg depending on where the sample was derived from.

The firm characteristics for the cross-sectional regression on abnormal returns of the merger inversions were collected from the Financial Analysis tabs in the Bloomberg Professional Service Terminal. Where data did not exist or was missing, data was supplemented by company Annual Reports. For both deal-specific information and firm characteristics for the merger inversions, the data was controlled by cross-checking with annual reports and press releases. The data for the control samples was validated by random selection. More details on the validity and quality of data sources are provided in Section 5.4.

5.3 DESCRIPTIVE STATISTICS

This section addresses descriptive statistics and how differences in the firm characteristics included in the samples may impact the observed results of both the event study and the cross-sectional regression. To examine the differences between merger inversions and the control samples, the descriptive transaction characteristics should be documented and compared (Davidson et al 2012). Initially, the data for the merger inversion group is compared and contrasted against the three control groups, and any differences that might influence the results are documented. Thereafter, the descriptive data for the seven variables included in the cross-sectional regression on abnormal returns of the merger inversions sample is described. This is to ensure that there is, in fact, a spread between observations.

5.3.1 DESCRIPTIVE STATISTICS FOR THE FOUR SAMPLES OF THE EVENT STUDY

This section describes the descriptive statistics for the data of the merger inversion sample as well as the three control samples, and documents differences that might influence the results. As discussed in Section 3.3, many studies have documented various characteristics that may influence the impact of an announcement. In order to thoroughly draw conclusions from the control sample comparisons, the descriptive statistics of market capitalization, deal value, price-to-book ratio, and the ratio of market capitalization over deal value of each sample are documented and compared.

Table 5 below summarizes the descriptive data for each sample individually. For the three control samples, a comparison is additionally made to the merger inversion sample.

Table 5: Descriptive statistics for the four samples of the event study

	MARKET CAP (USDm)	P/B (Ratio)	DEAL VALUE (USDm)	RELATIVE DEAL SIZE (Ratio)
MINV				
Median	4139	2.48	5000	0.827
Mean	11540	3.63	9290	0.979
Observations	25	25	23	23
PINV				
Median	1751	1.44	-	-
Mean	2133	0.88	-	-
Observations	15	14	-	-
Difference - median	2387	1.05	-	-
Median multiple (MINV/PINV)	2.36x	1.73x	-	-
CBA				
Median	2064	2.40	56	0.033
Mean	13506	10.52	209	0.092
Observations	182	182	182	182
Difference - median	2075	0.08	4944	0.794
Median multiple (MINV/CBA)	2.01x	1.03x	88.77x	25.15x
CTRL				
Median	11155	2.13	1274	0.149
Mean	113526	2.42	2697	0.369
Observations	160	156	160	160
Difference - median	-7016	0.36	3726	0.679
Median multiple (MINV/CTRL)	0.37x	1.17x	3.92x	5.57x

Description: This table summarizes descriptive data of acquirer market capitalization, deal value, price-to-book ratio, and the relative deal size for each sample. For the three control samples, a comparison is additionally made to the merger inversion sample. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries. Market cap is the market value of equity in USD million two days prior to announcement. P/B represents the price-to-book ratio and is the ratio between the acquirer's market value of equity over book value of equity two days prior to announcement. Deal value is the transaction size in USD million. The relative deal size of the transaction represents the ratio of deal value over market capitalization.

As the above table shows, all the control samples differ from the merger inversions with respect to average market capitalization. The merger inversions have a higher median market capitalization than both the pure inversions and the US cross-border acquisitions, but lower median market capitalization than the M&A control group. With respect to median price-to-book, the merger inversions and the cross-border acquisitions have similar statistics, only differing by 3 percent. Both pure inversions and the M&A control

group exhibit lower median price-to-book than the merger inversion sample, where the merger inversions have 73 percent and 17 percent higher medians respectively.

Pure inversions have no deal value given that these are simply a company inverting with its own subsidiary abroad, and therefore pure inversions and merger inversions are not compared with respect to either deal value or the relative deal size. Merger inversions exhibit higher median deal value and median relative deal size than both the cross border acquisitions and the M&A control group. The merger inversions have nearly 90 times higher median deal value and 25 times higher median relative deal size than that of the cross-border acquisitions control group. The merger inversions exhibit approximately 4 times higher deal value and 5.5 times higher relative deal size than that of the M&A control group.

A control regression is run for each control sample on the basis of the above-mentioned differences. This acts as a robustness test, and aims to check that the difference in observed average abnormal returns between the merger inversions and the control groups are not due to differences in sample characteristics. See Section 7.2.2 for more details and the results of these robustness tests.

5.3.2 DESCRIPTIVE STATISTICS OF THE VARIABLES IN THE CROSS-SECTIONAL REGRESSION

Theoretically, there should be an association between the magnitude of abnormal returns and characteristics specific to the event (MacKinlay 1997), and consequently it is of relevance to analyze whether differences within the selected variables differ between the observations. This section summarizes descriptive data of six explanatory variables of the cross-sectional regression on the merger inversion sample. The healthcare dummy variable is not included as it only has two possible values, 0 or 1. The mean, minimum, median, maximum and standard deviation of each variable is presented in the Table 6 below.

Table 6: Descriptive statistics of the variables in the cross-sectional regression

	Post-deal target ownership (%)	Ownership concentration (%)	Board independence (%)	Potential tax savings (%)	R&D intensity (Ratio)	Price-to-book (Ratio)
Mean	33.78%	48.20%	82.57%	3.89%	-0.09	3.36
Min	20.00%	7.66%	33.33%	-30.00%	-16.46	-18.71
Median	29.00%	44.47%	87.50%	1.60%	0.13	2.48
Max	65.00%	94.61%	100.00%	22.70%	13.16	18.96
Standard deviation	13.18%	16.88%	13.52%	10.89%	4.42	6.39

Description: This table summarizes descriptive data of the explanatory variables of the cross-sectional regression on the merger inversion sample. The mean, minimum, median, maximum and standard deviation are presented. Post-deal target ownership is the percentage the target company owns of the merged company after the inversion. Ownership concentration is the percentage of shares owned by the ten largest shareholders out of the total number of shares issues. Board Independence is the percentage of non-executive directors out of the total number directors. Potential tax savings is a proxy for the potential reduction in tax expenditure by removing the double taxation imposed by the U.S. Government, approximated by the value of foreign tax rate differential as reported in the effective tax reconciliation in the companies' annual reports. R&D Intensity is defined as the R&D expenditure over operating cash flow. Price-to-Book of the company undergoing an inversion is calculated as the market value over the book value two days prior to the announcement.

All six variables in the table above exhibit variation between the observations, and are therefore considered relevant for the cross-sectional regression.

5.4 VALIDITY AND QUALITY OF SOURCES

This section addresses the validity and quality of the sources of data for the event study and the cross-sectional regression on abnormal returns, where both are considered to be high.

The primary sources of data are extracted from either the Zephyr database or the Bloomberg Professional Service Terminal. The data from Zephyr and Bloomberg has thereafter been complemented and validated using secondary sources. These secondary sources consist primarily of publicly available information, including company annual reports and press releases. Financial data in terms of stock market prices, market index and market capitalization and price-to-book has been retrieved from Datastream. The firm characteristics for the merger inversion companies used for the cross-sectional regression were downloaded from Bloomberg Professional Service Terminal's Financial Analysis tab. Where information was missing or not available, data was complemented by company annual reports. All data retrieved has been processed using the statistical software Stata. These steps have been taken to ensure high validity of the data sources.

The overall quality of data sources is deemed high and the potential risk of errors in the data processing is considered to be limited given that Datastream and Bloomberg are frequently used by researchers as data sources for financials. The downloaded data from these sources have thereafter been manually checked for potential errors. Potential areas for errors in the deal data retrieved are the announcement date, deal value and financials of deal participants. These variables have been cross-checked with press releases at announcement, and consequently neither of these sources are considered to contain any of the mentioned potential errors.

