Hubris hypothesis and Size effect in M&As

- The relationship between CEO overconfidence, firm size and merger performance –

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*How does CEO overconfidence and firm size influence the stock returns of acquirers at the merger announcement?*

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Management Summary

This thesis studied the effects of hubris and size on merger performance. Theory predicts that hubris is negatively related with merger performance: managers who are considered to be overconfident perform worse when a merger is announced than its rational counterparts. This study does not find a result which agrees with this theory. In contrast, this study finds a positive relationship between CEO overconfidence and the announcement abnormal returns. Several reasons are considered in the discussion part. Regarding the size effect, the results of this thesis do agree with the hubris theory. Theory states that small firms perform better during a merger announcement than large firms. This thesis only considers overconfident acquisitions to test this hypothesis, and find similar results. An explanation is offered by Moeller, Schlingemann, and Stulz (2004) which state that managers of large firms might be more prone to hubris, because they are more important socially, have succeeded in growing the firm, or simply face fewer obstacles in making acquisitions because their firm has more resources.
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After completing the Bachelor Bedrijfseconomie, and master Strategic Management at Tilburg University, I started in September last year with the Master Finance.

For three months desktop 16016 was my playground. Using that desktop in the library of Tilburg University, I worked on all the facets of this thesis. However, I wasn’t able to do this without the unconditional help of several persons. First, I would like to thank my supervisor prof.dr. Henriëtte Prast, who provided me the chance to defense at the end of August. Due to some unforeseen circumstances I did not thought that this was possible. I would also like to thank Dr. Peter de Goeij, the second reader of this master thesis. Then also thanks to my fellow students who were important during my study in Tilburg: Dion, Maarten, Michiel, and Peter Jan. Last but, certainly, not least I would like to thank my family, girlfriend and friends for their support. Especially my brother, Thijmen for reviewing this thesis very critically. Thank you all!

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Chapter 1: Introduction

This master thesis will be the finishing part for the study Msc. Finance at Tilburg University. In order to write the master thesis, this introduction chapter provides a solid basis. The first part indicates the problem of interest, after which the problem statement and research questions are formulated. This chapter concludes with a further structure of the thesis.

Mergers and acquisitions\(^1\) (M&A’s) are popular topics in the research field of finance, which should come as no surprise, since M&A are one of the most important events for a firm and the economy. Especially when Fama, Fisher, Jensen and Roll (1969) pioneered the event-study methodology, which allowed scholars to analyze successes of M&As, research became extremely popular. However, there are some questions which are not fully answered yet. For example; bidder firms, on average, do not profit from M&As as much as target firms do. In many cases, M&As even destroy shareholders’ wealth of the bidder firm. This wealth destruction seems to be even higher for large acquirers. In the past, several studies have been undertaken to explain these variations in bidder abnormal returns. Some possible explanations, hubris hypothesis and size effect, will be examined in this thesis.

For this research, the hubris hypothesis is taken as a starting point. The hubris hypothesis is often used by explaining managerial overconfidence in mergers and acquisitions. The rationale behind this theory is that managers over rate their ability to evaluate potential acquisition targets. As a result, the financial market reacts negatively and the share price of the bidder firm decreases. The hubris theory predicts that this effect is even stronger for larger firms, since their CEOs are more overconfident than the CEOs of smaller firms. The hubris hypothesis is already investigated in several settings (Brown and Sarma, 2007; Doukas and Petzemas, 2007; Malmendier and Tate, 2005). However, none of these studies focused on the time period after the year 2000. Moreover, they only consider the relationship between CEO overconfidence and the bidder’s stock return. This study also tries to include the size effect as an independent variable. The results can be interesting, since it may provide some insights on the determinants of a firm’s stock price when it announces a merger or acquisition.

Based on the problem indication, the following problem statement can be formulated:

*How does CEO overconfidence (Hubris) and firm size influence the stock returns of bidders at the merger announcement?*

\(^1\) The terms mergers and acquisitions are used interchangeably in this research.
The problem statement needs to be separated in research questions.

- How do the stock prices of a bidder firm react when a merger is announced?
- When is a CEO considered to be overconfident?
- Does CEO overconfidence influence the short run performance of a merger?
- In what way does firm size affect the short run performance of a merger?

In the present chapter the research problem is addressed. In chapter two the theoretical background will be presented. Chapter three describes the model and how each variable is operationalized. Chapter four continues with a description of the methodology. This chapter also provides the first descriptive results. The hypotheses are tested in chapter five. This chapter provides all the main results. These results will be discussed in chapter six. Chapter six also contains some managerial implications and the limitations of this research.
Chapter 2: Theoretical Background

2.1 Introduction

This chapter aims to provide a theoretical explanation. First, the changes in shareholder wealth of bidder and target firms will be examined in detail. Second, some behavioral explanations for this ‘wealth mutation’ will be provided. The concept of overconfidence will be further examined in a M&A context. This chapter ends with two hypotheses which will be investigated in chapter five while using the research methods described in chapter three and four.

