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THE INFLUENCE OF TARGET CEO OVERCONFIDENCE IN MERGERS AND ACQUISITIONS

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ABSTRACT

In this thesis evidence is provided that overconfident CEOs are less often involved in mergers and acquisitions as a target than their non-overconfident counterparts. Contrary to the expectations, target CEO overconfidence does not cause more negative acquirer announcement returns or more positive target announcement returns. When both the target CEO and the acquirer CEO are overconfident, neither more negative or more positive stock market reactions are observed. Furthermore, this thesis examines the influence of two corporate governance mechanisms in combination with overconfidence. Higher proportions of variable compensation for overconfident CEOs do not lead to more involvement in acquisitions or lower target announcement returns. Neither does this thesis find supportive evidence for the influence of independent boards on an overconfident CEO's M&A activity or their firm's announcement returns.

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1. INTRODUCTION

"Most people are average but few people believe it" – (Alicke & Govorun, 2005: 85)

In psychology the phenomenon of people overestimating their abilities relative to other people is widely observed. This cognitive bias is known as the overconfidence bias, which translates into the better-than-average effect. This bias is found across several professions and aspects of life. For example, Neale and Bazerman (1985) argue that overconfidence explains the large amount of lawsuits that go to trial because of lawyers overestimating their ability to win the case. Russo and Schoemaker (1992) point out the overconfidence of geologists employed by Royal Dutch Shell who were systematically too confident in predicting the presence of oil. Lastly, the most famous example might be the study by Svenson (1981). In this study students are questioned about their driving skills. The author finds that almost 93% of the U.S. students in the sample considered themselves above the median.

In this thesis overconfidence among CEOs is investigated, which is widely documented in the current academic literature. For example, Hackbarth (2008) documents that overconfident CEOs choose higher debt levels than is expected based on traditional theory. Hirshleifer, Low and Teoh (2012) find that overconfident CEOs achieve greater innovation. Alternatively, this thesis examines the effects of CEO overconfidence in an M&A setting. One of the most prominent papers regarding the effect of CEO overconfidence on mergers and acquisitions is the paper of Malmendier and Tate (2008). In their paper they find that overconfident CEOs are more likely to conduct a merger and that those mergers tend to be value-destroying. Similar results are obtained in various other studies, even when other measures to capture overconfidence are used (Kolasinski & Li, 2013). Important to note is that most of the studies considering overconfidence in an M&A setting, focus on acquirer overconfidence and its implications for acquirer shareholders. Rather few studies focus on the effect of overconfidence on the likelihood to be acquired and its implications, i.e., target CEO overconfidence. In order to contribute to the existing literature, this thesis examines the influence of target CEO overconfidence in an M&A setting, leading to the following research question:

What is the influence of target CEO overconfidence on their firms M&A activity and announcement returns?

While most current literature focusses on acquirer CEO overconfidence instead of target CEO overconfidence, this literature provides insights that allows one to establish hypotheses with respect to the research question in this thesis. As mentioned before, Malmendier and Tate (2008) find that overconfident CEOs perform more acquisitions as those CEOs overestimate their positive impact, abilities, and synergies between the companies. Likewise, when such CEOs are on the target side, they might demand a higher prices in negotiations since they believe that their company is undervalued by outside investors. Obviously, this decreases the probability of merger completion. Therefore, the expectation is that overconfident CEOs are less often involved in mergers and acquisitions as a target than non-overconfident CEOs.

When a deal with an overconfident target CEO ultimately is completed, there is an increased likelihood that the acquirer has overpaid since the overconfident target CEO demands a relatively higher price. Without taking overconfidence into account, deal announcements are often followed by a negative stock market reaction for the acquirer (Andrade, Mitchell & Stafford, 2001). However, with an increased likelihood of overpayment due to target CEO overconfidence, the expectation is that the market reaction for the acquirer is more negative (John, Liu & Taffler, 2011). On the other hand, overpayment by the acquirer would be beneficial for the targets shareholders. Therefore, the expectation is that target CEO overconfidence leads to more positive announcement returns for the target company as well. Additionally, when both the target CEO and acquirer CEO are overconfident, the expectation is that even more positive target announcement returns and even more negative acquirer announcement returns are observed.

Furthermore, this thesis examines whether the effects of overconfidence on the likelihood to be acquired and the announcements returns can be influenced by corporate governance mechanisms. First, the influence of variable compensation is considered. In the literature variable compensation is often described as a mechanism to align incentives and encourage the CEO to take risks (Gervais, Heaton & Odean, 2003). When overconfident CEOs are considered, variable compensation might lead to excessive risk taking. Therefore, higher proportions of variable compensation might lead to an increase in M&A activity and a decrease in target announcement returns. On the other hand, independent boards are expected to lead to lower M&A frequency and more positive target announcement returns, since those boards are capable of preventing the overconfident CEO to make value-destroying acquisitions.

In order to classify overconfidence of CEOs, a measure based on stock option exercise behaviour is constructed. In line with Malmendier and Tate (2008), CEOs are classified as overconfident if they hold stock options that are more than 67% in the money, meaning that the stock price exceeds the exercise price by more than 67%. According to the authors, managers that hold such stock options are too confident about the their own abilities and future firm performance. The overconfidence measure that is used in this thesis mimics the measure of Malmendier and Tate (2008), using the approach of Campbell, Gallmeyer, Johnson, Rutherford and Stanley (2011). The measure is constructed for firms that are available in the ExecuComp database in the period 2000-2019. To test the hypotheses in this thesis, two types of regressions models are used. First, logistic regressions are used to test whether certain firms are more likely to be involved in an acquisition as a target. Secondly, Ordinary Least Squares (OLS)-regressions are used to evaluate the announcement returns after an acquisition. In both regression types, several control variables are used that are common in the current literature. These control variables are mainly based on CEO-, firm-, or deal characteristics.

In this thesis, evidence is provided that overconfident CEOs are less often involved in mergers and acquisitions as a target than non-overconfident CEOs. An overconfident CEO is 0.798 times as likely to be involved in an acquisition as a target compared to a non-overconfident CEO. Furthermore, this thesis investigates the announcement returns of the acquirer firm and target firm after an acquisition. In contrast to the expectations, this thesis does not find significantly more positive or more negative announcement returns for the targets and acquirers respectively. When both the target CEO and the acquirer CEO are overconfident, more extreme stock market reactions are not observed either. However, the coexistence of target and acquirer overconfidence has a negative effect on acquirer announcement returns that is close to significance.

Furthermore, this thesis examines the influence of two corporate governance mechanisms in combination with overconfidence on M&A activity and announcement returns. First, the influence of variable compensation for overconfident CEOs is considered. This thesis does not find that higher variable compensation for overconfident CEOs leads to more involvement in acquisitions as a target or lower target announcement returns. Neither does this thesis find supportive evidence for the influence of independent boards on an overconfident CEO's M&A activity nor their firms announcement returns.

The main contribution of this thesis to the existing literature, is the focus on target CEO overconfidence as literature on this subject is remarkably rare. Similarly, most of the literature focusses on acquirer announcement returns, while in this thesis the focus is on target announcement returns. Nevertheless, this thesis takes the acquirer announcement returns into consideration as well. Another important contribution is the evaluation of the corporate governance measures. Gervais et al. (2003) address the importance of variable compensation for overconfident CEOs, but empirical evidence on this subject is lacking. Similarly, the influence of independent boards in combination with overconfident CEOs is still a relatively scarcely covered subject in the literature.

The remainder of this thesis is structured as follows. First, a theoretical framework is constructed in order to motivate the hypotheses. Secondly, the data and methodology that are used in this thesis are discussed. Thereafter, the results regarding the hypotheses are presented in section 4. Section 5 discusses the main limitations of this thesis. Finally, section 6 contains the conclusion and provides suggestions for additional research.

2. LITERATURE REVIEW

In this section, the theoretical foundations of this thesis are explained. First, the traditional corporate finance literature which assumes rational agents is discussed. Subsequently, the behavioural corporate finance literature that questions the rationality assumption is considered. Within this behavioural framework a comprehensive review of studies concerning the overconfidence bias and its implications regarding mergers and acquisitions is discussed.

2.1 Traditional Corporate Finance

In traditional corporate finance literature, financial markets are assumed to be efficient and therefore assets are assumed to be priced correctly. This is the result of the assumed rationality of economic agents, such as investors and managers of a company. That agents are rational means that they update their beliefs correctly and make normatively acceptable choices, or in other words maximize expected utility (Scott, 2000).

It is clear that the assumed rationality influences the choices of economic agents such as managers. An important theory in traditional corporate finance that aims to explain corporate decision making, is the agency theory by Jensen and Meckling (1979). This theory emphasizes the potential problems that occur due to agents (managers) being rational and therefore acting in their own interest, while they are expected to act in the interest of the principals (shareholders). When interests differ between those groups and shareholders cannot assure that managers act in their interest due to information asymmetry, agency costs arise due to suboptimal choices from shareholder perspective. However, even when interests of both parties align, differences in risk appetite could also cause managers to undertake investments that shareholders would have forgone (Eisenhardt, 1989). By incorporating corporate governance mechanisms giving the right incentives to managers, agency costs can be limited (Jensen & Meckling, 1979). An example of such a mechanism is variable compensation for the manager, which aligns the incentives of the manager and the shareholders.

2.2 Behavioural Corporate Finance

Traditional corporate finance literature aims to explain corporate decision making by assuming rationality. Within the behavioural framework, distortions in investments are caused by imperfect capital markets. The root cause of these distortions often lies with asymmetric information. Opposed to the traditional literature, the behavioural corporate finance literature does not assume rationality. Instead, this view aims to explain investment distortions by using potentially more realistic behavioural principles (Baker, Ruback & Wurgler, 2007).

In the paper of Baker et al. (2007) the authors identify two approaches regarding irrationality in the literature. The first approach focusses on irrational investors, while the second approach stresses out irrationality of managers. Considering the first approach, it is assumed that some investors are less than completely rational. This irrationality leads to suboptimal investment decisions, causing mispricing in the market. Managers who are assumed to be fully rational, are expected to identify this mispricing due to superior information, experience, and knowledge. Subsequently, these managers can exploit mispricing and maximize short-term firm value since in the long-run prices will return to fundamental value (Baker et al., 2007). Contrary to the first approach, the building elements of the second approach are irrational managers and rational investors with limited governance mechanisms. Therefore, this approach studies non-standard managerial behaviour that departs from the rational benchmark. However, it should not be confused with the earlier discussed rational agency models as the irrational manager wrongly believes that he is maximizing firm value. In this approach managerial decisions, and therefore corporate investment decisions, are driven by the managers personal characteristics, preferences, and beliefs (Baker et al., 2007). In this thesis the focus will be on this second approach.

To further understand what drives the decision making of managers, Shefrin (2007) identifies three concrete psychological phenomena which cause non-random deviations from rational behaviour. First, the author specifies managerial biases. Examples of biases are the confirmation bias and the illusion of control. The confirmation bias implicates that managers have the tendency to place too much weight on information that is in line with their personal beliefs. The illusion of control bias causes managers to overestimate the ability to control events over which they have limited influence. Overconfidence is considered to be a bias as well, but will be discussed extensively in the next paragraph. Secondly, Shefrin (2007) distinguishes

heuristics, which are described as rules of thumb or as cognitive shortcuts which reduce the complexity of tasks to simpler judgemental operations (Tversky & Kahneman, 1974). An example of an heuristic is the anchoring and adjustment heuristic, which is the tendency to use arbitrary values as reference point and adjust insufficiently to new information. Lastly, Shefrin (2007) discusses framing effects, which state that the setting and description of a choice have influence on the decision outcome. That these psychological phenomena have influence in practice, can be observed in several papers. For example, Baker, Pan and Wurgler (2012) find that there is an anchoring bias in M&A offer prices, where recent price peaks serve as an anchor.

2.3 Overconfidence

Although not discussed yet, managerial overconfidence is considered to be a bias as well (Shefrin, 2007). The overconfidence bias finds its origin in the hubris hypothesis as developed by Roll (1986). In his paper the aim of acquisitions is questioned since there is few evidence that acquisitions create shareholder value for the acquiring firm. Roll (1986) argues that acquisitions take place because of CEOs who systematically overestimate synergies and have excessive confidence in their own valuations. Managerial hubris is most likely to follow periods of good performance, which they attribute to their superior managerial competences. A consequence of managerial hubris is that the managers affected by it, are associated with paying higher premia for the target and therefore destroying shareholder value (Hayward & Hambrick, 1997).

