

**Nijmegen School of Management  
Radboud Universiteit**

Master Economics  
*Corporate Finance and Control*

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**The role of CEO overconfidence in failed  
Mergers and Acquisitions**

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**Abstract**

This study examines the influence of CEO overconfidence on M&A activity. The effect of CEO overconfidence on acquisitiveness as well as the effect of CEO overconfidence on the probability of failure of attempted mergers and acquisitions is studied. Previous studies show that overconfident CEOs are more likely to initiate mergers or acquisitions, especially when abundant internal resources are available. However, those studies have limited data and incorporate a short time frame. The availability of resources plays an important role in overconfidence as this enables CEOs to make decisions by themselves and thereby passing other corporate governance mechanisms. By using a larger data set and analyzing a larger period evidence is found for the relationship between overconfidence and acquisitiveness in case of abundant internal resources. However, no evidence is found for the expected relationship between overconfidence and the likelihood of failed M&As.

**Keywords:** Behavioral corporate finance, CEO overconfidence, Self-attribution bias, mergers and acquisition, M&A attempts, failure

**Masterthesis**

July 18, 2017

Author: Karen Paters (S4218531)

Supervisor: Oege Dijk

# Table of Contents

<b>Chapter 1   Introduction.....</b>	<b>4</b>
<b>Chapter 2   Theoretical background.....</b>	<b>8</b>
2.1   Definition of overconfidence.....	8
2.2   Overconfidence in M&A behavior.....	9
2.2.1   Self-attribution bias and CEO overconfidence.....	10
2.3   Implications of CEO overconfidence.....	12
2.3.1   Overinvestment.....	12
2.3.2   Excessive risk taking.....	13
2.4   Overconfident behavior in the M&A process.....	13
2.4.1   Phase 1.....	14
2.4.2   Phase 2.....	14
2.4.3   Phase 3 and 4.....	15
2.4.4   Phase 5.....	15
2.4.5   Phase 6.....	15
2.4.6   Phase 7 and 8.....	16
2.5   Formation of the hypotheses.....	19
<b>Chapter 3   Model and variables.....</b>	<b>21</b>
3.1   Model.....	21
3.2 Existing measures of overconfidence.....	21
3.3 Existing measures for failed mergers and acquisitions.....	23
3.4   Measures used in this research.....	24
3.4.1   Independent variables.....	24
3.4.2 Dependent variable.....	26
3.4.3 Control Variables.....	26
<b>Chapter 4   Data and methodology.....</b>	<b>28</b>
4.1   Sample.....	28
4.2   Regression Specification.....	28
4.2.1   Dataset hypothesis 1.....	30
4.2.2   Dataset hypothesis 2.....	30
<b>Chapter 5   Results.....</b>	<b>31</b>
5.1   Descriptive statistics.....	31
5.2   Correlation.....	33
5.3   Regression results.....	33
5.3.1   Results hypothesis 1a.....	33

5.3.2   Hypothesis 1b .....	37
5.3.3   Hypothesis 2 .....	40
<b>Chapter 6   Conclusion and discussion .....</b>	<b>45</b>
6.1   Conclusion.....	45
6.2   Limitations and Recommendations for further research .....	46
<b>References .....</b>	<b>48</b>
<b>Appendices .....</b>	<b>55</b>
Appendix A   Summary statistics .....	55
Appendix B   Correlation matrices.....	57
Appendix C   Industry specification .....	59
Appendix D   Industry and time effects hypothesis 1.....	60
Appendix E   Industry and time effects hypothesis 2 .....	64

# Chapter 1 | Introduction

The field of behavioral finance has gained in importance over the last decades. It concentrates on the influence of psychology on the behavior of financial practitioners to extend the understanding of cognitive biases and emotions, and the way on which this influences financial decision making (Ricciardi and Simon, 2000). This field of expertise has contributed to knowledge regarding the inefficiency of markets (Rosenberg et al, 1985; Stout, 2002; Ito and Sugiyama, 2009). For example, in traditional economic theory investors as well as managers are expected to act rationally, which would result in decisions that maximize firm value as well as shareholders value. But in reality, people do not act completely rational due to market imperfections and irrationality, which causes anomalies in the existing traditional models (Shefrin, 2001; Sewell, 2007). Behavioral corporate finance puts the field into modern perspective and takes human aspects, such as psychological and sociological factors, into account when it comes to real investment behavior. Biases like managerial judgment, overconfidence, prejudices, loss aversion, narcissism and other irrationalities may influence for example CEO decisions (Baker et al., 2004; Baker et al. 2007; Aktas et al, 2016; Malmendier and Tate, 2008).

Rational motives for conducting mergers or acquisitions would be for example to achieve economic gain due to (1) economies of scope and scale, (2) synergies, (3) increased growth of the acquirer, (4) tax benefits, (5) diversification and (6) gains through horizontal and vertical M&As. All of these are examples of how mergers and acquisitions can result in increased shareholder value. However, recent studies show that the majority of mergers and acquisitions fail with a failure rate between 70 percent and 90 percent, in the sense that no shareholder value was created or that the shareholder value even diluted (Moeller et al, 2005; Christensen et al, 2011). When it comes to merger and acquisition attempts Brown and Raymond (1986) shows that the probability of a failed merger and acquisition attempt lies between 20.9 percent (0 weeks prior to resolution) and 42 percent (7 weeks prior to resolution). Rational CEOs should only initiate mergers and acquisitions that add value. Unfortunately, this is often not the case. One of the biases, which has achieved considerable attention in the field of behavioral corporate finance in the past decades, is overconfidence. Managerial overconfidence is a major phenomenon which impacts corporate investments (i.a. Malmendier and Tate, 2004, 2005a, 2005b, 2008; Kind and Twardawski, 2016; Doukas and Petmezas, 2007; Ferris et al., 2009; Billett & Qian, 2008; Hayward and Hambrick, 1997). Overconfidence is a powerful, widespread and consistent psychological bias, which makes it one of the most important errors in the rational decision making process of individuals (Johnson and Fowler, 2011).

Managerial overconfidence appears to originate from the self-attribution bias. This means that overconfident CEOs have the feeling that they possess superior decision-making abilities when compared to their peers and that they believe to be more capable than they actually are. As a result of this overconfidence, CEOs feel encouraged to emphasize their own judgment in decision-making. Often they will engage in highly complex transactions, such as diversifying acquisitions. This can cause problems, as their overconfidence will lead to underestimating risks and overestimating possible synergies in mergers and acquisitions (Ferris et al, 2009; Doukas and Petmezas, 2007). Other consequences can be found in existing literature, such as loss averseness, choosing internal financing over external financing and with that encouraging overinvestment using internal resources only, believing in undervaluation of the firm and finally a preference of debt over equity . (Ben-David et al. 2007; Shefrin, 2001). Another consequence is that more debt will be issued than would be value maximizing, resulting higher financial distress costs (Heaton, 2002; Malmendier and Tate, 2005a; Hackbarth, 2009).

Doukas and Petzmezas (2007) found that serial bidders (presumed overconfident) exhibit poor long-term performance and create announcement returns that are considerably lower than returns that single bidders realize. In addition high-order acquisitions, which are defined as five or more deals within a three-year period, are associated with significantly lower wealth effects compared to low-order acquisitions, which means that managers tend to credit the initial success to their own ability (Doukas and Petzmezas, 2007).

One of the most important studies on CEO overconfidence was performed by Malmendier and Tate (2005a, 2008). They investigated to what extent overconfidence can help explain behavior of CEOs when it comes to mergers and acquisitions. Overconfident CEOs appear to pursue acquisitions with a higher likelihood than rational (not overconfident) CEOs. Overconfident CEOs tend to undertake more diversifying mergers and they more often use internal resources to finance these mergers. The availability of these resources has proven to play an important role in the relationship between CEO overconfidence and mergers and acquisitions (Malmendier and Tate, 2008). Furthermore overconfident managers fail to generate superior abnormal returns compared to rational managers (Malmendier and Tate, 2005a, 2005b).

Until now, research has focused exclusively on successful merger and acquisition attempts, when it comes to overconfidence (Malmendier and Tate, 2004, 2005a, 2005b, 2008; Doukas and Detmezas, 2007; Ferris et al., 2016). Mergers and acquisitions are a commonly used subject in financial studies, but the failure of M&A activity is a relatively unexplored subject (Wong and O'Sullivan, 2001). This thesis will contribute to existing literature on the subject of CEO overconfidence and mergers and acquisitions by investigating the role of overconfidence in failed mergers and acquisition. Successful mergers or acquisitions can lead to a great amount of

benefits like a better competitive market position and added value for shareholders. But mergers or acquisitions attempts do not always succeed. If the deal fails, there are many direct and indirect costs involved, which is bad for the company as well as for the shareholders. For example gains resulting from the announcement of the takeover bid can dissipate in failed takeover attempts (Bradley et al., 1983). Furthermore a large revaluation of the target after bid failure will occur (Dodd and Ruback, 1977) and permanent revaluation of targets' shares can occur in case of abandoned takeover bids (Bradley, 1980; Denis, 1990). Break-up fees might be included as part of the agreement and will have to be paid by the party who withdraws from the agreement (Officer, 2003). Other costs involved are the time and effort put into the process of initiating the merger or acquisition. This time and effort could also have been spend to manage and improve the existing company. Also, costs are involved in collecting information, making a valuation of the target and obtaining advice about the possible merger or acquisition from a consultancy firm or investment bank (Snow, 2011). Furthermore if a merger or acquisition fails, negative publicity occurs which might damage the public image of the firm (Lhabitant, 2011). The existing literature only investigates failed M&As after completion of the deal and it leaves the fact that many more attempts could have been made prior to the completed deal untouched. This thesis is the first research that will examine the relationship between CEO overconfidence and failed merger or acquisition attempts and can provide insights into the reason for deals not being completed by linking it to the overconfidence of the CEO initiating the deal.

Additionally, the data used by both Malmendier and Tate (2005, 2008) and Doukas and Detmezas (2007) can be considered outdated. Malmendier and Tate have used data from 1980 to 1994 and Doukas and Detmezas data from 1980 to 2004. Therefore, this thesis will also update prior research by incorporating data from 1992 till 2016. Moreover, the samples used in existing literature are limited in size. Malmendier and Tate (2004, 2005a , 2005b, 2008) for example use in their papers only 477 firms of which only a small portion have overconfident CEOs. In this thesis 1293 firms were used, which makes the sample bigger and increases the validity. Another thing to consider is that the effect of overconfidence of CEOs on mergers and acquisitions might have changed due to increased awareness as a result of recent studies into the subject.

The aim of this thesis is to investigate whether overconfidence of a CEO plays a role in failed attempted mergers or acquisitions which will contribute to existing knowledge on the subject of failures in mergers and acquisitions. The main question this thesis will answer is:

*Are merger or acquisitions attempts initiated by overconfident CEOs more likely to fail?*

The data used in this thesis will incorporate information from 1293 listed US S&P 1000 companies including 16943 unique deals with a time frame of 24 fiscal years, from 1992 to 2016.

The data was collected using “Thomson One” and “Compustat” and more specifically “Execucomp”. In order to test the hypotheses, two proxies are constructed for overconfidence, Holder 67 and Net buyer.

The next chapter will elaborate on the relevant literature and definitions in order to gain an understanding of the relevant theory. The chapter will end by defining hypotheses based on the existing literature. The third chapter contains the model used for this thesis and will elaborate all variables used. Chapter four contains a detailed explanation of the data and method used to test the hypotheses. The results will be presented and explained in the fifth chapter and finally, this thesis will end with a brief conclusion and discussion.

## Chapter 2 | Theoretical background

Mergers and acquisitions refer to transactions in which the ownership of the company or part of the company is transferred to, or will be combined with another company. There are many different motives for a company to engage in mergers and acquisitions. For example, a major driver for a merger or acquiring a firm can be to achieve external corporate growth. However, it can also be a strategic choice of the firm to enable further strengthening of the core competence or other motives discussed in the introduction (Piesse et al., 2012).

Not all mergers and acquisitions are successful, which is shown by extensive literature (Porter, 1987; Jensen and Ruback, 1983; Ravenscraft and Scherer, 1987b; Lubatkin, 1983; Agrawal et al., 1992; Lougran and Vijh, 1997).

Failure of a M&A occur when a bid is placed and the deal is announced, but that the attempted deal will fail before completion. Another perspective of a failed merger or acquisition is a deal which is completed, but the company fails to generate shareholder returns. In this thesis the former perspective of failure will be used in order to examine whether there is a relationship between overconfidence and failed merger and acquisitions. The definition of Neuhauser et al. (2011) will be used for defining a takeover failure, which is stated as: '*A takeover failure is the cessation of a takeover bid that leaves no other pending bid for the target.*' (p. 348). First, the definition of overconfidence as will be used in this thesis will be given. Next, the relationship between overconfidence and mergers and acquisitions will be discussed and third, the M&A process in relation to overconfidence will be elaborated, where the last paragraph contains possible failure reasons.

### 2.1 | Definition of overconfidence

DeBondt and Thaler (1995) state in their paper that overconfidence is '*perhaps the most robust finding in the psychology of judgment*' (p. 6) There are many different definitions given for the term overconfidence. Malmendier and Tate (2008) formulate a definition for M&A activity, which is posed as follows: "*Overconfident CEOs overestimate the returns they generate internally and believe outside investors undervalue their companies*" (p. 1). Their definition means that overconfident managers overestimate their ability to create value and their capabilities to be above average level, resulting in overestimating the change of obtaining desirable outcomes (Langer, 1975). This definition closely corresponds to the definition given by Moore and Healy (2008), who state that overconfident individuals overestimate their abilities, performance, level of control and/or the probability of success. Additionally, overconfident individuals have the better-than-average effect, which contains the thought of individuals to perform better than

others. People tend to compare themselves to a group. For example, Svenson (1981) showed in an experiment about driving that people tend to believe that they are more skilled and safer drivers compared to the average driver. This particular research is a clear example of the “better-than-average effect”.

. Another definition is that individuals who are overconfident have excessive certainty in the accuracy of their belief (Moore and Healy, 2008; Ben-David et al., 2007). However, one more commonly used definition of overconfidence is formulated by Klayman et al. (1999) which is formulated as follows: ‘*Overconfidence is a human characteristic that leads individuals to have a subjective confidence in a judgment that exceeds its objective accuracy*’. In this paper the definition of Klayman et al. (1999) is used.

In these debates regarding the definitions of overconfidence there is an ambiguity about the terms ‘optimism’ and ‘overconfidence’. Both are commonly used terms in financial literature. Often the terms are used interchangeably, but there is a difference between the two traits. Overestimation of future outcomes is sometimes seen as optimism instead of overconfidence and underestimation of confidence intervals is denoted as overconfidence (Malmendier and Tate, 2008). The research of Gervais et al (2003) shows that almost every time overconfidence is also showing optimistic behavior, which means that they could be jointly used as overconfidence.

## **2.2 | Overconfidence in M&A behavior**

Overconfidence can be viewed in conjuncture with mergers and acquisitions. The first study that explored this relationship was performed by Roll (1986). In order to make the decision whether or not to place a bid there are several steps to be performed. First, the potential target firm has to be identified by the bidding firm. The second step is perform a valuation of the equity of the target. The third step is to compare this value to the current market price, because only in that case a bid should be made. If the value is lower than the current market price, there will be no bid, because the bidder knows that the lower bound for the target firm is the current market price (Roll, 1986). In 1986 Richard Roll developed the hubris hypothesis of corporate takeovers. It might be the case that the bidding firm believes that significant synergy gains can be achieved, but that there are in fact no potential synergies or other sources of takeover gains. Their research indicates several behavioral traits in making corporate finance decisions. The market acts as irrational, because if it was rational no bidding would occur if there was no value in takeovers. The hubris hypothesis states that decision makers of acquiring firms pay too much on average for their targets (Roll, 1986). If a decision maker of the acquiring firm is overconfident, future outcomes will be overestimated even as the value of the target.