2.2 Abnormal Returns of Bidder and Target Firms

The most reliable evidence on whether mergers create value for shareholders comes from short-term event studies. In an event study, the average abnormal stock market reaction at a merger announcement is used as an approximation for value creation or destruction. Many studies with mostly similar outcomes have been already undertaken.

Andrade, Mitchell, and Stafford (2001) have shown that the average abnormal return over a three-day event window for the target and bidder combined equals 1.8%. This means that mergers, on average, do create shareholder value. But while the combined value increases, the study of Andrade et al. (2001) shows that this is mainly, if not only, attributable to the target firm. When confronted with a merger announcement, the value of target firms increased with 16.0% on average. In contrast, when a bidder firm announces the merger, its value decreased with 0.7% on average. The results of Servaes (1991) are even clearer. He found a target and bidder return of respectively 23.64% and -1.07%.

Andrade, Mitchell, and Stafford (2001) analyzed the acquisition and the acquirer in more detail. They found that large acquirers make worse deals than small acquirers. Moeller, Schlingemann, and Stulz (2004) provide more evidence. They evaluate this size effect in acquisition announcement returns. Moeller et al. (2004) show that large acquirers have on average a CAR of 0.076%, while small acquirers’ CAR equals 2.318%. The difference of 2.242% is statistically significant. Furthermore, Moeller et al. (2004) regresses size on cumulative abnormal return (CAR). They find that the abnormal return of an acquisition is 1.59 percentage points higher if it involves a small acquirer.

Why do bidder firms have lower announcement abnormal returns than target firms? And why is there a size effect? Despite much research, scholars have been unable to successfully explain much of these variations (Fuller, Netter, and Stegemoller, 2002). Shleifer and Vishny (2003) propose a
concept that is related to the neoclassical theory. The fundamental assumption here is that financial markets are inefficient, so some firms are valued incorrectly by the market. In contrast, managers are completely rational, and therefore use mergers as a form of arbitrage. The theory of Shleifer and Vishny (2003) states somewhat the opposite of Roll’s (1986) hubris hypothesis. The hubris theory claims that the management of acquiring firms over rates their ability to evaluate potential acquisition targets (Deo and Shah, 2012). As a result, bidders pay too much for their targets. Thus, the financial market is rational, but corporate managers are not. This study takes Roll’s hubris hypothesis as a starting point, because this study focuses on managerial behavior. Besides that, the evidence of the neoclassical theory in acquisitions is inconclusive and incomplete. Moreover, the hubris theory also offers an explanation for the size effect, since CEOs of large firms are more likely to be overconfident.

To explain the hubris hypothesis in a decent way, this chapter will first explain the concept of overconfidence.

2.3 Overconfidence in psychology and finance
This paragraph aims to provide the most important theory about overconfidence. Firstly, the (psychological) concept of overconfidence will be explained. Then I will discuss CEO overconfidence in more detail. In the last section of this paragraph I will discuss the main applications of CEO overconfidence in M&As.

Overconfidence is a very important and wide-spread bias which comes in two types: the “better-than-average effect”, and the “too-certain effect”. The better-than-average effect states that; when assessing their position in a distribution of peers on any positive trait, a vast majority of people say they are above average (Camerer & Lovallo, 1999). For example, 82% of the people in a survey believed they are in the top 30% in terms of their ability to drive safely (Svenson, 1981). Most people are even overconfident or optimistic for totally random events (Weinstein, 1980). The too-certain effect states that people believe that they are more accurate than they in reality are. For example, an investor is too-certain if he believes that the stock price of a particular share will be between $15 and $17 with 90% probability, while in reality the 90% confidence interval should be set between $14 and $18 (Hvide, 2002).

Since the 1990s behavioral finance has become a field of interest for economists. Some puzzles on the financial markets, which were not solved using the standard economic theory – inter alia efficient market hypothesis – were successfully accounted for once overconfidence was assumed (Skala,
Investor behavioral issues like excessive trading (Odean, 1999), the disposition effect (Odean, 1998), and under-reaction (DellaVigna & Pollet, 2009) has proven the effects of overconfidence. Moreover, Barber and Odean (2001) found that overconfidence also explains the excessive trading of men, and how this excessive trading damages the performance of men relative to women. All these results show that investors do not always act in a rational way. Assuming rationality in this research can be problematic in two ways. First, if investors are confronted with a merger announcement they have to reconsider their portfolio and buy, sell or hold their shares in the bidding company. Taking the several investors biases and heuristics into account, who says that the investors are correct in their investment decision? Second, one can wonder if the merger announcement date represents the moment that the news hits the market. Rumors, inside or private information, and speculation can influence the results. Thus, when interpreting the results of an event study one has to be extremely careful to consider the irrationality of investors.

A field less explored is the existence of overconfidence in the corporate finance context. The two main directions of overconfidence research in the field of corporate finance are studies of mergers and acquisitions activities and analyses of corporate financing structures (Skala, 2008). This study focuses solely on CEO overconfidence related to mergers and acquisitions. This is described in the next paragraph.