6 EMPIRICAL RESULTS

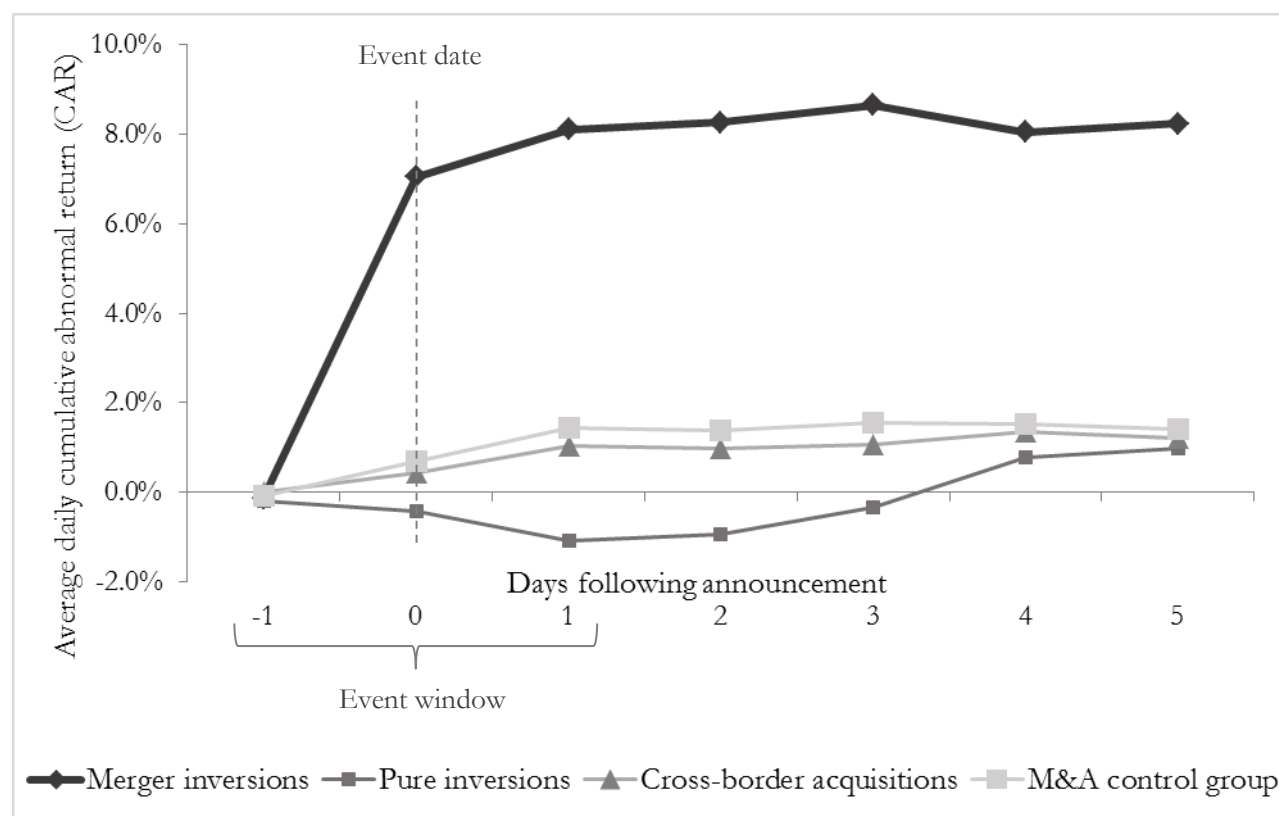
The following section documents the empirical results of the study and is divided into two parts. Initially, the empirical results of the event study are presented through a graphical illustration of cumulative abnormal returns and tables of the results from the parametric and non-parametric statistical tests. Thereafter, the results from the cross-sectional regression on the abnormal returns of the event study are presented.

6.1 EVENT STUDY RESULTS

The event study methodology is used to capture the initial expected shareholder value effects of a merger inversion, measured through average cumulative abnormal returns (CAR) over the event window. Section 4 detailed the specifics of the event study method used in this study.

The average CAR following the merger inversion announcements, as well as that of the three control samples, are illustrated in Graph 1 below. The graph includes the average CAR for the days in the event window as well as up to 5 days after the event date in order to illustrate whether or not the entire effect is incorporated during the event window.

Graph 1: The average daily cumulative abnormal return surrounding the event date



Positive cumulative abnormal returns are observed for merger inversion announcements from the event date and onwards. The CAR increases from one day prior to the inversion announcement until one day past the inversion announcement. Thereafter, the CAR remains relatively stable, indicating that investors

reacted positively to the merger inversion announcement, and that the reaction was captured over the event window. The CARs following announcements in the three control groups - pure inversions, US 100% cross-border acquisitions and the M&A control group of similar deals in terms of size and industries - are different to that of merger inversions. The CAR for pure inversions differs to merger inversions with regards to both magnitude and direction. The other two control groups differ in terms of magnitude. Thus the graphical illustration above suggests that there is a difference between investors' initial expectations of shareholder value effects following merger inversions and pure inversions, as well as between merger inversions and other M&A transactions. Although the reaction for merger inversion announcements seems clear based on Graph 1, there is a risk that the abnormal return is unrelated to the specific event. Therefore, a graph illustrating the abnormal returns of the merger inversion sample over an extended time period is presented and discussed in Section 7.2.4 as a robustness test.

6.1.1 STATISTICAL PARAMETRIC TEST RESULTS

The statistical parametric test results are reported in Table 7 where the estimated average CAR is reported in four columns. In the first column, average CAR is estimated for the sample of merger inversions alone. In the second to fourth column, average CAR of merger inversions is included along with one of the control groups (one in each column). The estimated average CAR for the control groups is reported on the first row and the estimated difference in average CAR between merger inversion announcements and the control groups are reported on the fourth row. The P-value is reported below each estimated average CAR along with the corresponding test statistic. *, ** and *** denote statistical significance at the 10, 5 and 1 percent levels respectively. Lastly, the number of observations included in the test is reported.

Table 7: Statistical parametric test results of cumulative abnormal returns

	STATISTICAL TEST			
	(1) MINV	(2) MINV vs PINV	(3) MINV vs CBA	(4) MINV vs CTRL
Average CAR	0.081***	-0.011	0.010**	0.015***
P-value	0.009	0.432	0.022	0.002
t-statistic	2.83	-0.79	2.31	3.11
Diff average CAR: MINV - control	-	0.092***	0.071**	0.066**
P-value	-	0.006	0.014	0.022
t-statistic	-	2.88	2.47	2.31
Number of observations	25	40	207	186

Description: This table summarizes the results of a t-test of the estimated cumulative abnormal return (CAR) following announcements of a merger inversion and the three control samples. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries. The first column contains statistics for the sample of merger inversions. The second, third and fourth columns report statistics on the control samples and reports the difference of cumulated abnormal return between merger inversions and the control sample respectively. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels respectively.

The findings from the CAR graph are confirmed in the statistical parametric tests. CAR estimated on a window of three days is positive and significant at the 1 percent level using a two tailed test. Thus the t-test suggests that the null hypothesis can be rejected and that CAR for merger inversions is statistically

different from zero. The t-test also shows that the estimated CAR over a three day event window is 9.2 percentage points higher for merger inversions compared to pure inversions, and is significant at a 1 percent significance level using a two tailed test. The estimated CAR following a merger inversion announcement is also statistically larger than the sample of U.S. 100% cross-border acquisitions and the M&A control group of similar deals in terms of size and industry at a 5 percent level, with a difference of 7.1 and 6.6 percentage points respectively. Thus the null hypotheses that there is no difference in average cumulative abnormal returns between merger inversions and the three control groups can be rejected, and data suggests that the CAR for merger inversions is higher than for the control groups.

6.1.2 STATISTICAL NON-PARAMETRIC TEST RESULTS

This section documents the results of the non-parametric statistical tests. It is determined that the results of the non-parametric tests support the results of the parametric t-test. The four non-parametric tests used in this study were explained in detail in Section 4.2.6. The Sign test and the Wilcoxon signed-rank test were conducted to test if the average of cumulated abnormal return of merger inversions is statistically different from zero. The Mann-Whitney *U* test and the Median test were conducted to test if the average cumulated abnormal return of merger inversions is statistically different from the three control samples. The results of the non-parametric tests are reported in Table 8 below.

Table 8: Results of the non-parametric tests

NON-PARAMETRIC TEST	TEST STATISTICS AND PROBABILITIES	STATISTICAL TEST			
		(1) MINV	(2) MINV vs PINV	(3) MINV vs CBA	(4) MINV vs CTRL
Sign test	P-value (+)	0.007***	-	-	-
	P-value (-)	0.998	-	-	-
	P-value (\pm)	0.015**	-	-	-
Wilcoxon Signed-Rank test	z-statistic	2.700***	-	-	-
	p-value	0.007	-	-	-
Mann-Whitney <i>U</i> test	z-statistic	-	-2.808***	-3.137***	-2.889***
	P-value	-	0.005	0.002	0.004
Median test	chi-squared statistic	-	12.907***	5.627**	3.743*
	P-value	-	0.000	0.018	0.053
	continuity corrected	-	10.667***	4.660**	2.958*
	P-value	-	0.001	0.031	0.085

Description: This table summarizes the results of four non-parametric tests of the estimated cumulative abnormal return (CAR) following announcements of a merger inversion and the three control samples. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries. The first column contains statistics for the sample of merger inversions. The second, third and fourth columns report statistics on the difference in average CAR between merger inversions and the control samples respectively. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels respectively.

The Sign test suggests that CAR for merger inversions estimated on a window of three days is positive and significant at the 1 percent level. Similarly, the Wilcoxon Signed-rank test indicates that CAR is greater than zero at a 1 percent level of significance.

The Mann-Whitney *U* test and the Median test also validate the results of the parametric t-test. The Mann-Whitney *U* test shows that the estimated CAR for merger inversions is different from the three control samples at a 1 percent level. The Median test also indicates that the estimated CAR for merger inversions differs from the three control samples. However, the significance levels are different from that of the Mann-Whitney *U* test. The results of the Median test are significant at the 1 percent level for pure inversions, significant at the 5 percent level for cross-border acquisitions and significant at the 10 percent level for the M&A control group.

In sum, the non-parametric tests support the results of the parametric t-test across all four tests. Based on the statistical tests, the null hypotheses can be rejected for all four tests. The average of cumulated abnormal return of merger inversions is statistically different from zero. Additionally, the difference in average of cumulated abnormal return of merger inversions and each of the control samples are found to be statistically different from zero.

Consequently, the three-day average CAR for merger inversions of approximately 8.1 percent is statistically significant. Assuming the average market capitalization of USD 11,540 million⁵, the 8.1 percent return represents an increased market value of USD 935 million in three days surrounding the announcement. This implies an average 10 percent return on investment, calculated by dividing the average increased market value by the average deal value of USD 9,290 million. Therefore, the average CAR for merger inversions is also considered to be economically significant.