Malmendier and Tate (2008) performed additional research and noted that the implications of overconfidence for mergers are more subtle than mere overbidding. M&A decision making can be viewed as one of the most important corporate decisions to make, which makes direct CEO oversight necessary. Thus M&A decisions can be considered a good tool to investigate individual overconfidence, rather than broad company performance and decision-making (Malmendier and Tate, 2004). Furthermore overconfidence plays a bigger role when individuals believe the outcomes are under their control or when they are highly committed to that outcome, such as in the case of a CEO attempting a merger (Weinstein, 1980; Weinstein and Klein, 2002; Malmendier and Tate, 2004).

Not only the CEOs of acquiring companies can be considered overconfident. Overconfidence can also play a role in target companies. Malmendier and Tate (2004) and Camerer et al. (1999) argue that if the CEO of the target company is overconfident, the conducted takeover will more likely result in a hostile takeover. For example, if the CEO of the target believes that he can create at least as much value as the acquirer thinks he can, this can result in a rejection of the bid, because the CEO believes it is too low. John et al. (2011) show that overbidding by overconfident CEOs is reinforced when the target CEO is also overconfident. Building on all this, we would expect that firms are less likely finalizing a merger or acquisition with a target company with an overconfident CEO (Malmendier and Tate, 2004; Camerer et al., 1999).

### **2.2.1 | Self-attribution bias and CEO overconfidence**

An important term that is related to overconfidence is “self-attribution bias”. Doukas and Petmezas (2007) provide evidence that overconfidence stems from self-attribution. The term self-attribution bias refers to a theory of positive self-evaluation. The theory states that people have the tendency to be biased in causal attribution of personal outcomes. There are two kinds of biases involved, bias in internal attribution and in external attribution. Bias in internal attribution means that people tend to take personal credit in case of success. They ascribe this positive outcome to their own abilities. However, in case of a failure people tend to deny taking responsibility and they ascribe the failure to external factors, which is what is meant by bias in external attribution (Kind and Twardawski, 2016). The self-attribution bias is strongest when one of the following four situations applies.

The first situation is when there is the illusion of control. Illusion of control can be considered especially strong for overconfident CEOs that believe they are in control of future merger outcomes. In so-called highly committed mergers this is even more pronounced according to Weinstein (1980) and Weinstein and Klein (2002). If the compensation of the CEO who initiates successful M&As, in other words his personal wealth, correlates to the share price

of the firm and thus to results from corporate investment decisions, he or she can be seen as highly committed (Weinstein, 1980, Weinstein and Klein, 2002, Nisbett and Ross, 1980). Excessive optimism about future prospects in M&A activity is likely when illusion of control is present. This also creates the potential downside and probability of failure to be underestimated, which can be considered a strong case of overconfidence (Langer, 1975; Langer and Roth, 1975; March and Shapira, 1987; Doukas and Petmezas, 2007).

The second situation is the case of prior experience. It can occur that CEOs believe that they are more experienced and knowledgeable than others because they have a history of successful deals. This way their tendency for being overconfident can be reinforced (Kahneman and Tversky, 1979; Weinstein, 1980; Griffin and Tversky, 1992; Mankhoff et al., 2013; Doukas and Petmezas, 2007; Kind and Twardawski, 2016). In theory there is the 'learning objection', which implies that experience will teach irrational agents to become rational, but important decisions regarding capital structure and investments are way less frequent than typically used examples from trading. Also the outcomes of corporate financial decision are much longer delayed and the feedback on these outcomes is noisier. Therefore, learning by experience in case of mergers and acquisitions is harder and less likely, which makes the odds of failure bigger than expected when someone thinks he or she has a lot of experience (Brehmer, 1980; Doukas and Petmezas, 2007).

The difficulty of a task is the third circumstance that encourages strong self-attribution. Dunning et al. (2004), Lichtenstein and Fischhoff (1977) and Soll (1996) provide evidence in their studies regarding the level of overconfidence in case of difficult tasks, such as corporate merger attempts. A specific example of this is the so-called planning fallacy. It appears that people often underestimate the time and effort that a certain complicated task will cost to complete. The difficulty of the task is underestimated due to overconfidence, resulting in missed deadlines and cost overruns (Buehler et al., 1994; Dunning et al., 2004; Lichtenstein and Fischhoff, 1977; Soll, 1996).

The fourth and final circumstance is rare events. People have the tendency to forget that the average person probably faces the same chance of experiencing rare events, than him- or herself, when considering their own chances of experiencing such an event. Especially when he or she is overconfident. This means that people have a sense of unrealistic optimism in case there are common desirable events or rare undesirable events. People often think 'that will not happen to me' (Dunning et al., 2004; Brehmer, 1980).

## **2.3 | Implications of CEO overconfidence**

*'The combination of overconfidence and optimism is a potent brew, which causes people to overestimate their knowledge, underestimate risks and exaggerate their ability to control events.'*

*(Kahneman and Riepe, 1998, p. 54)*

Existing literature suggests that CEOs can exhibit overconfident behavior. In mergers and acquisitions the CEO has an important decisions making role to play. This leads him or her to believe that they can exercise a lot of influence on the decision. Overconfidence of the CEO can affect their decision making. However, individual differences can be present in overconfident behavior. Therefore, implications of CEO overconfidence will be discussed in the next paragraph.

### **2.3.1 | Overinvestment**

Existing literature shows evidence between the relationship of overinvestment and overconfidence. Heaton (2002) argues that overconfident CEOs may invest in projects with a negative net present value, due to their overoptimistic perspective, resulting in overinvestment. Another argument for overinvestment of overconfidence CEOs is made by Ben-David et al. (2007). This paper shows evidence that overconfident CEO may underestimate the risk of an investment, which can lead to overinvestment. Furthermore Malmendier and Tate (2005a, 2005b) studied overinvestment by overconfident CEOs. They argue that an CEO overinvests when there are abundant internal resources and via that way they are not dependent of external financing. As a result of abundant internal resources, overconfident CEOs might not be subject to certain corporate governance mechanisms or the capital markets and there will not be any disciplinary actions as a result of their potential failure. This is in contrast to a rational CEO who invests at first-best level regardless whether there is an abundance of internal resources or not. Malmendier and Tate (2005a) suggest that if cash is constrained for the CEO, the perceived costs will mitigate overinvestment. Overconfidence can lead to an overestimation of firm value by the CEO. He or she believes that the outside investors are undervaluing the firm. As a result, overconfident CEOs are reluctant to issue equity, resulting in possibly not conducting value creating M&A opportunities when external funds are needed. On the other hand, in the case of abundant internal resources, this issue does not apply, which makes that overconfident managers in such position are more likely to conduct a merger or acquisition. A (more) negative market reaction will be the result of the conducted lower quality M&As and the tendency of overpayment (Malmendier and Tate, 2004). Besides the amount of cash, the amount of debt also plays a part in internal resources. An alternative to avoid financing by equity is to make use of debt (Barros and Da Silveira, 2007). Abundant internal resources of debt are present when there

is spare riskless debt capacity. In such situation this amount is available for the CEO to use in a merger or acquisition (Malmendier and Tate, 2008).

### **2.3.2 | Excessive risk taking**

According to the research of Sitkin and Weingart (1995) the influence of recent ‘outcome histories’<sup>1</sup> of experimental subjects are high. For a CEO an ‘outcome history’ could be a previous string of successful M&As that can act as cue for the CEO to overestimate their capabilities and increase their risk-taking behavior. If the performance of a CEO on recent complex risky activities is successful, it is more likely that he or she will view similar activities as less risky and will be more likely to engage in the activity in the future than CEOs without those favorable recent performance. So this means that if prior risk-related actions were successful, decision makers will persist in taking risks (Sitkin and Weingart, 1995; Chatterjee and Hambrick, 2011). Excessive risk taking of overconfident CEOs argument is supported by investigations like the one of Gervais et al. (2011), who showed that convex compensation combined with overconfidence trigger a CEO to take excessive risk.

In the same way, overconfidence can also result in excessive leverage taking. The overconfident CEO believes that the firm value is undervalued, which results in repurchasing shares of the firm with the use of borrowed money. This way there is a direct influence on the capital structure of the firm, which implies that overconfidence of the CEO is related to excessive leverage taking (Heaton, 2002; Gervais et al. 2011).

## **2.4 | Overconfident behavior in the M&A process**

An M&A process consists of several activities culminating in the transfer of ownership from the target to the acquirer. This process can be viewed from two different perspectives, the perspective of the acquirer and the perspective of the target. From the target’s perspective, a practical framework of eleven steps was developed by Boone and Mulherin (2009). DePamphilis (2015) developed a M&A process from acquirer perspective consisting of ten steps<sup>2</sup>. This paragraph will be based on the latter framework, because this research will focus on acquirer perspective. However it will be supplemented with target perspective, because this is also a possibility where CEO overconfidence could play a role in (failed) deals.

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<sup>1</sup> Outcome history is a determinant of risk propensity used in the research of Sitkin and Weingart (1995) to test the mediating role of risk perceptions and propensity in risky decision-making behavior. It is defined as ‘*as the degree to which the decision maker believes that previous risk- related decisions have resulted in successful or unsuccessful outcomes*’ (Sitkin and Weingart, 1995, p. 1576)

<sup>2</sup> Phase 9 and 10 contains integration and evaluation, which occur both after closing the deal. This is not relevant for this research and therefore will be excluded from this paragraph.

### **2.4.1 | Phase 1**

The first step in the takeover process is to develop a business plan. An external analysis will be performed in order to determine where and how to compete. Additionally an internal analysis is necessary to examine the firm's strengths and weaknesses compared to the competition.<sup>3</sup> A mission statement should be formed based on external analysis and basic operating beliefs and values of the management. Roles, responsibilities and resource requirements need to be defined and a strategy will be formed (DePamphilis, 2015). Overinvestment could play a role in the sense that an overconfident CEO would more likely start with a business plan and will overvalue the company. Underestimating the risks involved and with that excessive risk taking will also play a role in this step of the process. This makes the likelihood to engage in an unwise takeover attempt (subsequently resulting in a failure) higher with an overconfident (Gervais et al., 2011). The target company on the other hand can also make a business plan. The management of the target company begins with considering different strategic possibilities, which include for example selling the firm or other restructuring forms (Boone and Mulherin, 2009).

### **2.4.2 | Phase 2**

The second phase in the framework of DePamphilis (2015) is the acquisition plan. This plan concentrates mainly on tactical and short-term issues and includes a market analysis, a resource assessment, management objectives, a timetable, senior management's guidance regarding management of the acquisition process and assigning a person who is responsible for the deal. Particularly in this step the CEO has a lot of influence, and as a result their overconfidence can play an important role. For example a timetable needs to be developed. Evidence shows that people tend to overestimate the time and effort that a certain task will cost to complete, the so-called planning fallacy as discussed previously. Overconfidence might lead to underestimation the difficulty of the task, resulting in for example missed deadlines and cost overruns (Buehler et al., 1994; Dunning et al., 2004; Lichtenstein and Fischhoff, 1977; Soll, 1996). DePamphilis (2015) mentions three types of risk where the senior management is confronted with, operating risk, financial risk and overpayment<sup>4</sup> risk. Overconfident CEOs underestimate the risks involved and take excessive risk, which increases the probability of a failure. The CEO will provide guidance to ensure that the process, the identifying and valuation of the target, is managed according to his or her risk tolerance. As a result, the CEO has substantive control in the deal and with that overconfidence could be of influence. Also miscommunication and too much trust in the

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<sup>3</sup> External and internal analysis together is a so-called SWOT analysis (DePamphilis, 2015).

<sup>4</sup> Operational risk is the acquirer's ability to manage the target company. The willingness and ability of the acquirer to leverage a transaction and the willingness of shareholders to accept that the short-term EPS will decrease is meant by financial risk. Overpayment risk contains paying more than the target's economic value.

executives of the deal could result from an overconfident CEO (DePamphilis, 2015). From the perspective of the target, the target will select their advisors. An investment bank will be engaged for financial advice and furthermore a law firm will be selected in order to provide legal counsel. Also the method of sale and the amount of prospective bidders to contact will be determined (Boone and Mulherin, 2009).

#### **2.4.3 | Phase 3 and 4**

The search process is the third phase in the M&A process. An active search has to be performed in order to identify potential acquisition candidates. Selection criteria have to be determined such as industry and transaction size. In perspective of the target, a search should be performed for potential acquirers (DePamphilis, 2015; Boone and Mulherin, 2009). After the search process is completed, the screening process takes place, where prioritization takes place as well as taking a deeper look at the possible target. Market segment, product line, profitability, degree of leverage, market share and cultural compatibility are here key criteria that should be quantified if possible (DePamphilis, 2015). In perspective of the target in this phase the potential bidders begin their research, collect the necessary information and might engage with advisors for legal and financial advice.

#### **2.4.4 | Phase 5**

The fifth phase is about making the first contact with the target. An approach strategy is developed with reasons why the target firm should consider the acquisition proposal. Often a confidentiality agreement will be signed. The bidder receives then non-public information about the target, which is important when making a formal valuation. The target receives information about the acquirer in order to assess the financial credibility (DePamphilis, 2015). In case of deal initiation by the target, bidders show their interest by giving a range of possible prices. According to these prices, the strongest indications of interest will be invited for the first contact (Boone and Mulherin, 2009).

#### **2.4.5 | Phase 6**

The most complex phase of the M&A process is the negotiation phase, during which the actual offer price will be determined, which quite often deviates much from the initial valuation. Additionally, this phase incorporates the refinement of the valuation based on new information. The deal structuring will take place, due diligence will be conducted and a finance plan will be developed. Consultants may be hired in order to help with for example financial, legal and tax issues. Overconfidence is in this phase important, because it may have an effect on several

aspects. First, an overconfident CEO may underestimate the new and the old information, which results in overvaluation. Furthermore when hiring an advisor, an overconfident CEO might underestimate its importance by for example hiring a local advisor instead of a major investment bank.<sup>5</sup> Also overconfident CEOs are perhaps less diligent in their due diligence. Therefore the 'real' underlying value and risk might not be discovered. This might lead to a failure of the attempted merger or acquisition. The fourth aspect is the development of the financing plan, where a combined balance sheet, income and cash flow statements are developed. This financing plan is based on assumptions made about estimated costs and synergies, which might be overoptimistic when a CEO is overconfident. Based on this finance plan, limitations of the offer price can be determined, which are higher in case of overconfidence. As a result, an overconfident CEO pays too much for the target (DePamphilis, 2015; Roll, 1986). In perspective of the target company in this phase formal bids will be made. In case there are more bidders, subset of potential acquirers will make binding sealed bids. The bids will be reviewed and the best and final offers will be demanded by the target and the investment bank. The highest bidder usually wins the contest and signs the takeover agreement (Boone and Mulherin, 2009). When looking at CEO overconfidence, the winner's curse will play a role in this phase. The winner's curse is a concept within game theory which states that the right price or an auction item, in this case the target, is the average valuation of the participants. However, the auction item will go to the highest bidder, which is the bidder that has the highest estimation of the value and therefore tends to overpay (Roll, 1986). If a CEO is overconfident he or she will overestimate the target and overpay for the deal, which makes that he or she will more likely be the winner of the auction and therefore initiate more deals, but that the deals are more likely to fail.

#### **2.4.6 | Phase 7 and 8**

After the negotiation phase is completed, a takeover agreement will be signed and thereafter the deal will be publicly announced (Boone and Mulherin, 2009). Furthermore a plan for integrating the acquired firm will be developed. The eighth phase is the closing phase. In order to finalize the deal, the necessary approvals need to be obtained and post-closing issues need to be resolved. The deal must be in compliance with state corporate laws, antitrust laws and securities. Also often a deal must require the approval of the acquirer firm shareholders as well as the target firm shareholders. A lot can go wrong in this phase of the merger or acquisition, which might lead to a failed merger or acquisition attempt. Like defined before, in this thesis the definition of Neuhauser et al. (2011) will be used for defining a takeover failure, which is states

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<sup>5</sup> Assuming that a major investment bank could provide more quality than a local bank in case of large and/or complex deals.

as: 'A takeover failure is the cessation of a takeover bid that leaves no other pending bid for the target.' (p. 348).