Building on the evidence provided by Roll (1986), two main variants of overconfidence can be distinguished in the literature. The first variant is based on miscalibration or overprecision, meaning that managers have the tendency to overestimate the accuracy of their information. This variant is used in the study of Ben-David, Graham and Harvey (2013), where the authors show that managers overestimate the precision of their forecasts. The second type of overconfidence is defined as the better-than-average effect, meaning that managers have the tendency to overestimate their own abilities and believe that they are better than a peer group. According to Malmendier and Tate (2005) this type of overconfidence translates into optimism about future prospects that are related to the manager's own performance and to an illusion of control.

Important to mention is that not only managers suffer from overconfidence. According to psychologists almost every individual tends to overestimate their abilities and attribute satisfying results to their own actions (Larwood & Whittaker, 1977). Therefore, overconfidence is observed in multiple professions, such as physicians, nurses, (Christensen-Szalanski & Bushyhead, 1981) and engineers (Kidd, 1970). However, it could be argued that managers are more prone to be overconfident for several reasons. For example, overconfident individuals might be more likely to apply for managerial positions. Moreover, they are more likely to win contests as they are more willing to take risks (Baker & Nofsinger, 2010).

Due to managerial overconfidence, corporate decisions are not only driven by firm-level fundamentals but by manager characteristics as well. Empirical evidence argues that this bias has been shown to, both theoretically and empirically, explain important corporate decisions with respect to dividends, buybacks, and acquisitions (Campbell et al., 2011). For example, Hackbarth (2008) argues that overconfident CEOs affect capital structures by choosing higher levels of debt and issuing debt more regularly than expected by the pecking order theory. According to Hackbarth (2008) this might have a positive effect on firm value, since higher debt levels will prevent overconfident CEOs from investing too much. Similar results have been obtained by Ben-David et al. (2013). Additionally, those authors find that overconfident managers are associated with higher corporate investments. Hirshleifer et al. (2012) in their turn argue that for this reason some firms specifically want to hire overconfident CEOs, since their overconfidence may balance out other managerial characteristics or agency problems that are undesired by shareholders. The authors hypothesize that overconfident managers accept more risk and therefore invest more heavily in innovative projects. This would ultimately lead to greater innovation achievements. The findings of this paper show that overconfident CEOs are indeed producing more highly cited patents and have higher research and development expenses. Next to this, the authors find that overconfidence increases innovation effectiveness, meaning that for a given level of R&D expenditures the number of patents and citations increase in overconfidence. However, these findings only hold for innovative industries. Based on these results, the authors state that overconfident CEOs are better able to transform growth opportunities into firm value (Hirshleifer et al., 2012). These findings clearly provide a bright side of overconfidence.

2.4 Overconfidence in M&A

Mergers and acquisitions have been studied extensively in corporate finance literature. This literature has provided several reasons to conduct an acquisition with the main goal of creating shareholder value (Andrade et al., 2001). To indicate whether an acquisition creates value, the average abnormal stock market reaction in the days surrounding the merger announcement is often used as indicator. Using this measure, several studies find negative acquirer announcement returns, suggesting that mergers and acquisitions are not in the interest of acquirer shareholders since they do not create shareholder value. For example, Andrade et al. (2001) find a three-day average abnormal return of -0.7 percent, which becomes even more negative when a longer event window is used. These findings initiated research regarding overconfident acquirer CEOs, which have shown results that partly explain the negative returns.

Building on the evidence obtained by Roll (1986), the paper of Malmendier and Tate (2008) studies the influence of acquirer CEO overconfidence on mergers and acquisitions. According to Malmendier and Tate (2008) overconfident managers overestimate their positive impact and abilities to select profitable projects. Moreover, the authors argue that those managers tend to overestimate synergies between the companies and underestimate the disruptiveness of a merger. In their paper overconfidence is proxied by executive stock option exercising behaviour and CEO press coverage. Based on those proxies, the authors find that overconfident CEOs are more likely to conduct a merger and that those mergers are expected to be value-destroying. To indicate which mergers are expected to be value-destroying, the authors rely on previous literature that suggests that diversifying mergers are often value-destroying. These results are most common in companies with generous amounts of cash or unused debt capacity. According to Malmendier and Tate (2008) the reason for this last finding is that overconfident managers are reserved in issuing new equity, since they view their company as undervalued by the market. Other papers with different measures of overconfidence found that overconfident managers pursue more acquisitions as well. Examples of these papers are the studies by Kolasinski and Li (2013) who used stock buying behaviour to identify overconfidence and Ben-David et al. (2007) who conducted a survey among CFOs to identify overconfidence.

The results that these papers obtained focus on acquirer CEO overconfidence, while this thesis focusses on target CEO overconfidence. In the current literature there are few studies that focus on target CEO overconfidence and therefore it is unclear what the exact relation between target CEO overconfidence and their M&A activity is. Nevertheless, a hypothesis regarding this relation can be constructed using the findings of the discussed papers. As already mentioned, Malmendier and Tate (2008) argue that overconfident managers believe that their company is undervalued by outside investors. For this reason the managers are unwilling to issue new stock to finance a merger. When overconfident target CEOs believe that their companies is undervalued by the market, this might result in the overconfident target CEO demanding a higher price in negotiations which decreases the probability of deal completion. Therefore, the expectation is that overconfident CEOs are less often involved in mergers and acquisitions as a target than their non-overconfident counterparts. In an earlier study by Aktas, De Bondt, Bollaert and Roll (2016), the relation between the CEO characteristic narcissism and deal completion is discussed. In this study the authors show that narcistic target CEOs realize higher bid premia and decrease the probability of completion of the deal. Since narcissism is somehow related to overconfidence and the results of Aktas et al. (2016) are in line with our prediction, the first hypothesis of this thesis is:

H1:   Overconfident CEOs are less often involved in mergers and acquisitions as a target than their non-overconfident counterparts.

As previously mentioned, the stock market reaction is an important indicator to asses whether an acquisition creates shareholder value. Based on the foregoing, it became clear that acquirers experience negative abnormal announcement returns and therefore acquisitions might not create shareholder value for the acquirer. Malmendier and Tate (2008) investigate whether there is a relation between acquirer CEO overconfidence and those negative acquirer announcement returns. The authors find that that announcements by overconfident acquirer CEOs are followed by a more negative stock market reaction compared to the announcements by non-overconfident CEOs. More specifically, the market discounts announcements by overconfident CEOs by 60 to 100 basis points over a three-day window relative to the average announcement by their non-overconfident counterparts. Similar results are obtained by Ben-David et al. (2007) and Kolasinski and Li (2013). According to Malmendier and Tate (2008) the negative stock reaction is caused by the lower average quality of the acquisitions and the increased likelihood that an overconfident CEO has overpaid for their acquisition.

In the mentioned studies the acquirer CEO is considered to be overconfident. However, similar arguments apply when the target CEO is assumed to be overconfident. An overconfident target CEO might increase the likelihood to overpay as well, since they view their company as undervalued and therefore demand a relatively higher price. The relation between target CEO overconfidence and acquirer announcement returns have been investigated by John et al. (2011). In their paper they show acquirer announcement returns are indeed more negative when the target CEO is overconfident. The market discounts announcements involving overconfident target CEOs by 5 to 63 basis points over a three-day window relative to the average announcement that does not involve an overconfident target CEO. Instead, when a CEO suffers from narcissism a decrease of 1.3 percentage points in acquirer announcement returns is observed (Aktas et al., 2016).

Without taking overconfidence into account, the literature has often found positive announcement returns for the target companies contrary to the negative returns for acquirers. For example, Andrade et al. (2001) find a 16% abnormal target return for the two days surrounding the announcement date. To indicate the magnitude of this return, the authors show that this return for target company shareholders equals the return that is normally obtained over a period of 16 months. Taking these results into account, target firm shareholders obviously benefit most from mergers. Similar results have been obtained by Ruback and Jensen (1983) and Jarrell, Brickley and Netter (1988). Despite the abundant amount of studies considering target announcement returns, literature regarding the influence of overconfidence on these announcement returns is remarkably rare. Nevertheless, the earlier mentioned literature on acquirer overconfidence allows to construct a hypothesis considering the target announcement returns. As mentioned, this literature argues that the negative acquirer announcement returns are caused by the increased likelihood to overpay when an overconfident target CEO is involved (John et al., 2011). On the other hand, it might be possible that the increased likelihood to an overpaid acquisition leads to a more positive announcement return for the target company as an overpaid acquisition is beneficial for the target shareholders. Based on this reasoning, the second hypothesis states:

H2:   *Target CEO overconfidence leads to more negative acquirer announcement returns, while leading to more positive target announcement returns.*

In the paper of John et al. (2011), the influence of the coexistence of target and acquirer CEO overconfidence on the acquirer announcement returns is investigated as well. Compared to the mergers involving only an overconfident target CEO, the acquirer announcement returns become more negative when both the acquirer and target CEO are overconfident. In this case, a negative abnormal announcement return of more than 10% is found. According to John et al. (2011) these results suggest that the market identifies the potential for increased value destruction. The authors do not investigate the influence of coexisting overconfidence on the target announcement returns. Nevertheless, the results obtained in this paper suggest that the combination of overconfidence might cause a more positive stock market reaction on the target side as well. Therefore the third hypothesis of this thesis is as follows:

H3:   *The coexistence of target CEO overconfidence and acquirer CEO overconfidence leads to even more negative acquirer announcement returns, while leading to even more positive target announcement returns.*

2.5 Corporate governance and overconfidence in M&A

After examining the influence of overconfidence on the likelihood of being involved in an acquisition and the effect on the announcement returns, the next hypotheses focus on corporate governance mechanisms that might influence the impact of overconfidence. First, the influence of variable compensation is considered. Variable compensation, such as variable bonusses and stock options, is often used in the context of mitigating agency-problems by aligning the interest of management and shareholders. Managers tend to behave conservatively and therefore take less risks than is desired by the shareholders. By rewarding the CEOs when stock prices rise while not harming them when stock prices decline, shareholders will encourage managers to take more risks (Gervais et al., 2003). In this context several studies have been conducted, showing the benefits of such convex compensation schemes. For example, Datta, Iskandar-Datta and Raman (2001) show that higher levels of equity-based compensation leads to positive long-run returns and more value-creating acquisitions. However, the agency problem discussed in those papers is different from the problem that arises from overconfident managers. The overconfident manager truly believes that shareholder value is maximized by his actions, while the rational manager in the agency-problem context maximizes his own utility (Malmendier & Tate, 2008). Since overconfident CEOs hesitate less before making corporate investment

decisions, compensating them with stock options like rational CEOs is unnecessary. Moreover, it can even hurt shareholders since variable compensation will encourage the overconfident CEO to take excessive risks (Gervais et al., 2003). In a minor study regarding the U.S. restaurant industry, the relation between overconfident CEO compensation and value-destroying investments is investigated. The authors find that overconfident CEOs with equity-based compensation tend to make more risky investments (Seo & Sharma, 2014). Therefore, higher proportions of variable compensation for overconfident acquirer CEOs might lead to both an increase in M&A activity as well as lower acquirer announcement returns. In this thesis it is investigated whether the same holds for overconfident target CEOs and their firms announcement returns. Therefore the fourth hypothesis is as follows:

H4:   *Overconfident CEOs with higher proportions of variable compensation are more often involved in mergers and acquisitions as a target and experience less positive target announcement returns.*

In the last hypothesis the influence of an independent board will be studied. Strong and independent boards control and advise the CEO and can therefore help him to avoid making 'honest' mistakes (Kolasinski & Li, 2013). According to the literature, an independent board is therefore expected to lower M&A frequency for acquirers. In the paper of Kolasinski and Li (2013) boards with 4 to 12 members and a majority of independent directors are classified as independent. In their paper they find that independent boards indeed reduce the likelihood of the overconfident CEO to conduct an acquisition. Similar results have been found by Brown and Sarma (2007), who show that M&A activity decreases with the fraction of outside directors in the board. Additionally, those papers argue that independent boards can minimalize the excessive risk taking by overconfident CEOs leading to less value destroying investments. Accordingly, Malmendier and Tate (2008) show that effective corporate governance has a positive influence on acquirer announcement returns, indicating that investors favour deals with an independent board to control overconfident CEOs. However, these results solely focus on acquirer CEO overconfidence and acquirer returns. Nonetheless, this thesis examines whether similar results can be found considering target firms. Therefore the fifth hypothesis states:

H5:   *Overconfident CEOs accompanied by an independent board are less often involved in mergers and acquisitions as a target and experience more positive target announcement returns.*

3. DATA & METHODOLOGY

In this section, the data used in this thesis is discussed. First, the construction of the overconfidence measure is described. This is followed by a description of several control variables based on CEO-, firm-, and deal characteristics. Thereafter, a specification of the returns of both target and acquirer firm is given. Next, this section will provide some descriptive statistics of the main variables of interest and provide some insight in the relation between those variables. Lastly, the methodology that is used in this thesis will be discussed.