6.1.3 PRESENCE OF OUTLIERS

The purpose of this section is to identify potential outliers in the observed cumulative abnormal returns in the event study. In this thesis, an outlier is defined as observations greater than two standard deviations from the mean. Table 9 on the following page summarizes the descriptive statistics for the average cumulative abnormal returns of the four samples. The mean, maximum, minimum and standard deviations are presented along with the calculated outlier limits and number of outliers observed in the samples.

⁵ As stated in Table 5 of Section 5.3.1

Table 9: Descriptive statistics and outliers

DESCRIPTIVE STATISTICS AND OUTLIERS	SAMPLES			
	MINV	PINV	CBA	CTRL
Mean	0.081	-0.011	0.010	0.015
Max	0.430	0.124	0.417	0.259
Min	-0.270	-0.083	-0.182	-0.219
Standard deviation	0.143	0.052	0.061	0.060
Observations	25	15	182	161
Positive outlier limit	0.367	0.094	0.132	0.134
Negative outlier limit	-0.205	-0.115	-0.111	-0.105
No. positive outliers	1	1	5	5
No. negative outliers	1	0	2	5

Description: This table summarizes descriptive statistics and outlier statistics of the estimated cumulative abnormal returns following the announcement of merger inversions and the three control groups. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries. Outliers are defined as cumulative abnormal returns greater than two standard deviations from the mean. The statistics are reported for each of the sample groups separately, one group per column. The mean, maximum, minimum and standard deviation of the cumulative abnormal returns is documented in the first four rows. Thereafter, statistics for the outliers are presented. The number of positive and negative outliers present in the samples, based on the outlier limits, are lastly presented.

Both positive and negative statistical outliers are exhibited in Table 6 above. There are two identified outliers for the merger inversions. The highest cumulative abnormal return (CAR) observed is 43 percent, which is 2.5 standard deviations from the mean. The lowest CAR is -27 percent, which is 2.5 standard deviations from the mean. A robustness test is conducted by running the regressions without these outliers in order to determine whether the observed results are influenced by the presence of outliers. The same was done for the identified outliers for the three control samples. It was determined that the outliers did not have an impact. Therefore, with regards to the presence of outliers, the event study results presented in the following section are robust. See Section 7.2.3 for more details and the analysis of this robustness test.

6.2 CROSS-SECTIONAL REGRESSION ON ABNORMAL RETURNS

In the Section 4.3 it was explained that the cumulative average performance over many firms may hide substantial cross-sectional differences, and that therefore it was of relevance to perform a cross-sectional regression on the observed abnormal returns. After documenting the results of the event study, it is apparent that this holds true for the merger inversion sample investigated, where variation between the independent abnormal returns for each firm exists. Similarly, Table 6 in Section 5.3.2 indicated that there was a variation in each of the firm characteristics. This section provides the results of the cross-sectional regression, and determines whether the differences in characteristics between the observations can explain the differences in abnormal returns.

The abnormal returns for each observation in the sample are documented in Appendix 1.

Running the cross-sectional regression resulted in the following model:

$$\widehat{CAR}_{-1,1} = -0.598 + 0.007 \cdot TargetOwn_i + 0.004 \cdot OwnershipConc_i + 0.003 \cdot BoardInd_i + 0.134 \cdot Healthcare_i + 0.003 \cdot TaxSav_i + 0.010 \cdot RDintensity_i - 0.005 \cdot PricetoBook_i$$

where,

$TargetOwn_i$ = Post-deal target ownership for each observation, i

$OwnershipConc_i$ = Ownership concentration for each observation, i

$BoardInd_i$ = Board Independence for each observation, i

$Healthcare_i$ = Dummy variable taking the value of 1 if it is within the healthcare sector

$TaxSav_i$ = Potential tax savings for each observation, i

$RDintensity_i$ = R&D Intensity for each observation, i

$PricetoBook_i$ = Price-to-Book-ratio for each observation, i

The results of the cross-sectional regression on the abnormal returns, including coefficients, their significance levels and test statistics are summarized in Table 10 below.

Table 10: Statistical results of the cross-sectional regression

REGRESSION RESULTS	Coefficient	P-value	t-statistic
Intercept	-0.598***	0.000	-4.75
Post-deal target ownership	0.007***	0.000	4.51
Ownership concentration	0.004***	0.000	6.11
Board independence	0.003*	0.099	1.75
Healthcare	0.134***	0.002	3.73
Potential tax savings	0.003**	0.046	2.15
R&D intensity	0.010**	0.044	2.17
Price-to-book ratio	-0.005***	0.006	-3.12
Number of observations	25		
R-squared	0.7199		
Adjusted R-squared	0.6045		

Description: This table summarizes the cross-sectional regression results of the three day cumulative abnormal returns around a merger inversion announcement on seven explanatory variables. The coefficients, P-value and t-statistics are presented. Intercept is the average value of CAR excluding the other variables expressed in percentage. The coefficients of the explanatory variables represent its average contribution to CAR. Post-deal target ownership is the percentage the target company owns of the merged company after the inversion. Ownership concentration is the percentage of shares owned by the ten largest shareholders out of the total number of shares issues. Board Independence is the percentage of non-executive directors out of the total number directors. Healthcare is a dummy variable taking the value of 1 if the transaction is within the healthcare sector and 0 otherwise. Potential Tax Savings is a proxy for the potential reduction in tax expenditure by removing the double taxation imposed by the U.S. Government, approximated by the value of foreign tax rate differential as reported in the effective tax reconciliation in the companies' annual reports. R&D Intensity is defined as the R&D expenditure over operating cash flow. Price-to-Book of the company undergoing an inversion is calculated as the market value over the book value two days prior to the announcement. R-squared is the proportion of total variation of outcomes explained by the model. Adjusted R-squared is a modification of R-squared that adjusts for the number of variables included in the regression model. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and ***denote statistical significance at the 10%, 5% and 1% levels respectively.

Table 10 above reports significant coefficients for all the explanatory variables in the cross-sectional regression of the three-day cumulative abnormal returns on the merger inversions.

The *Post-Deal Target Ownership*, i.e. what percentage the target company owns of the merged company, is found to have a positive, significant coefficient of 0.7 percentage points. *Ownership Concentration*, i.e. the percentage of non-executive directors out of the total number directors, is found to have a positive, significant coefficient of 0.5 percentage points. *Board Independence*, defined as the percentage of non-executive directors out of the total number directors has a positive, significant coefficient of 0.3 percentage points. *Healthcare*, the dummy variable for whether or not the company undergoing an inversion is in the healthcare sector, has a positive, significant coefficient of 13.4 percentage points. The *Potential Tax Savings*, approximated by the foreign tax rate differential, is found to have a positive, significant coefficient of 0.3 percentage points. *R&D Intensity*, defined as the R&D expenditure over operating cash flow, has a positive, significant coefficient of 1.0 percentage points. Finally, the *Price-to-Book* of the company undergoing an inversion two days prior to the announcement is found to have a negative, significant coefficient of 0.5 percentage points.

The coefficients of *Post-Deal Target Ownership*, *Ownership Concentration*, *Healthcare* and *Price-to-Book Ratio* are significant at a 1 percent significance level. The coefficients of *Potential Tax Savings* and *R&D Intensity* are significant at the 5 percent significance level, and the coefficient of *Board Independence* is significant at a 10 percent level.

These variables explain approximately 60% of the variation in cumulative abnormal returns over the three-day event window according to the Adjusted R-Squared, which is a measure of the proportion of total variation of outcomes explained by the model.

The results of both the event study and the cross-sectional regression are analyzed in the following section.

7 ANALYSIS

The previous section presented the empirical results. The following section consists of the empirical analysis which aims at answering the research question. The analysis is structured in four main sections: summary of results and interpretations, robustness tests, analysis of the cross-sectional regression and lastly, an extension to the interpretations of the event study. Thereafter, an overall summary is provided.

7.1 SUMMARY OF RESULTS AND ANALYSIS

The event study, using a three-day event window and the market model for estimating normal returns, suggests a statistically significant positive cumulative abnormal return at the announcement of merger inversions. Additionally, significant explanatory variables were found via a cross-sectional regression to explain the variance observed in the abnormal returns of the merger inversions. Statistically significant abnormal return differences are found between announcement of merger inversions and all three control samples. Table 11 below summarizes the results of this study. Thereafter, these results are analyzed.

Table 11: Summary of the empirical findings of the event study and the cross-sectional regression

EVENT STUDY	Average CAR	P-value	t-statistic
MINV	8.1%	0.009	2.83
MINV - PINV	9.2%	0.006	2.88
MINV - CBA	7.1%	0.014	2.47
MINV - CTRL	6.6%	0.022	2.31
CROSS-SECTIONAL REGRESSION	Average contribution to CAR	P-value	t-statistic
Post-deal target ownership	0.7%	0.000	4.51
Ownership concentration	0.4%	0.000	6.11
Board independence	0.3%	0.099	1.75
Healthcare	13.4%	0.002	3.73
Potential tax savings	0.3%	0.046	2.15
R&D intensity	1.0%	0.044	2.17
Price-to-book ratio	-0.5%	0.006	-3.12

Description: This table summarizes the empirical finding of this study. First, the results of the event study are presented. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents the control group of cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries. The first row presents the average CAR of merger inversions alone. The second to fourth row presents the difference in average CAR between announcements of merger inversions and the control groups. The second part of the table summarizes the cross-sectional regression results of the three day cumulative abnormal returns around a merger inversion announcement. The average contribution to average CAR is presented for each explanatory variable. Post-deal target ownership is the percentage the target company owns of the merged company after the inversion. Ownership concentration is the percentage of shares owned by the ten largest shareholders out of the total number of shares issues. Board Independence is the percentage of non-executive directors out of the total number directors. Healthcare is a dummy variable taking the value of 1 if the transaction is within the healthcare sector and 0 otherwise. Potential tax savings is a proxy for the potential reduction in tax expenditure, approximated by the value of foreign tax rate differential as reported in the effective tax reconciliation in the companies' annual reports. R&D Intensity is defined as the R&D expenditure over operating cash flow. Price-to-Book of the company undergoing an inversion is calculated as the market value over the book value two days prior to the announcement.