2.4 Overconfidence in M&As
In the research field of finance, managerial overconfidence in acquisitions is often explained by the hubris hypothesis (Morck, Shleifer, and Vishny, 1990; Malmendier and Tate, 2008). This section tries to capture the most-valuable studies regarding this relationship. At the end of the section some hypotheses will be formulated.

While devising the hubris hypothesis, Roll (1986, p.109) argues that markets behave as if they are populated by rational investors. Actually, he suggests, a market is populated by grossly irrational individual behavior that cancels out in the aggregate. Overall, the market then still presents rational prices. Because the takeover market solely reveals the winning bid, Roll (1986) believes that corporate takeovers do reflect only individual, and thus gross irrational, decisions. Managers may convince themselves that their valuation is right and that the market does not reflect the full economic value of the combined firm. Bidder firms are too-certain that their valuation is the best (thus better-than-average). As a result, managers pay too much for the target firms.
In essence, the hubris hypothesis can be seen as a variant of the winner’s curse in an M&A context (Thaler, 1988). Logically, bidding firms bid for the target if and only if their estimated value exceeds the market value. Because Roll is convinced of the efficient market hypothesis, he states that bidders, in a semi-strong efficient market, are always overpaying. For example, Hietala, Kaplan, and Robinson (2003) investigated a case where the ‘winning bidder’ (Viacom) overpaid for the target (Paramount) by more than $2 billion. The researchers devote this huge overpayment to managerial overconfidence.

Following Roll’s argumentation, Malmendier and Tate (2008) show that overconfident CEOs overestimate their abilities to create value for their shareholders in a M&A setting. Malmendier and Tate (2008) show that overconfident CEOs conduct more mergers, and that they overestimate merger synergies. As a consequence, overconfident CEOs are more likely to undertake value-destroying projects that rational managers would forgo. The researchers show that per bid, overconfident CEOs destroy on average $7.7 million more value than the other CEOs. Doukas and Petzemas (2007) examined acquisitions of privately held U.K. targets, and came up with the same conclusions. They state that overconfident managers make more acquisitions, and show that high acquisitive firms fail to outperform low acquisitive firms. In other words, Doukas and Petzemas (2007) conclude that CEO overconfidence is negatively related to acquisition performance. Moreover, Doukas and Petzemas (2007) show that overconfident CEOs think that they have superior manager skills and are more capable than their counterparts. Additional support is provided by Vagenos-Nanos (2010) who also conclude that overconfident bidders destroy more or create less value than their rational counterparts. Taking these results into account this study hypothesizes that:

Hypothesis 1: Bidder overconfidence and announcement abnormal returns are negatively related.

The hubris hypothesis also provides an explanation for the size effect in acquisitions. The size effect was already examined by Dimson and Marsh (1986) and is defined as the difference between the abnormal returns of small acquirers and large acquirers (Moeller, Schlingemann, and Stulz, 2004). Moeller et al. (2004) found that, controlling for many acquisition characteristics, the abnormal return of an acquisition is 1.59 percentage points higher if it involves a small acquirer. The scholars explain this size effect with the hubris theory: ‘managers of large firms might be more prone to hubris, because they are more important socially, have succeeded in growing the firm, or simply face fewer obstacles in making acquisitions because their firm has more resources.’ Because managers of large
firms might have made these firms big, or might have to overcome more obstacles to become CEOs than managers of small firms, this study hypothesizes that:

**Hypothesis 2:** Large bidders who are overconfident perform worse than small overconfident bidders.

### 2.5 Conclusion

This chapter has tried to provide a theoretical framework regarding the concepts of announcement abnormal returns, (CEO) overconfidence, and the hubris theory. Using the theory I suggested two hypotheses. These hypotheses will be tested in chapter 5. The next chapter tries to explain the methodology which will be used to test the two hypotheses.
Chapter 3: Model, Variables and Data

3.1 Introduction
This chapter discusses the model that is used to answer the problem statement and to test the hypotheses. Moreover, this chapter outlines how all the different variables included in this study will be measured. The studies of Moeller, Schlingemann, and Stulz (2004) and Malmendier and Tate (2008) serve as a guide for the empirical analysis. Furthermore, this chapter also provides the databases and information resources that will be used for each variable.

3.2 Model
Taking the hypothesis into account one can create a graphical representation. With the arguments from previous literature I hypothesize that overconfident CEOs create less value than rational CEOs in acquisitions. This relationship is modeled in graph one.

Graph 1: Model hypothesis I

CEO overconfidence

Control variables

Bidder announcement abnormal returns

With the arguments from previous literature I hypothesize that large overconfident bidders create less value than overconfident bidders which are small. The relationship of this size effect is modeled in graph two.
Graph 2: Model hypothesis II

The next paragraph outlines how each variable will be measured.

3.3 Operationalization of variables

This section tries to explain how each variable is calculated. First, the variables of hypothesis 1 are examined. Thereafter, I will present which variables are used for hypothesis 2 and how they are measured.

3.3.1 Operationalization of Hypothesis 1

Hypothesis 1: Bidder overconfidence and announcement abnormal returns are negatively related.