3.1 Overconfidence measure

The overconfidence measure that is used in this thesis is based on stock option exercise behaviour and used in several papers including the paper of Malmendier and Tate (2008). As mentioned in section 2, two types of overconfidence can be distinguished. The first type of overconfidence is related to overprecision, meaning that managers overestimate the accuracy of their information (Ben-David et al., 2013). The second type of overconfidence is referred to as over-optimism or the better-than-average effect, meaning that managers overestimate their abilities (Malmendier & Tate, 2008). The overconfidence measure that is used in this thesis is related to the second type of overconfidence (Huang, Tan, Sulaeman & Faff, 2016).

Based on this measure, a CEOs are defined as overconfident if they hold stock options that are more than 67% in the money, meaning that the exercise price is exceeded by the stock price by more than 67%. According to Malmendier and Tate (2008), a risk-averse rational manager should, in general, exercise stock options early given a favourable price. This follows from the managers often being exposed to high amounts of idiosyncratic risks of their own firm (Hall & Murphy, 2002). When a manager holds stock options that are highly in the money, this indicates that the CEO is very confident about the company's future performance and his own capabilities (Malmendier & Tate, 2008).

To construct this measure, data regarding the compensation of CEOs in S&P 1500 firms is obtained from ExecuComp. Unfortunately, it is impossible to construct exactly the same measure of overconfidence as Malmendier and Tate (2008), since the option-grant-specific

exercise prices are not available in the ExecuComp database. For this reason, their overconfidence measure is mimicked, using the approach of Campbell et al. (2011), who estimate the average exercise price of the options. First, the realizable value per option is computed by dividing the total realizable value of the exercisable options by the total number of exercisable options. The realizable value per option is then subtracted from fiscal year-end stock price, resulting in an estimate of the average exercise price of the options. Subsequently, the average option moneyness can be calculated by dividing the realizable value per exercisable option by the estimate of the average exercise price. According to Campbell et al. (2011) and Malmendier and Tate (2008), CEOs are then classified as overconfident when they hold options that are more than 67% in the money at least two times during the sample period. When this criteria is fulfilled, the overconfidence classification is allocated when the CEO exhibits this option-holding behaviour for the first time.

3.2 Control variables

3.2.1 CEO characteristics

In order to control for personal characteristics of the CEO, several control variables are constructed using the database ExecuComp. This database contains data regarding CEO characteristics and compensation for every firm in the S&P 1500 index. The first variable that is constructed is the variable named *StockOwnership*, which is defined as the percentage of the total outstanding shares of the firm that are personally owned by the CEO. Stock options are excluded in defining this measure. A similar control variable is used in the paper of Malmendier and Tate (2008) and John et al. (2011), who argue that increased ownership of the CEO might lead to more value-maximizing decisions since their interests are more aligned with shareholders. Similar reasoning is documented in the paper of Berger, Ofek and Yermack (1997), who additionally argue that CEO tenure is positively related to CEO overconfidence. For this reason the variable *Tenure* is incorporated as well, which is defined as the amount of years that the CEO is employed at the company at the time of the observation. Furthermore, the variables *Age* and *VestedOptions* are defined. Both variables are used in the paper of Malmendier and Tate (2008) as well. The first mentioned variable obviously contains the age of the CEO. The second variable is defined as the amount of exercisable options owned by the CEO divided by the total amount of shares outstanding of the firm (Malmendier & Tate, 2008).

Next, the dummy variable *Female* is constructed, which takes on the value 1 if the CEO is a woman. According to Levi, Li and Zhang (2014) men tend to be more overconfident than women in financial matters. For this reason gender is sometimes even used as a proxy for overconfidence (Barber & Odean, 2011). Lastly, the variable *VarCompensation* is constructed, since the influence of compensation on the decision making of overconfident CEOs is investigated in this thesis. The variable is defined as the total compensation of a CEO minus the (fixed) salary of the CEO divided by the total compensation (Otto, 2014). Total compensation typically includes salary, bonusses, restricted stock, and options. To test the fourth hypothesis, an interaction variable between this variable of interest and the overconfidence measures is constructed. Important to note is that the overconfidence measure as well as the CEO control variables, except *VarCompensation,* are constructed for both target and acquirer.

3.2.2 Firm characteristics

The firm characteristics are obtained from the databases CompuStat and BoardEx. The latter is used to construct the variable *IndBoard*, which is a dummy variable that indicates whether the board of a company is independent. This variable is used to test the influence of independent boards as formulated in the fifth hypothesis. Malmendier and Tate (2008) use the size of a board as proxy for an independent board and find a positive relation with acquirer announcement returns. However, in this thesis another proxy is used, similar to the one in the paper of Kolasinski and Li (2013). In their paper, a board is classified as independent when the boards has 4 to 12 members and a majority of independent directors. To test the fifth hypothesis an interaction variable between this variable of interest and the overconfidence measures is constructed as well. The CompuStat database is used to construct the other variables based on firm characteristics. Those variables are used in the papers of Malmendier and Tate (2008) and Kolasinski and Li (2013) as well. The first variable (*LogSize)* aims to control for firm size and is constructed by taking the natural logarithm of the firm's assets. The rationale behind this measure is documented by Moeller, Schlingemann and Stulz (2004), who find that larger firms are more acquisitive and experience lower announcement returns. Furthermore, they find that increased size leads to a higher chance of the CEO being overconfident. The second variable that is constructed using the CompuStat database is *Tobin's Q.* In the literature higher levels of Tobin's Q are associated with being more acquisitive (Hirschleifer et al., 2012) and higher

abnormal announcement returns (Lang, Stulz & Walkling, 1989). This variable is calculated by dividing the market value of a firm's assets by the book value of a firm's assets. In this formula the market value of assets is defined as the book value of the assets plus the market capitalization minus the book value of the firms equity (Dessaint, Olivier, Otto & Thesmar, 2019). Ultimately, the variable *CashFlow* is created to control for a company's profitability since higher profitability leads to higher acquisitiveness (Harford, Mansi & Maxwell, 2008). *CashFlow* is defined as net income plus depreciation and amortizations scaled by assets (Dessaint et al., 2019). The variables that are made using the data from CompuStat are constructed for both targets and acquirers.

3.2.3 Deal characteristics

After creating the already mentioned variables, information about deals is added to the dataset for those firms that were involved in an acquisition. Deal characteristics are obtained from the Thomson One database. Only deals announced between January 2000 and December 2019 are retrieved. Furthermore, the target needs to be U.S. listed and the deal value needs to be at least 1 million dollar. Using these criteria, 28,582 deals are retrieved from the Thomson One database. After obtaining the data, only observations with a private or public acquirer are kept, meaning that acquirers indicated as governments or subsidiaries are dropped. Furthermore, observations that contain a target firm which equals the acquirer firm are dropped. This decreases the amount of deals in the dataset substantially to roughly 10,700 deals.

The variables that are constructed using the Thomson One database aim to control for several deal characteristics. All of these variables are commonly used in literature when explaining announcement returns (Dessaint et al., 2019). Firstly, the dummy variable *Diversification* is defined, which equals 1 if the three digit SIC codes of the target and acquirer differ. In the literature, diversifying mergers are often considered as value-destroying since abnormal announcement returns tend to be lower when the acquisition is diversifying (Morck, Shleifer & Vishny, 1990). A second dummy variable that is constructed denotes *Payment*. This variable controls for the method of payment and takes on the value of 1 if the merger is financed with cash exclusively (John et al., 2011). These two variables are used in the paper of Malmendier and Tate (2008) as well. Additional deal control variables relative to this paper, are the variables *Hostile* and *DealValue*. Both variables are used in the paper of Kolasinski and

Li (2013). In line with this paper the *Hostile* variable is defined as a dummy variable that equals 1 when the deal is a hostile takeover and the *DealValue* variable equals the natural logarithm of the transaction value. The rationale behind these variables is that larger deals and deals financed with stock are associated with more positive abnormal announcement returns (Fuller, Netter & Stegemoller, 2002). On the other hand, hostile takeovers are often associated with more negative stock market reactions (Dessaint et al., 2019).

3.3 Abnormal returns

From the CRSP database, or more specifically the U.S. Daily Event Study offered by WRDS, the abnormal returns for the target and acquirer around the announcement date of the acquisitions in our dataset are obtained. The abnormal returns are calculated by subtracting the benchmark returns from the actual stock return of a certain day, as shown in the following equation:

$$AbnormalReturn_{it} = Return_{it} - (Rf_t + \alpha_{it} + \beta_{it} (MarketReturn_t - Rf_t))$$

As shown, the abnormal returns are defined according to the Capital Asset Pricing Model (CAPM), where the market return is the CRSP value-weighted market return. The abnormal returns of the firms are obtained for the seven days surrounding the announcement date in order to construct to cumulative abnormal return (CAR) for a three-day event window [-1,1] and a seven-day event window [-3,3]. The CAR for a certain window is simply calculated by adding the abnormal returns of the respective days in the period. In this thesis the CAR of the seven-day event window is used as a robustness check. The estimation window that is used is equal to the estimation window in Malmendier and Tate (2008) and therefore equals the period [-252, -42].

3.4 Descriptive statistics

In this section, the descriptive statistics for the relevant variables in the dataset of this thesis are discussed. The dataset is obtained after merging all mentioned variables into a single dataset.

The dataset contains 36,525 observations for which the overconfidence measure is defined, meaning that there are 36,525 firm-year combinations with an indicator variable for overconfidence. Only 715 (1,96%) of these firm-year combinations are involved in an acquisition as a target company. This relatively low amount of observations is partly explained by the use of the ExecuComp database that is needed to construct the overconfidence measure. In this database only firms that are part of the S&P 1500 index are documented.

Another characteristic that has a major influence on the dataset, is the choice of dropping observations in the raw dataset obtained from Thomson One. This dataset contains the information regarding the acquisitions. As mentioned, an observation that contains a target firm which equals the acquirer firm is dropped. This leads to a substantial reduction of deals in this raw dataset. Subsequently, when the deals are matched to the targets for which an overconfidence measure is constructed, only 715 deals could be matched. To illustrate, when the deals with the same acquirer and target are not filtered out the raw dataset, 6,893 (18.46%) deals could be matched. However, without imposing the requirement most of these deals enclose a target that at the same time is the acquirer as well, which resembles rather a share buyback than a takeover.

The descriptive statistics of the most relevant variables in the dataset of this thesis are shown in Table 1. The sample used in this thesis contains 36,525 observations. As shown in panel A, the *Takeover* variable indicates that only 1,96% of these observations are involved in an acquisition as a target. Furthermore, the descriptive statistics of the overconfidence measure for both the target and acquirer are shown in panel A. The *Holder67* indicates that 59.9% of the CEOs are overconfident. In the paper of Campbell et al. (2011) only 35% of the CEOs are classified as overconfident. However, to construct the overconfidence measure based on stock option exercise behaviour, they require CEOs to hold stock options that are 100% in the money since they want a clear distinction between optimism and overconfidence. In this thesis a cut-off of 67% moneyness is used, with the consequence of classifying more CEOs to be overconfident. When the 100% moneyness cut-off is used in this thesis instead, only 51% of the CEOs is considered to be overconfident.[1] On the other hand, Campbell et al. (2011) report that when they use the 67% cut-off instead of the 100% cut-off 57% of their CEOs is

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[1] Using the 100% cut-off instead of the 67% cut-off in this thesis does not lead to results that are more in line with the defined hypothesis, despite that Campbell et al (2011) argue that using the 100% cut-off will capture the most overconfident CEOs.

overconfident. It therefore seems that the distribution of the *Holder67* variable is in line with earlier research. Panel A shows the descriptive statistics of the overconfidence measures for the acquirers as well. However, this variable only has 194 observations, indicating the deals for which the overconfidence measure could be constructed for both target and acquirer. For the acquirers the mean of *Holder67* is slightly lower than for the target firms.