These results are interpreted to conclude that announcements of merger inversions are associated with investor expectations of shareholder value creation. Based on the patterns identified in Graph 1, shareholders seem to incorporate their expectations of shareholder value creation within the three days surrounding the event. Furthermore, results following the event study can be interpreted as shareholders having greater initial expectations of value creation following merger inversions than all three control samples. Investors expect greater shareholder value effects following the announcement of merger inversions than pure inversions. Also, it can be interpreted that investor expectations of value creation are greater for the announcement of merger inversions than the announcement of U.S. acquirers undergoing a 100% cross-border acquisitions without an inversion. Additionally, the same can be seen for the third control sample where initial shareholder expectations of value creation are greater for merger inversions than for M&A deals similar in size and industry that do not involve an inversion.

The results of the cross-sectional regression indicate that the magnitude of the stock price increase of a merger inversion announcement is more pronounced when the post-target deal ownership, the ownership concentration, the board independence, the potential tax savings and the R&D intensity are high. However, the results indicated that the lower the price-to-book, the higher the magnitude of the stock price increase at the announcement. Additionally it was found that a company within the healthcare sector reacts more positively to a merger inversion announcement than a company in another industry.

The results of the event study, as has been touched upon during the methodology and data collection section, might be sensitive to data sample characteristics and influenced by assumptions and methodological choices. Therefore, prior to analyzing the data further and drawing corresponding conclusions, robustness tests are performed. The results of the robustness tests are described in the following section. Thereafter, the results of the cross-sectional regression are analyzed in more detail in Section 7.3. Section 7.4 provides an extension to the interpretations of the results of the event study. Lastly, Section 7.5 summarizes the overall interpretations of the study based on the results and corresponding analysis.

7.2 ROBUSTNESS TESTS

Potential sensitivities in the results have been highlighted in both the descriptive statistics and empirical results presented previously. This section presents the results and analysis of the robustness tests performed to control for these sensitivities. To summarize, in Section 4.1.4, it was established that non-parametric tests do not make assumptions about a specific distribution and consequently can act as a safeguard against drawing wrongful conclusions. Additionally, in Section 5.3, it was determined that the results of the difference in cumulative abnormal returns might be sensitive to the identified differences between the samples. The differences investigated were market capitalization, deal value, relative deal size and the price-to-book ratios. Thereafter, the potential impact on the presence of outliers in the samples as well as risk of fluctuations in daily abnormal returns surrounding the event was discussed in Section 6.1.

Two additional sensitivities that have not been highlighted previously in this paper are also checked for using robustness tests. The first is that the observed results may be influenced by the three-day event window, i.e. that the average cumulative abnormal returns were measured over three days surrounding the announcement, and not just the event date. Lastly, the M&A control group includes observations where the acquirer is not a U.S. listed company, implying a risk that the results of comparing merger inversions to that control group may be dependent on differences in geography.

The results are analyzed to check that the above described potential sensitivities have not impacted the results of the event study. Table 11 below summarizes the setup and methodology of conducting these robustness tests and the subsequent results. The table summarizes the potential sensitivities that were tested along with the method used and the rationale for the test, as well as presents the results of these robustness tests.

Table 12: Robustness tests and results

SENSITIVITY	ROBUSTNESS TEST	REASON FOR TEST	RESULT			
			MINV	MINV - PINV	MINV - CBA	MINV - CTRL
Parametric assumptions	Non-parametric tests	Non-normality assumption may not hold	ROBUST	ROBUST	ROBUST	ROBUST
Size and valuation differences between samples	Regression of cumulative abnormal returns on control factors	Differences between samples might lead to biased results	-	ROBUST	NOT ROBUST	ROBUST
Presence of outliers	Regressions run excluding outliers	Results might be driven by outliers	ROBUST	ROBUST	ROBUST	ROBUST
Event window consisting only of the announcement day	Regression of abnormal returns over a one-day event window	Results might be due to abnormal returns being aggregated over several days	ROBUST	ROBUST	ROBUST	ROBUST
Fluctuations in abnormal returns surrounding the event	Graphical illustration of the daily abnormal return before and after the event window	The observed abnormal return might not be due to the event	ROBUST	-	-	-
Acquirer country	Regressions excluding observations where the acquirer is not a U.S. listed company	Differences between MINV and CTRL could be due to geographical reasons	-	-	-	ROBUST

Description: The results of the findings of the robustness tests are summarized. The sensitivities tested for are presented in the first column. In the second column, the robustness test for each of the sensitivities is described. A short motivation for the robustness test and how it might impact the results are provided in the third column. The remaining four columns presents the findings from the robustness tests for the merger inversion sample independently as well as the differences between the merger inversions and each control sample. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries.

The details surrounding each of these robustness tests are described in the following sections.

7.2.1 NON-PARAMETRIC TESTING

When dealing with the potential problem of violated assumptions, the use of both parametric and non-parametric test allows the researcher to check the robustness of the parametric test. Given the small sample size, non-parametric tests were performed to test the robustness of the parametric t-tests. As stated in Section 6.1.2, the non-parametric tests support the results of the parametric t-test. As such, the results of the parametric t-test are determined to be robust.

The details of the four non-parametric tests were described in Table 8 of Section 6.

7.2.2 REGRESSION CONTROLLING FOR DIFFERENCES IN FIRM CHARACTERISTICS

In the presence of firm characteristic differences between the samples, a control scenario regression can be used to test relevant features of the stock to test that they do not impact the event. It is only of relevance to control for characteristics that are different. These were identified previously in Section 5.3. Consequently, the variables controlled for will differ for each of the regressions for the pure inversions sample, the cross-border acquisitions sample, and the similar M&A control sample respectively. Each control sample is regressed against the merger inversion sample. The details surrounding each regression and the corresponding results are found in Appendix 3, and Appendix 4 and Appendix 5.

The robustness test for the comparison between merger inversions and pure inversions is performed using a regression of cumulative abnormal return on market capitalization in USD million and price-to-book ratio as control variables. Results of the difference in abnormal returns between merger inversions and pure inversions are considered to be robust with regards to market capitalization of acquirer and price-to-book ratio. The difference is found to be statistically significant in all specifications for the event study and thus the results are found to be robust. The interpretation of the results from the main study remains.

The robustness test for the comparison between merger inversions and U.S. 100% cross-border acquisitions is done using a regression of cumulative abnormal return on market capitalization of acquirer in USD million, deal value in USD million, and relative deal value (deal value/market capitalization of acquirer) as control variables. Table 5 in Section 5.3.1 identified that there was no difference in the price-to-book ratios of the two samples. Therefore, there was no need to control for this factor in the control regression. Results of the difference in abnormal returns between merger inversions and the sample of cross-border acquisitions are considered robust with regards to the market capitalization of the acquirer and the deal value. However, the difference is found to be statistically non-significant with regards to relative deal value. This implies that the difference in cumulative abnormal returns identified in section 6.1 is due to differences in relative deal size between the two samples.

The robustness test for the comparison between merger inversions and the M&A control group is done using a regression of cumulative abnormal return on market capitalization in USD million and price-to-book ratio as control variables. Results of the difference in abnormal returns between merger inversions and pure inversions are considered robust with regards to market capitalization, deal value, relative deal size and price-to-book ratio. The difference is found to be statistically significant in all specifications for the event study and thus the results are found to be robust. The interpretation of the results from the main study remains.

7.2.3 OUTLIERS

Statistical outliers were identified in section 6.1.3. As outliers have the potential to make the result dependent on a few observations, the t-test of this study was redone excluding the observations with a cumulative abnormal return greater than two standard deviations from the mean. As can be seen in Appendix 6, the results of the seventh study were found to be robust when excluding outliers. The interpretation of results remains following robustness tests of outliers.