CEO overconfidence (IV) - In past research, several proxies are used to capture managerial overconfidence in an empirical way. Malmendier and Tate (2008) use CEO’s stock options. If CEO’s hold their stock options until expiration, even though the stock option is in-the-money, he or she is classified as overconfident. This is because the CEO believes that the stock price will continue to rise further. Another method is called the business press proxy. This measure takes into account the way in which newspapers represent the character and personality of CEOs. Another proxy for CEO hubris is about multiple acquisitions. Doukas and Petmezas (2007) argue that overconfident managers have an urge to acquire other firms quickly and frequently. This measure of ‘merger frequency’ is also used by Billet and Qian (2007). The conclusion of both studies is the same: ‘those firms which engage in multiple acquisitions are largely considered to be overconfident’.

Unfortunately, the data used by these researchers is not accessible, or it is very time-consuming to gather the data. Therefore I use another well-accepted measure for CEO overconfidence: Holder67.
This measurement was first introduced by Malmendier and Tate (2005), and later validated by Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011). Holder67 uses the timing of option exercises to identify overconfidence. Theory predicts that if an option is in-the-money, the holder (here CEO) should exercise the option, unless the holder believes that the stock prices of their company will continue to rise under their leadership more than they objectively should expect. So, overconfidence induces CEOs to postpone option exercise. To measure the Holder67 variable I will follow the methods of Malmendier and Tate (2005).

This study uses American Stock Options, which provide the CEO the right to exercise at any point before maturity. However some employee stock options are fully vested after four years (Malmendier & Tate, 2005). So, in order to compare each option package with vesting periods of different duration, the first year in which all of the packages in the sample are exercisable (year 5) will be examined. From year 5 the percentage in-the-money of the options is calculated using the following formula:

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

The denominator reflects the exercise price, which is calculated by subtracting the average realizable value per option from the stock price at the end of the fiscal year. If an option is more than 67% in-the-money as from the fifth year, the CEO should have exercised his options. The 67%-threshold coincides with a risk aversion of three, which is identified by Hall and Murphy (2002). Very important to note here, is that the Holder67-variable is a dummy variable which equals 1 if the CEO is overconfident and equals 0 if the CEO is considered as rational. In this research I will refer to this variable as OC67.

Employee stock options are widely used as a compensation or incentive for (top) executives. A typical option gives the executive the right to buy a specified number of shares at a fixed price, up to the expiration date. The reason why American options are used here, is that they are not tradeable, are exercisable any time before expiration, and have a vesting period of several (usually four) years at the start (Chance, Kumar, and Todd, 2000). European options, however, are only exercisable at the expiration date and are therefore useless as a proxy for overconfidence.

To obtain the data I will use the ‘Compustat Executive Compensation’ (ExecuComp) database. From this database I need to retrieve the following variables: Company code, CEO ID number,
OPT_UNEX_EXER_EST_VAL (Total Value of Unexercised Exercisable Options), and OPT_UNEX_EXER_NUM (Number of Unexercised Exercisable Options). To obtain the stock price at fiscal year end I will use PRCC_F which is included in the Compustat Fundamental Annual file.

**Bidder announcement abnormal returns** (DV) – using event study methodology, the bidders’ CAR will be used as a proxy for the value creation of acquisitions. To calculate the Cumulative Abnormal Returns, I will follow the basic steps of Malmendier and Tate (2005). The researchers calculate the CAR to the acquiring firm’s stock over a three-day window around the announcement of the merger bid (t = -1, 0, 1), using the daily return on the S&P500 index as a proxy for expected returns. The S&P500 is appropriate since the sample consists of U.S. companies that comprise a substantial portion of market returns. First, the abnormal returns have to be calculated. So, for acquirer i at time t, the abnormal return equals:

\[ AR_{it} = R_{it} - R_{S&P500,t} \]

Second, the CAR of acquirer i can be obtained by adding up the three-day abnormal returns.

\[ CAR_i = AR_{i,-1} + AR_{i,0} + AR_{i,1} \]

Because the news of a possible takeover-bid might spread gradually to the public, and thus may be reported with some lag in the press, the abnormal returns may be spread around the chosen event date (De Jong & De Goeij, 2011). Therefore, I will test the significance of abnormal returns in a window around t=0. This is done in section 4.4.

The sample of acquisitions comes from the Securities Data Company’s (SDC) U.S. Mergers and Acquisitions database. This study considers (almost) the same conditions as Moeller, Schlingemann, and Stulz (2004). I select domestic mergers and acquisitions with announcement dates between January 1st 2000 and December 31th 2009. I require that acquiring companies obtain at least 51% of the target shares, and acquisitions in which the acquirer already holds at least 51% of the target before the deals are omitted. I further require that the transaction is completed, the deal value is higher than $1 million, and the acquirer is a public firm listed on the Center for Research in Security Prices (CRSP) and Compustat databases during the event window. Moeller et al. (2004) also require that the deal value relative to the market value of the acquirer is more than 1%. The market value of the acquirer here equals the sum of the market value of equity, long-term debt, debt in current liabilities, and the liquidating value of preferred stock.
The most ideal way to conduct an event study is by using the Eventus database, provided by Wharton Research Data Services (WRDS). Eventus performs event studies using data directly from CRSP stock databases. Unfortunately, due to budget cuts, Tilburg University does not have access to this dataset anymore. Therefore I was forced to conduct an event study with the financial program STATA. The do-files can be found in the appendix (section 8.1).