Panel B contains the CEO specific variables. The average age of the CEOs is close to 56 years, which is roughly equal to the average age of CEOs in the samples of Malmendier and Tate (2008), John et al., (2011), Campbell et al., (2011) and Otto (2014). The average tenure of 8 years, the majority of CEOs being male, and the fraction of company stock owned by the CEO are in line with these papers as well. The holdings of vested options by the target CEO are higher than expected based on earlier literature.

In panel C the firm specific characteristics are shown. There are no substantial deviations in variables between targets and acquirers, except for the acquirers having a larger size on average. The distribution of the variables *CashFlow* and *Q* are in line with the paper of Malmendier and Tate (2008). In this thesis a slightly higher *Q* is found on average, which is almost equal to the average Q found by John et al. (2011).

Panel D reports the summary statistics of the deal control variables. The average transaction value is close to 5.4 billion dollar, which is due to some severe outliers. The median transaction value is close to 825 million dollar. Furthermore, this panel shows that the majority of deals is payed in cash exclusively, are diversifying, friendly, and within the same country.

Panel E reports the descriptive statistics of some additional CEO- an firm specific variables, which are used to construct interaction variables to test the fourth and fifth hypothesis. On average, 72.4% of the total compensation for CEOs appears to be variable compensation. This is slightly higher than the average of 65% by Otto (2014). Regarding this variable there is large dispersion since some CEOs receive no variable compensation while others receive variable compensation only. Furthermore, this panel shows that 66.6% of the firm-year combinations have an independent board. Kolasinksi and Li (2013) find a mean of 73.5% for this variable. *BoardSize* indicates that the average board consists of more than 12 members and *PctOutsiders* shows that 83.9% of the boards have a majority of outside board members.

Table 1: Descriptive Statistics

This table presents the descriptive statistics of the relevant variables in the final dataset of this thesis. The sample period is 2000-2019. The table is divided in 6 panels based on different variable categories. All variables focus on target firms, except for the variables indicated with (AC) that focus on acquirer firms. Panel A shows the descriptive statistics of the overconfidence measure for the target firms as well as for the acquirers. *Holder67* is a dummy variable that equals one if the CEO holds options that are more than 67% in the money at least two times during the sample period (Campbell et al., 2011). *Takeover* is a dummy variable that equals one if a company is involved in an acquisition as a target. Panel B shows the descriptive statistics of CEO characteristics. *Age* is the age of the CEO during the observation. *Tenure* is defined as the amount of years that the CEO is employed at the company. *Female* is a dummy variable that equals one if the CEO is a woman. *StockOwnership* is defined as the percentage of total outstanding shares of the firm that is personally owned by the CEO. *Vested Options* is defined as the amount of exercisable options owned by the CEO divided by the total amount of shares outstanding of the firm. This variable is multiplied by 100 to improve readability. Panel C shows three types of company characteristics for both target and acquirer. *LogSize* is the natural logarithm of the firm's assets. *Q* is calculated as (total assets + (outstanding shares x share price year-end) – equity) / total assets. *CashFlow* is defined as net income plus depreciation and amortizations scaled by assets. Panel D shows the descriptive statistics of the deal controls. *Dealvalue* and *Log(Dealvalue)* are the transaction value and natural logarithm of the transaction respectively. *Payment* is a dummy variable that equals one if the deal is financed with cash exclusively. *Hostile* is a dummy variable that equals one if the deal is a hostile takeover and *Diversification* is a dummy variable that equals one if three digit SIC codes of the target and acquirer differ. Panel E shows the variables that are used to create the interaction variables. *Varcompensation* is defined as the total compensation of a CEO minus the (fixed) salary of the CEO divided by the total compensation. *BoardSize* indicates the amount of members on the companies board. *PctOutsiders* is calculated as the amount of independent board members divided by the total amount of board members. *IndBoard* indicates independent boards, which are classified as boards with 4 to 12 members and a majority of independent directors. Lastly, Panel F shows the three-day and seven-day window cumulative abnormal returns (*CAR)* for both acquirer and target.

Panel A – Overconfidence

	N	Mean	Median	SD	Min.	Max.
Takeover	36,525	0.0196	0	0.139	0	1
Holder67	36,525	0.599	1	0.490	0	1
Holder67 *(AC)*	194	0.577	1	0.495	0	1

Panel B – CEO Controls

	N	Mean	Median	SD	Min.	Max.
Age	35,816	55.890	56	7.433	27	96
Female	36,525	0.032	0	0.176	0	1
Tenure	35,956	7.706	5.507	7.239	0	62.04
VestedOptions	35,994	0.163	0.001	9.501	0	1,204
StockOwnership	27,527	0.026	0.005	0.064	0	1

Panel C – Firm Controls

LogSize	36,274	7.759	7.661	1.814	0.040	15.04
Q	35,564	1.927	1.469	1.827	0.200	151.2
CashFlow	34,479	0.064	0.077	0.481	-33	46.45
LogSize *(AC)*	262	9.431	9.480	1.983	2.407	14.56
Q *(AC)*	256	1.779	1.505	0.954	0.524	6.646
CashFlow *(AC)*	254	0.067	0.082	0.129	-1.032	0.312

Panel D – Deal Controls

	N	Mean	Median	SD	Min.	Max.
Dealvalue (in $ mil.)	715	5,481	827.3	13,914	2.115	145,785
Log(Dealvalue)	715	6.681	6.718	2.194	0.749	11.89
Payment	715	0.741	1	0.438	0	1
Hostile	715	0.0392	0	0.194	0	1
Diversification	715	0.634	1	0.482	0	1
Crossborder	715	0.200	0	0.400	0	1

Panel E – Interactions

	N	Mean	Median	SD	Min.	Max.
BoardSize	30,723	12.43	10	6.490	3	69
IndBoard	30,723	0.666	1	0.472	0	1
PctOutsiders	30,723	0.839	0.875	0.086	0.100	1
VarCompensation	36,275	0.724	0.797	0.225	0	1

Panel F – Returns

	N	Mean	Median	SD	Min.	Max.
CAR [-3,3]	567	0.127	0.1120	0.183	-0.845	1.027
CAR [-1,1]	567	0.125	0.0948	0.161	-0.665	1.011
CAR [-3,3] *(AC)*	164	-0.027	-0.0195	0.079	-0.405	0.172
CAR [-1,1] *(AC)*	164	-0.023	-0.0159	0.073	-0.296	0.186

Lastly, panel F shows the CARs for the target and acquirer over a three-day and seven-day event window. All types of returns show a large dispersion and are on average consistent with the findings documented in earlier literature. For example, Andrade et al. (2001) find a three-day average abnormal announcement return for the acquirer of minus 0.7%, while finding a 16% positive return for the target firm. As shown in panel F, similar returns are documented in the dataset of this thesis. For the acquirer even more negative announcement returns are found compared to earlier literature.

In table A.1, which can be found in the appendix, several additional descriptive statistics are presented. This table presents the mean of several variables for two distinct groups which differ in every panel. Panel A distinguishes observations in whether they are involved in an acquisition as a target or not. Therefore, this panel shows the descriptive statistics of the subsample of the 715 CEO-year combinations that were involved in an acquisition as a target. This panel shows that the mean for *Holder67* is lower for CEOs involved in an acquisition as a

target than for the CEOs not involved in an acquisition. This finding is in line to what is expected based on earlier literature. Furthermore, variables are roughly equal between the groups. Only *Tenure* and *VestedOptions* differ substantially between the groups and have a larger mean for the CEOs not involved in an acquisition. Panel B reports the mean of several variables for overconfident and non-overconfident CEOs separately. Variables are again similarly distributed, with exceptions for *Tenure* and *VestedOptions* which are higher for the overconfident CEOs. That those variables substantially differ between several groups might be due to the high standard deviation of those variables that are reported in table 1. Furthermore, the acquirer CAR seems to be lower for acquisitions that do not involve an overconfident target CEO. To obtain more insight in the relations between several variables in the dataset, the next section provides multiple correlation coefficients.

3.5 Correlation

Table 2 shows the correlation coefficients of several variables in the dataset that are used in this thesis. Panel A contains the cross-correlation coefficients between the overconfidence measure and several CEO control variables. Most of the coefficients are statistically significant and in line with earlier literature. For example, the overconfidence variable is negatively correlated with the female variable. This indicates that females are less likely to be overconfident which is found in the study of Barber and Odean (2001) as well. On the other hand, the correlation between *VarCompensation* and *Holder67* is not in line with the literature. The significant negative correlation suggest that overconfident CEOs receive more variable compensation, while Otto (2014) finds that they receive less variable compensation. Furthermore, the correlation between *StockOwnership* deviates from the relation that is found in the literature. In this thesis a significant and positive correlation is found.

Panel B shows the cross-correlation matrix regarding the firm control variables. The table shows that *Holder67* and *Takeover* are negatively related, suggesting that overconfident CEOs are less likely to be involved in an acquisition as a target. This relation is in line with the expectations that are based on prior research. Furthermore, the correlations of the overconfidence measure with the firm controls are all in line with the correlations found by Malmendier and Tate (2008). The correlations suggest that overconfident CEOs work at firms with higher cashflows and that they often are accompanied by an independent board.

Table 2: Correlation Matrix

This table presents the cross-correlation matrix between several relevant variables in the final dataset of this thesis. The table is divided in 3 panels. Panel A shows the correlation between the overconfidence measure and some CEO characteristics. Panel B shows the correlation between the overconfidence measure and some firm variables. Panel C shows the correlation between the overconfidence measures and several deal control variables. The definition of the variables corresponds with the descriptions given in Table 1. The p-values are presented in the parenthesis (* Significant at 10%; ** significant at 5%; *** significant at 1%).

Panel A – CEO Controls

	Holder67	Age	Tenure	Female	StockOwner.	VestedOptions	VarComp.
Holder67	1.000						
Age	0.089 ***	1.000					
Tenure	0.234 ***	0.418 ***	1.000				
Female	-0.014 ***	-0.042 ***	-0.058 ***	1.000			
StockOwnership	0.093 ***	0.156 ***	0.352 ***	-0.025 ***	1.000		
VestedOptions	0.014 ***	0.015 ***	0.007	-0.002	0.009	1.000	
VarCompensation	0.046 ***	-0.041 ***	-0.102 ***	0.001	-0.235 ***	-0.009 **	1.000

Panel B – Firm Controls

	Holder67	Takeover	LogSize	Q	CashFlow	IndBoard
Takeover	-0.026 ***	1.000				
LogSize	-0.015 ***	0.019 ***	1.000			
Q	0.118 ***	-0.018 ***	-0.198 ***	1.000		
CashFlow	0.038 ***	-0.003	0.034 ***	-0.094 ***	1.000	
IndBoard	0.075 ***	0.005	-0.294 ***	0.015 ***	-0.009	1.000

Panel C – Deal Controls

	Holder67	DealValue	Diversification	Payment	Crossborder	Hostile
DealValue	0.104 ***	1.000				
Diversification	-0.037	-0.237 ***	1.000			
Payment	0.036	-0.469 ***	0.373 ***	1.000		
Crossborder	0.102 ***	0.037	-0.048	0.104 ***	1.000	
Hostile	0.055	0.155 ***	-0.116 ***	-0.095 **	0.007	1.000

Panel C contains the cross-correlation matrix regarding the deal control variables. Several variables have insignificant correlation coefficients. Surprisingly overconfident CEOs are not more often involved in diversifying acquisitions as suggested by Malmendier and Tate (2008). Furthermore, it seems that overconfident CEOs are more often involved in acquisitions with a foreign acquirer. Since the correlation coefficients between two variables do not control for relations with other variables, more sophisticated methods are used in this thesis which will be discussed in the following subsection.