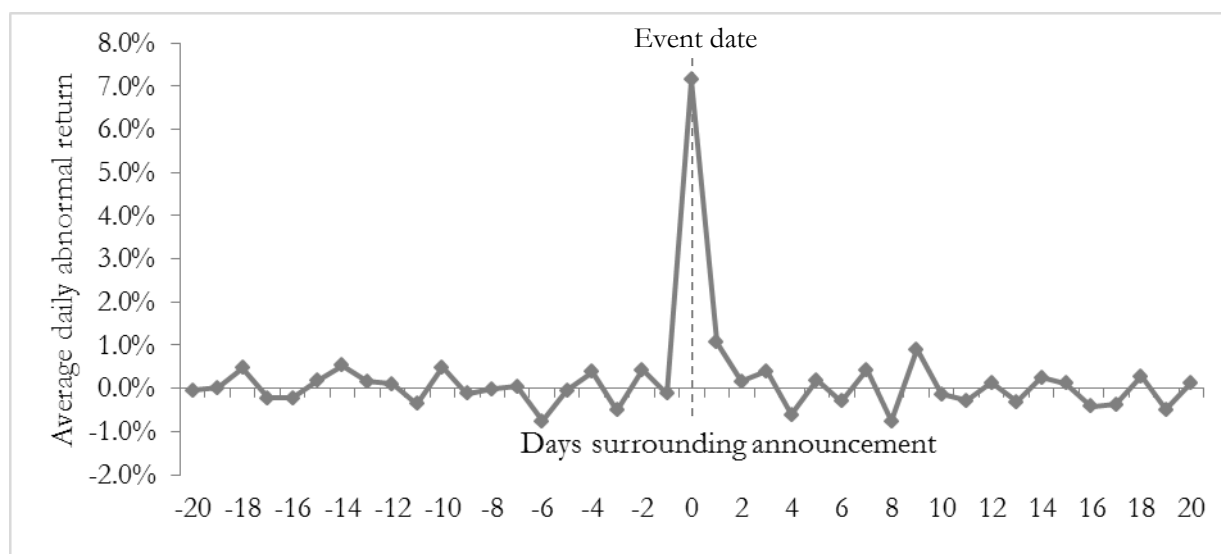
7.2.4 NARROWING THE EVENT WINDOW

The observed results could be due to the fact that the average cumulative abnormal returns are measured over three days surrounding the announcement, and not just the event date, since a wider event window can increase the significance of the results. To evaluate the robustness of the results, a narrower event window consisting of only the event day was considered. The results of the event studies of all four samples are documented in Appendix 7. The results show that the narrowing of the event window does not affect the main interpretations, and the results are robust across all four tests.

7.2.5 FLUCTUATIONS IN ABNORMAL RETURNS

In Section 6.1 it was identified that there was a need for studying abnormal returns over an extended period of time. Although the statistical tests have provided the abnormal returns found over the event window, they do not capture any potential disturbance before or after the event window. This can be observed by a graphical illustration of the abnormal returns over a longer period of time. Graph 2 below illustrates the daily abnormal returns 20 days before and 20 days after the announcement, and allows for the abnormal returns prior to and after the event window to be analyzed. If one can observe similar abnormal returns of the same magnitude either before or after the event window, it may be the case that the reactions over the event window are unrelated to the specific event.

Graph 2: Average daily abnormal returns of the merger inversion from day -20 to day +20 surrounding the announcement.



A sharp positive abnormal share price return peak is observed at the announcement date for merger inversions. The average abnormal share price return fluctuates slightly throughout the twenty days prior to and the twenty days after the announcement, indicating a variance in the sample of abnormal returns. The presence of variance may indicate that there is a potential risk that the return peak at the announcement day may not be fully attributable to the event. However, none of the fluctuations prior to or after the event is of the same or similar magnitude as the peak in abnormal returns observed over the event window on the event day. Thereby, the pattern of abnormal returns illustrated in Graph 2 does not imply that the observed average abnormal returns are unrelated to the merger inversion announcement. Thus, the interpretation of the results from the event study remains.

7.2.6 REMOVING ALL NON-US ACQUIRING COMPANIES IN THE M&A CONTROL GROUP SAMPLE

The M&A control group includes observations where the acquirer is not a U.S. listed company, implying a risk that the results comparing merger inversions to that control group may be dependent on differences in geography. In order to test whether the results are dependent on the non-U.S. firms, a t-test was performed including only the acquirers listed in the U.S. (reported in Appendix 8).

The results were found to be robust when only including U.S. acquirers - the MINV dummy variable is still significant at a 1 percent level. The interpretation of the results of the difference between merger inversions and the M&A control group therefore remains.

7.2.7 CONCLUSIONS OF ROBUSTNESS TESTS

In general, the results are robust and the interpretations from Section 7.1 remain the same. The one exception to this is with regards to the difference in average CAR between the merger inversions and the sample of cross-border acquisitions. This difference may be explained by the difference in relative deal size. When the event window is narrowed to only include the announcement day, the difference between merger inversions and the sample of cross-border acquisitions remains significant. However, the cumulative abnormal returns of the cross-border acquisitions on a stand-alone basis are no longer significant. Therefore, it can be interpreted that the deal size of the cross-border acquisitions sample is on average too small to have an impact on share prices. The magnitude and direction of initial shareholder expectations of merger inversions is robust across all robustness tests, as well as the difference in expectations between merger inversions and pure inversions and the M&A control group respectively.

7.3 CROSS-SECTIONAL REGRESSION ON ABNORMAL RETURNS

This paper finds evidence consistent with the theory described in Section 3.3. The magnitude of the stock price increase is more pronounced (a) the higher the post-target deal ownership, (b) the higher ownership concentration, (c) the greater the board independence, (d) if the company is within the healthcare sector, (e) the greater the potential tax savings, (f) the higher the R&D intensity, and (g) the lower the valuation of the company (in terms of price-to-book ratio). These seven variables are found to explain 60 percent of

the variation in cumulative abnormal returns observed over the three-day event window surrounding the announcement of the 25 merger inversions.

A one percentage point increase in post-deal target ownership leads to a 0.7 percentage point increase in abnormal share price returns. This means that, on average, a post-deal target ownership of 30 percent implies a 7 percentage point greater reaction compared to a 20 percent target ownership. This is in line with existing theory, which finds that the larger the target is compared to the acquirer, the greater the shareholder value effects. In addition to this reasoning, another explanation can be found in the U.S. tax laws. U.S. tax laws require more than 20 percent of the combined company to be owned by target shareholders in order to avoid U.S. taxes on foreign earnings. The greater the post-deal target ownership, the greater is the likelihood that the IRS accepts the firm as being expatriated for tax purposes.

The regression contains two variables representing corporate governance - ownership concentration and board independence. Ownership concentration is expressed as the total percentage of shares owned by the ten largest shareholders. Board independence is the percentage of non-executive directors to executives in the Board of Directors. A one-percentage point increase in ownership concentration leads to a 0.5 percentage point increase in CAR, and a one-percentage point increase in board independence leads to a 0.3 percentage point increase. Thus, both of the corporate governance variables have a positive correlation to cumulative abnormal returns, which is in line with previous research.

A merger inversion within the healthcare sector has on average a 13.4 percentage point greater cumulative abnormal returns upon announcement compared to inversions within other industry sectors. This variable has the largest economic significance out of all the tested variables. Thus, it can be determined that shareholders within the healthcare industry value inversions higher than shareholders in other industries.

Additionally, the results for the variables *Potential Tax Savings*, *R&D Intensity* and *Price-to-Book Ratio* are in line with the theory presented in Section 3.3. A one-percentage point increase in potential tax savings leads to a 0.3 percentage point increase in cumulative abnormal returns. A one-unit increase in R&D Intensity leads to a one-percentage point increase in cumulative abnormal returns. A one-unit increase in Price-to-Book Ratio leads to a 0.5 percentage point decrease in abnormal share price return. The effects on CAR of adding one explanatory variable at a time to the regression can be found in Appendix 9.

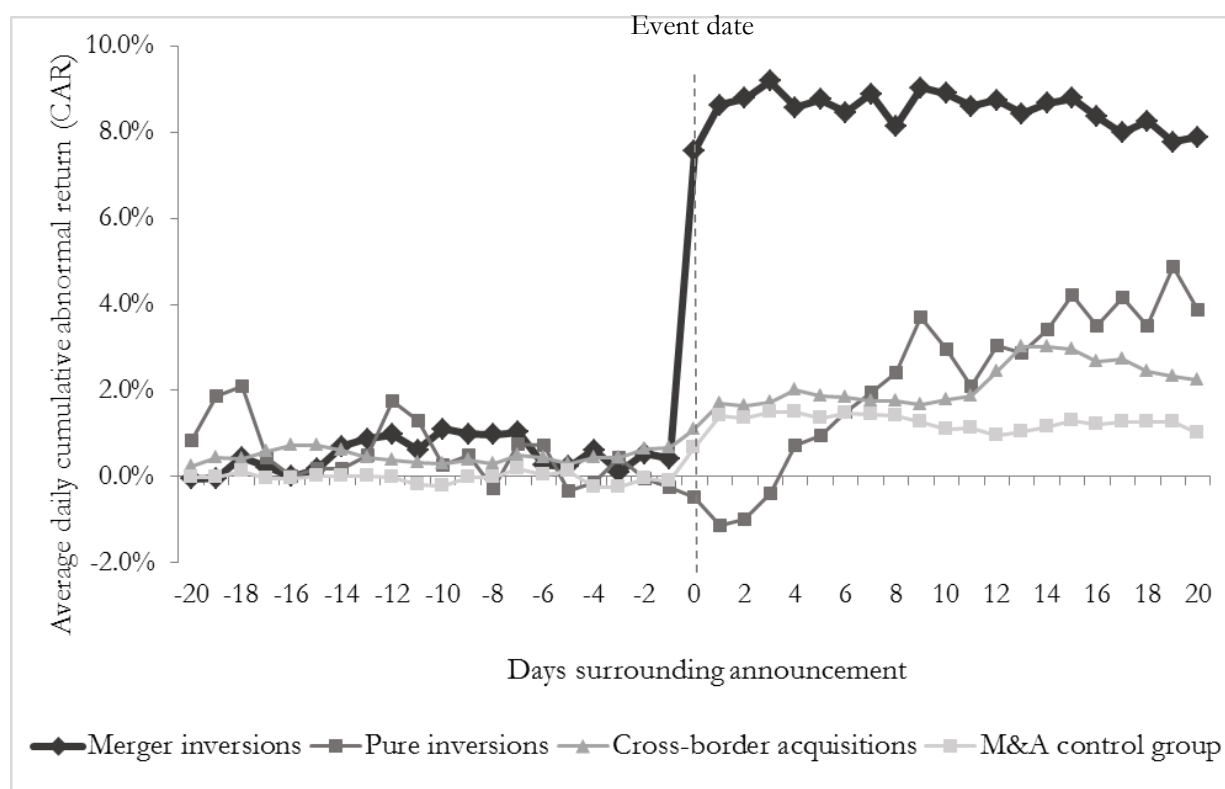
One must be careful when interpreting results from a cross-sectional regression following an event study (Campbell et al. 1997). Due to the small sample size, this regression aims at explaining the differences in the firm characteristics present in the 25 observations of merger inversions and whether or not these can explain the spread in abnormal returns observed, rather than predicting abnormal returns of future inversions.