**Control variables** – control variables are quantities that are held constant in order to assess or classify the relationship between two other variables. They are held constant, because they can influence the results significantly.

For both hypotheses I will use mainly the same control variables as Malmendier and Tate (2008). Just like Moeller et al. (2004) I will also try to add some deal and CEO characteristics.

The following control variables are retrieved from the Compustat database:

- **Firm size**: natural logarithm of assets at the beginning of the year \((AT, \text{item 6})\).
- **Investments**: capital expenditures \((CAPX, \text{item 128})\).
- **Cash flow**: income before extraordinary items \((IB, \text{item 18})\) + depreciation \((DP, \text{item 14})\) + capital as property, plants, and equipment \((PPENT, \text{item 8})\).
- **Q**: the ratio of *market value of assets* to *book value of assets* \((AT, \text{item 6})\), where:

  \[
  \text{Market value of assets} = \text{total assets} \ (AT, \text{item 6}) + \text{market equity (common shares outstanding (CSHO, \text{item 25})} \times \text{fiscal year closing price (PRCC, \text{item 199}) + balance sheet deferred taxes and investment tax credit (TXDITC, \text{item 35}) – post-retirement assets (PRBA, \text{item 330})}.
  \]

The following control variables are retrieved from the SDC database U.S. Mergers Database:

- **Deal attitude**: this is a binary variable where 1 signifies that the deal attitude is ‘Hostile’, and 0 signifies ‘Friendly’ or ‘Neutral’.
- **Deal payment**: this is also a binary (dummy) variable where 1 signifies that the method of payment of the deal is cash, if not the deal payment is signified with 0.

The last control variables are retrieved from the ExecuComp database, and reflect some CEO characteristics which may be important:

- **CEO age**: this is a numerical variable which reflect the present age of the CEO. Again Malmendier, Tate, and Yan (2011) show that measurable managerial characteristics have
significant explanatory power for corporate finance decisions. Yim (2013) demonstrated that young CEOs are more likely to announce an acquisition than its older counterparts. On the contrary, Ortoleva and Snowberg (2013) documented that overconfidence increases with the number of experiences. Hereby assuming that people have more experiences as they age.

- **CEO gender**: the gender of each CEO will be presented with a dummy variable, 1=MALE and 0=FEMALE. In psychology and finance it is well-known that men are willing to take more risks, and are perceived as more overconfident than women - as described in section 3.2.

### 3.3.2 Operationalization of Hypothesis 2

**Hypothesis 2**: *Large bidders who are overconfident perform worse than small overconfident bidders.*

**Size of overconfident firms** (IV) – in order to measure this variable, the sample will be split into two groups: small and large acquirers. Moeller, Schlingemann, and Stulz (2004) identify small acquirers having a market capitalization equal to or less than the market capitalization of the 25th percentile of NYSE firms in the same year. Because the CRSP database only allows me to retrieve the market capitalization in deciles, I will identify small acquirers to have a market capitalization equal to or less than the market capitalization of the 30th percentile of NYSE firm in the same year. The specific database I use for this variable is the ‘CRSP Annual Index Built on Market Capitalization’. Market capitalization is calculated as follows:

\[
\text{Market capitalization} = \text{common shares outstanding} \times \text{stock price (at fiscal year end)}
\]

The dependent and control variables remain the same.

### 3.4 Conclusion

This chapter tried to present the models in a clear way. Furthermore, this chapter aimed to describe the way how each variable is measured. This is very important, since this research has to be valid and reliable. Saunders and Lewis (2012) state that the validity is concerned with whether the findings are really about what they appear to be about. A research is reliable, when it employs data collection methods and analysis procedures which produce consistent findings (Saunders & Lewis, 2012). The reliability of this analysis seems to be high, since only common and well-known procedures are used – Malmendier and Tate (2005), and Moeller et al. (2004) - . To enlarge the validity and reliability of this thesis, I will elaborate more on the methodology in chapter four.
Chapter 4: Methodology, sample, descriptive results

4.1 Introduction

This chapter aims to elaborate further on the empirical processes and methods which will be used to test the hypotheses. First, I will explain which type of regression analysis is used. Secondly, I will illustrate how the final sample is created. Third, the significance of the event study will be examined. The fourth section outlines some first descriptive results of this final sample. This chapter ends with a concluding paragraph which summarizes the most important findings.