A first form of failure is simply the withdrawal of the offer by the sole bidder. Neuhauser et al. (2011) found that this type of takeover failure is most common. A reason why this can occur can be that the bidder firm finds out that the initial offer was wrong. So when there is a realization of the acquirer that the value of the target firm is less than assessed before the bid. One example is that managers can make mistakes of over-optimism in assessing potential targets. Overconfidence can contribute to the mistake of the manager to be too confident in the potential target. Like Roll (1986) shows in his study that CEOs often pay too much for their targets in mergers and acquisitions. Overconfidence is a reason for paying above the actual value of the company in M&A offers. Another example is that there is additional information gained by the acquirer after the bid (Neuhauser et al., 2011; Malmendier and Tate, 2016). This new (often bad) information can be associated with public news or private news about the target, which the acquirer discovered after the bid is placed and the attempt is publicly announced (Malmendier and Tate, 2016). An overconfident CEO will be convinced that he or she has the necessary information and that that information is accurate. People tend to overestimate the accuracy and depth of their knowledge regarding a situation and the information they possess. Analogical to that is the bias where people ignore or are not seeking disconfirming information, which may cause that necessary information is not taken into account when valuing the firm (Martin, 2017). The last example is that a change in the state of nature can happen, which may reduce the initial valuation of a target firm. Underestimating risk by the CEO due to overconfidence could cause this (Neuhauser et al., 2011).

A second reason why a bidder would withdraw the offer (besides a wrong initial offer), is because of the failure to find and convince enough potential sources of finance. In this case the management of the acquirer is convinced of the initial valuation, but the company is not able to find sufficient sources of financing as others may not be as convinced by the accuracy of the valuation. A possibility is that in case of CEO overconfidence the external investors and institutions see through the overconfidence bias, which makes that they may be seen as a monitor for the acquirer's hubris. Most takeover agreements contain a financing contingency, which means that if the acquirer is unable to obtain adequate funding in order to complete the transaction, he or she is not subject to the contract terms. If there are not enough internal resources available or external resources willing to invest, the inevitable result of the attempt is a withdrawal (Neuhauser et al., 2011; Fama, 1985; Roll, 1986, Malmendier and Tate, 2016).<sup>6</sup>

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<sup>6</sup> There is a third reason for the withdrawal by the bidder. The target management could also implement, as reaction on the takeover bid, a higher valued operating strategy (Neuhauser et al. 2011). But if this results in a failure of the takeover attempt, overconfidence of the acquirer's CEO does not play a role.

A third reason can be a shareholders revolt of the acquiring firm. This can happen when the manager acts out of self-interest, rather than out of shareholder interest. If an executive completes a merger or acquisition, his or her ego will be boosted. The reason for a merger or acquisition in case of agency problems might be more about glory-seeking than sound business strategy. It will add to their prestige and will build their spheres of influence. Furthermore, there might be for example bonuses for the CEO for conducting the specific merger or acquisition and influences of advisors who earn fees with the merger or acquisition (DePhamphilis, 2015; Masulis et al. 2007). In cases such as these, the merger or acquisition is often not actually in the interest of the shareholder. If this becomes known to the shareholders, they will not accept the merger or acquisition and seek to block it. In this case overconfidence comes again with the underestimation of risk. When a CEO is overconfident, he or she will underestimate the risk that the shareholders will revolt. This cause does not occur very often. According to empirical evidence the effect of agency driven behavior in mergers and acquisition is relatively limited for example due to corporate governance structures.<sup>7</sup> (Jensen and Meckling, 1976; Trautwein, 1990; Shleifer and Vishny, 1989).

Besides failed takeovers there are also cases of canceled merger agreements. Often a break-up fee and reversed break-up fee are part of the merger or takeover agreement. A break-up fee, also called termination fee, is a fee paid by the target to the acquirer when backing out the deal. This fee is used to compensate the other party for the costs, time and resources used in order to facilitate the deal. Not only the target can back out of the deal, also the acquirer can be responsible for the failure of a merge attempt. In this case it is called a reverse breakup fee, also called reversed termination fee, for example when the acquirer cannot obtain enough funding in order to finance the merger (Officer, 2003). If a CEO is overconfident, perhaps they are more likely to agree with a higher breakup fee, because of the underestimation of the likelihood of such a breakup occurring. An overconfident CEO might not believe that the merger will be terminated, which makes that he or she does not worry about a break-up fee and perhaps sets an unnecessary high break-up fee. Also an overconfident CEO could believe the value of the target is higher than in reality, which makes that he can agree with a higher fee.

Another possibility for a failed merger or acquisition is management rejection of the target. Not all takeovers are friendly, but sometimes the acquirer conducts a hostile takeover. In this situation overconfidence plays a bigger role than in a normal takeover process. An overconfident CEO is more likely to underestimate the defenses of the target against the takeover compared to a rational CEO. This form of failure consists of management who

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<sup>7</sup> In this case agency driven behavior means that CEO's own interest will be consciously pursued at the expense of maximizing shareholder value. Overconfident CEOs are acting unconsciously in the disadvantage of shareholders

prevented the takeover using takeover defenses, like adopting poison pills, repurchasing shares from the bidder (greenmail), buybacks or merger covenants that are deliberately breached (Malmendier and Tate, 2016; Neuhauser et al., 2011; Pan et al., 2006).

## **2.5 | Formation of the hypotheses**

The sections discussed above contained the literature study on the relationship between overconfidence and (failed) mergers and acquisitions. Overconfident CEOs have too much confidence in their abilities and therefore tend to overestimate returns that they expect to generate in their own firm as well as the target firm. Furthermore it is likely that overconfident CEOs underestimate the difficulty of finalizing the deal. Overconfidence CEOs tend to overestimate their own ability to see the specifications of the deal. Therefore they are expected to more likely undertake a merger or acquisition than non-overconfident CEOs which results in the first hypothesis.

**Hypothesis 1a: Overconfident CEOs are more likely to conduct a merger or acquisition than non-overconfident CEOs.**

In this relationship, the degree of abundant internal resources is expected to play a role. This because without abundant resources, CEOs are more likely to be restrained by own shareholders, which makes the attempt less likely to take place. If this is the case the CEO needs to convince investors of the deal in order to get enough external funds in order to finance the deal. With abundant internal resources, the CEO is less financially constrained, which makes financing the deal easier. Therefore the second sub-hypothesis can be formed.

**Hypothesis 1b: Overconfident CEOs are more likely to conduct a merger or acquisition when there are abundant internal resources.**

Roll (1986) explains the hubris-based theory of acquisitions. He suggests that successful acquirers are overconfident, optimistic about returns and synergies and fall victim to the winner's curse. An overconfident CEO tends to pay a higher premium and therefore the odds of the inability to raise sufficient funds and failure to get financing or regulatory approval increases. Excessive willingness to acquire firms induces overestimation. There are perceived financing costs with this overestimation of stand-alone value, for example higher interest rate demanded by potential lenders or investors want lower issuance prices compared to the expectations of future returns by the CEO (Malmendier & Tate, 2005a). Doukas and Petmezas (2007) found that overconfident bidders realize lower announcement returns than rational

bidders and exhibit poor long-term performance. Overconfident CEOs are more likely to overpay and therefore initiates a wrong offer. The bidding firm could find out that his initial offer is too high. Furthermore the accuracy and completeness of information could be overestimated and due diligence could be performed less diligently by overconfident CEOs, which makes that there is a possibility that new (bad) information may come to light after the deal is announced (Malmendier and Tate, 2016; Neuhauser et al., 2011). Or perhaps the state of nature could change after making the bid, which is underestimated by an overconfident CEO (Neuhauser et al., 2011). This makes that the second hypothesis can be formed. Perhaps the following argument plays a role, which is that it is difficult for an overconfident CEO to acknowledge his or her mistake, overvaluation or overestimation. Therefore it is difficult to find out that it contains an unwise deal before the merger or acquisition attempt is completed.

**Hypothesis 2a: Overconfident CEOs are more likely to perform a failed merger or acquisition than non-overconfident CEOs**

Also in case of the second hypothesis, the presence of abundant internal resources might play a role. The same argument as used for hypothesis 1b can be mentioned, which is that with abundant internal resources, the CEO is less financially constrained and as a result have a higher likelihood of financing the deal with success. This means that overconfident CEOs are more likely to conduct a merger or acquisition when there are abundant internal resources. In combination with hypothesis 2a, this makes that overconfident CEOs with abundant resources are more likely to engage in bad M&A attempts that subsequently fail. On the other hand when there are not abundant internal resources, an M&A attempt is more likely to fail due to lack of financing. Therefore the following two hypotheses can be formed:

**Hypothesis 2b: With abundant resources, overconfident CEOs are more likely to engage in bad M&A attempts that subsequently fail compared to non-overconfident CEOs**

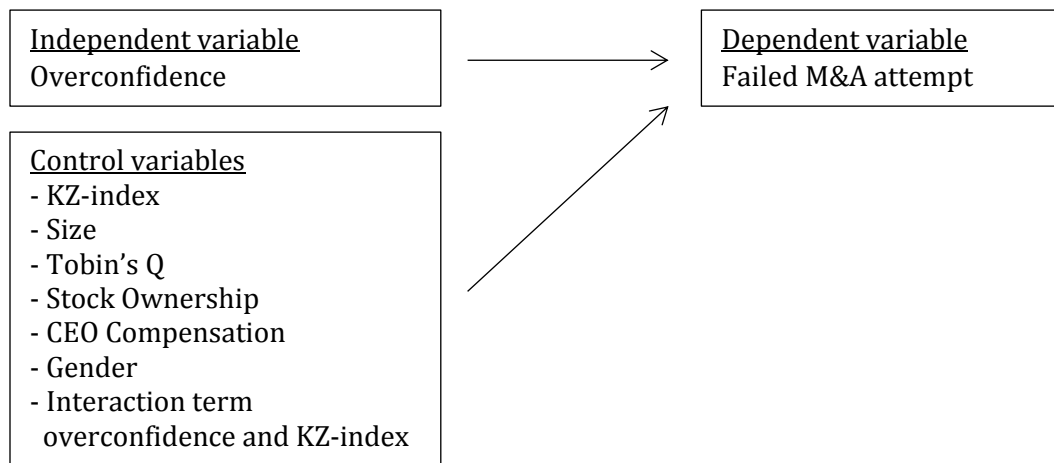
**Hypothesis 2c: Without abundant resources, overconfident CEOs are more likely to initiate M&A attempts that will fail compared to non-overconfident CEOs**

## Chapter 3 | Model and variables

This chapter will discuss the model that will be used in order to address the research question and hypotheses. Additionally, the variables used in the model will be discussed.

### 3.1 | Model

In this thesis the relationship between overconfidence and failed mergers and acquisitions is investigated. Overconfidence is not the only variable that can influence the potential failure of a merger or acquisition when investigating this relationship. For this reason variables that may influence the outcome unintentionally must be added to the model as control variables. These variables will be explained in more detailed later in this chapter. The model is depicted below:



### 3.2 Existing measures of overconfidence

Measuring CEO overconfidence is not easy. Biased beliefs and personal traits are difficult to measure directly and precisely, therefore a good direct proxy for overconfidence is hard to obtain (Baker and Wurgler, 2011). In the existing literature there are a several ways in which rough proxies were obtained.

Questionnaires have been commonly used to survey for overconfidence. For example Ben-David et al (2013) measured executive biases using a survey conducted by the Duke University about projections of US chief financial officers. They investigate overconfidence using a survey based on miscalibration test in order to separate overconfidence from optimism. They use questions about where the respondents have to estimate certain company or economy statistics with a given confidence intervals (usually 90%), in which a too narrow interval implicates that there is overconfidence. Another example is Oliver (2005), who uses the Consumer Sentiment Index to measure overconfidence and Puri and Robinson (2007) make use of data from the Survey of Consumer Finances. Not only surveys have been used for measuring

overconfidence as some researchers have used experiments. In the research of Zacharis and Shepherd (2001) experiments among venture capital employees were used in order to measure their overconfidence level. Unfortunately, in this research it is not attainable to make use of surveys or experiments in order to make a good proxy for overconfidence, because that would mean that experiments or a survey must be conducted among many CEOs.

A non-survey based proxy for overconfidence is developed by Statman, Thorley and Vorkink (2006) using high past returns. The reasoning behind this is that posterior volume of trade will be higher after high past returns, as successful investment increases the degree of overconfidence.

A third proxy for overconfidence was developed by Doukas and Petzemas (2007) using firm characteristics. Overconfidence was measured by the number of acquisitions that overconfident CEOs perform within a short span of time, following the Hubris hypothesis of Roll (1986). If they conduct five or more acquisitions in three years of time, a manager is considered overconfident. Doukas and Petmezas argue that this measure is in line with investor overconfidence models (Odean, 1998) and with it comes the idea that overconfidence enhances the chances to succeed in contests. Also this proxy brings some problems, because many other factors can be of influence on these firm characteristics apart from managerial overconfidence.

The last category of proxies discussed are the proxies introduced by Malmendier and Tate (2004, 2005a, 2005b, 2008). They came up with three proxies, which can be seen as one of the most important and influential measures of overconfidence. All of those proxies found their basis in the CEOs voluntary exposure to firm-specific risk. The first one is 'holder 67', which uses timing of option exercises to identify overconfidence. A CEO is overconfident when you hold an option that is at least 67% in the money. Second, there is 'longholder', which also uses timing of option exercises to identify overconfidence, but then overconfidence is present when the option is hold all the way to expiration date. The last proxy is net buyer, which uses the habitual acquisition of company stock (Malmendier and Tate, 2005a, 2008). In their papers Malmendier and Tate (2004, 2008) add a press-based measurement to measure overconfidence. They studied articles for each CEO and sample year from Factiva and the LexisNexis database. They wrote down the total numbers of articles, the number of articles using 'confidence' or 'confident', number of articles containing 'optimistic' or 'optimism' and at last number of articles with the words 'reliable', 'cautious', 'conservative', 'practical', 'frugal', or 'steady'. The CEO is overconfident when the number of articles with confident is higher than the number of articles where the CEO is written as conservative. Press-based measurement brings also some restrictions, because every single article has to be verified by hand, which can cause limited data, too much time and is not attainable because of lack of access to Factiva.

### **3.3 Existing measures for failed mergers and acquisitions**

Failed mergers and acquisitions have been measured using a variety of methods. The first way of measuring the successfulness is making a distinction between a successful bid and an unsuccessful bid. Several methods have been applied in the past to make this distinction. Malmendier, Opp and Saidi (2016) compared the market value of a target before the announcement of the bid and after the failure of a bid. Another option for measuring the successfulness of a bid is to look at the termination fee, also called breakup fee. It is a common used concept in takeover agreements, which contains a fee if the seller backs out of a deal. The process of coming to a takeover agreement takes time and resources to facilitate the deal. There needs to be compensation for the prospective purchaser for this (Officer, 2003). Associated there is the concept of reversed termination fee, where the buyer back out of the deal and therefore a fee has to be paid to the target.

Another way of measuring successfulness of mergers and acquisitions is through post-deal investigation. Event studies have been dominant approach since 1970 (Martynova and Renneboog, 2008), which are stock-market-based measures. The aim is to find out whether there is an abnormal stock price effect associated with an unanticipated event, like a merger or acquisition. Advantages of event study is that it is relatively objective public assessment. Furthermore, data is easy to access. Third, influence of outside factors can be screened in short-term event study and lastly, there is no industry sensitivity, since abnormal return is calculated. There are also some disadvantages with this method. It is difficult to meet the assumptions and furthermore the assessment is of the expected synergy and not the realized synergy. Even though the access of data is easy, the implementation is complicated and finally, it does not take multiple motives for conducting mergers and acquisitions in consideration (Wang and Moini, 2012). When comparing the advantages and disadvantages, this method will not be used.

Another way to measure the successfulness of the takeover or merger attempt is by making use of the deal status in the SDC Platinum database of Thomson Reuters. This data item consists of five categories: completed, pending, tentative, unknown and withdrawn. Completed means that the transaction has been closed. When a deal is pending, the merger or acquisition is announced, but not yet completed or withdrawn. The category tentative includes rumors published by the media about a likely transaction, but no formal announced has been made by the acquirer or the target. Also in this category are announcements by targets stating the plan to seek out a buyer or buyers for their assets or the company. The fourth category is unknown, which contains deals for which no definitive, conclusive evidence of the outcome of the deal was available after extensive research. The fifth and last category is withdrawn. This category contains deals that have been formally announced, but where the target or the acquirer has terminated the deal (Thomson Reuters, 2017).