3.6 Methodology

In this subsection, the statistical methods to test the hypotheses are discussed. To test the hypotheses, two types of regressions will be used. In these regressions, several control variables are taken into account. The descriptive statistics of these control variables are discussed in section 3.4. For simplicity *Age, Tenure, Gender, VestedOptions,* and *StockOwnership* are hereafter referred to as *CEO Controls*. The variables *Size, Q,* and *CashFlow* are denominated as *Firm Controls*. Those controls are available for both target and acquirer separately. Lastly, the *Deal Controls* contain the variables *Log(DealValue), Payment, Diversification,* and *Hostile*.

3.6.1 Logistic regressions

The first hypothesis predicts that overconfident CEOs are less likely to be involved in mergers and acquisitions as a target than their non-overconfident counterparts. This hypothesis resembles the first hypothesis that is considered in the paper of Malmendier and Tate (2008), except they are focussing on acquirer CEO overconfidence. Since the hypotheses are similar to a moderate extent, a similar approach is used as well. Therefore, the first hypothesis is tested using a logistic regression. Those regression types are often used to asses to probability of a certain event and when the dependent variable is a binary variable. The logistic model to test this hypothesis is shown in equation (1):

$$PR\{TakeOver_{it} = 1 \mid Holder67_{it}, X_{it}\} = G(\beta_0 + \beta_1\ Holder67_{it} + \beta_x\ X'_{it}) \tag{1}$$

This model assesses the probability of being involved in an acquisition as a target for each firm-year combination. The G denotes the logistic distribution and therefore indicates that this model is a logistic model. The output of the logistic models is not suitable for direct interpretation, but can be transformed to odds ratios. Those odds ratios have a more intuitive interpretations and therefore only the odds ratios are shown for the logistic models in this thesis. The X indicates two of the three control variable groups. The *Deal Controls* are not used in this regressions, since those variables are only available for the firms that were involved in an acquisition. Similar to Malmendier and Tate (2008) these regressions are included with year- and industry fixed effects. The fixed effects control for time trends and differences across industries.

3.6.2 Ordinary Least Squares (OLS) regressions

The second hypothesis predicts that target CEO overconfidence will lead to more negative acquirer announcement returns, while leading to more positive target announcement returns. To test this hypothesis an OLS regression is used, because the dependent variable is no longer binary. The regression conducted to test the second hypothesis is shown in equation (2):

$$CAR[-1,1]_{it} = \alpha + \beta_1\ Holder67_{it} + \beta_x\ X'_{it} + \varepsilon_{it} \tag{2}$$

This regression is estimated for both the target announcement return and the acquirer announcement return, using all three groups of control variables. The three-day window CAR is used as the dependent variable. For robustness purposes this regression is also estimated using the seven-day window CAR of both the acquirer and the target. Furthermore, these regression types are included with year- and industry fixed effects as well.

3.6.3 Extensions to the regressions

 The regression models discussed so far serve as a baseline model in this thesis. For hypotheses three to five exactly the same type of regressions will be used. However, the baseline model for every hypothesis is extended with an additional variable. These additional variables differ for every hypothesis but they are all interaction variables.

To test the third hypothesis, equation (2) is extended with an interaction variable of *Holder67* and *Acquirer Holder67*. This variable is denoted as *HolderInteraction*. In the regressions to test hypothesis three, both target and acquirer CAR are used as the dependent variable.

In order to test the fourth hypothesis, an interaction variable between *VarCompensation* and *Holder67* is constructed. Furthermore, an interaction variable for *IndBoard* and *Holder67* is established to test the fifth hypothesis. For each hypothesis separately, the variables are added to the equations (1) and (2) in order to investigate their influence on the probability of being involved in an acquisition and the target announcement returns respectively.

4. RESULTS

In this section, the results of this thesis are discussed. First, the relation between target CEO overconfidence and M&A activity is investigated. Thereafter, the effect of target CEO overconfidence on the announcement returns of the target firm and the acquirer firm are discussed. Additionally, the influence of coexisting target and acquirer CEO overconfidence on the target and acquirer announcement returns is investigated as well. Lastly, additional insights are given in the relation of overconfidence on M&A intensity and announcement returns, by investigating the influence of variable compensation and independent boards in combination with overconfidence.

4.1 Overconfidence and M&A intensity

In this subsection, the influence of target CEO overconfidence on M&A intensity is investigated. Based on earlier literature, the expectation is that overconfident CEOs tend to be less often involved in mergers and acquisitions as a target than their non-overconfident counterparts. As mentioned in section 2, overconfident managers believe that their company is undervalued and therefore might demand a higher price in negotiations which decreases the probability of deal completion.

The results regarding this hypothesis are shown in table 3. The table presents four logit regressions with *Takeover* as dependent variable. This variable indicates whether a firm in a certain year is involved in an acquisition as a target. The table only shows the odds ratios, since those have a more intuitive interpretation than the coefficients. In the columns (2) – (4) several control variables are taken into account. Furthermore, year- and industry fixed effects are added to the regressions.

In all the columns of table 3, significant odds ratios are found. All the odds ratios are significant at the 1% level and strongest for baseline model that does not include control variables and fixed effects. Nevertheless, the odds ratios remain significant at the 1% level after controlling for several variables and after adding the fixed effects. The odd ratio of 0.798 that is found in column (4) suggests that an overconfident CEO is 0.798 times as likely to be

involved in an acquisition as a target compared to their non-overconfident counterparts. This result is not as strong as found in earlier literature that investigates acquirer overconfidence. In this literature odds ratios of around 1.60 are found (Malmendier and Tate, 2008). The odds ratio for acquirers is above 1 as overconfident CEOs are more likely to be involved in acquisitions as acquirers. Despite finding weaker results for targets, the findings of this thesis confirm the hypothesis that overconfident CEOs are less likely to be involved in an acquisition as a target.

Taking the control variables that are used in the logit regressions into account, several statistical significant relations are found. First, larger firms tend to be more often involved in mergers and acquisitions as a target than smaller firms. This is not in line with the findings of Aktas et al. (2016), who find that larger targets are less often involved in mergers and acquisitions. This would be more intuitive as, in general, larger targets require larger acquirers, resulting in a smaller pool of acquirers when the target becomes bigger. On the other hand, the firm characteristics Q and *CashFlow* are associated with less involvement in acquisitions as a target. Especially the variable *CashFlow* is economically significant. That the likelihood of being involved in an acquisition decreases when Tobin's Q or cashflows increases seems to be reasonable. Firms with higher cashflows are more profitable and will therefore demand a higher offer price which will lead to being involved less often. Additionally, firms with a higher Q are relatively expensive and will therefore be involved less often in mergers and acquisitions as well.

4.2 Overconfidence and announcement returns

In this subsection, the impact of target CEO overconfidence on target and acquirer announcement returns is investigated. As previously mentioned, the stock market reaction is an important indicator to asses whether an acquisition creates shareholder value. Without taking overconfidence into account, the literature has often found positive announcement returns for the target companies and negative returns for acquirers (Andrade et al., 2001). Based on earlier literature, the expectation is that target CEO overconfidence amplifies these reactions as an overconfident target CEO might increase the likelihood of overpaying by the acquirer. CEO target overconfidence might therefore lead to more positive target announcement returns and more negative acquirer announcement returns.

Table 3: M&A Intensity

This table presents four logit regressions with *Takeover* as dependent variable. The output of the regression shows the odds ratios. *Takeover* is a dummy variable that equals one if a company is involved in an acquisition as a target. In columns 2 – 4 Target CEO Controls and Target Firm Controls are included in the regressions. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Target Firm Controls contain *LogSize, Q and CashFlow*. Column 3 includes year fixed-effects and column 4 includes year- and industry fixed effects. The definition of the variables corresponds with the descriptions given in Table 1. In parenthesis the z-statistic of the odds ratios are shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively.

	(1)	(2)	(3)	(4)
Holder67	0.682***	0.785**	0.784**	0.798**
	(-5.061)	(-2.474)	(-2.469)	(-2.252)
Age		1.003	1.005	1.006
		(0.370)	(0.620)	(0.823)
Tenure		0.984*	0.983*	0.984*
		(-1.825)	(-1.871)	(-1.785)
Female		1.149	1.159	1.051
		(0.607)	(0.648)	(0.214)
StockOwnership		0.0628*	0.0429*	0.0301**
		(-1.698)	(-1.876)	(-2.079)
VestedOptions		0.0200	0.0136	0.00931
		(-0.780)	(-0.812)	(-0.872)
LogSize		1.091***	1.104***	1.067**
		(3.310)	(3.586)	(2.149)
Q		0.914**	0.924**	0.921**
		(-2.141)	(-1.960)	(-1.979)
CashFlow		0.654***	0.669***	0.707**
		(-3.341)	(-2.733)	(-2.404)
Constant	0.0247***	0.0149***	0.0190***	0.0366***
	(-68.71)	(-10.06)	(-8.758)	(-4.659)
Observations	36,525	25,268	25,268	24,447
Target CEO Controls	No	Yes	Yes	Yes
Target Firm Controls	No	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes

The results regarding this hypothesis are shown in table 4 and table 5. Table 4 focusses on target announcement returns and presents four ordinary least squares (OLS) regressions with the three-day target CARs as dependent variables.[2] In the columns (2) – (4) several control variables that focus on CEO, target firm, and deal characteristics are taken into account. Furthermore, year- and industry fixed effects are added to the regressions in column (3) and (4).

Contrary to the expectations, table 4 reports negative coefficients for the overconfidence variable. On first sight, this finding suggests that target CEO overconfidence leads to less positive target announcement returns. More specifically, announcements by an overconfident target CEO result in a market reaction that is roughly 150 – 200 basis points lower compared to the announcement by a non-overconfident CEO. However, the coefficients are statistically insignificant and therefore the null hypothesis can not be rejected. Subsequently, the conclusion is that there is no evidence that announcements by an overconfident target CEO leads to more positive or more negative target announcement returns.

Interestingly, there are several control variables that have statistical significant coefficients. The coefficients of *Q* and *LogSize* are negative and significant. This suggests that larger targets experience more negative announcement returns and that a higher Q is related with more negative announcement returns. On the other hand, *Dealvalue* has a positive coefficient. This indicates that announcements of deals with a higher transaction value result in a more positive target announcement return. Despite being statistically relevant, the variables are economically less relevant. To illustrate, the coefficient of *Dealvalue* indicates that when the *Dealvalue* variable increases by 1, the target announcement return increases by roughly 4 percentage points. On first sight this seems economically relevant since an increase of 4 percentage points represents a substantial amount of money. However, since *Dealvalue* is defined as the logarithm of the transaction value, the logarithm has to increase by 1 to induce this stock market reaction. For the median deal in the dataset this means that the transaction value has to increase by roughly 270% to cause a 4% higher return, ceteris paribus.

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[2] In all the OLS-regressions that are used throughout this thesis to test the influence of overconfidence on target (acquirer) announcement returns, the dependent variable is three-day target (acquirer) announcement return. For robustness purposes the seven-day announcement returns are used as dependent variable as well. However, these regressions are not shown in this thesis. The results do not change when the seven-day CARs are used.

Table 5 shows the results that focus on acquirer announcement returns. This table shows five OLS regressions. Column (1) – (4) are identical to the columns in table 4, except table 5 uses the three-day acquirer CAR as dependent variable. In column (5) acquirer firm controls are added. The coefficients of these variables are not shown in the table.

As expected, the table reports mainly negative coefficients for the overconfidence variable. This suggests that target CEO overconfidence has a negative effect on acquirer announcement returns. In the paper of John et al. (2011) the authors show that the market discounts announcements involving overconfident target CEOs by 5 to 63 basis points over a three-day window relative to the average announcement that does not involve an overconfident target CEO. Table 5 reports coefficients of similar magnitude. However, the coefficients are again insignificant, meaning that there is no evidence that announcements by an overconfident target CEO leads to more negative acquirer announcement returns.