7.4 EXTENSION TO INTERPRETATIONS OF THE RESULTS AND ANALYSIS

Under the assumption of semi-strong market efficiency, the results indicate that merger inversions have a higher shareholder value effect than do pure inversions as well as other acquisitions (both cross-border as well as M&A deals in similar industries), as described in Section 7.1. Disregarding assumptions of market efficiency, the event study shows the shareholders' initial expectations of shareholder value effects. As described in Section 3.2, the market is efficient in the semi-strong form if stock prices respond immediately and correctly (in both magnitude and direction) on the announcement of new, publicly available information. While the aim of this thesis is not to determine whether or not the market is efficient, it is still worth commenting on briefly in order to extend the interpretations to the results.

The analysis of the results is extended to graph the cumulative abnormal returns (CAR) over a longer period, including both a pre-event window and a post-event window. This is presented in Graph 3 on the following page.

Graph 3: Average daily abnormal cumulative returns 20 days before and 20 days following the event date for the merger inversions and the three control groups



As can be observed in the above graph, neither the merger inversions nor the M&A control group of similar transactions exhibit a drift in abnormal share price returns after the announcement. The sample of U.S. cross-border acquisitions shows a slight positive drift around day 10 after the announcement, while the average CAR of pure inversions has a steady positive drift directly following the announcement.

These drifts and lack of drifts allows us to discuss the possible economic interpretations over a longer perspective than the three-day event window. The merger inversions are compared to each of the control samples individually below.

Comparing merger inversions to pure inversions, the first interpretation of the results is that shareholders value inversions by way of merger higher than a pure inversion. This interpretation makes economic sense since the merger inversions are not only a form of tax inversion, but have the added benefit of being a business combination with possible additional synergies than solely tax savings. As can be seen from the above graph, the merger inversion CAR following the announcement remains relatively stable, whereas a strong positive drift can be seen following the pure inversion announcement. Consequently, the gap between cumulative abnormal returns of a merger inversion announcement and pure inversion announcement decreases over the twenty days following the announcement. This delayed response could be interpreted to signal that the market underreacted to the pure inversions announcement and that the market was not semi-strong efficient. This in turn implies that the difference in shareholder expectations may be a result of differences in market efficiency rather than of differences in value creation.

Another possible interpretation is that the market is semi-strong efficient, and that there are other factors present which can explain the drift. When it comes to comparing the differences in results between merger inversions and pure inversions, there is an added complexity of different time periods. The pure inversions took place between 1982 and 2002, whereas the merger inversions occurred between 2010 and 2014. One must be aware that the market may have changed between these periods of time. A potential explanation to the drift is that it took longer time for the information to become publicly available (e.g. due to differences in technology and accessibility to information) for the pure inversion announcements and therefore the reaction was delayed. Thus, there are several interpretations that can be drawn. Either the market values an announcement of a merger inversion but does not care about the announcement of a pure inversion, or the market was simply inefficient at the time of the pure inversions, which is why no impact was observed at the announcement date for these transactions.

A slight drift is observed for the cross-border acquisitions control group around day 10, but there is not enough information to make any conclusions regarding the reasons behind this slight drift, or make interpretations concerning market efficiency. However, given that the drift stabilizes shortly thereafter, it can be assumed that this drift does not impact the interpretations of the results. Based on the patterns identified, investors seem to incorporate their expectations of shareholder value creation within the three days surrounding the announcement. The results following the event study are therefore interpreted the same as in Section 7.1, where evidence shows that investors have greater initial expectations of value creation following merger inversions than other cross-border acquisitions. Robustness tests in Section 7.2.2, however, showed that this difference may rather be explained by the difference in relative deal size between the two samples and not the future tax savings.

Graph 3 shows no significant drift in the post-event window for either the CAR of the merger inversions or the M&A control group. Both samples have a similar reaction trend, where the distance between each sample's CAR remains at the same level. The only observed difference is the magnitude of the reaction at announcement, where levels remain constant thereafter. As there is no drift in either sample, there is no observed evidence that the market is not efficient. However, the observed immediate response may be 'incorrect' and consequently there is no evidence that the market is semi-strong efficient either. The interpretation following this result is the same as in Section 7.1, which stated that investors (at least initially) expect merger inversions to be more value creating than similar M&A deals without an inversion. The conclusions that can be drawn from this perspective are that investors view merger inversions not only as a form of tax avoidance, but as business combinations that make business sense. The higher shareholder value impact of the announcement for the merger inversions, measured as cumulative abnormal returns, simply means that investors value the tax inversion component as an additional financial synergy, and thus has a greater benefit than those in the M&A control group.

The combination of the three different control groups covered key aspects of the merger inversion transaction – announcement of inversion, announcement of a cross-border acquisition, and the effects of size and industries - and served to separate the effect of the inversion from that of the M&A announcement. A summary of the results, analysis and corresponding interpretations are provided in the following section.

7.5 SUMMARY OF RESULTS, ANALYSIS AND INTERPRETATIONS

The abnormal share price return was found to be positive for announcements of merger inversions, with an average cumulative abnormal return of 8.1 percent. This result is interpreted as investors, at the time of announcement, having expectations of shareholder value creation following announcements of merger inversions. The abnormal share price returns were higher following announcement of merger inversions than that of each control sample, indicating that investors expected, at the time of announcement, that the shareholder value creation was higher for merger-related corporate tax inversions.

Cumulative abnormal returns over the event window were on average 9.2 percentage points higher for merger inversions than for pure inversions, where the pure inversion group showed no significant abnormal returns. The lack of significant returns for pure inversions is in line with previous research. However, this gap decreased over the twenty days following the announcement, suggesting that perhaps the market underreacted and the shareholder value effects were not fully incorporated within the three days following the announcement. Under this interpretation, one can contemplate that perhaps shareholders do have shareholder value expectations following an announcement of pure inversions, in contrast to what previous research suggests.

Two control samples were used to separate the effect of the inversion announcement from a 'regular' M&A announcement. A difference in abnormal returns of 7.1 percentage points was found between the

merger inversions and the control sample of cross-border acquisitions of 100% where the acquirer is a U.S. listed company. However, a robustness test involving a cross-sectional control regression found that this difference may rather be explained by the difference in relative deal size between the two samples. Consequently, the result of the control group of similar M&A deals is more relevant to interpret in detail. The control group of similar M&A deals presented on average 6.6 percentage points less abnormal returns on announcement. This difference remained over the twenty days following the announcement and was robust for all conducted tests of robustness.

The interpretation of the event study results is that investors view merger inversions as positive signals of shareholder value creation. Additionally, merger inversions are viewed not purely as a form of tax avoidance, but also as business combinations that make business sense – with greater benefits than those in the M&A control group. Thus, investors have greater initial expectations of value creation for corporate tax inversions done via a merger.

Although the average of 8.1 percent is found to be statistically significant, there is a large spread in the abnormal return for each stock, where both the highest and the lowest abnormal share price return of the merger inversions were 2.5 standard deviations from the mean. The cross-sectional regression on the abnormal share price returns of merger inversions found that a correlation exists between firm characteristics and the abnormal returns following the inversion announcement. Post-target deal ownership, ownership concentration, board independence, potential tax savings and R&D intensity are positively correlated with abnormal share price returns. On average, a higher price-to-book ratio corresponds to a lower abnormal share price return. Additionally, shareholders within the healthcare sector value corporate tax inversions greater than shareholders within other industries. The seven variables tested in the cross-sectional regression were found to explain approximately 60 percent of the variation in cumulative abnormal returns following the announcement of a merger inversion.

8 CONCLUDING REMARKS

This section presents the concluding remarks following the results and analysis of the study. First, a conclusion summarizing the answers to the research questions is provided. Thereafter, the reliability and validity of the thesis is discussed. The section finishes with suggestions for future research.

8.1 CONCLUSION

The aim of this paper was to answer the following questions:

- 1) *What are the expected shareholder value effects upon the announcement of a corporate tax inversion where a U.S. multinational company re-domiciles through a merger to a lower tax-rate country?*
- 2) *Additionally, can differences in characteristics between the inverting firms explain variations in expected shareholder value effects?*

The corporate tax inversions investigated in this paper were limited to U.S multinationals that re-domiciled via a merger. To avoid confusion, these were referred to as merger inversions throughout the paper. Shareholder value effects were defined as either value creation or value destruction, measured through cumulative abnormal share price returns over a three-day event window surrounding the announcement.

To answer the research questions, the study was operationalized through two parts. Initially, an event study was conducted and thereafter a cross-sectional regression on the abnormal returns of the event study was performed. The event study researched the direction of shareholder value effects following the announcement of a merger inversion. Additionally, it compared the share price reaction to the merger inversion announcements to announcements of three control groups. The cross-sectional regression investigated whether differences in firm characteristics between the merger inversion firms could help explain the variation in shareholder effects found in the event study.