4.2 Analyses

This section provides a theoretical introduction to chapter 5. Chapter 5 aims to provide the main results, using uni- and multivariate analysis. In order to test the first hypotheses I use a multiple regression analysis. For both hypotheses the bidder’s abnormal return will be the dependent variable. For hypothesis 1 - Bidder overconfidence and announcement abnormal returns are negatively related – I will perform the following regression in STATA:

\[ \text{CAR}_{i,t} = \beta_1 \text{OC67}_{i,t} + \beta_2 \text{FirmCharacteristics}_{i,t} + \beta_3 \text{DealCharacteristics}_{i,t} + \beta_4 \text{CEOCharacteristics}_{i,t} \]

**STATA-code:** `reg CAR OC67 FIRMCONTROLS DEALCONTROLS CEOCONTROLS`

A major complication is the possibility of inconsistent parameter estimation due to endogenous regressors. This means that there is a correlation between the error term and the independent variable. This makes the Ordinary Least Squares (OLS) inconsistent, since the regression estimates only measures the magnitude of association, rather than the magnitude and direction of causation which is of interest here. For these kind of problems, one another can imply instrumental variables estimations (Angris, Imbens, and Rubin, 1996). To conduct such an estimation, an instrument is needed which is (1) uncorrelated with the error term, and (2) correlated with the independent variable. Finding a proper instrument frequently turned out to be very difficult. However, in this study it could be that merger frequency can be used as an instrument. As described in section 3.3.1, merger frequency appears to be correlated. Since many scholars showed that those firms which engage in multiple acquisitions are largely considered to be overconfident (i.a. Billet and Qian, 2007).

For hypothesis 2 - Large bidders who are overconfident perform worse than small overconfident bidders – I will first split the sample in two groups: small and large bidders. After that I regress for each subsample:
\[ CAR_{t,t} = \beta_1 \text{SmallBidders} + \beta_2 \text{FirmCharacteristics}_{t,t} + \beta_3 \text{DealCharacteristics}_{t,t} + \beta_4 \text{CEOCharacteristics}_{t,t} \]

**STATA-code:** `reg CAR SMALL FIRMCONTROLS DEALCONTROLS CEOCONTROLS`

\[ CAR_{t,t} = \beta_1 \text{LargeBidders} + \beta_2 \text{FirmCharacteristics}_{t,t} + \beta_3 \text{DealCharacteristics}_{t,t} + \beta_4 \text{CEOCharacteristics}_{t,t} \]

**STATA-code:** `reg CAR LARGE FIRMCONTROLS DEALCONTROLS CEOCONTROLS`

### 4.3 Sample

As said in chapter three, the SDC database is used to collect all the mergers and acquisitions between 1/1/2000 and 31/12/2009. Exactly 18,026 M&A’s satisfied the conditions which are mentioned in chapter three. Using the 8-digit CUSIP I collected the stock returns for all companies which were present in the provisional sample. For only 10,016 acquisitions the stock return data was available. To collect the data for the Holder67 variable I used the Execucomp database. Using the 8-digit CUSIP I collected the executive information and compensation data.

Following the steps of Malmendier and Tate (2005) the sample will be diminished extremely, because they consider a subsample of CEOs who, at least twice during the sample period, had options that were valued above the threshold during the fifth year. So, if a CEO is above the 67%-threshold in 2004 he or she is included in the final sample. If the CEO exhibits this behavior at least one more time during his or her tenure as a CEO, he or she is classified as overconfident. Important note; overconfidence is considered to be persistent. Once a manager is identified as overconfident, he remains to be overconfident for the whole sample period. These severe restrictions guarantee that every CEO in the sample had the opportunity to be classified as overconfident. As a consequence, the number of firms included in my sample is limited to only 177 companies. These 177 companies acquired between 1/1 2000 and 31/12/2009 a number of 644 firms.

Some scholars (Sudarsanam & Huang (2006); Liu & Taffler (2008)) argue that such severe restrictions lead to potential problems in generalizing the overall results. Moreover, for hypothesis two, the sample only has to include observations in which the CEO is considered as overconfident. So, to keep the sample large enough I prefer the method of the latter researchers. This method, however, is very similar to the former method. Where Malmendier and Tate (2005) only looked at the fifth year (here 2004), this method takes the whole time period (2004-2009) in to account. This increases the sample significantly to 2119 observations (acquisitions) undertaken by 584 unique companies.
The last step is to add the control variables. Because Compustat does not work by using the 8-digit CUSIP, I have to convert the company_id in to a gvkey. In appendix 8.2, I provided a table which shows the elements of each database I used for hypothesis 1. After deleting the missing values of the control variables, the sample contains 1960 acquisitions undertaken by 558 unique companies. Unfortunately, adding the deal control variables (deal attitude, deal payment) is problematic for several reasons. Deal attitude reflects if the acquisition was friendly or hostile. However, out of the 1960 observations, only 4 were considered by the SDC database as hostile. Moreover, the SDC database does not include a variable which easily reflects the method of payment. Therefore these control variables are not considered anymore in this research. However, by interpreting the results, these choices have been taking in to account, because they may have influenced the results.

4.4 Significance event study

By determining the statistical significance of the CARs, I test if the particular events had an impact on the stock price. To do this I follow the steps of a hypothesis test. The t-test is the most common test statistic used in event studies, and is provided below.