## 3.4 | Measures used in this research

### 3.4.1 | Independent variables

For this research, the measurement method as developed by Malmendier and Tate (2004, 2005a, 2005b, 2008) and Hirshleifer et al (2012) will be used to make proxies based on holder 67 and Net Buyer. Malmendier and Tate used three proxies for overconfidence, namely Holder 67, Longholder and net buyer. Because the data for longholder proxy is not publicly available, this proxy is not included in this research. Malmendier and Tate (2005, 2008) make use of detailed data about option holdings and exercise prices for each option grant for each single CEO which is also unavailable to the public. Hirshleifer et al. (2012) adjusted the proxies of Malmendier and Tate, which made it possible to perform research with the publicly available data by using the method developed by Campbell et al. (2009) who calculated the average moneyness of option portfolio of each CEO. For this reason, the method of Hirshleifer et al. (2012) is followed in this thesis. A press-based measure of CEO overconfidence will not be added. The reason for this is simply that the data is not attainable.

When determining the 67 proxy, the calculation of the moneyness of the options is necessary. Execucomp does not directly provide this information, which requires us to perform an approximation using the method of Core and Guay (2002) and Campbell et al. (2011). In order to find the moneyness of the options, the value of the exercisable unexercised options is divided by the number of exercisable unexercised options that the CEO holds.<sup>8</sup> This is the realizable value per option, which is needed in order to estimate the average exercise price. By subtracting the realizable value per option from the stock price at the end of the fiscal year<sup>9</sup> this can be calculated. The moneyness of the option is calculated by dividing the average exercise price from the stock price. If the moneyness of the option is more than 67%, the shares are more than 67% 'in the money,' which means that the CEO is overconfident. Overconfidence is a threat that is persistent, which makes that once a CEO is overconfident, he or she will be considered overconfident for the rest of the sample period (Malmendier and Tate, 2005; Hirshleifer et al. 2012).<sup>10</sup>

$$\text{Moneyness of options} = \frac{\text{Stock price at fiscal year end}}{\text{stockprice at fiscal year end} - \left( \frac{\text{total realizable value of unexercised exercisable options}}{\text{number of unexercised exercisable options}} \right)} - 1$$

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<sup>8</sup> OPT\_UNEX\_EXER\_EST\_VAL represents in Execucomp the value of exercisable unexercised options and OPT\_UNEX\_EXER\_NUM represents in Execucomp the number of exercisable unexercised options.

<sup>9</sup> PRCC\_F represents in Execucomp the stock price at the end of the fiscal year

<sup>10</sup> Hirshleifer et al. (2012) requires in there robustness checks that the CEO holds two times shares that are more than 67% in the money, before the CEO can be seen as overconfident. However, the results are similar, which makes that in this thesis only one time is taken into account.

The net buyer proxy is the number of company stock that a CEO buys and sells. It exploits the tendency of some CEOs to purchase additional company stock despite the fact that their personal wealth is already highly exposed to company risk (Malmendier and Tate, 2005). In order to determine overconfidence, the method of Malmendier and Tate (2005) will be followed. A CEO is overconfident in a year, in case he or she buys more own company stock than he or she sells in a year. Shares owned excluding options by CEO will be used in order to calculate this measure.<sup>11</sup>

Both holder 67 and New Buyer are used as dummy variables in the regression. One means that the CEO is considered overconfident and zero if not.

In order to determine whether the abundancy of internal resources plays a role in this relationship, the variable KZINDEX is added as an interaction to the regression. The Kaplan-Zingales index is a way of measuring the reliance of companies on external financing.<sup>12</sup> It is a relative measure, comparing the specific company to the overall universe of companies.<sup>13</sup> The higher the KZ-index score, the more likely the company must reliance on external financing. The method originates from Kaplan and Zingales (1997) who generated a direct measure for financial constraints. They used annual reports and direct information from executives in order to classify each firm as constrained or unconstrained. Five accounting ratios were included, which are cash flow to total capital, Q, debt to total capital (i.e. leverage), dividend to total capital and cash holdings to capital (Lamont et al. 2001, Malmendier and Tate, 2004; Baker et al., 2003; Kaplan and Zingales (1997). This is used by Malmendier and Tate (2008) to construct an index. The KZ-index score is defined as:

$$KZ = -1.001909 \times \frac{Cash\ Flow}{K} + 0.2826389 \times Q + 3.139193 \times \frac{Debt}{Total\ Capital} - 39.3678 \times \frac{Dividends}{K} - 1.314759 \times \frac{Cash}{K}^{14}$$

There is a possibility that overconfidence and abundant internal resources interact with each other, in order to test this potential effect, the interaction variable OVERCONFIDENCE×KZINDEX will be added to the regression.

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<sup>11</sup> SHROWN\_EXCL\_OPTS item from Execucomp is used.

<sup>12</sup> Malmendier and Tate (2008) show similar results using Kaplan-Zingales index and the Harford model.

<sup>13</sup> The model is probabilistic, which means that the prediction whether a company is financially constrained or not is not perfect.

<sup>14</sup> Cash flow = income before extraordinary items + total depreciation and amortization

K = capitalt-1 (i.e. Property, Plant and Equipment)

Q = (item 6 + (item 24 × item 25) – item 60 – item 74)/item 6

Debt to capital (leverage) = (item 9 + item 34) / (item 9 + item 34 + item 216)

Dividends to capital = (item 21 + item 19) / item 8

Cash to capital = item 1 / item 8

Item 8 is lagged by one year, which means that it is the value at the beginning of the year.

### 3.4.2 Dependent variable

For measuring failed mergers and acquisitions the database Security Data Company (SDC) Mergers and acquisition, which is part of Thomson One database, is used. The dependent variable in this research will be a categorical variable, which consists of successful (0) and failed (1). As explained before, the data of Thomson gives the status of the merger attempt, which shows whether the merger or acquisition was completed, pending, tentative, unknown or withdrawn. In this thesis we are only interested in the completed category and in the withdrawn category. Deals with statuses of other categories will be removed from the dataset. The bids included in the dataset consists of bidders who are seeking to own at least 50% of the target firm and all bidders need to be in the Compustat database in order to match the data from the two different databases.

### 3.4.3 Control Variables

In order to control for other influences to the failure of a merger or acquisition besides overconfidence, several control variables are included in the regression. Malmendier and Tate (2005a, 2005b) included Size, Tobin's Q, Cash Flow, Stock Ownership and Vested Options in the regression. Hirshleifer (2012) used firm size, CEO shares ownership and CEO compensation as control variables. Also both studies give gender of the acquiring CEO as control variable. In this research the control variables of both studies will be used which include controls for firm effects and for incentive effects.<sup>15</sup>

Size (SIZE) can be measured multiple ways. Hirshleifer (2012) for example, calculated the size of a firm by taking the logarithm of the sales. On the other hand, both Harford (1999) as well as Malmendier and Tate (2005a, 2005b) use the log of total assets at the beginning of the year. In this research the latter method is used. According to the research of McCarthy and Dolfsma (2012) the size of a company has influence on the acquisitiveness of firms. They argue that the motivation of smaller companies M&As are more likely value-enhancing and therefore less likely to be a value-destroying deal compared to larger companies. A deal will be more likely to be completed when driven by overvaluations, mistakes and miscalculations if the company is large compare to a smaller company. This makes that deals of smaller companies are more likely

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<sup>15</sup> When a firm has a large cash flow, it is expected to have less financial constraints. This makes that the deal can more easily be completed relative to firms with lower cash flows. However cash flow will not be used as a control variable, because the KZ-index is added to the regression, which represents the level of financial constraint.

to be withdrawn relative to larger companies. In their research evidence is provided for this reasoning.<sup>16</sup>

The second control variable is Tobin's Q (TOBIN). This is the market value of the assets relative to the book value of the assets. (i.e. Tobin's Q = market value of assets/book value of assets). The market value of assets will be calculated as total assets plus market value of equity minus book value of equity. The market value of equity will be calculated by common shares outstanding (CSHO) times the fiscal year closing price (PRCC\_F). Book value of equity will be defined as common equity and deferred taxes on the balance sheet. The book value of assets is equal to total assets (Fama and French, 2002; Malmendier and Tate, 2008)

Stock ownership (STOCK OWNERSHIP) is the third control variable. This can be determined by taking the fraction of company stock owned by the CEO and his immediate family. This can be calculated by the following formula: CEO shares ownership = number shares held / total shares outstanding (Hirshleifer, 2012; Malmendier and Tate, 2004). Options are not included. It appears that when a CEO holds a significant amount of company shares, the more the CEO acts in shareholders' interest and so perhaps is less likely to succumb to hubris (Berger et al. 1997).

The fourth control variable added will be CEO compensation (COMPENSATION). This will be determined by taking the total compensation of CEO including option grants. Berger et al. (1997) state that a manager is more likely to be overconfidence, the smaller the proportion of fixed compensation compare to variable compensation. That is, the smaller the ratio of fixed compensation to total compensation, the level of CEO entrenchment tends to be higher. The more entrenched a CEO is the more overconfident (Berger et al. 1997). In this thesis fixed compensational will be defined as salary and total compensation will consist of all compensation including options and bonuses.

The last control variable that will be used in this research is the gender of the acquiring CEO (GENDER). Barber and Odean (2001) show evidence that the gender of the CEO plays a role in the tested relationship. Gender will be a binary variable in the dataset, which means that a dummy will be created consisting out of ones and zeros, the dummy that equals zero represents male CEOs and the dummy one represents female CEOs.

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<sup>16</sup> Theory suggests that there is also an interaction effect between size and overconfidence. Therefore an interaction term between size and overconfidence was generated and added to the regression. The results showed no evidence for this relation, which makes that it is excluded from the research.

## **Chapter 4 | Data and methodology**

### **4.1 | Sample**

The datasets used were based on information collected from the Compustat database and Thomson One database as discussed in chapter three. The Compustat database is part of the Wharton Research Data Services and contains information about active and inactive global companies from 1962 up to now. Execucomp contains information about executive compensation covering S&P 1000 firms. The deal information is collected from the SDC Platinum section of Thomson One, which is a part of the Thomson Reuters database. In total, data on 1293 unique listed US companies and 16943 deals with a time frame of 24 fiscal years, from 1992 to 2016, was used.

In this research four different datasets were used. The first hypothesis contained a Holder67 dataset with 10357 observations containing 1116 different companies and a Net Buyer dataset with 11710 observations containing 1293 different companies. The second hypothesis was tested using a dataset of 12157 deals with 962 companies with the Holder67 proxy and a dataset containing 16943 deals with 1223 unique companies including the Net Buyer proxy. The data in Execucomp only contains data from 1992 and further, which is the reason for the used time frame. Since this research is about CEO overconfidence, only the data with available CEO data was used. Furthermore missing data of the dependent, independent and the control variables were excluded, in line with the research of Hirshleifer et al. (2010).

### **4.2 | Regression Specification**

In order to examine the effect of overconfidence on the failure of a merger or acquisition attempt, a regression analysis will be performed. It is important to determine which data and tests are required to collect good results. In this research the first dataset is panel, because it consists of multi-dimensional data instead of one dimension like time series or cross-sectional data. Multidimensional means that it consists of more than one observation of more than one variable at different moments in time. In this case the dependent variable is binomial, which means that the outcome can only be 0 or 1, which makes the correct form to apply a logistic regression. David Cox (1958) developed this regression model. The model is used in order to estimate probabilities, which is in case of a binary logistic model the probability of a binary response based on independent variables (predictors). In other words, with this model we have the allowance to say that the probability of an outcome may be increased by a certain factor by a specific percentage (Cox, 1958).

The first hypothesis was stated as follows: “Overconfident CEOs are more likely to conduct a merger or acquisition than non-overconfident CEOs”. In order to analyze this the following regression was developed containing the components as described in the previous chapter:

$$\Pr\{Y=1|O, KZ, S, Q, CF, ST, C, G, OCF\} = \beta_1 + \beta_2 \times \text{OVERCONFIDENCE} + \beta_3 \times \text{KZINDEX} + \beta_4 \times \text{SIZE} + \beta_5 \times Q + \beta_6 \times \text{STOCKOWNERSHIP} + \beta_7 \times \text{COMPENSATION} + \beta_8 \times \text{GENDER} + \beta_9 \times \text{OVERCONFIDENCE} \times \text{KZINDEX} + \varepsilon$$

Y represents the binary variable, where 0 means that no deal has taken place and 1 means that at least one deal has occurred in the fiscal year for a particular company. The role of abundant internal resources in this relationship will be tested using two different methods. First, an interaction term will be added to the regression, which has the advantage that all data can be used. Second, the sample will be split into three tertiles based on the KZINDEX. The first tertile contains companies with the lowest KZ indices, which means they can be seen as the least constrained companies and therefore they less likely need to make use of external resources. The third tertile contains the firms with the highest KZ indices, which makes them most constrained. Those companies experience more likely difficulties when financial conditions tighten or when they need to finance a merger or acquisition (Malmendier and Tate, 2005b). That way there can be tested whether abundant internal resources play a role. The advantage of this method is that it is clearer, but the disadvantage is that a part of the data will be lost.

The second hypothesis was stated as follows: “Overconfident CEOs are more likely to perform a failed merger or acquisition than non-overconfident CEOs”. The same regression as used to test the first hypothesis will be used, which is:

$$\Pr\{Y=1|O, KZ, S, Q, CF, ST, C, G, OCF\} = \beta_1 + \beta_2 \times \text{OVERCONFIDENCE} + \beta_3 \times \text{KZINDEX} + \beta_4 \times \text{SIZE} + \beta_5 \times Q + \beta_6 \times \text{STOCKOWNERSHIP} + \beta_7 \times \text{COMPENSATION} + \beta_8 \times \text{GENDER} + \beta_9 \times \text{OVERCONFIDENCE} \times \text{KZINDEX} + \varepsilon$$

However, in this case the dependent variable Y is 1 if the merger or acquisition has failed and 0 in case it was completed. In order to answer hypothesis 2b this sample includes both the interaction term as well as the tertiles as discussed previously in order to test whether internal resources play a significant role.

### **4.2.1 | Dataset hypothesis 1**

In order to determine whether to accept or reject the first hypothesis two datasets were created, Holder 67 and Net Buyer. The Net Buyer dataset is created in order to check for robustness. Both contain the same variables but the overconfidence proxy is calculated differently in each dataset. Furthermore not all proxies can be constructed for all firms as a result of missing data. Though this leads to inequality between the dataset, they remain comparable. The datasets are panel, because it consists of multi-dimensional data instead of one dimension like time series or cross-sectional data. Multidimensional means that it consists of more than one observation of more than one variable at different moments in time. In this case the panel is unbalanced, because there are time gaps and fixed, because the same entities are observed for each period (Greene, 2008).

In order to account for heteroscedasticity and auto-correlation, standard errors were clustered in the pooled and fixed-effects logits (Malmendier and Tate, 2008). In order to test the equation, three steps are performed. The first one is to use logit regressions with standard error clustered by acquirer. The second step is to perform a Hausman test for endogeneity in order to determine whether to use the random effect model or the fixed effects model. The random effect model deviates from the pooled regression regarding firm effects on acquisitiveness and the fixed effects model uses only the within-firm variation. This way the effect of overconfidence on acquisitiveness will include the variation of rational and overconfidence CEOs within a firm (Malmendier and Tate, 2008).

### **4.2.2 | Dataset hypothesis 2**

In the dataset used for hypothesis 2, the unique values are the deals, because valuable data would be lost if the deals were combined per company. However, as a result this dataset is no longer regarded as panel data. The regression can now be seen as a logistic regression with standard errors clustered on acquirer. The standard errors are clustered by acquirer, because there are more observations per acquirer. Also the outcome per cluster may be correlated, which means that the observations are not independent of each other. Again two datasets will be used, both the Holder 67 and Net Buyer, in order to check for robustness.

## Chapter 5 | Results

In this chapter the result of the tests that were performed in order to examine the relationship between overconfidence and deals will be presented. The chapter starts with descriptive statistics about the data. After that the results of the correlations and the regression analyses will be discussed.