The event study finds that investors have positive expectations of shareholder value, i.e. expectations of value creation, following an announcement of a corporate tax inversion conducted via a merger. Statistically significant average cumulative abnormal returns of 8.1 percent were found following announcement of merger inversions. The expected shareholder value creation upon announcement was found to be greater for merger inversions than that of the three control groups. Thus, it can be concluded that merger inversions are viewed not purely as a form of tax avoidance, but also as business combinations that make business sense. Investors expect merger inversions to create higher shareholder value than similar M&A deals without an inversion.

The results of the cross-sectional regression indicated that differences in characteristics between the inverting firms can explain differences in shareholder value effects. The magnitude of the stock price

increase of a corporate tax inversion announcement is more pronounced (a) the higher the post-target deal ownership, (b) the higher the ownership concentration, (c) the greater the board independence, (d) the greater the potential tax savings, (e) the higher the R&D intensity, and (f) the lower the valuation of the company (in terms of price-to-book ratio). Additionally, greater abnormal returns are observed if the inverting company is within the healthcare sector. These seven variables were found to explain 60% of the variation in expected shareholder value effects following the announcement of a corporate tax inversion.

8.2 RELIABILITY AND VALIDITY

Reliability is concerned with whether the design and method of the study is applied in such a manner that the same results would be observed with repeated trials. In this study, the reliability is considered to be high. The data used is based on publicly available information and the method applied and data selection process is described in detail. Thus, other researchers should be able to follow the details of the thesis and yield the same results.

The internal validity of the thesis considers whether the method applied captures what was meant to be measured. As described under Section 4.1.6, the assumptions underlying the methods and models are considered to be fulfilled with relatively high certainty. The event investigated is clearly defined and possible to isolate from potentially confounding or unexpected events. Therefore, both the reliability and internal validity of this paper are deemed to be high.

The external validity of the thesis, i.e. the possibility to generalize the results and apply it to other settings, concerns whether the results can be extended and assumed to hold for data that has not been included in the study. This is dependent on whether the sample used can be considered representative for the greater population of data. The ability to generalize the results is limited due to both the sample size and the time period considered. While the sample of 25 merger inversions covers all the relevant transactions that have occurred, the small sample size means that one cannot assume normal distribution. Additionally, due to the current situation in the U.S. with changing regulations coming within the near future, including those that were announced during the study, the conclusions of this study may not be applicable to future corporate tax inversions. Even disregarding sample size and changing regulations, research suggests that the shareholder value effect following transactions is dependent on the time period studied. Therefore, there is reason to believe that the results of the study are not possible to generalize beyond the time period investigated, and thus the external validity of the paper is limited. This, however, was not the aim of the paper. Rather, this paper aimed to explain the effects of the announcements of the sample of 25 merger-related corporate tax inversions conducted to date. As such, the thesis fulfills its intended purpose.

8.3 SUGGESTIONS FOR FURTHER RESEARCH

After screening existing research, it was identified that there were no studies solely investigating merger inversions. To the authors' knowledge, this is the first event study investigating the shareholder reactions to announcements of U.S. multinational companies' intentions to re-domicile to lower tax-rate countries through mergers. Thereby, there is much room for future research within this subject. Given the attention in U.S. legislation and media throughout the year, it is probable that research will increase within the topic of corporate tax inversions. A few suggestions stemming from the findings of this study, as well as comments on additional areas on which research is missing, are provided below.

This study contributes to existing research by performing an event study, measuring the expectations of shareholder value effects at the announcement. To build on these findings, future research could determine whether the expected shareholder value creation is realized in the future. Since the majority of inversions were announced in 2013 and 2014, this could not be investigated in this study. However, in a couple of years, this could be performed by conducting a long-run event study and analyzing the performance over a longer period of time. Additionally, a qualitative study can broaden the findings presented in this purely quantitative study. Future studies could, for example, interview executives and management in companies that have undergone an inversion in order to understand the motives behind the transaction in more depth.

Similarly, the changing tax regulation and the extensive tax reform, assumed to be proposed in the coming years, provide a platform to investigate the implications of a tax reform. There is room to investigate whether the U.S. government is successful in preventing corporate tax inversions from occurring, or if companies will always be able to find ways to lessen their taxes.

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10 APPENDIX

Appendix 1: List of merger inversion including the abnormal returns, predicted normal returns and real returns aggregated over the event window

COMPANY	ABNORMAL RETURN	NORMAL RETURN	ACTUAL RETURN
Catalyst Health Solutions	0.4302244	0.0074488	0.4376732
Valeant	0.2840653	-0.0143380	0.2697273
Endo International	0.2662656	0.0087079	0.2749735
Pentair	0.1897055	-0.1220540	0.1775001
Stratasys	0.1820277	0.0016706	0.1836983
Horizon Pharma	0.1708685	0.0266009	0.1974695
Burger King^^	0.1569699	0.0050108	0.1619807
Questcor^^	0.1422875	-0.1248960	0.1297979
Pride International	0.1341443	0.0180019	0.1521463
Applied Materials	0.1276285	-0.0102305	0.1173980
Actavis	0.1201427	0.0030695	0.1232121
Alkermes	0.1091383	0.0181415	0.1272798
Chiquita^^	0.1066185	-0.0014490	0.1051695
Jazz Pharma	0.0652111	0.0114549	0.0766661
Medtronic^^	0.0409479	0.0092981	0.0503460
Mylan^^	0.0199076	0.0089999	0.0289074
Abbvie^^	0.0115723	-0.0045964	0.0069759
C&J Energy Services^^	0.0115355	-0.0007138	0.0108218
Auxilium^^	0.0098357	0.0100154	0.0198511
Eaton	-0.0075005	0.0123209	0.0048205
Salix^^	-0.0405426	-0.0050090	-0.0455518
Perrigo	-0.0430183	-0.0021175	-0.0451359
Liberty Global	-0.0668518	0.0028198	-0.0640320
Tower Group	-0.1271900	0.0129262	-0.1142638
Tronox	-0.2703999	0.0507688	-0.2196311

Description: This table presents a list of the corporations having undergone, or planning to undergo a merger inversion as of Sep 15, 2014 between the years of 2010 and 2014. The first column presents the abnormal returns aggregated over the three day event window. The second column presents the predicted returns estimated by the market model over the estimation window. The third column presents the actual returns of the stocks aggregated over the three day event window. Note that the abnormal returns plus the predicted returns are equal to the observed returns for each observation. The observations are listed by size from largest to smallest estimated cumulative abnormal return over the event window. ^^ denotes the transactions that are pending as of September 15, 2014.

Appendix 2: Industries in the merger inversion sample

INDUSTRY	MERGER INVERSIONS	
	NUMBER OF OBSERVATIONS	PERCENTAGE OF SAMPLE
Pharmaceuticals	12	48%
Medical equipment and devices	1	4%
Healthcare supply chain	1	4%
TOTAL HEALTHCARE	14	56%
Oil drilling	1	4%
Oil & gas services	1	4%
Semiconductors	1	4%
Cable/Satellite	1	4%
Insurance	1	4%
Specialty chemicals	1	4%
Electrical equipment	2	8%
Restaurants	1	4%
3D printing	1	4%
Fruit farming	1	4%

Description: The above table documents the industries present in the merger inversion sample. The first column presents the number of observations for each respective industry. The second column indicates what percentage this is out of the total number of observations in the sample. Three industries are combined to make up the Healthcare sector, which as indicated above represents 56% of the sample.

Appendix 3: Robustness test - control regression comparing the merger inversions to the pure inversions control group

	(1)	(2)	(3)
Intercept	-0.011	0.002	0.094
P-value	0.432	0.971	0.903
t-statistic	-0.79	0.04	-0.12
MINV	0.092***	0.094**	0.094**
p-value	0.006	0.026	0.045
t-statistic	2.88	2.32	2.08
Size (logarithm of market capitalization)		-0.002	0.001
P-value		-0.200	0.965
t-statistic		0.84	0.04
Valuation (price-to-book ratio)			-0.001
P-value			0.741
t-statistic			-0.330
N	40	40	39
R2	0.129	0.13	0.128
Adjusted R2	0.106	0.083	0.053

Description: This table summarizes the control regression results between the merger inversion sample and the pure inversion sample following a build-up of three factors. As there are three control factors in total, there are three columns with results. For each column, an additional factor is added. Intercept is the average value of CAR excluding the control factors expressed in percentages. MINV is a dummy variable with the value of 1 if the transaction is a merger inversion and with the value of 0 if it is a pure inversion. Size is the logarithm of the acquirer's market capitalization two days prior to the announcement, expressed in USDm. Valuation is the price-to-book ratio of the acquiring firm two days prior to the announcement. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Appendix 4: Robustness test - control regression of the merger inversions compared to the cross-border acquisitions control group

	(1)	(2)	(3)	(4)
Intercept	0.010**	0.068**	0.071**	0.041
P-value	0.022	0.042	0.033	0.12
t-statistic	2.31	2.04	2.15	1.56
MINV	0.071**	0.076***	0.085***	0.035
P-value	0.014	0.008	0.003	0.36
t-statistic	2.47	2.66	2.97	0.92
Size (logarithm of market capitalization)		-0.008*	-0.009	-0.004
P-value		0.06	0.035	0.261
t-statistic		-1.89	-2.12	-1.13
Deal value (logarithm of deal value)			0.002	-0.002
P-value			0.429	0.447
t-statistic			0.79	-0.76
Relative deal size				0.072*
P-value				0.098
t-statistic				1.66
N	207	207	205	205
R2	0.086	0.120	0.172	0.229
Adjusted R2	0.082	0.111	0.160	0.213

Description: This table summarizes the control regression results between the merger inversion sample and the sample of U.S. 100% cross-border acquisitions following a build-up of four factors. As there are four control factors in total, there are four columns with results. For each column, an additional factor is added. Intercept is the average value of CAR excluding the control factors expressed in percentages. MINV is a dummy variable with the value of 1 if the transaction is a merger inversion and with the value of 0 if it is a pure inversion. Size is the logarithm of the acquirer's market capitalization two days prior to the announcement, expressed in USDm. Deal size is the logarithm of the acquirer's market capitalization two days prior to the announcement, expressed in USDm. Relative deal size is the ratio between deal size and the acquirer's market capitalization. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and ***denote statistical significance at the 10%, 5% and 1% levels respectively.