Null hypothesis: \( H_0: E(CAR_i) = 0 \)

T-test: \( TS = \sqrt{N} \frac{CAAR}{s} \approx N(0,1) \)

Where CAAR: \( CAAR = \frac{1}{N} \sum_{i=1}^{N} CAR_i \)

Where standard deviation: \( s = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (CAR_i - CAAR)^2} \)

In order to conduct this test, I assume that the abnormal returns are independently and identically distributed. Figure 1 presents all the inputs which are needed to calculate the t-statistic.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAAR</td>
<td>0.0085</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.061</td>
</tr>
<tr>
<td>N</td>
<td>1960</td>
</tr>
<tr>
<td>t-statistic</td>
<td>6.1847</td>
</tr>
</tbody>
</table>

Figure 1: Event study significance test
Since the test statistic equals 6.1847 the null hypothesis that the event has no impact is strongly rejected. This means that the merger announcement has an impact on the value of the bidding firm. Note however that this test is not fully applicable here, since event dates for different firms in the sample occur around the same time period. This is called event clustering, which violates the assumption that abnormal returns are independent. Because of event clustering there may be cross-sectional correlation between abnormal returns (De Jong & De Goeij, 2011). As a consequence, the variance of CAR gets somewhat larger (if the correlation is positive), or smaller (if the correlation is negative). However, the test statistic is quite large, so it is not very likely that the null hypothesis was accepted if the cross-sectional correlations were taking into account.

4.5 Descriptive statistics

To retrieve more insight in the data, this section will present some descriptive information. It can be helpful to gather some basic information, before more advanced research techniques are used. Figure 2 reflects the number of deals for each fiscal year. The results are not very exciting, but the table shows that there seems to be a small merger wave in the United States in the middle years of the sample period. This result supports the findings of Alexandridis, Mavrovitis, and Travlos (2011) who state that the sixth U.S. merger wave emerged in 2003, peaked in 2006, and came to an end in late-2007. Most likely, this was due to the upcoming financial crisis.

<table>
<thead>
<tr>
<th>year</th>
<th>Freq.</th>
<th>Percent</th>
<th>Cum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>158</td>
<td>8.06</td>
<td>8.06</td>
</tr>
<tr>
<td>2001</td>
<td>155</td>
<td>7.91</td>
<td>15.97</td>
</tr>
<tr>
<td>2002</td>
<td>219</td>
<td>11.17</td>
<td>27.14</td>
</tr>
<tr>
<td>2003</td>
<td>234</td>
<td>11.94</td>
<td>39.08</td>
</tr>
<tr>
<td>2004</td>
<td>228</td>
<td>11.63</td>
<td>50.71</td>
</tr>
<tr>
<td>2005</td>
<td>234</td>
<td>11.94</td>
<td>62.65</td>
</tr>
<tr>
<td>2006</td>
<td>217</td>
<td>11.07</td>
<td>73.72</td>
</tr>
<tr>
<td>2007</td>
<td>234</td>
<td>11.94</td>
<td>85.66</td>
</tr>
<tr>
<td>2008</td>
<td>155</td>
<td>7.91</td>
<td>93.57</td>
</tr>
<tr>
<td>2009</td>
<td>126</td>
<td>6.43</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>1,960</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: number of deals each sample year
Figure 3 presents the descriptive summary of the sample. The cumulative average abnormal return is slightly positive for the acquirers (CAAR=0.85%). This result is almost similar to Andrade et al. (2001) who report a bidder’s CAR of 0.70%. The data also report some outliers. On July 11\textsuperscript{th} 2006 Secure Computing Corporation announced the acquisition of CipherTrust, which caused a downfall in its stock price of 38.63%. On the other side, Wackenhut Corrections Corporation saw its value increasing with 30.74% when it announced to purchase a majority stock from Group 4 Falck on 1 May 2003. The dummy variable OC67 represents the CEO overconfidence measure. Figure 3 shows that 32.09% (629 observations) of the sample consists of observations from overconfident CEOs. The remaining 67.91% (1,331 observations) is regarded as non-overconfident or rational. Figure 3 furthermore presents some descriptive results of the control variables. It shows that 97.09% all cases includes a men as CEO. The mean age of all CEOs in the sample is 55 years.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>1960</td>
<td>0.008499</td>
<td>0.061214</td>
<td>-0.386326</td>
<td>0.3074045</td>
</tr>
<tr>
<td>OC67</td>
<td>1960</td>
<td>0.320918</td>
<td>0.466949</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Firm size</td>
<td>1960</td>
<td>7.388812</td>
<td>1.566732</td>
<td>2.21025</td>
<td>12.36018</td>
</tr>
<tr>
<td>Investments</td>
<td>1960</td>
<td>418.2954</td>
<td>1479.182</td>
<td>0.059</td>
<td>22491</td>
</tr>
<tr>
<td>Cash flow</td>
<td>1960</td>
<td>2671.237</td>
<td>9152.581</td>
<td>-4918.238</td>
<td>170313</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>1960</td>
<td>2.641843</td>
<td>1.368971</td>
<td>1.067082</td>
<td>20.06616</td>
</tr>
<tr>
<td>CEO age</td>
<td>1960</td>
<td>55.85051</td>
<td>7.160780</td>
<td>38</td>
<td>82</td>
</tr>
<tr>
<td>CEO gender</td>
<td>1960</td>
<td>0.970918</td>
<td>0.168078</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 3: Descriptive results