### 5.1 | Descriptive statistics

Tables 1 to 4, which can be found in appendix A, report the summary statistics of the four databases. For the datasets of hypothesis 1, SIC codes are used in order to specify in which industry they operate. Following the research of Malmendier and Tate (2005a), firms were divided into six broad categories.<sup>17</sup>

In the Holder67 dataset used for hypothesis one, there are 1116 unique US firms included in the sample, which makes in total 10357 observations of companies in the panel. In the holder 67 dataset for hypothesis one, 4056 observations are considered in the technical industry, 1073 in the financial industry, 2379 in the manufacturing industry, 1270 in the transportation industry, 1027 in the trade industry and 826 in the services industry.<sup>18</sup> The summary statistics show that in 25.5 percent of the observations a deal was performed. In the Holder67 proxy overconfidence was noted in 46.9 percent of the deals. When looking at the CEOs used for this dataset, 1028 of the 2246 CEOs, which is 45.77 percent are considered overconfident regarding the Holder 67 proxy. Malmendier and Tate (2005a) noted that in their research, 51 percent of the CEOs are overconfident, this is somewhat higher when compared to this research, but still in line with the findings of this thesis<sup>19</sup>. Furthermore summary statistics show that in only 1.7 percent of the observations the CEO is a female.

When looking at the Net Buyer dataset for hypothesis one, 1293 unique US companies are included in the sample. The summary statistics show that in total there are 11710 observations of companies. Of these observations 4728 were part of the technical industry, 1135 of the financial industry, 2795 of the manufacturing industry, 1343 of the transportation industry, 1151 of the trade industry and 884 of the services industry. The summary statistics show corresponding averages compared to the Holder 67 dataset in case of the overconfident measure. In the Net Buyer database the mean of the overconfident proxy is 62.7 per cent. In their research, Malmendier and Tate (2005a) found that 61 per cent of the CEOs are considered

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<sup>17</sup> Those category specifications can be found in Appendix B

<sup>18</sup> When adding up the amounts of different industries, the sum is not equal to 10357. The reason for this is because some firms belong to multiple industries.

<sup>19</sup> Malmendier and Tate (2005) considered 58 of the 113 CEOs as overconfident, which is a small sample size.

overconfident. The dataset in this research can therefore be considered in line with the data used for the study of Malmendier and Tate (2005a).

The dataset of the holder 67 for the second hypothesis consists out of 12157 unique deals from 960 different listed companies in the USA. From those deals 3 percent were considered a failure. When looking at the summary statistics, the holder 67 proxy contains a mean of 62.6 percent. In case of the dataset that includes the Net buyer proxy, also 3 percent of the deals are considered a failure. The overconfident proxy has a mean of 0.583, which means that 58,3 percent of the deals is performed by an overconfident CEO. This is comparable with the holder 67 proxy.

When looking at industries, Thomson one identifies the macro industry of the acquirer, by using SIC codes, NAIC codes and overall company business description. The following table presents the deal distribution of industries of both datasets.<sup>2021</sup>

**Table A. Industry distribution hypothesis 2**

<b>Industry</b>	<b>Holder 67</b>	<b>Net Buyer</b>
Consumer products and services	819	1073
Consumer staples	707	980
Energy and power	856	1061
Financials	1343	1853
Healthcare	1416	1801
High technology	2463	3251
Industrials	2304	2989
Materials	904	1330
Media and entertainment	269	569
Retail	538	774
Telecommunications	275	339

<sup>20</sup> The industries Government and Agencies and Real estate were not included. This because Government and Agencies have not performed a deal in this dataset and the outcomes in the retail industry does not vary which makes that this industry also has to be excluded.

<sup>21</sup> In table 22 and 23 of appendix F the distribution and the results based on SIC codes are shown for Holder 67 dataset as well as Net Buyer dataset.

## 5.2 | Correlation

The first step is to verify whether the variables are not highly correlated. There might be multicollinearity (Keller, 2005). In order to test whether this is the case, a correlation matrix reporting pairwise correlations is made. Pallant (2001) defined high correlation as 0.7 or higher. The correlation matrices, included in Appendix B, show that there is only high correlation between the KZINDEX and the interaction terms HOLDER67XKZINDEX and NETBUYERXKZINDEX. The reason for this is that the interaction term includes the KZINDEX variable. The remaining correlations are in general quite low. The matrices indicate no multicollinearity in the datasets that could affect the regression coefficients.

## 5.3 | Regression results

### 5.3.1 | Results hypothesis 1a

Hypothesis 1a was developed in order to test whether overconfident CEOs are more likely to perform a merger or acquisition compared to non-overconfident CEOs. Table 10, presented on the next page, represents the hypothesized effect of overconfidence on acquisitiveness including the Holder 67 proxy for overconfidence.

The table shows the t-values as well as the significance level of the variables. The first column represents the logistic regression with clustered standard errors and the second column represents the results of the fixed effects model. After performing the Hausman test, the model that to be used was verified to be the fixed effects model. The advantage of this model is that it eliminates time-invariant firm effect on acquisitiveness. However there is also a downside, because the dependent variable is binary, the model is called fixed effects logit model, which brings two conditions for using this method. The first one is that at least two occasions for each firm must be measured by the dependent variable. The second condition is that the independent variable has to change across time for a substantial amount of firms. These conditions make that a lot of observation are lost in the regression. In this case only 5079 of the 10125 observations are left. The second disadvantage of this model is that it is not good in observing effects of variables that do not change over time, such as gender.<sup>22</sup>

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<sup>22</sup> Because the variable GENDERDUMMY shows not much variation over time, the fixed effects model can't predict it well. Therefore that variable is left out the fixed effects logistic regression.

**Table 10: effect of overconfidence on acquisitiveness (Holder 67 proxy)**

The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. HOLDER67 is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005a) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the logit regression with standard errors clustered by acquirer. Logit with standard errors clustered by acquirer corrects for non-independence within firms. Fixed effects logit eliminates time-invariant firm effect on acquisitiveness.

	Logit with clustered standard errors	Fixed-effects logit
HOLDER67	0.0617 (0.70)	0.144* (1.79)
KZINDEX	1.88e-11 (0.17)	1.74e-11 (0.14)
SIZE	0.301*** (8.05)	0.0636 (1.06)
TOBINQ	0.0000266*** (4.91)	0.0000192*** (3.55)
COMPENSATION	-0.000341 (-0.93)	0.000661 (1.25)
STOCKOWNERSHIP	0.0000259** (2.27)	0.0000344 (0.21)
GENDERDUMMY	-0.322 (-1.06)	
HOLDER67XKZINDEX	-3.20e-10 (-1.60)	-3.78e-10* (-1.66)
Intercept	-6.668*** (-9.95)	
Firm fixed effects	Yes	Yes
Year fixed effects	No	Yes
Observations	10125	5079

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 10 shows significant result on the holder 67 overconfidence proxy on the fixed effects logit model. It shows that overconfidence has a positive effect on acquisitiveness, which is comparable to the results of Malmendier and Tate (2008). However, the logistic regression with clustered standard errors, which includes all observations, is not significant, in contrast to the results of Malmendier and Tate (2005a). They found on both models that a negative effect of the holder 67 proxy on investment was significant at 10%. They took firms capital expenditures normalized for capital at beginning of the year as their measure for corporate investment. The results do match the results of Malmendier and Tate (2008), where they found that the holder 67 proxy for overconfidence has a positive significant (at 5%) effect on acquisitiveness. In their research similar variables were used in order to make the estimation. They used the same dependent binary variable where 1 represents that at least one merger or acquisition bid is

released. However there are two differences. First, in this dataset both completed and withdrawn bids are included, but Malmendier and Tate (2008) only included bids that turned out to be successful. Second the scope of this research might play a role, because Malmendier and Tate (2008) only used data from 1984 to 1994.

The fixed effects model contains year fixed effects. When looking at table 16 in appendix D, 1992-2003 gives a positive significant effect of overconfidence on acquisitiveness, but the more recent period of 2004-2016 show no significant effect. Perhaps this because overconfidence is more studied recent years. Looking at the control variables, we can see that size has a significant positive influence on acquisitiveness according to the pooled logit model, but show no significance according the fixed effects model. For both models Tobin's Q shows a very significant little positive effect on acquisitiveness. Furthermore the fixed effects model shows a significant but very small negative influence of the interaction term on acquisitiveness. Finally stock ownership can be considered significant (at 5 percent) according to the logistic regression with clustered standard error, which was shown to have a positive influence on acquisitiveness in line with the expectation.

The Net Buyer dataset had to be tested in order to make the results robust. The results can be found in table 11 on the next page, where the Net Buyer is included as proxy for overconfidence. The table shows for both logit model with clustered standard errors and fixed effects model no significant result regarding the net buyer overconfident proxy. As a result hypothesis 1b cannot be accepted based on the data from this dataset. This is not similar to results from comparable studies. Malmendier and Tate (2005a) found that on the Net Buyer proxy a positive significant effect on the fixed effects model was present (significant at 1%) as well as the logit model with standard errors clustered by firm. Similar to the holder 67 dataset, Tobin's Q estimates are significant at 1%. However, the logit model with clustered standard errors shows a small negative effect and the fixed effects model a small positive effect. The fixed effects model result of Tobin's Q is in line with the results of Malmendier and Tate (2005a) who also have a small positive effect on corporate investments at 1% significance. In this dataset size shows in the logit model with clustered firm standard errors a highly significant positive effect, similar to the holder67 database. Similar results to the holder 67 database can be seen as robust.

**Table 11: effect of overconfidence on acquisitiveness (Net Buyer proxy)**

The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. NETBUYER is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005a) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. NETBUYERXKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term. In the logit regression with standard errors clustered by acquirer. Logit with standard errors clustered by acquirer corrects for non-independence within firms. Fixed effects logit eliminates time-invariant firm effect on acquisitiveness.

	Logit with clustered standard errors	Fixed-effects logit
HOLDER67	-0.0190 (-0.45)	-0.0536 (-0.73)
KZINDEX	-4.53e-10 (-1.18)	9.47e-11 (0.44)
SIZE	0.192*** (5.05)	0.0222 (0.34)
TOBINQ	-0.0000466*** (-5.25)	0.0000238*** (4.18)
COMPENSATION	-0.000752** (-2.55)	0.000397 (0.71)
STOCKOWNERSHIP	0.0000106 (0.92)	0.0000294 (0.12)
GENDERDUMMY	-0.450 (-1.49)	
HOLDER67XKZINDEX	-5.43e-11 (-0.32)	-2.09e-10 (-1.06)
Intercept	-3.213*** (-4.77)	
Firm fixed effects	Yes	Yes
Year fixed effects	No	Yes
Observations	11470	4695

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Based on the results of both datasets there is no conclusive evidence that overconfident CEOs are more likely to conduct a merger or acquisition compared to non-overconfident CEOs and therefore hypothesis 1a will be rejected.

### 5.3.2 | Hypothesis 1b

In order to address hypothesis 1b, the distinction is made between firms who are more financially constrained and firms that are less financially constrained by using the KZ-index. Results can be found in tables 12 and 13. Table 12, presented on page 38, contains the results of the tested relationship between overconfidence and acquisitiveness taking internal resources into account as well as the Holder 67 proxy for overconfidence. The first column represents the results of a logit regression with clustered standard errors of firms, the second column embodies results of the first tertile and the last column contains the results of the third tertile. The first tertile, which contains companies who are least financially constrained and therefore are considered to have abundant internal resources, show a positive effect on the acquisitiveness, significant at 5%. This is in line with the expectations based on literature and therefore hypothesis 1b can be accepted based on this dataset. The logistic regression coefficient is 0.316, which makes the odds ratio 1.37.<sup>23</sup> This implies that the odds of conducting a merger or acquisition when overconfident are 1.37 times that of non-overconfident CEOs. When looking at the third tertile, no significant effect of overconfidence on acquisitiveness can be found in this dataset. Of the control variables, size is on all regression results positive and significant at 0.1%, which makes that size does have a positive influence on acquisitiveness. The bigger the company, the more deals conducted. Furthermore Tobin's Q shows for the first and third column a small positive effect, which is significant at 1%.

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<sup>23</sup> Odds ratio can be calculated by raising e to the power of the logistic coefficient

**Table 12: Effect of overconfidence on acquisitiveness taking internal resources into account (Holder 67 proxy)**

Logit with standard errors clustered by acquirer corrects for non-independence within firms. Based on the KZ-index, firms were divided into three tertiles (lowest, middle and highest). Lowest KZ-index represents the least financially constraint companies and Highest KZ-index are the most financially constraint companies. The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. HOLDER67 is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005a) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the logit regression with standard errors clustered by acquirer.

	Logit with clustered standard errors	Tertile 1 - Firms with lowest KZ-Index	Tertile 3 - Firms with highest KZ-Index
HOLDER67	0.0617 (0.70)	0.206** (2.20)	-0.0773 (-1.00)
KZINDEX	1.88e-11 (0.17)		
SIZE	0.301*** (8.05)	0.372*** (8.95)	0.364*** (10.85)
TOBINQ	0.0000266*** (4.91)	0.00000958 (0.27)	0.0000467*** (10.00)
COMPENSATION	-0.000341 (-0.93)	0.000265 (0.53)	-0.000380 (-0.47)
STOCKOWNERSHIP	0.0000259** (2.27)	-0.00294 (-1.17)	0.0000171 (0.06)
GENDERDUMMY	-0.322 (-1.06)	-0.111 (-0.32)	-0.251 (-0.91)
HOLDER67XKZINDEX	-3.20e-10 (-1.60)		
Intercept	-6.668*** (-9.95)	-7.385*** (-10.95)	-8.268*** (-10.27)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	No	No	No
Observations	10125	3401	3342

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 13: Effect of overconfidence on acquisitiveness taking internal resources into account (Net Buyer proxy)**

The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. NETBUYER is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005a) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. NETBUYERXKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the logit regression with standard errors clustered by acquirer. Logit with standard errors clustered by acquirer corrects for non-independence within firms. Based on the KZ-index, firms were divided into three tertiles (lowest, middle, highest). Lowest KZ-index represents the least financially constraint companies and highest KZ-index are the highest financially constraint companies.

	Logit with clustered standard errors	Tertile 1 - Firms with lowest KZ-Index	Tertile 3 - Firms with highest KZ-Index
NETBUYER	-0.0190 (-0.45)	0.376*** (3.32)	0.0111 (0.15)
KZINDEX	-4.53e-10 (-1.18)	3.24e-10 (0.01)	1.54e-11 (0.24)
SIZE	0.192*** (5.05)	0.691*** (16.02)	0.308*** (8.42)
TOBINQ	-0.0000466*** (-5.25)	-0.000154*** (-23.60)	0.0000496*** (11.62)
COMPENSATION	-0.000752** (-2.55)	-0.000569 (-0.76)	-0.000667 (-0.82)
STOCKOWNERSHIP	0.0000106 (0.92)	-0.000722 (-1.01)	-0.0000454 (-0.22)
GENDERDUMMY	-0.450 (-1.49)	-0.644* (-1.83)	-0.489* (-1.86)
NETBUYERXKZINDEX	-5.43e-11 (-0.32)		
Intercept	-3.213*** (-4.77)	-9.269*** (-13.29)	-7.091*** (-10.14)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	No	No	No
Observations	11470	3841	3786

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

In case of the net buyer database, which is used to test the robustness of the research, the net buyer overconfidence proxy shows significant evidence on the regression including companies from the first tertile, which are considered the least constrained. The overconfidence proxy has a positive effect on the acquisitiveness of companies which are considered financially not constrained. In this case the logistic coefficient is 0.335, which makes the odds ratio 1.40, implying that the probability that an overconfident CEO initiate a deal is 1.40 times more likely than a non-overconfident. This is comparable to the significant finding in the Holder67 dataset. The results of the tests can be found in table 13 presented on previous page. This table consists of three columns which represents, similar to the holder 67 table, the logistic regression with standard errors clustered for firms, results of the first tertile and results of the third tertile. Based on this database hypothesis 1b can be accepted, which makes the result from the holder67 database robust. This is in line with comparable studies, which show that overconfidence have an effect on acquisitiveness in case of abundant internal resources (Malmendier and Tate, 2005a). When looking at the control variables more significant results can be found compared to the holder 67 dataset. Size and Tobin's Q are in all regression significant. The bigger the company, the more likely a deal is initiated. However Tobin's Q does show mixed results. Finally the first and third tertile regression shows both a negative significant effect of gender, which means that females are less likely to perform a merger or acquisition when either financially constrained or financially unconstrained. Tables 14-17 are included in the appendix to see whether a certain industry or period play a role, which show no significant results.