Despite the coefficients of the overconfident measure being insignificant, the *Payment* variable does have statistically significant coefficients at the 1% level. The *Payment* variable is a dummy variable that indicates one if the deal is financed with cash exclusively. The coefficients of this variable are positive, indicating that the acquirer announcement return is more positive when the acquirer pays with cash only. More specifically, a deal paid with cash exclusively will generate an acquirer announcement return that is 474 to 637 basis points higher than when the deal is (partly) financed with equity. This finding is in line with earlier research. For example, Malmendier and Tate (2008) find that the market reacts more favourably to cash-only financed deals.

Although not yet discussed, the *Payment* variable has a positive and statistically significant coefficient in table 4 as well. This suggests that the method of payment has influence on both target- and acquirer announcement returns. In table 4, the coefficients are of similar magnitude as the coefficients reported in table 5. Although not shown in the table, an interesting difference between table 4 and table 5 is that the acquirer firm characteristics are not statistically significant related to the acquirer announcement returns, while the target firm characteristics are strongly related with target announcement returns.

Table 4: Target announcement returns

This table presents four OLS regressions with the three-day target CAR as dependent variable. In columns 2 – 4 Target CEO Controls, Target Firm Controls and Deal Controls are included in the regressions. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Target Firm Controls contain *LogSize, Q and CashFlow*. Deal Controls contain *Log(DealValue), Diversification, Hostile* and *Payment*. The definition of the variables corresponds with the descriptions given in Table 1. Column 3 includes year fixed-effects and column 4 includes year- and industry fixed effects. In parenthesis, the t-statistic of the coefficients is shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively.

	(1)	(2)	(3)	(4)
Holder67	0.0009	-0.0159	-0.0220	-0.0185
	(0.0666)	(-0.985)	(-1.281)	(-1.014)
Age		0.0001	0.0011	0.0017
		(0.0698)	(0.969)	(1.235)
Tenure		0.0022*	0.0020	0.0011
		(1.698)	(1.468)	(0.746)
Female		-0.0590	-0.0698*	-0.0737*
		(-1.532)	(-1.788)	(-1.813)
StockOwnership		-0.1580	-0.206	-0.107
		(-1.014)	(-1.326)	(-0.461)
VestedOptions		-0.371	-0.213	0.497
		(-0.499)	(-0.286)	(0.559)
LogSize		-0.0428***	-0.0449***	-0.0460***
		(-6.940)	(-6.889)	(-6.642)
Q		-0.0248***	-0.0254***	-0.0229***
		(-3.557)	(-3.583)	(-2.835)
CashFlow		-0.0789	-0.1040	-0.0814
		(-1.044)	(-1.440)	(-1.217)
DealValue		0.0384***	0.0440***	0.0469***
		(7.351)	(7.976)	(7.337)
Payment		0.0274	0.0433**	0.0559**
		(1.364)	(1.997)	(2.534)
Hostile		0.0289	0.0035	-0.0009
		(0.929)	(0.108)	(-0.0256)
Diversification		-0.0040	-0.0054	-0.0141
		(-0.225)	(-0.296)	(-0.774)
Constant	0.125***	0.237***	0.0869	-0.0131
	(11.45)	(3.068)	(0.928)	(-0.124)
Observations	567	414	414	414
R-squared	0.000	0.159	0.226	0.364
Target CEO Controls	No	Yes	Yes	Yes
Target Firm Controls	No	Yes	Yes	Yes
Deal Controls	No	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes

Table 5: Acquirer announcement returns

This table presents five OLS regressions with the three-day acquirer CAR as dependent variable. In columns 2 – 5 Target CEO Controls, Target Firm Controls and Deal Controls are included in the regressions. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Target Firm Controls contain *LogSize, Q and CashFlow*. Deal Controls contain *Log(DealValue), Diversification, Hostile* and *Payment*. Column 3-5 include year fixed-effects and column 4-5 include industry fixed effects as well. In column 5 Acquirer Firm Controls are included, but are not shown in the table. Acquirer Firm Controls contain the same variables as Target Firm Controls but for acquirers. The definition of the variables corresponds with the descriptions given in Table 1. . In parenthesis, the t-statistic of the coefficients are shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively.

	(1)	(2)	(3)	(4)	(5)
Holder67	0.0158	0.0034	-0.0032	-0.0081	-0.0075
	(1.388)	(0.298)	(-0.278)	(-0.633)	(-0.525)
Age		-0.0008	-0.0013	-0.0022*	-0.0026*
		(-0.764)	(-1.231)	(-1.767)	(-1.917)
Tenure		0.0010	0.0014	0.0018	0.0023
		(0.848)	(1.045)	(1.171)	(1.391)
Female		0.0003	-0.0020	-0.0098	-0.0110
		(0.0168)	(-0.0983)	(-0.366)	(-0.379)
StockOwnership		0.167	0.0385	0.408	0.368
		(0.521)	(0.107)	(0.875)	(0.748)
VestedOptions		-0.106	-0.189	-0.376	-0.427
		(-0.132)	(-0.218)	(-0.324)	(-0.338)
LogSize		0.0061	0.0065	-0.0046	-0.0007
		(1.357)	(1.195)	(-0.579)	(-0.0691)
Q		0.0108**	0.0107**	0.0069	0.0094
		(2.522)	(2.529)	(1.057)	(1.085)
CashFlow		0.0159	0.0284	0.0467	0.0470
		(0.506)	(0.729)	(0.897)	(0.849)
DealValue		-0.0064*	-0.0083	0.0034	0.0016
		(-1.714)	(-1.600)	(0.467)	(0.210)
Payment		0.0502***	0.0474***	0.0624***	0.0637***
		(3.994)	(3.132)	(3.011)	(2.907)
Hostile		0.0122	0.0230	-0.0165	-0.0185
		(0.512)	(0.949)	(-0.547)	(-0.592)
Diversification		0.0098	0.0148	0.0235*	0.0251*
		(0.872)	(1.150)	(1.671)	(1.710)
Constant	-0.0310***	-0.0372	-0.0149	0.0408	0.0654
	(-3.786)	(-0.497)	(-0.183)	(0.425)	(0.591)
Observations	164	147	147	147	144
R-squared	0.012	0.214	0.343	0.538	0.545
Target CEO Controls	No	Yes	Yes	Yes	Yes
Target Firm Controls	No	Yes	Yes	Yes	Yes
Deal Controls	No	Yes	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes	Yes
Acquirer Firm Controls	No	No	No	No	Yes

4.3 Coexisting overconfidence

In this subsection, the impact of the coexistence of target CEO overconfidence and acquirer CEO overconfidence on announcement returns is investigated. The simultaneous combination of target- and acquirer CEO overconfidence is expected to cause a more negative acquirer announcement return and a more positive target announcement return.

Table 6 shows the results. In panel A, the announcement returns of the targets are considered. All regressions contain an interaction variable between target overconfidence (*Holder67*) and acquirer overconfidence (*Holder67AC*), which is denoted as *HolderInteraction*. The coefficients of the interaction variable are ambiguous as in column (1) – (3) the coefficients are negative and in column (4) the coefficient is positive. None of the coefficients in panel A is significant and therefore the conclusion is that coexistence of target- and acquirer overconfidence does not cause a more positive target announcement return.

In panel B, the coefficients of the interaction variable are less ambiguous as all coefficients are negative. The coefficient in column (3) is even statistically significant at the 10% level and suggests that when both CEOs are overconfident, the acquirer announcement return is almost 4.5 percentage points lower. The negative coefficient is in line with earlier literature that finds that the acquirer announcement returns becomes more negative when both the acquirer and target CEO are overconfident. In the paper of John et al. (2011), a negative abnormal return of more than 10 percentage points is found when both CEOs are overconfident. However, after incorporating industry fixed effects in column (4) the coefficient becomes insignificant in this thesis. Nevertheless, the coefficient remains close to significance at the 10% level.

An important difference with the paper of John et al. (2011) is the high R-squared of the regressions in table 6. A potential explanation is the limited amount of observations that is used in this thesis and especially in table 6. This table only uses 140 observations, while in the paper of John et al. (2011) almost 1,500 observations are used to investigate a similar relation.

Table 6: Coexisting overconfidence and announcement returns

This table presents eight different OLS regressions. In panel A, the dependent variable is the three-day target CAR. In panel B the dependent variable is the three-day acquirer CAR. Panel C shows the shared specification of the regression in the corresponding columns. All regressions contain an interaction variable between target overconfidence (*Holder67*) and acquirer overconfidence (*Holder67AC*), which is denoted as *HolderInteraction*. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Acquirer CEO Controls contain the same variables, but for acquirers. Target Firm Controls contain *LogSize, Q and CashFlow*. Acquirer Firm Controls contain the same variables, but for acquirers. Deal Controls contain *Log(DealValue), Diversification, Hostile* and *Payment*. The definition of the variables corresponds with the descriptions given in Table 1. In the table the coefficients of the control variables are not shown. Column 3 includes year fixed-effects and column 4 includes year- and industry fixed effects. In parenthesis, the t-statistic of the coefficients is shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively.

Panel A – Target CAR	(1)	(2)	(3)	(4)
Holder67	-0.0030	-0.0328	-0.0139	-0.0771
	(-0.0775)	(-0.901)	(-0.302)	(-1.218)
Holder67AC	0.0133	0.0245	0.0566	0.0311
	(0.292)	(0.511)	(1.095)	(0.455)
HolderInteraction	-0.0434	-0.0314	-0.0805	0.0200
	(-0.803)	(-0.609)	(-1.366)	(0.265)
Constant	0.175***	-0.153	-0.325	-0.591*
	(5.275)	(-0.677)	(-1.069)	(-1.727)
Observations	163	140	140	140
R-squared	0.010	0.269	0.425	0.620
Target Firm Controls	No	Yes	Yes	Yes

Panel B – Acquirer CAR	(1)	(2)	(3)	(4)
Holder67	0.0306*	0.0218	0.0215	0.0236
	(1.786)	(1.136)	(1.139)	(1.057)
Holder67AC	0.0252	0.0262	0.0239	0.0104
	(1.501)	(1.355)	(1.457)	(0.471)
HolderInteraction	-0.0241	-0.0276	-0.0438*	-0.0464
	(-1.048)	(-1.114)	(-1.717)	(-1.511)
Constant	-0.0464***	-0.117	-0.0843	0.0457
	(-3.481)	(-1.305)	(-0.897)	(0.360)
Observations	164	145	145	145
R-squared	0.026	0.223	0.390	0.578
Acquirer Firm Controls	No	Yes	Yes	Yes

Panel C – Shared specification	(1)	(2)	(3)	(4)
Target CEO Controls	No	Yes	Yes	Yes
Acquirer CEO Controls	No	Yes	Yes	Yes
Deal Controls	No	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes

4.4 Overconfidence and variable compensation

In this subsection, the effect of variable compensation for overconfident target CEOs on M&A intensity and target announcement returns is investigated. Some academics argue that compensating overconfident CEOs with stock options is unnecessary and can even hurt shareholders because variable compensation encourages overconfident CEOs to take excessive risks (Gervais et al., 2003). Therefore, the expectation is that higher proportions of variable compensation for overconfident CEOs might lead to an increase in M&A activity and lower target announcement returns.

The results regarding this hypothesis are shown in tables 7 and 8. First, table 7 presents four logit regressions with *Takeover* as dependent variable, which indicates whether a firm in a certain year is involved in an acquisition as a target. All regressions contain an interaction variable between target overconfidence (*Holder67*) and variable compensation (*VarCompensation*), which is denoted as (*Holder67*VarComp*). The table only shows the odds ratios, since those have a more intuitive interpretation than the coefficients. In the columns (2) – (4), several control variables are taken into account. Furthermore, year- and industry fixed effects are added to the regressions.

In all the columns of table 7, the interaction variable has an odds ratio above 1, which indicates that overconfident CEOs receiving a high proportion of variable compensation indeed tend to be more often involved in mergers and acquisitions as a target than overconfident CEOs that receive lower proportions of variable compensation. However, the odds ratios are insignificant after controlling for several variables and after adding the fixed effects. Therefore, it can not be concluded that higher proportions of variable compensation for overconfident target CEOs lead to higher M&A intensity. Furthermore, the coefficients of the control variables do not show major deviations in sign or significance compared to the coefficients reported in table 3.