Appendix 5: Robustness test - control regression of the merger inversions compared to the M&A control group

	(1)	(2)	(3)	(4)	(5)
Intercept	0.015***	0.036	0.046	0.048	0.070
P-value	0.002	0.276	0.302	0.303	0.151
t-statistic	3.110	1.090	1.030	1.030	1.440
MINV	0.066**	0.064**	0.080***	0.080***	0.086***
P-value	0.022	0.025	0.005	0.005	0.003
t-statistic	2.310	2.260	2.840	2.840	3.030
Size (logarithm of market capitalization)		-0.002	-0.003	-0.003	-0.003
P-value		0.477	0.347	0.3	0.358
t-statistic		-0.710	-0.940	-1.040	-0.920
Deal value (logarithm of deal value)			0.000	0.000	-0.004
P-value			0.943	0.974	0.52
t-statistic			-0.07	-0.03	-0.65
Relative deal size				-0.001	-0.001
P-value				0.787	0.722
t-statistic				-0.270	-0.360
Valuation (price-to-book ratio)					0.000
P-value					0.775
t-statistic					-0.39
N	186	185	183	183	179
R2	0.081	0.084	0.131	0.131	0.143
Adjusted R2	0.076	0.074	0.116	0.111	0.118

Description: This table summarizes the control regression results between the merger inversion sample and the M&A control group following a build-up of five factors. As there are four control factors in total, there are five columns with results. For each column, an additional factor is added. Intercept is the average value of CAR excluding the control factors expressed in percentages. MINV is a dummy variable with the value of 1 if the transaction is a merger inversion and with the value of 0 if it is a pure inversion. Size is the logarithm of the acquirer's market capitalization two days prior to the announcement, expressed in USDm. Deal size is the logarithm of the acquirer's market capitalization two days prior to the announcement, expressed in USDm. Relative deal size is the ratio between deal size and the acquirer's market capitalization. Valuation is the price-to-book ratio of the acquiring firm two days prior to the announcement. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and ***denote statistical significance at the 10%, 5% and 1% levels respectively.

Appendix 6: Robustness test - removing outliers that are more than two standard deviations from the mean

	STATISTICAL TEST			
	MINV	MINV vs PINV	MINV vs CBA	MINV vs CTRL
Average CAR	0.081***	-0.020*	0.006**	0.015***
P-value	0.001	0.053	0.05	0.00
t-statistic	3.67	-2.01	1.98	4.22
Diff average CAR: MINV - control group	-	0.101***	0.075***	0.066***
P-value	-	0	0.001	0.003
t-statistic	-	4.15	3.44	3.00
Number of observations	23	37	198	178

Description: This table summarizes the results of a t-test of the estimated Cumulative Abnormal Return (CAR) following announcements of a merger inversion and the three control samples when outliers have been removed. Outliers are defined as cumulative abnormal returns greater than two standard deviations from the mean. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries. The first column contains statistics for the sample of merger inversions. The second, third and fourth columns report statistics on the control samples and reports the difference of aggregated abnormal return between merger inversions and the control sample respectively. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and ***denote statistical significance at the 10%, 5% and 1% levels respectively.

Appendix 7: Robustness test - event window containing only the event day 0

	STATISTICAL TEST			
	MINV	MINV vs PINV	MINV vs CBA	MINV vs CTRL
Average CAR	0.071***	-0.002	0.004	0.008**
P-value	0.008	0.685	0.18	0.031
t-statistic	2.92	-0.41	1.35	2.17
Diff average CAR: MINV - control group	-	0.073***	0.067***	0.063***
P-value	-	0.006	0.006	0.01
t-statistic	-	2.93	2.76	2.6
Number of observations	25	40	207	186

Description: This table summarizes the results of a t-test of the estimated abnormal return (AR) following announcements of a merger inversion and the three control samples on the announcement day. MINV represents merger inversions. PINV represents the control group of pure inversions. CBA represents cross-border acquisitions of 100% where the acquirer is a U.S. listed company. CTRL represents the control group of similar M&A deals in terms of deal value and industries. The first column contains statistics for the sample of merger inversions. The second, third and fourth columns report statistics on the control samples and reports the difference of aggregated abnormal return between merger inversions and the control sample respectively. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and ***denote statistical significance at the 10%, 5% and 1% levels respectively.

Appendix 8: Robustness test - MINV vs CTRL after removing all non-US acquirers

	ALL	ONLY US
Average CAR	0.015***	0.020***
P-value	0.002	0.002
t-statistic	3.11	3.19
Diff average CAR: MINV - CTRL	0.066**	0.061**
P-value	0.022	0.037
t-statistic	2.31	2.11
Number of observations	186	136

Description: This table presents the results of a robustness test checking whether or not the results of the difference between reaction at announcement of the merger inversions and the announcement of the M&A control group differs when the M&A control group contains only US Acquirers. MINV represents merger inversions, and CTRL represents the control group of similar M&A deals in terms of deal value and industries. The first column presents results of the t-test of the estimated Cumulative Abnormal Return (CAR) testing for differences between the merger inversions and the CTRL group. The second column presents the result of the same test when all non-US acquirers (50 observations) are removed from the CTRL group. . P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and ***denote statistical significance at the 10%, 5% and 1% levels respectively.

Appendix 9: Cross-sectional regression following a build-up of the explanatory variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.081***	-0.076	-0.264**	-0.538**	-0.538**	-0.428***	-0.573***	-0.598***
P-value	0.009	0.305	0.044	0.024	0.011	0.008	0.001	0.000
t-statistic	2.83	-1.05	-2.14	-2.43	-2.81	-2.97	-4.15	-4.75
Target ownership		0.005**	0.005**	0.006***	0.007***	0.007***	0.007***	0.007***
P-value		0.044	0.025	0.004	0.000	0.000	0.000	0.000
t-statistic		2.13	2.41	3.19	4.58	4.34	4.39	4.51
Ownership concentration			0.004**	0.003**	0.003**	0.003**	0.003***	0.004***
P-value			0.045	0.043	0.023	0.026	0.000	0.000
t-statistic			2.13	2.15	2.46	3.55	4.48	6.11
Board independence				0.003	0.002	0.001	0.002	0.003*
P-value				0.163	0.306	0.668	0.154	0.099
t-statistic				1.45	1.05	0.44	1.49	1.75
Healthcare					0.096**	0.113***	0.121***	0.134***
P-value					0.030	0.005	0.004	0.002
t-statistic					2.33	3.19	3.26	3.73
Potential tax savings						0.005***	0.004**	0.003**
P-value						0.003	0.03	0.0460
t-statistic						3.38	2.35	2.15
R&D intensity							0.008*	0.010**
P-value							0.082	0.044
t-statistic							1.84	2.17
Price-to-book ratio								-0.005***
P-value								0.006
t-statistic								-3.12
Number of observations	25	25	25	25	25	25	25	25
R-squared	0	0.1822	0.3526	0.4321	0.5326	0.6338	0.6751	0.7199
Adjusted R-squared	0	0.1467	0.2938	0.3509	0.4391	0.5374	0.5668	0.6045

Description: This table summarizes the cross-sectional regression results of the three day cumulative abnormal returns around a merger inversion announcement following a build-up of the explanatory variables tested. As there are seven variables and one intercept, there are eight columns with results. For each column, an additional variable is added. Intercept is the average value of CAR excluding the other variables expressed in percentages. . Post-deal target ownership is the percentage the target company owns of the merged company after the inversion. Ownership concentration is the percentage of shares owned by the ten largest shareholders out of the total number of shares issues. Board Independence is the percentage of non-executive directors out of the total number directors. Healthcare is a dummy variable taking the value of 1 if the transaction is within the healthcare sector, and 0 otherwise. Potential tax savings is a proxy for the potential reduction in tax expenditure by removing the double taxation imposed by the US Government, approximated by the value of foreign tax rate differential as reported in the effective tax reconciliation in the companies' annual reports. R&D Intensity is defined as the R&D expenditure over operating cash flow. Price-to-Book of the company undergoing an inversion is calculated as the market value over the book value two days prior to the announcement. Price-to-Book of the company undergoing an inversion is calculated as the market value over the book value two days prior to the announcement. R-squared is the proportion of total variation of outcomes explained by the model. Adjusted r-squared is a modification of R-squared that adjusts for the number of variables included in the regression model. P-value is the probability, expressed as a percentage, of obtaining the observed sample results (or a more extreme result) when the null hypothesis is true. *, ** and ***denote statistical significance at the 10%, 5% and 1% levels respectively.