Based on the tests of the two databases, the following can be concluded. Hypothesis 1b can be accepted and is robust, which means that overconfident CEOs are more likely to conduct a merger or acquisition when there are abundant internal resources.

### **5.3.3 | Hypothesis 2**

Because both datasets for the second hypothesis are not panel, only the logistic regression with standard errors clustered on acquirer will be used. Hypothesis 2a is about whether an overconfident CEO is more likely to perform a failed merger or acquisition compared to non-overconfident CEOs. Similar to hypothesis 1, abundant internal resource are also taken into account. Therefore hypothesis 2b and 2c were formed, which hypotheses that in case of abundant internal resources as well as in case of no abundant internal resources, M&A attempts initiated by overconfident CEOs are more likely to fail compared to deals initiated by non-overconfident CEOs.

**Table 18: Effect of overconfidence on the probability of a failed M&A taking internal resources into account (Holder 67 proxy)**

The dependent variable is binary where 1 represents that the deal is withdrawn (e.g. failed). HOLDER67 is the overconfidence proxy, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005a) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the logit regression with standard errors clustered by acquirer. Logit with standard errors clustered by acquirer corrects for non-independence within firms. Based on the KZ-index, firms were divided into three tertiles (lowest, middle and highest). Lowest KZ-index represents the least financially constraint companies and Highest KZ-index are the most financially constraint companies.

	Logit with clustered standard errors	Tertile 1 - Firms with lowest KZ-Index	Tertile 3 - Firms with highest KZ-Index
HOLDER67	-0.0931 (-0.66)	-0.182 (-0.84)	0.159 (0.60)
KZINDEX	0.000000471* (1.76)		
SIZE	0.0568 (1.23)	0.154** (2.26)	-0.00784 (-0.10)
TOBINQ	0.416 (1.08)	-0.0241 (-0.04)	0.400 (0.66)
COMPENSATION	-0.000150 (-0.09)	-0.00698* (-1.86)	0.00229** (2.15)
STOCKOWNERSHIP	0.00688 (0.50)	0.0170 (1.23)	-0.0365 (-1.28)
GENDERDUMMY	-2.016** (-2.05)	0 (.)	0 (.)
HOLDER67XKZINDEX	0.00000203 (0.44)		
Intercept	-4.637*** (-6.20)	-6.099*** (-5.57)	-3.700*** (-2.67)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	No	No	No
Observations	12125	3992	3948

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 19: Effect of overconfidence on the probability of a failed M&A taking internal resources into account (Net Buyer proxy)**

The dependent variable is binary where 1 represents that the deal is withdrawn (e.g. failed). NETBUYER is the overconfidence proxy, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005a) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. NETBUYERXKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the logit regression with standard errors clustered by acquirer. Logit with standard errors clustered by acquirer corrects for non-independence within firms. Based on the KZ-index, firms were divided into three tertiles (lowest, middle and highest). Lowest KZ-index represents the least financially constraint companies and Highest KZ-index are the most financially constraint companies.

	Logit with clustered standard errors	Tertile 1 - Firms with lowest KZ-Index	Tertile 3 - Firms with highest KZ-Index
HOLDER67	0.0648 (0.62)	0.0856 (0.53)	0.0609 (0.33)
KZINDEX	0.000000230 (0.30)	0.00000163* (1.79)	-7.24e-08 (-0.80)
SIZE	0.0351 (0.92)	0.122** (2.29)	-0.0114 (-0.18)
TOBINQ	0.341 (1.07)	-0.207 (-0.40)	0.351 (0.65)
COMPENSATION	-0.000740 (-0.56)	-0.00277 (-1.36)	0.00127 (0.86)
STOCKOWNERSHIP	-0.00421 (-1.44)	-0.00286 (-1.23)	-0.0235 (-1.00)
GENDERDUMMY	-0.619 (-1.29)	-0.687 (-1.02)	-0.425 (-0.69)
HOLDER67XKZINDEX	-0.000000188 (-0.25)		
Intercept	-4.315*** (-6.93)	-5.454*** (-6.18)	-3.616*** (-3.26)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	No	No	No
Observations	16357	5428	5466

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

The results of the holder 67 dataset are reported in table 18 on page 41. This table contains three columns where the first column represents the logistic regression with standard errors clustered on acquirer. The second column embodies the results of the logistic regression for the acquirers included in the first tertile and the third column contains the results of the acquirers included in the third tertile. The results show that no significant effect was present between the holder 67 overconfidence proxy and the probability of a failed merger or acquisition. Also the control variables show no significant results regarding the unsuccessfulness of a merger or acquisition. There is only one significant result, which is CEO compensation in the third tertile. This means that CEO compensation has a positive effect on the probability of a failed merger or acquisition in companies who are financially constrained. Additionally, when looking at the Net Buyer dataset, no significant results can be found for net buyer as overconfident proxy that has an influence on the probability of a failed merger or acquisition. The results are reported in table 19 on previous page. Also there are not many significant results in this dataset even as the holder 67 database. The CEO compensation, that was significant in the holder 67 dataset, is here not significant anymore. However size at least financially constrained companies has a significant positive effect on the probability of a failure and cash flow at most financially constrained companies has a small negative significant influence on the probability of a failure.

Based on the tests on both datasets, hypothesis 2a, 2b and 2c cannot be accepted and therefore are rejected.

In order to find whether industry effects play a role in this relationship, the firms were divided into industry categories and a logit regression is performed on every single category. The results can be found in tables 20 and 21 in appendix E<sup>24</sup>. Table 20 shows the results of holder 67 dataset, in two of the eleven categories overconfidence does play a role in the probability of a failed merger or acquisition. Column two contains companies of the consumer products and services industry and has a negative significant (at 1%) effect on the probability of a failed merger or acquisition. Additionally the control variables for that industry are (excluding stockholders ownership) significant. The results on the KZ-index in this industry indicate that the more financially constrained, the smaller the probability of a failure. Size suggests that the bigger the company, the greater the probability that an M&A fails. Tobin's Q has a negative effect, which means that the higher Tobin's Q, the lower the probability of a failure. Compensation shows also a significant negative effect. The higher the compensation, the more influence the M&A has on the CEO's personal wealth, the lower the probability of a failed M&A. And finally the interaction term is significant, which indicates that the higher the KZindex and the more overconfident the CEO, the higher the probability of a failed merger and acquisition. Gender

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<sup>24</sup> Table 22 and 23 represent industry effects according the SIC distribution explained in table 9 of appendix C, but because the Thomson distribution is more specific, the results of these two tables will not be discussed.

appears to play no role in this industry because there were no female CEOs in this industry in this sample. Also there is another industry, telecommunications, which shows that overconfidence based on the holder 67 proxy has a highly significant (at 1%) positive effect on the probability of a failure, which means that the probability that an overconfident CEOs performs a failed M&A is higher. Also the interaction term is highly significant. This indicates that an overconfident CEO with a higher KZ-index has a lower probability on a failed deal. When looking at two time periods, 1992-2003 and 2004-2016, no significant results were found, which indicates that the time effects does not play a role in this relationship. This can be found in table 24 in appendix E.

When looking at the Net Buyer results reported in table 21, only the industry telecommunications shows a significant positive effect, which is in line with the result of the Holder 67 dataset, which makes the result robust. Table 25 in appendix E shows, similar to table 24, no significant results, which indicates no time effects.

In conclusion, it can be said that industry plays a small role in the relationship between overconfidence and failed M&As. Telecommunications has a positive significant effect on the probability of a failure. However no other industry shows a significant result. Furthermore, there can be concluded that time does not play a role.

## Chapter 6 | Conclusion and discussion

### 6.1 | Conclusion

The aim of this paper was to investigate whether merger or acquisition attempts initiated by overconfident CEOs are more likely to fail. Overconfidence stems from the self-attribution bias, which might cause irrational decision making. Because of overconfidence, CEOs might be more likely to overpay for a merger or acquisition. Overconfident CEOs can overestimate firm value, have a tendency to overinvest, have an overoptimistic perspective on opportunities, underestimate risks involved, take excessive risk and overvalue target companies. Another important factor involved in the decision making process regarding mergers and acquisitions is the level of internal resources. When a firm has abundant internal resources, the CEO does not depend on external finance in order to pay for the merger or acquisition,

In order to answer the main question two hypotheses were developed. The hypotheses consisted respectively out of 2 and 3 sub-questions.

The first hypothesis was developed in order to analyze whether overconfident CEOs are more likely conduct a merger or acquisition compared to non-overconfident CEOs. The results indicate that there is a positive effect of overconfidence on acquisitiveness. However, as this result is not robust, the first hypothesis has to be rejected. When adding the abundance of internal resources part, it appears that in case of abundant internal resources, there actually is a positive significant effect on the acquisitiveness, which confirms hypothesis 1b.

The second hypothesis was developed in order to analyze the relationship of overconfidence and failed M&As. All sub-hypotheses can be rejected, because of no significant results, which indicate that overconfidence does not have an influence on the probability of a failed merger or acquisition, also not in case of abundant internal resources or without abundant internal resources. Only when looking at industry effects, there is one significant positive robust effect of overconfidence on failed M&A attempt. The industry telecommunications shows that in case of an overconfident CEO the probability of failure is higher. The answer to the research question, based on the data and method applied in this research, is that there is no significant evidence that CEO overconfidence leads to a higher probability of failure in mergers or acquisitions.

## 6.2 | Limitations and Recommendations for further research

Comparable research in the field of overconfidence in mergers and acquisitions shows that there is a significant relationship between overconfidence and acquisitiveness in M&A behavior. This thesis attempted to contribute to this subject by expanding the sample and period analyzed. Additionally it extends the scope of the research by analyzing whether managerial overconfidence increases the probability of a failed attempted merger or acquisition. However, the findings of this thesis show no significant result regarding hypothesis 1a, which is different from previous research.

The sample used in this research included more than 10000 observations per dataset, which makes the datasets much larger than used by similar research such as was performed by Malmendier and Tate (2005) who used 477 US listed firms from 1980 till 1994 and Malmender and Tate (2008) who used 394 US listed firms from 1980 till 1994. This research makes the result more robust and more generalizable. Because the dataset is quite large, the sample size does in this case not play a role in the insignificant results. However, when studying the influence of behavioral biases on corporate decisions, several limitations apply. Behavioral biases, such as overconfidence, cannot be measured directly, but are measured using an approximation, because there is not enough information in order to determine the bias directly.

Multiple psychological tests are needed to define a person as overconfident and personal factors have to be considered as for instance the social environment of the person can influence his or her decision making in real life in order to measure such an aspect accurate. Due to time and resource limitations this is almost impossible.

An alternative achievable way to measure overconfidence would be by using proxies as was applied in this thesis Holder67 and Net Buyer. The disadvantage regarding the proxies is that it only provides an approximation for overconfidence. The holder 67 measure is linked to the stock price of the firm, which means also to the overall stock market. The price changes could lead to CEOs being prevented from overconfidence when their options do not rise above the 67% threshold. The other way around if the stock prices increases suddenly, a CEO can be triggered to become overconfident. Furthermore in this research only option-based measures for CEO overconfidence are used, while several studies use also press-based measures as proxy. Due to limited available resources this proxy was not used in this thesis, nor is the Longholder overconfidence proxy as was developed by Malmendier and Tate (2005) which might explain for the different results between their research and this one.

Another limitation is that only one measure was used to determine whether the merger or acquisition is successful or failed. The use of termination fees is a possible alternative measure that could be used to check for robustness. However, as insufficient data was available to accurately test this this was left out of scope of this research. Furthermore Cumulative

Abnormal Returns (CAR) could have been used, but this is an event study measure which examines exclusively post-deal successfulness instead of the used measure for M&A attempts which makes the results incomparable.

As a result a recommendation for further research is to look at the relationship between overconfidence and the quality of mergers and acquisitions. Perhaps more significant results can be found when looking at the failure of the merger or acquisition after it has taken place. The basis for this is that overconfident CEO are more likely to engage in a deal in case of abundant internal resources. Those deals may be overpaid, which could be measured by analyzing the loss of shareholders value and lower returns.

Reasons why a merger or acquisition could fail is another limitation of this research. As paragraph 2.4.6 suggests that there is a large variety of reasons based on which a merger or acquisition could fail and where overconfidence could play a role. However there are also reasons that could lead to the failure of a merger or acquisition where overconfidence does not play a role. For example, the interference of politics, newly acquired laws or defense mechanism in the target company against unwanted acquirers. Therefore it was useful to investigate the relationship on different categories of failure. Unfortunately due to data limitations, this distribution was not included in this study which, if properly corrected for, could provide for a 'cleaner' dataset. Therefore a recommendation for further research is to include different types of causes for the failure of a merger or acquisitions as this could lead to more accurate results.

This research also does not incorporate whether or not overconfidence of the target CEO plays a role in M&A activity. There are several reasons why an overconfident target CEO might influence M&As as was discussed in the theoretical section. For example, Malmendier and Tate (2004) and Camerer et al. (1999) argue that if the CEO of the target company is overconfident, the conducted takeover will more likely be a hostile takeover. Another example is that the overconfident target CEO may underestimate their takeover defenses. Therefore, incorporating overconfidence of the target CEO is another suggestion for further research.

Last, this thesis only included data on companies listed in the USA which is similar to the previous studies. However, there may be differences between countries or regions, the operational freedom of CEOs and the functioning of corporate governance mechanisms in these countries. For example, there are clear differences between market-based countries, like the USA and bank-based countries, like Germany.

It should be noted that much has yet to be explored in the field of overconfidence and the impact on the financial markets in behavioral corporate finance. More accurate tools will have to be developed and more data will have to be included in such research across different continents in order to properly analyze this subject and form decisive conclusions regarding overconfidence of CEOs related to mergers and acquisitions.