In table 8 four OLS regressions with the three-day target CAR as dependent variable are shown. The interaction variable has a positive coefficient in all four columns, which is against the expectations. This result suggests that higher proportions of variable compensation for overconfident target CEOs might lead to higher target announcement returns instead of

Table 7: Variable compensation and M&A intensity

This table presents four logit regressions with *Takeover* as dependent variable. The output of the regression shows the odds ratios. *Takeover* is a dummy variable that equals one if a company is involved in an acquisition as a target. All regressions contain an interaction variable between target overconfidence (*Holder67*) and variable compensation (*VarCompensation*), which is denoted as (*Holder67*VarComp*). In columns 2 – 4 Target CEO Controls and Target Firm Controls are included in the regressions. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Target Firm Controls contain *LogSize, Q and CashFlow*. Column 3 includes year fixed-effects and column 4 includes year- and industry fixed effects. The definition of the variables corresponds with the descriptions given in Table 1. In parenthesis, the z-statistic of the odds ratios are shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively

	(1)	(2)	(3)	(4)
Holder67	0.412***	0.516**	0.535*	0.567*
	(-3.448)	(-2.027)	(-1.905)	(-1.735)
Holder67*VarComp	2.081**	1.824	1.723	1.624
	(2.122)	(1.412)	(1.269)	(1.137)
VarCompensation	0.544***	0.516**	0.562*	0.607
	(-2.658)	(-2.091)	(-1.816)	(-1.548)
Age		1.002	1.004	1.006
		(0.317)	(0.560)	(0.795)
Tenure		0.983**	0.982**	0.983*
		(-1.964)	(-1.991)	(-1.894)
Female		1.142	1.152	1.048
		(0.583)	(0.620)	(0.201)
StockOwnership		0.0606*	0.0443*	0.0317**
		(-1.702)	(-1.850)	(-2.051)
VestedOptions		0.0243	0.0190	0.0118
		(-0.735)	(-0.746)	(-0.819)
LogSize		1.111***	1.119***	1.083**
		(3.636)	(3.811)	(2.412)
Q		0.926*	0.934*	0.928*
		(-1.884)	(-1.759)	(-1.830)
CashFlow		0.673***	0.687**	0.720**
		(-3.040)	(-2.505)	(-2.210)
Constant	0.0377***	0.0207***	0.0243***	0.0441***
	(-19.90)	(-8.681)	(-7.686)	(-4.249)
Observations	36,275	25,158	25,158	24,340
Target CEO Controls	No	Yes	Yes	Yes
Target Firm Controls	No	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes

Table 8: Variable compensation and target announcement returns

This table presents four OLS regressions with the three-day target CAR as dependent variable. All regressions contain an interaction variable between target overconfidence (*Holder67*) and variable compensation (*VarCompensation)*, which is denoted as *(Holder67*VarComp)*. In columns 2 – 4 Target CEO Controls, Target Firm Controls and Deal Controls are included in the regressions. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Target Firm Controls contain *LogSize, Q and CashFlow*. Deal Controls contain *Log(DealValue), Diversification, Hostile* and *Payment*. Column 3 includes year fixed-effects and column 4 includes year- and industry fixed effects. The coefficients of the control variables are not shown in the table. The definition of the variables corresponds with the descriptions given in Table 1. In parenthesis, the t-statistic of the coefficients is shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively.

	(1)	(2)	(3)	(4)
Holder67	-0.0150	-0.0513	-0.0668	-0.0587
	(-0.328)	(-0.816)	(-0.967)	(-0.791)
Holder67*VarComp	0.0196	0.0462	0.0598	0.0549
	(0.327)	(0.583)	(0.701)	(0.590)
VarCompensation	0.0314	0.0060	-0.0041	0.0087
	(0.653)	(0.0859)	(-0.0576)	(0.115)
Constant	0.103***	0.229***	0.0868	-0.0104
	(2.780)	(2.770)	(0.903)	(-0.0961)
Observations	565	413	413	413
R-squared	0.003	0.161	0.228	0.366
Target CEO Controls	No	Yes	Yes	Yes
Target Firm Controls	No	Yes	Yes	Yes
Deal Controls	No	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes

lower target announcement returns. Therefore, it could be beneficial for the shareholders to encourage risk taking of overconfident CEOs as their (excessive) risk taking seems to pay off. However, the coefficients are shown to be insignificant and therefore it can not be concluded that higher proportions of variable compensation for overconfident target CEOs leads to more positive or more negative target announcement returns. Despite not being reported, the coefficients of the control variables do not change substantially sign and significance compared to the coefficients reported in table 4.

4.5 Overconfidence and independent boards

In this subsection, the effect of an independent board in combination with an overconfident target CEO on M&A intensity and target announcement returns is investigated. In the paper of Kolasinksi and Li (2013), the authors find that independent boards reduce the likelihood of conducting an acquisition when the acquirer CEO is overconfident. Therefore, strong and independent boards seem able to control and advise the CEO and help him by avoiding making 'honest' mistakes (Kolasinski & Li, 2013). Subsequently, the expectation is that an independent board reduces the likelihood for an overconfident CEO of being involved in a merger or acquisition and that target announcement returns are more positive.

The results regarding this hypothesis are shown in tables 9 and 10. The tables are similar to tables 7 and 8 respectively, with the only difference that another interaction variable is used. In tables 9 and 10, an interaction variable between target overconfidence (*Holder67)* and a variable that indicates an independent board (*IndBoard)* is constructed which is denoted as (*Holder67*IndBoard)*.

Table 9 presents the logit regressions with odds ratios below 1, which indicates that overconfident CEOs with an independent board by their side are indeed involved less often in mergers and acquisitions than a target than overconfident CEOs that are not accompanied by an independent board. However, the odds ratios are again insignificant, even before controlling for several variable and adding fixed effects. Therefore, it cannot be concluded that an independent board curbs the overconfident CEO, leading to less acquisitions.

In table 10, the OLS regressions are presented. The coefficients of the interaction variable are positive which suggests that an independent board cooperating with an overconfident CEO indeed leads to higher target announcement returns. However, the coefficients are again insignificant. Therefore, an independent board does not seem to have an effect on the overconfident CEO. Furthermore, the coefficients of the control variables do not change substantially in sign and significance compared to the coefficients reported in table 4.

Table 9: Independent boards and M&A intensity

This table presents four logit regressions with *Takeover* as dependent variable. The output of the regression shows the odds ratios. *Takeover* is a dummy variable that equals one if a company is involved in an acquisition as a target. All regressions contain an interaction variable between target overconfidence (*Holder67*) and the variable that indicates a independent board (*IndBoard*), which is denoted as *Holder67*IndBoard*. In columns 2 – 4 Target CEO Controls and Target Firm Controls are included in the regressions. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Target Firm Controls contain *LogSize, Q and CashFlow*. Column 3 includes year fixed-effects and column 4 includes year- and industry fixed effects. The definition of the variables corresponds with the descriptions given in Table 1. In parenthesis, the z-statistic of the odds ratios are shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively

	(1)	(2)	(3)	(4)
Holder67	0.973	1.136	1.105	1.060
	(-0.167)	(0.645)	(0.503)	(0.293)
Holder67*IndBoard	0.758	0.731	0.737	0.801
	(-1.399)	(-1.338)	(-1.306)	(-0.942)
IndBoard	1.290*	1.372*	1.355	1.354
	(1.728)	(1.688)	(1.611)	(1.601)
Age		1.004	1.006	1.007
		(0.440)	(0.644)	(0.742)
Tenure		0.984	0.984	0.987
		(-1.533)	(-1.478)	(-1.160)
Female		1.032	1.020	0.867
		(0.113)	(0.0723)	(-0.513)
StockOwnership		0.0575	0.0548	0.0278*
		(-1.383)	(-1.444)	(-1.766)
VestedOptions		1.006	2.437	0.916
		(0.000989)	(0.156)	(-0.0149)
LogSize		1.123***	1.132***	1.110***
		(3.370)	(3.508)	(2.789)
Q		0.894**	0.909*	0.889*
		(-1.963)	(-1.738)	(-1.945)
CashFlow		0.305***	0.317***	0.355***
		(-3.928)	(-4.484)	(-4.292)
Constant	0.0154***	0.0071***	0.0039***	0.0066***
	(-34.41)	(-9.459)	(-7.682)	(-5.246)
Observations	30,723	22,432	22,432	20,656
Target CEO Controls	No	Yes	Yes	Yes
Target Firm Controls	No	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes

Table 10: Independent boards and target announcement returns

This table presents four OLS regressions with the three-day target CAR as dependent variable. All regressions contain an interaction variable between target overconfidence (*Holder67*) and the variable that indicates a independent board (*IndBoard)*, which is denoted as *Holder67*IndBoard*. In columns 2 – 4 Target CEO Controls, Target Firm Controls and Deal Controls are included in the regressions. Target CEO Controls contain *Age, Tenure, Female, VestedOptions and StockOwnership*. Target Firm Controls contain *LogSize, Q and CashFlow*. Deal Controls contain *Log(DealValue), Diversification, Hostile* and *Payment*. Column 3 includes year fixed-effects and column 4 includes year- and industry fixed effects. The coefficients of the control variables are not shown in the table. The definition of the variables corresponds with the descriptions given in Table 1. In parenthesis, the t-statistic of the coefficients is shown, with significance levels at 10%, 5% and 1% level indicated with *, ** and *** respectively.

	(1)	(2)	(3)	(4)
Holder67	-0.0226	-0.0328	-0.0310	-0.0466
	(-0.716)	(-1.018)	(-0.901)	(-1.149)
Holder67*IndBoard	0.0188	0.0263	0.0122	0.0527
	(0.515)	(0.660)	(0.289)	(1.078)
IndBoard	-0.0145	-0.0239	-0.0231	-0.0639
	(-0.490)	(-0.626)	(-0.597)	(-1.460)
Constant	0.132***	0.256**	0.334**	0.293*
	(5.140)	(2.508)	(2.486)	(1.824)
Observations	401	309	309	309
R-squared	0.002	0.216	0.289	0.455
Target CEO Controls	No	Yes	Yes	Yes
Target Firm Controls	No	Yes	Yes	Yes
Deal Controls	No	Yes	Yes	Yes
Year Fixed-Effects	No	No	Yes	Yes
Industry Fixed-Effects	No	No	No	Yes

5. DISCUSSION

In this section, the main limitations and concerns throughout this thesis are discussed. Those limitations and concerns mainly focus on the overconfidence measure that is used in this thesis, since a good measure that captures overconfidence is vital.

An important limitation of this thesis is that the overconfidence measure does not capture overconfidence directly, but that an indirect quantitative measure is used. As already mentioned, this quantitative measure is based on stock option exercise behaviour. Malmendier and Tate (2008) are the first to implement this measure and classify CEOs as overconfident if they hold stock options that are more than 67% in the money. In this thesis, the overconfidence measure by Malmendier and Tate (2008) is mimicked as the option-grant-specific exercise prices are not available in the accessible databases. A drawback of this mimicked measure is that it is less accurate as it estimates the average exercise price (Campbell et al., 2011). Nevertheless, this mimicked measure appears to be quite similar to the original measure based on several validation tests performed by Campbell et al. (2011).[3] This finding validates the use of this measure in this thesis.

Nonetheless, there are several other drawbacks of the overconfidence measure that is used in this thesis. As Malmendier and Tate (2008) argue, there are multiple reasons for not exercising options that are highly in-the-money. Examples of those alternative explanations are postponing taxes and dividends, pressure from the board or investors, and CEO-specific preferences. Regarding the pressure from the board, the board of directors could expect the CEO to not exercise his stock options in order to keep incentives aligned or to signal high quality of their stocks to the market. In order to mitigate these concerns, Malmendier and Tate (2008) as well as Campbell et al. (2011) emphasize the importance of the use of several control variables in the regressions. By adding fixed effects to the regressions and controlling for several firm- and CEO specific characteristics such as age, tenure, and cashflow, concerns about the noisiness of the overconfidence measure are minimalized as much as possible in this thesis. Other, more sophisticated, tests that the authors use to tighten the interpretation of the CEO

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[3] These validation tests include the replication of the results by Malmendier and Tate (2008) and a comparison to the qualitative measure that is discussed later in this section. This qualitative measure is based on press portrayal (Malmendier and Tate, 2008).

behaviour that is shown in this thesis, are outside the scope of this thesis and impossible to replicate due to time constraints and unavailability of data.

Another concern that is inherent to the use of a stock option based measure is the dependence on the stock price when calculating the option moneyness. When stock prices are temporarily extremely high or low, it can lead to a false classification. This is mainly a problem that arises due to the use of the measure of Campbell et al. (2011) instead of Malmendier and Tate (2008), since the former estimates the average exercise price. A potential solution to control for such false classification would be a qualitative measure. In the paper of Malmendier and Tate (2008), a direct qualitative measure is used next to the quantitative measure. As the authors argue, a direct measure would allow for comparison and evaluation of the indirect measure and therefore mitigate the concerns of a false classification by the stock option based measure even more. The qualitative measure that Malmendier and Tate (2008) use for this evaluation is based on press portrayal in prominent business publications. In their paper, the authors find similar results for both the overconfidence measures. This finding provides evidence for the quantitative measure to be able to capture overconfidence despite measuring it indirectly. Furthermore, the findings suggest that it is overconfidence influencing corporate investment decisions and not an omitted firm effect (Malmendier & Tate, 2008). Unfortunately, the construction of a similar qualitative measure in this thesis is impossible due to time constrains and data unavailability. Therefore, it remains unknown whether the quantitative measure in this thesis captures overconfidence as good as Malmendier and Tate (2008) suggest. Nevertheless, their findings and the widespread use of this quantitative measure in the literature validates the use of this measure in this thesis.

As mentioned before, several control variables are used in the models of this thesis in order to capture the effect of other variables than overconfidence that have an effect on the respective dependent variables. These control variables are mainly based on earlier literature that investigates the influence of overconfidence on corporate decisions. However, several control variables are based on the paper of Dessaint et al. (2019) as well. This paper gives a comprehensive overview of several variables that influence announcement returns in mergers and acquisitions. The control variables from this paper mainly contain deal characteristics.

Examples of such variables are variables that identify toeholds, tender offers, target defence mechanisms, or multiple bidders. Some of these variables are not commonly used in the overconfidence literature and are therefore not used in this thesis. This could be seen as a limitation as those variables proved their importance in other papers. Nevertheless, another reason for not implementing these variables is the limited amount of observations in this thesis. In order to get reasonable estimates in the regression analyses, there have to be enough observations relative to the amount of variables in the model to capture variations across the observations (Tabachnick & Fidell, 2007). Since for some regressions the observations are limited, the models should not contain to much variables. For this reason, not all variables are included in the regressions, but only those that seemed of importance based on overconfidence literature.

Important to note is that the limited amount of observations is mainly due to the requirement of a firm to be available in the Execucomp database. This database is needed to construct the overconfidence measure on CEO level and only contains firms that are included in the S&P 1500 index. Therefore, only the largest public U.S. firms are considered in this thesis. In the next section several suggestions for further research are given, which are often related to the limitations discussed in this section.

6. CONCLUSION

In this section, the conclusions of this thesis are discussed. The aim of this thesis is to examine the influence of target CEO overconfidence on mergers and acquisitions. More specifically, this thesis investigates whether overconfident CEOs are less often involved in acquisitions as a target than their non-overconfident counterparts. Furthermore, the differences in stock market reaction between the announcement of overconfident and non-overconfident target CEOs are taken into account. Additionally, this thesis investigates the influence of an overconfident target CEO on both target and acquirer announcement returns. Moreover, the effect of coexisting target and acquirer CEO overconfidence on those announcement returns is investigated as well. Lastly, the influence of variable compensation and independent boards on an overconfident CEOs firm M&A activity and announcement returns is examined.

The sample of this thesis contains 36,525 firm-year combinations for which an overconfidence measure is constructed. Only 715 (1.96%) of the observations are involved in an acquisition as a target during the sample period of 2000-2019. The overconfidence measure is based on stock option exercise behaviour and classifies CEOs as overconfident if they hold options that are more than 67% in the money. Using a 100% cut-off instead of a 67% cut-off does not lead to results that are more in line with the defined hypothesis, despite the fact that Campbell et al (2011) argue that using the 100% cut-off will only capture the most overconfident CEOs. The cumulative abnormal returns are evaluated using a three-day window. The results are robust for using the seven-day window. Furthermore, several control variables are used in the regressions that capture firm-, CEO- or deal characteristics.

First, this thesis provides evidence that overconfident CEOs are less often involved in mergers and acquisitions as a target than their non-overconfident counterparts. More specifically, an overconfident CEO is 0.798 times as likely to be involved in an acquisition as a target compared to a non-overconfident CEO. This result is significant at the 1% level after controlling for several variables, but the results are not as strong as found for acquirers in the opposite direction in earlier literature (Malmendier and Tate, 2008).

The results regarding the announcement returns differ from the expectations based on earlier literature. Target CEO overconfidence is expected to cause more positive target announcement returns and more negative acquirer announcement returns. Nevertheless, announcements by an overconfident CEO result in a market reaction for the target firm that is roughly 150 – 200 basis points lower compared to the announcement by a non-overconfident CEO. However, the coefficients are statistically insignificant and therefore it can not be concluded that that announcement of an overconfident CEO lead to more positive target announcement returns. Regarding the acquirer announcement returns, a negative relation is found as well. However, the coefficients are insignificant again and therefore it can not be concluded that announcements by an overconfident target CEOs lead to more negative acquirer announcement returns either.

In the cases that target CEO overconfidence and acquirer CEO overconfidence coexist, the expectation is that stock markets react more extremely. With respect to the target announcement returns, the sign of the effect of coexisting overconfidence differs across the models. Since the models are inconclusive and provide insignificant coefficients, it can not be concluded that coexistence causes a more positive target announcement return. Regarding the acquirer announcement returns, a strong and significant reaction is found. When both CEOs are overconfident, the acquirer announcement return is almost 4.5 percentage points lower. However, after incorporating industry fixed effects this result becomes insignificant. Therefore, the conclusion is that coexisting overconfidence does not cause stronger stock market reactions.

After investigating the influence of overconfidence on M&A intensity and announcement returns, this thesis takes two types of corporate governance into account which might have influence on the earlier defined relations. First, the influence of variable compensation for overconfident CEOs is considered. The expectation is that higher proportions of variable compensation for overconfident CEOs might lead to an increase in M&A activity and lower target announcement returns. The results show that overconfident CEOs receiving a higher proportion of variable compensation indeed tend to be more often involved in mergers and acquisitions as a target than overconfident CEOs that receive lower proportions of variable compensation. However, the coefficients are insignificant as well and therefore it can not be concluded that higher variable compensation for overconfident CEOs leads to more involvement in acquisitions. Regarding the announcement returns, the coefficients point at the opposite direction as expected, but unfortunately neither significant results are obtained.

Lastly, the influence of an independent board in firms with an overconfident CEO on the involvement in acquisitions and target announcement returns is investigated. The expectation is that independent boards in firms with an overconfident CEO will decrease the likelihood of being involved in a merger or acquisition as a target and will lead to more positive target announcement returns. The results of this thesis are in line with those expectations since less involvement and higher target announcement returns are found. However, all coefficients are insignificant and therefore it cannot be concluded that an independent board in firms with an overconfident CEO have an effect on M&A intensity or target announcement returns.

Since most of the results that are obtained in this thesis are insignificant, it is difficult to provide conclusive implications for firms or policy makers. A significant result that is obtained in this thesis, is that overconfident CEOs are less often involved in an acquisition as a target. Therefore, appointing such a CEO would decrease the likelihood of the company being taken over. On the other hand, earlier research argues that overconfident CEOs are more acquisitiveness themselves which could result in being more involved in acquisitions as an acquirer (Malmendier & Tate, 2008). However, most interesting for firms would be to gain insight in the influence of variable compensation and independent boards, since firms have direct influence on these governance mechanisms. Despite the results regarding the corporate governance mechanisms being mainly pointing in the expected direction, all results are insignificant. Therefore, further research on the influence of these corporate governance mechanisms is recommended.

Other recommendations for further research focus on the vital part of this thesis: the overconfidence measure. In most of the research regarding CEO overconfidence, the stock option based measure from Malmendier and Tate (2008) is used. However, recent literature suggests other methods to measure overconfidence. One of these measures uses earnings forecasts, which are available in the IBES databases, to capture overconfidence. More specifically, the measure captures overconfidence by determining the fraction of EPS forecasts that exceeded the ex post realized EPS. This measure is based on the idea that overconfident CEOs overestimate the future performance of the firm and therefore are more likely to announce inflated forecasts than their non-overconfident counterparts (Otto, 2014). In the paper of Otto (2014) this measure is used to investigate the influence of overconfidence on compensation schemes, but this measure is suitable to be used in an M&A context as well.

Furthermore, most of the overconfidence literature focusses on the overconfidence dimension related to over-optimism or better-than-average effect. The other dimension of overconfidence, over-precision, is relatively unexplored in the literature. This is mainly due to the difficulty of constructing a measure that captures over-precision. Nevertheless, Huang et al. (2017) managed to construct a quantitative measure using earnings forecasts. By using this measure in an M&A context, additional insights could be obtained of the role of the two distinct dimension of overconfidence on acquisitiveness and announcement returns.

Another recommendation for further research focusses on the way of measuring value-creation. In most of the overconfident studies, the short-term announcement returns are investigated to conclude whether an acquisition creates value for the shareholders (Malmendier & Tate, 2008). Nevertheless, it could be that the acquisition creates value particularly in the long-run. Therefore, it would be interesting to investigate the long-run buy-and-hold returns for both acquirers and targets. Lastly, further research could focus on other regions since most of the research focusses on U.S. stock markets due to data availability. Examining whether the relations found in earlier literature hold in other stock markets as well, would be an important contribution to the current literature.

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8. APPENDIX

Table A.1: Descriptive Statistics by Group

This table presents the number of observations and mean of several variables in the final dataset of this thesis grouped by two different variables. Panel A shows the statistics for firms involved in a acquisition (*Takeover* =1) and those not involved in an acquisition (*Takeover* =0). Panel B shows the cumulative abnormal returns (*CAR)* for a three-day and seven-day event window for the firms with an overconfident CEO (*Holder67*=1) and with a non-overconfident CEO (*Holder67*=0). *Holder67* is a dummy variable that equals one if the CEO holds options that are more than 67% in the money at least two times during the sample period (Campbell et al., 2011). *Age* is the age of the CEO during the observation. *Tenure* is defined as the amount of years that the CEO is employed at the company. *Female* is a dummy variable that equals one if the CEO is a woman. *StockOwnership* is defined as the percentage of total outstanding shares of the firm that is personally owned by the CEO. *Vested Options* is defined as the amount of exercisable options owned by the CEO divided by the total amount of shares outstanding of the firm. *LogSize* is the natural logarithm of the firm's assets. *Q* is calculated as (total assets + (outstanding shares x share price year-end) – equity) / total assets. *CashFlow* is defined as net income plus depreciation and amortizations scaled by assets.

Panel A – Grouped by Takeover

	(Takeover = 1)		(Takeover = 0)	
	N	Mean	N	Mean
Holder67	715	0.506	35,810	0.601
Age	692	55.75	35,124	55.89
Female	715	0.034	35,810	0.032
Tenure	698	6.660	35,258	7.726
VestedOptions	689	0.001	35,305	0.166
StockOwnership	542	0.016	26,985	0.025
LogSize	693	8.000	35,581	7.754
Q	689	1.691	34,875	1.931
CashFlow	666	0.053	33,813	0.065

Panel B – Grouped by Holder67

	(Holder67 = 1)		(Holder67 = 0)	
	N	Mean	N	Mean
Target – CAR [-1,1]	296	0.126	271	0.125
Acquirer – CAR [-1,1]	79	-0.015	85	-0.031
Age	21,645	56.42	14,171	55.07
Female	21,867	0.030	14,658	0.035
Tenure	21,532	9.092	14,424	5.635
VestedOptions	21,399	0.273	14,595	0.001
StockOwnership	17,587	0.030	9,940	0.018
LogSize	21,648	7.737	14,626	7.792
Q	21,003	2.106	14,561	1.669
CashFlow	20,477	0.079	14,002	0.042