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# Appendices

## Appendix A | Summary statistics

**Table 1. Summary statistics Holder 67 for hypothesis 1**

Variable	Obs.	Mean	St. Dev	Min.	Max.
DEAL	10357	.2551897	.4359889	0	1
FAILED	10357	.0084967	.0917894	0	1
HOLDER67	10357	.4691513	.4990715	0	1
KZINDEX	10230	1.04e+08	4.21e+08	-8.19e+07	1.00e+10
SIZE	10355	17.36022	1.823014	10.48235	23.97097
TOBINQ	10355	11872.65	11029.77	-.9949192	191574.2
COMPENSATION	10350	12.2651	73.56469	0	996.9342
STOCKOWNERSHIP	10248	24.62014	1373.037	0	137575.3
GENDERDUMMY	10357	.0169933	.1292524	0	1
ACQUIRERNAME	10357	524.6197	306.4729	1	1116
HOLDER67XKZINDEX	10230	4.24e+07	2.12e+08	-178.4233	8.51e+09

**Table 2. Summary statistics Net Buyer for hypothesis 1**

Variable	Obs.	Mean	St. Dev.	Min.	Max.
DEAL	11710	.4181042	.4932685	0	1
FAILED	11710	.0091546	.0952456	0	1
NETBUYER	11710	.6268147	.4836714	0	1
KZINDEX	11572	8.88e+07	3.96e+08	-8.19e+07	1.00e+10
SIZE	11708	1.808105	1.808105	11.78593	23.97097
TOBINQ	11708	9384.062	10912.87	.1708245	191574.2
COMPENSATION	11697	11.42326	69.65731	0	996.9342
STOCKOWNERSHIP	11613	22.61234	1290.242	0	137575.3
GENDERDUMMY	11710	.016567	.1276478	0	1
ACQUIRERNAME	11710	602.3798	357.313	1	1293
NETBUYERXKZINDEX	11572	6.03e+07	3.44e+08	-833255.8	1.00e+10

**Table 3. Summary statistics Holder 67 for hypothesis 2**

Variable	Obs.	Mean	St. Dev	Min.	Max.
FAILED	12157	.0304351	.1717884	0	1
HOLDER67	12157	.6256478	.4839751	0	1
KZINDEX	12157	-716.6295	208634.6	-1.09e+07	221571.1
SIZE	12157	17.6661	1.810549	11.23993	23.97097
TOBINQ	12157	.5263584	.2193985	-.0389545	2.960987
COMPENSATION	12125	6.617538	44.18574	0	993.9498
STOCKOWNERSHIP	12157	1.285704	4.438985	0	91.1466
GENDERDUMMY	12157	.0186724	.1353707	0	1
HOLDER67XKZINDEX	12157	-34.5389	181232.7	-1.09e+07	221571.1
ACQUIRERNAME	12157	435.8364	279.4109	1	962
TARGETNAME	12157	5791.767	3344.284	1	11569

**Table 4. Summary statistics Net Buyer for hypothesis 2**

Variable	Obs.	Mean	St. Dev	Min.	Max.
FAILED	16943	.0293927	.1689095	0	1
NETBUYER	16943	.5830136	.4930751	0	1
KZINDEX	16429	-25289.57	1730856	-1.50e+08	2.57e+07
SIZE	16943	17.76099	1.857486	11.23993	23.97097
TOBINQ	16943	.5327881	.2214711	-.0389545	2.960987
COMPENSATION	16915	7.931669	53.13856	0	993.9498
STOCKOWNERSHIP	16886	1153.44	99502.71	0	9125503
GENDERDUMMY	16943	.0216018	.1453838	0	1
NETBUYERXKZINDEX	16429	-26321.3	1730823	-1.50e+08	2.57e+07
ACQUIRERNAME	16943	570.185	355.3693	1	1223
TARGETNAME	16943	8051.003	4648.012	1	16082

## Appendix B | Correlation matrices

**Table 5: Correlation matrix variables of for hypothesis 1 (Holder67 dataset)**

	DEAL	HOLDER67	KZINDEX	SIZE	TOBINQ	COMPENSATION	STOCK- OWNERSHIP	GENDER- DUMMY	HOLDERXKZINDEX
DEAL	1.000								
HOLDER67	0.0286	1.0000							
KZINDEX	0.0862	-0.0304	1.0000						
SIZE	0.1894	0.0211	0.4514	1.0000					
TOBINQ	0.0802	0.1537	-0.1279	-0.2399	1.0000				
COMPENSATION	-0.0224	-0.0279	-0.0248	-0.0459	-0.0261	1.0000			
STOCKOWNERSHIP	0.0150	0.0126	-0.0030	0.0014	-0.0096	-0.0027	1.0000		
GENDERDUMMY	-0.0152	-0.0170	-0.0006	0.0019	0.0082	-0.0148	-0.0023	1.0000	
HOLDERXKZINDEX	0.0424	0.2124	0.4699	0.3290	-0.0837	-0.0210	-0.0011	0.0120	1.0000

**Table 6: Correlation matrix variables of for hypothesis 1 (Netbuyer dataset)**

	DEAL	NETBUYER	KZINDEX	SIZE	TOBINQ	COMPENSATION	STOCK- OWNERSHIP	GENDER- DUMMY	NETBUYERXKZINDEX
DEAL	1.000								
NETBUYER	0.0044	1.000							
KZINDEX	-0.0023	0.0218	1.000						
SIZE	0.1693	0.0534	0.3992	1.000					
TOBINQ	-0.2110	-0.0146	-0.0649	-0.2127	1.000				
COMPENSATION	-0.0254	-0.0094	-0.0220	-0.0466	-0.0167	1.000			
STOCKOWNERSHIP	0.0079	0.0086	-0.0025	-0.0003	-0.0059	-0.0025	1.000		
GENDERDUMMY	-0.0291	0.0171	0.0011	-0.0037	0.0124	-0.0146	-0.0022	1.000	
NETBUYERXKZINDEX	-0.0068	0.1334	<b>0.8505</b>	0.3197	-0.0522	-0.0175	-0.0020	0.0033	1.000

**Table 7: Correlation matrix variables of for hypothesis 2 (Holder67 dataset)**

	FAILED	HOLDER67	KZINDEX	SIZE	TOBINQ	COMPENSATION	STOCK- OWNERSHIP	GENDER- DUMMY	HOLDERXKZINDEX
FAILED	1.000								
HOLDER67	-0.0077	1.000							
KZINDEX	0.0044	0.0041	1.000						
SIZE	0.0231	-0.0464	0.0407	1.000					
TOBINQ	0.0216	-0.0099	0.0341	0.4087	1.000				
COMPENSATION	-0.0018	-0.0055	0.0036	-0.0506	-0.0038	1.000			
STOCKOWNERSHIP	0.0014	0.0948	-0.0129	-0.1487	-0.1047	0.0062	1.000		
GENDERDUMMY	-0.0208	0.0143	0.0044	0.0484	0.0284	-0.0100	-0.0284	1.000	
HOLDERXKZINDEX	0.0032	-0.0002	<b>0.8687</b>	0.0243	0.0167	0.0026	0.0058	0.0031	1.000

**Table 8: Correlation matrix variables of for hypothesis 2 (Netbuyer dataset)**

	FAILED	NETBUYER	KZINDEX	SIZE	TOBINQ	COMPENSATION	STOCK- OWNERSHIP	GENDER- DUMMY	NETBUYERXKZINDEX
FAILED	1.000								
NETBUYER	0.0068	1.000							
KZINDEX	0.0030	-0.0052	1.000						
SIZE	0.0171	0.0746	0.0039	1.000					
TOBINQ	0.0180	0.0816	0.0008	0.3814	1.000				
COMPENSATION	-0.0063	-0.0100	0.0019	-0.0391	-0.0246	1.000			
STOCKOWNERSHIP	-0.0021	0.0090	0.0002	-0.0095	-0.0041	-0.0017	1.000		
GENDERDUMMY	-0.0111	-0.0043	0.0027	0.0617	-0.0079	-0.0164	-0.0018	1.000	
NETBUYERXKZINDEX	0.0027	-0.0116	<b>0.8088</b>	0.0043	0.0027	0.0014	0.0002	0.0024	1.000

## Appendix C | Industry specification

**Table 9: Industry distribution based on SIC codes**

Industry	SIC codes	Description
Technical	- 1000-1799 - 2800-2999 - 3300-3699 - 4900-4999 - 8711	mining, construction chemicals, petroleum, coal metal, machinery electric, gas services engineering services
Financial	- 6000-6799 - 8721	financial, insurance, and real estate industries accounting, auditing, and bookkeeping
Manufacturing	- 2000-2799 - 3000-3299 - 3700-3999	food, tobacco, textile, wood, printing plastics, leather, glass vehicles, miscellaneous
Transportation	- 4100-4599, 4700-4799 - 4600-4699, 4900-4999, - 4800-4899	passenger & freight transportation pipelines, energy distribution communications
Trade	- 5000-5199 - 5200-5999	wholesale trade retail trade
Services	- 7000-8699 - 8712-8713 - 8730-8999	hotels, repair, recreation, legal, educational, social architectural, surveying R&D, PR, miscellaneous

## Appendix D | Industry and time effects hypothesis 1

**Table 14: Effect of overconfidence on acquisitiveness per industry (Holder 67 proxy)**

Firms were divided into six categories based on SIC codes (Table 9). Each categorie applies a logit regression with standard errors clustered by acquirer. The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. HOLDER67 is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constante term in the regression.

	Technical	Financial	Manufacturing	Transportation	Trade	Services
HOLDER67	0.0309 (0.35)	-0.222 (-1.36)	0.284*** (2.90)	-0.0237 (-0.09)	-0.0925 (-0.49)	0.178 (0.91)
KZINDEX	-2.40e-09*** (-4.59)	9.62e-11 (0.98)	-3.32e-10* (-1.95)	-1.26e-09 (-1.17)	-3.90e-09*** (-2.93)	2.12e-09 (1.38)
SIZE	0.437*** (12.94)	0.299*** (4.83)	0.414*** (11.91)	0.310*** (2.74)	0.683*** (8.61)	0.411*** (5.56)
TOBINQ	0.0000251*** (8.00)	0.0000453*** (4.10)	0.0000161*** (3.49)	0.000000194 (0.01)	0.0000106 (1.12)	0.00000676 (0.88)
COMPENSATION	-0.000610 (-1.07)	0.000422 (0.39)	0.000626 (0.92)	0.000104 (0.09)	0.0000978 (0.09)	-0.00214 (-1.18)
STOCKOWNERSHIP	-0.000222 (-0.45)	-0.000324 (-1.14)	0.000686* (1.68)	-0.0603 (-1.07)	0.00201 (1.64)	0.000446 (0.20)
GENDERDUMMY	-1.355*** (-3.33)	0.512 (0.63)	-0.0208 (-0.06)	0 (.)	0 (.)	0.920** (2.20)
HOLDER67XKZINDEX	1.03e-09* (1.65)	-5.26e-10** (-2.10)	6.39e-11 (0.23)	1.76e-09* (1.80)	5.02e-10 (0.35)	-2.35e-09 (-1.43)
Intercept	-8.839*** (-15.35)	-7.006*** (-5.73)	-8.227*** (-13.58)	-7.797*** (-3.96)	-12.84*** (-9.53)	-8.242*** (-6.49)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	4056	1073	2379	1270	1027	826

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 15: Effect of overconfidence on acquisitiveness per industry (Net Buyer proxy)**

Firms were divided into six categories based on SIC codes (Table 9). Each category applied a logit regression with standard errors clustered by acquirer. The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. NETBUYER is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the regression.

	Technical	Financial	Manufacturing	Transportation	Trade	Services
NETBUYER	-0.0807 (-0.85)	-0.0838 (-0.67)	-0.0488 (-0.54)	0.237 (1.03)	-0.122 (-0.77)	-0.0210 (-0.14)
KZINDEX	-8.93e-09*** (-3.55)	-1.03e-10 (-0.40)	-4.65e-10 (-1.00)	-2.73e-09 (-0.94)	-5.20e-09** (-2.43)	-1.75e-09 (-0.53)
SIZE	0.523*** (6.93)	0.121 (0.92)	0.359*** (4.89)	0.405* (1.85)	0.803*** (6.96)	0.197 (1.37)
TOBINQ	-0.0000361*** (-3.13)	-0.0000162 (-0.58)	-0.0000693*** (-4.36)	-0.000307** (-2.19)	-0.0000868*** (-3.35)	-0.0000612** (-2.30)
COMPENSATION	-0.00103** (-2.18)	0.000379 (0.40)	-0.000731 (-1.13)	0.0000366 (0.05)	0.000202 (0.19)	-0.000324 (-0.39)
STOCKOWNERSHIP	-0.000230 (-0.96)	-0.000506 (-1.34)	0.000704** (2.21)	-0.0478 (-0.97)	0.000986 (1.41)	0.000170 (0.13)
GENDERDUMMY	-1.645** (-2.54)	0.191 (0.21)	-0.203 (-0.53)	-2.369** (-2.19)	0 (.)	0.989 (1.45)
NETBUYERXKZINDEX	2.34e-09 (1.09)	5.18e-11 (0.38)	-8.25e-10*** (-3.11)	3.51e-10 (0.29)	-4.86e-09*** (-3.42)	2.65e-09** (2.46)
Intercept	-8.584*** (-6.67)	-2.776 (-1.06)	-5.433*** (-4.35)	-7.207* (-1.77)	-13.11*** (-6.61)	-3.048 (-1.26)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	4728	1135	2795	1343	1151	884

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 16: Effect of overconfidence on acquisitiveness per period (Holder 67 proxy)**

In this table time effects were examined. The sample is divided in two periods, 1992-2003 and 2004-2016. Furthermore firms were divided into three tertiles (lowest, middle and highest) based in KZ-index. Lowest KZ-index represents the least financially constraint companies and highest KZ-index are the highest financially constraint companies. The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. HOLDER67 is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the regression.

	Logit with clustered errors		standard		Tertile 1 - Firms with lowest KZ-Index		Tertile 3 - Firms with highest KZ-Index	
	1992-2003	2004-2016	1992-2003	2004-2016	1992-2003	2004-2016	1992-2003	2004-2016
HOLDER67	0.237* (1.90)	-0.151 (-1.37)	0.269 (1.52)	0.0745 (0.36)	0.286 (1.33)	-0.270* (-1.88)		
KZINDEX	1.13e-10 (0.34)	-3.19e-11 (-0.33)	8.56e-08* (1.84)	5.27e-09 (0.16)	4.02e-10 (0.96)	-1.24e-10 (-1.03)		
SIZE	0.251*** (5.34)	0.300*** (7.16)	0.295*** (3.24)	0.397*** (4.28)	0.187 (1.29)	0.423*** (4.17)		
TOBINQ	0.0000228*** (4.05)	0.0000342*** (4.54)	0.00000196 (0.30)	0.00000762 (0.67)	0.0000401*** (3.49)	0.0000475*** (3.59)		
COMPENSATION	0.000106 (0.27)	-0.00113 (-1.44)	0.000699 (1.33)	-0.000972 (-0.85)	0.000000741 (0.00)	-0.000771 (-0.51)		
STOCKOWNERSHIP	-0.0220 (-1.52)	0.0000239** (2.17)	-0.00869 (-0.55)	-0.00282* (-1.70)	-0.121* (-1.78)	-0.0000212 (-0.06)		
GENDERDUMMY	0.126 (0.23)	-0.640** (-2.03)	0.759 (1.16)	-1.442* (-1.82)	0 (.)	-0.349 (-0.87)		
HOLDER67XKZINDEX	-3.24e-11 (-0.10)	-4.02e-10* (-1.75)						
Intercept	-6.029*** (-7.31)	-6.405*** (-8.40)	-6.654*** (-4.71)	-7.708*** (-5.19)	-5.140* (-1.89)	-9.020*** (-4.58)		
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes		
Year fixed effects	No	No	No	No	No	No		
Observations	5638	4487	2186	1215	1495	1845		

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 17: Effect of overconfidence on acquisitiveness per period (NETBUYER proxy)**

In this table time effects were examined. The sample is divided in two periods, 1992-2003 and 2004-2016. Furthermore firms were divided into three tertiles (lowest, middle and highest) based in KZ-index. Lowest KZ-index represents the least financially constraint companies and highest KZ-index are the highest financially constraint companies. The dependent variable is binary where 1 represents that at least one deal is initiated in that particular year. NETBUYER is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. NETBUYERXKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the regression.

	Logit with clustered standard errors		Tertile 1 - Firms with lowest KZ- Index		Tertile 3 - Firms with highest KZ- Index	
	1992-2003	2004-2016	1992-2003	2004-2016	1992-2003	2004-2016
NETBUYER	0.0146 (0.23)	-0.0190 (-0.34)	0.00411 (0.03)	0.231 (1.62)	0.0683 (0.61)	-0.0281 (-0.29)
KZINDEX	-5.60e-10 (-0.79)	-4.06e-10 (-1.35)	-0.00000155*** (-3.76)	2.74e-09 (0.14)	3.49e-10 (0.89)	-7.52e-11 (-0.65)
SIZE	0.198*** (3.56)	0.169*** (4.32)	0.625*** (5.34)	0.757*** (7.79)	0.179 (1.46)	0.353*** (4.02)
TOBINQ	-0.0000313*** (-3.29)	-0.0000659*** (-6.77)	-0.000149*** (-7.51)	-0.000161*** (-5.75)	0.0000493*** (4.63)	0.0000483*** (3.79)
COMPENSATION	-0.000563 (-1.58)	-0.000756 (-1.38)	-0.00112 (-1.21)	-0.000130 (-0.15)	0.000159 (0.17)	-0.00212 (-1.44)
STOCKOWNERSHIP	-0.0307* (-2.45)	0.00000711 (0.59)	-0.0290 (-1.46)	-0.000855 (-1.11)	-0.0750 (-1.52)	-0.0000973 (-0.44)
GENDERDUMMY	0.220 (0.47)	-0.881** (-2.77)	0.566 (0.59)	-1.910** (-2.97)	-1.443 (-1.13)	-0.551 (-1.43)
NETBUYERXKZINDEX	-8.28e-10 (-1.58)	1.01e-11 (0.07)				
Intercept	-3.612*** (-3.76)	-2.443*** (-3.53)	-7.969*** (-4.24)	-10.19*** (-6.37)	-4.909* (-2.16)	-7.714*** (-4.56)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	5706	5764	1751	2090	1679	2107

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

## Appendix E | Industry and time effects hypothesis 2

**Table 20: Effect of overconfidence on the probability of a failed M&A per industry (Holder 67 proxy)**

Firms were divided into 11 categories based on the industry indicator of Thomson Reuters. Each category applies a logit regression with standard errors clustered by acquirer. The dependent variable is binary where 1 represents a failed merger or acquisition. HOLDER67 is the overconfidence proxy, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constante term in the regression.

	Consumer Products and Services	Consumer Staples	Energy and Power	Financials	Healthcare	High Technology	Industrials	Materials	Media and entertainment	Retail	Tele-communications
HOLDER67	-2.800*** (-3.15)	0.352 (0.36)	1510 (1.52)	0.315 (0.33)	-0.243 (-0.50)	-0.00525 (-0.01)	-0.285 (-0.66)	0.00544 (0.01)	2551 (1.07)	0.612 (0.93)	6.504*** (5.46)
KZINDEX	-0.000975*** (-2.72)	0.0000279 (0.24)	0.000448*** (2.93)	-0.0198 (-0.52)	-0.000128 (-1.55)	0.00000202 (0.66)	-0.0000116 (-0.12)	0.000185 (1.11)	0.000146 (0.24)	-0.0000176 (-0.18)	-0.000116 (-0.40)
SIZE	0.199 (0.86)	0.113 (0.38)	-0.00996 (-0.06)	-0.0638 (-0.41)	0.242** (2.14)	-0.354*** (-3.31)	0.171 (1.55)	0.0847 (0.37)	0.590 (1.38)	0.197 (1.47)	0.568* (1.66)
TOBINQ	-3.690** (-2.45)	1907 (0.71)	4.176*** (2.68)	6.516* (1.74)	0.803 (1.06)	-0.221 (-0.18)	-0.215 (-0.18)	0.792 (0.66)	-0.518 (-0.12)	-0.352 (-0.43)	-8861 (-1.29)
COMPENSATION	-0.0613* (-1.81)	0.000904 (0.26)	0.0000240 (0.01)	-0.00314 (-0.92)	-0.0147 (-1.59)	-0.0843 (-0.87)	-0.00819 (-1.43)	0.00223 (1.11)	-1079 (-0.30)	0.00201*** (5.22)	-9858 (-0.81)
STOCKOWNERSHIP	0.0337 (1.47)	-0.194 (-0.92)	0.0134 (0.28)	0.0197 (0.97)	0.0598*** (2.67)	-0.0845* (-1.90)	0.0649* (1.82)	-0.227 (-1.16)	-0.0254 (-0.73)	-0.00282 (-0.06)	-21.43** (-2.09)
GENDERDUMMY	0 (.)	0.105 (0.14)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
HOLDER67XKZINDEX	0.000966*** (2.67)	0.0000337 (0.29)	-0.000803** (-2.42)	0.0198 (0.52)	0.000128 (1.55)	0.00000310 (0.82)	0.00000284 (0.03)	-0.0000212 (-0.14)	-0.000822 (-1.27)	0.0000387 (0.39)	-0.00394*** (-6.58)
Intercept	-2665 (-0.74)	-7192 (-1.41)	-6.249* (-1.71)	-8.151** (-2.53)	-8.061*** (-3.62)	2318 (1.53)	-5.963*** (-3.52)	-5685 (-1.29)	-14.16 (-1.30)	-6.476** (-2.44)	-8.413** (-2.24)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No
Observations	819	707	856	1343	1416	2463	2304	904	269	538	275

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 21: Effect of overconfidence on the probability of a failed M&A per industry (Net Buyer proxy)**

Firms were divided into 11 categories based on the industry indicator of Thomson Reuters. Each category applies a logit regression with standard errors clustered by acquirer. The dependent variable is binary where 1 represents a failed merger or acquisition. NETBUYER is the overconfidence proxy, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. NETBUYERXKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the regression.

	Consumer Products and Services	Consumer Staples	Energy and Power	Financials	Healthcare	High Technology	Industrials	Materials	Media and entertainment	Retail	Tele-communications
NETBUYER	0.967 (1.29)	0.874 (1.39)	-0.643 (-1.10)	0.0556 (0.18)	0.374 (1.03)	-0.172 (-0.62)	0.251 (0.56)	0.342 (0.51)	-1850 (-1.43)	0.0903 (0.25)	3.464** (1.96)
KZINDEX	-0.0000325*** (-2.64)	0.0000926** (2.41)	-0.000000265 (-0.00)	-0.00222 (-1.63)	0.000000317 (0.58)	-0.000000433 (-0.12)	-0.00000665 (-0.11)	0.000127 (1.28)	-0.000662** (-2.49)	0.0000125 (0.28)	-0.000129 (-0.62)
SIZE	0.457*** (2.87)	0.0955 (0.55)	-0.0587 (-0.39)	0.0309 (0.23)	0.194* (1.80)	-0.253*** (-2.86)	0.0432 (0.66)	0.0632 (0.39)	0.0804 (0.42)	0.0347 (0.26)	0.552* (1.78)
TOBINQ	-2.880** (-2.15)	-0.192 (-0.14)	3.327** (2.16)	2609 (1.39)	1.352* (1.75)	-0.641 (-0.59)	-0.212 (-0.21)	0.0139 (0.01)	-0.852 (-0.31)	-0.726 (-0.74)	-11.32** (-2.47)
COMPENSATION	-0.0569* (-1.80)	0.00116 (0.88)	-0.000383 (-0.10)	-0.000482 (-0.26)	-0.0161* (-1.81)	-0.624 (-1.64)	-0.00988 (-1.54)	0.000784 (0.44)	-1713 (-1.08)	0.00135 (1.23)	-0.101 (-1.33)
STOCKOWNERSHIP	-0.00187 (-0.11)	-0.00664 (-0.74)	-0.00337 (-1.54)	-0.00110 (-1.45)	-0.000210 (-0.61)	-0.0205 (-0.71)	-0.00132** (-2.25)	-0.234 (-1.51)	-0.0468 (-1.41)	0.00509 (0.20)	-0.460 (-0.41)
GENDERDUMMY	0 (.)	0.289 (0.64)	0 (.)	0.789 (0.57)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	-0.506 (-0.38)	0 (.)
NETBUYERXKZINDEX	-0.0000231 (-0.25)	-0.0000816** (-2.02)	0.0000757 (0.34)	0.00222 (1.63)	-0.000000350 (-0.62)	0.00000580 (1.59)	-0.000102 (-1.03)	-0.0000156 (-0.11)	0.000479 (1.05)	-0.0000299 (-0.73)	-0.000443 (-1.30)
Intercept	-10.64*** (-3.98)	-5.853** (-2.05)	-3610 (-1.07)	-6.099*** (-2.64)	-8.130*** (-3.91)	0.865 (0.65)	-3.882*** (-3.84)	-4948 (-1.64)	-2383 (-0.49)	-2861 (-1.30)	-10.30*** (-2.68)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No
Observations	1073	980	1061	1853	1801	3251	2989	1330	569	774	377

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 22: Effect of overconfidence on the probability of a failed M&A per industry (Holder 67 proxy)**

Firms were divided into six categories based on SIC codes (Table 9). Each category applies a logit regression with standard errors clustered by acquirer. The dependent variable is binary where 1 represents a withdrawal (e.g. failed). HOLDER67 is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the regression.

	Technical	Financial	Manufacturing	Transportation	Trade	Services
HOLDER67	-0.514* (-1.87)	0.0130 (0.03)	-0.332 (-0.68)	0.595 (0.94)	0.633 (1.23)	-0.564 (-1.43)
KZINDEX	-0.0000903 (-1.61)	-0.00104** (-2.34)	-0.0000211 (-0.27)	0.000223 (1.50)	0.0000593 (0.72)	0.000000665* (2.43)
SIZE	-0.0317 (-0.43)	0.0384 (0.25)	0.0539 (0.61)	0.141 (1.28)	0.321** (2.38)	-0.0479 (-0.35)
TOBINQ	0.0620 (0.08)	1.716 (0.85)	1.055** (2.04)	-1.256 (-0.96)	-0.720 (-0.66)	1.092* (1.85)
COMPENSATION	-0.000258 (-0.11)	-0.00330 (-0.84)	-0.00568 (-1.48)	-0.0780*** (-2.77)	0.00216*** (4.50)	-0.0485** (-2.37)
STOCKOWNERSHIP	0.0178 (0.79)	0.0117 (0.56)	-0.0233 (-0.46)	0.00718 (0.37)	0.0242 (0.59)	0.00922 (0.39)
GENDERDUMMY	0 (.)	0 (.)	-0.573 (-0.67)	0 (.)	0 (.)	0 (.)
HOLDER67XKZINDEX	0.0000899 (1.60)	0.00104** (2.34)	0.0000845 (1.02)	-0.000440** (-2.01)	0.0000176 (0.22)	0.00000766*** (3.65)
Intercept	-2.490* (-1.93)	-5.638** (-2.15)	-4.953*** (-3.24)	-4.856** (-2.18)	-9.231*** (-3.66)	-3.195 (-1.39)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	4447	1497	2571	608	986	1993

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 23: Effect of overconfidence on the probability of a failed M&A per industry (Net Buyer proxy)**

Firms were divided into six categories based on SIC codes (Table 9). Each category applies a logit regression with standard errors clustered by acquirer. The dependent variable is binary where 1 represents a withdrawal (e.g. failed). NETBUYER is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. NETBUYERXKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constant term in the regression.

	Technical	Financial	Manufacturing	Transportation	Trade	Services
NETBUYER	0.126 (0.77)	0.328 (1.16)	0.245 (0.74)	0.108 (0.20)	-0.177 (-0.42)	0.147 (0.43)
KZINDEX	6.11e-08 (0.03)	3.87e-08 (0.05)	0.0000637* (1.82)	-0.0000466 (-0.39)	0.00000987 (0.17)	0.0000403 (1.42)
SIZE	-0.0761 (-1.55)	0.0828 (1.21)	0.0414 (0.57)	0.0643 (0.63)	0.186** (1.97)	-0.0309 (-0.40)
TOBINQ	0.245 (0.56)	1.507* (1.66)	0.841 (1.53)	-1.272 (-1.17)	-1436 (-1.52)	0.422 (0.73)
COMPENSATION	-0.00160 (-0.71)	-0.000323 (-0.13)	-0.00163 (-0.62)	-0.117 (-0.19)	0.00175 (1.30)	-0.141 (-0.24)
STOCKOWNERSHIP	-0.00221 (-0.43)	-0.00113 (-0.24)	-0.00916 (-0.62)	-0.00219 (-0.18)	-0.000990 (-0.24)	-0.0113 (-0.57)
GENDERDUMMY	0 (.)	0.339 (0.32)	-0.232 (-0.32)	0 (.)	1282 (1.64)	-1113 (-1.08)
NETBUYERXKZINDEX	-0.000000141 (-0.07)	0.000000366 (0.12)	-0.0000532 (-1.01)	-0.0000929 (-0.58)	0.0000259 (0.35)	-0.0000401 (-1.41)
Intercept	-2.334*** (-2.75)	-6.400*** (-5.48)	-4.955*** (-4.04)	-3227 (-1.63)	-5.620*** (-3.51)	-3.722*** (-2.81)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	5716	2042	3260	914	1323	3080

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 24: Effect of overconfidence on the probability of a failed M&A per period (Holder 67 proxy)**

In this table time effects were examined. The sample is divided in two periods, 1992-2003 and 2004-2016. Furthermore firms were divided into three tertiles (lowest, middle, highest) based in KZ-index. Lowest KZ-index represents the least financially constraint companies and highest KZ-index are the highest financially constraint companies. The dependent variable is binary where 1 represents a withdrawal (e.g. failed). HOLDER67 is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO. HOLDER67XKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constante term in the regression.

	Logit with clustered standard errors		Tertile 1 - Firms with lowest KZ-Index		Tertile 3 - Firms with highest KZ-Index	
	1992-2003	2004-2016	1992-2003	2004-2016	1992-2003	2004-2016
HOLDER67	-0.198 (-0.87)	-0.0271 (-0.11)	-0.225 (-0.71)	-0.157 (-0.54)	0.649 (1.06)	-0.00762 (-0.02)
KZINDEX	-0.00000465*	0.0000148	0.00000223	0.00000488	0.00000664*	-0.0000380
SIZE	0.0525 (0.69)	0.0644 (1.20)	0.180 (1.21)	0.161* (1.95)	0.0267 (0.24)	-0.0481 (-0.49)
TOBINQ	1.123** (1.99)	0.0655 (0.13)	-0.116 (-0.08)	-0.354 (-0.48)	1.311 (1.50)	0.193 (0.24)
COMPENSATION	-0.00481** (-2.04)	0.00101 (0.68)	-0.00316 (-1.28)	-1.003 (-0.90)	-0.00867 (-1.22)	0.00255*** (3.10)
STOCKOWNERSHIP	0.0210 (1.05)	-0.000357 (-0.02)	0.0607* (1.72)	0.0108 (0.55)	0.00294 (0.10)	-0.0860* (-1.76)
GENDERDUMMY	0 (.)	-1.814* (-1.85)	0 (.)	0 (.)	0 (.)	0 (.)
HOLDER67XKZINDEX	0.00000885 (1.43)	-0.00000671 (-0.16)				
Intercept	-4.877*** (-4.07)	-4.682*** (-5.02)	-6.330*** (-3.14)	-6.083*** (-4.30)	-5.537** (-2.56)	-2.249 (-1.34)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	4663	7423	1466	2526	1766	2182

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 25: Effect of overconfidence on the probability of a failed M&A per period (Net Buyer proxy)**

In this table time effects were examined. The sample is divided in two periods, 1992-2003 and 2004-2016. Furthermore firms were divided into three tertiles (lowest, middle, highest) based in KZ-index. Lowest KZ-index represents the least financially constraint companies and highest KZ-index are the highest financially constraint companies. The dependent variable is binary where 1 represents a withdrawal (e.g. failed). NETBUYER is the overconfidence proxy in this panel, KZINDEX is the KZ-index measured by the formula used by Malmendier and Tate (2005) based on the coefficient estimates of Lamont et al.(2001), SIZE is the log of total assets, TOBINQ is the market value of assets over the book value of assets, COMPENSATION is the fraction fixed compensation of total compensation, STOCKOWNERSHIP is the percentage company stock owned by the CEO. GENDERDUMMY is a binary variable where 1 represents a female CEO.NETBUYERXKZINDEX represents the interaction between overconfidence and financial constraints. The intercept represents the constante term in the regression.

	Logit with clustered standard errors		Tertile 1 - Firms with lowest KZ-Index		Tertile 3 - Firms with highest KZ-Index	
	1992-2003	2004-2016	1992-2003	2004-2016	1992-2003	2004-2016
NETBUYER	-0.198 (-0.87)	-0.0271 (-0.11)	-0.225 (-0.71)	-0.157 (-0.54)	0.649 (1.06)	-0.00762 (-0.02)
KZINDEX	-0.00000465* (-1.73)	0.0000148 (0.38)	0.00000223 (0.44)	0.00000488 (0.63)	0.00000664* (1.75)	-0.0000380 (-0.95)
SIZE	0.0525 (0.69)	0.0644 (1.20)	0.180 (1.21)	0.161* (1.95)	0.0267 (0.24)	-0.0481 (-0.49)
TOBINQ	1.123** (1.99)	0.0655 (0.13)	-0.116 (-0.08)	-0.354 (-0.48)	1.311 (1.50)	0.193 (0.24)
COMPENSATION	-0.00481** (-2.04)	0.00101 (0.68)	-0.00316 (-1.28)	-1.003 (-0.90)	-0.00867 (-1.22)	0.00255*** (3.10)
STOCKOWNERSHIP	0.0210 (1.05)	-0.000357 (-0.02)	0.0607* (1.72)	0.0108 (0.55)	0.00294 (0.10)	-0.0860* (-1.76)
GENDERDUMMY	0 (.)	-1.814* (-1.85)	0 (.)	0 (.)	0 (.)	0 (.)
NETBUYERXKZINDEX	0.00000885 (1.43)	-0.00000671 (-0.16)				
Intercept	-4.877*** (-4.07)	-4.682*** (-5.02)	-6.330*** (-3.14)	-6.083*** (-4.30)	-5.537** (-2.56)	-2.249 (-1.34)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	4663	7423	1466	2526	1766	2182

t statistics in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%