Figure 4 represents the correlation matrix. The asterisks reflect the significance of each correlation. One asterisk means that the correlation between two variables is significant at the 0.01 significance level. Two asterisks mean that the correlation is significant at a level of 0.05. As a rule of thumb Brace, Kemp and Selgar (2009) argue that a correlation <0.3 is generally considered as weak, 0.3 to 0.7 as moderate, and >0.7 as strong. Figure 4 shows that there is a very strong and significant correlation between investments and cash flows. This relationship was already examined by Gilchrist and Himmelberg (1995). They developed a framework which clarified the role of cash flow in investment puzzles. More specifically, they found that mainly for smaller firms, investment appears to be excessively sensitive to fluctuations in cash flows. The rationale behind it is that smaller firms have less access to external capital markets and, thus, are more affected by the availability of internal funds (Kadapakkam, Kumar, and Riddick (1998). The correlation matrix also presents a
moderate relationship between firm size and investments, and between firm size and cash flow. According to Brace et al.’s criterion (2009), the other items are weakly correlated.

<table>
<thead>
<tr>
<th>Correl.</th>
<th>CAR</th>
<th>OC67</th>
<th>Firm size</th>
<th>Inv.</th>
<th>CF</th>
<th>Q</th>
<th>Age</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OC67</td>
<td>0.052**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>-0.114*</td>
<td>0.049**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investments</td>
<td>-0.067*</td>
<td>-0.007</td>
<td>0.489*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash flow</td>
<td>-0.082*</td>
<td>0.015</td>
<td>0.516*</td>
<td>0.907*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobin Q</td>
<td>0.023</td>
<td>0.013</td>
<td>-0.249*</td>
<td>-0.111*</td>
<td>-0.110*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEO age</td>
<td>-0.012</td>
<td>-0.036</td>
<td>0.057**</td>
<td>-0.005</td>
<td>0.036</td>
<td>-0.023</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CEO gender</td>
<td>-0.007</td>
<td>0.021</td>
<td>-0.029</td>
<td>-0.016</td>
<td>-0.025</td>
<td>-0.091*</td>
<td>0.093*</td>
<td>1</td>
</tr>
</tbody>
</table>

**Figure 4: Correlation matrix**

Finally, figure 4 shows that there is a weak, but significant at the 0.05 level, positive correlation between merger performance and CEO overconfidence. This means that the two variables weakly react in the same way. This may suggest a small positive relationship between CEO overconfidence and merger performance. Chapter 5 will elaborate further on that particular relationship.

4.6 Conclusion

This chapter tried to elaborate further on the methodology and the sampling process. It also showed that the results of the event study are significant. Moreover this chapter presented some first results. As said before, these results are only descriptive, thus hardly any conclusion can be drawn regarding the relationships between the investigated variables. This is the aim of the next chapter.
Chapter 5: Results

5.1 Introduction

This chapter aims to test the two hypotheses in a clear way. To test the hypotheses I will use the same procedure. First, I will conduct an univariate analysis which involves describing the way in which quantitative data tend to cluster around some value. After that, I will conduct a multivariate analysis which may provide the ‘real’ answer in order to reject or accept the hypothesis. This chapter ends with a conclusion which summarizes the most important findings.

5.2 Testing hypothesis 1

Univariate analysis shows that there might be a positive relationship between CEO overconfidence and merger performance. In the figure below, the CARs are divided in to five quintiles. The first quintile reflects the worse 20% acquisitions, and the fifth quintile represents the best 20% acquisitions. The mean of each quintile is presented in the second column, and logically the average CAR (CAAR) of the first quintile is the lowest (-7.073%) and the average CAR (CAAR) of the fifth quintile is the highest (8.985%). The figure surprisingly shows that the overconfident CEOs are better represented in the best three quintiles than they are in the worst quintiles.

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Mean CAR</th>
<th>Fraction OC67</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-7.073%</td>
<td>24.43%</td>
</tr>
<tr>
<td>2</td>
<td>-1.321%</td>
<td>29.41%</td>
</tr>
<tr>
<td>3</td>
<td>0.672%</td>
<td>34.44%</td>
</tr>
<tr>
<td>4</td>
<td>3.001%</td>
<td>38.27%</td>
</tr>
<tr>
<td>5</td>
<td>8.985%</td>
<td>33.93%</td>
</tr>
</tbody>
</table>

Because this is only a univariate analysis, one cannot yet conclude that there is indeed a significant and positive relationship between CEO overconfidence and merger performance. Therefore I have to conduct a multivariate analysis, like a multiple regression.

As described in section 4.2 I will run a multiple regression analysis in order to test the hypotheses. First, I will only regress the independent variable (OC67) on CAR. The results are presented in the next table. The raw regression output of STATA is attached in the appendix (section 8.3).
Table 1: Determinants of the bidder premium: overconfidence. The independent variable OC67 is a dummy variable which equals 1 if the bidder is overconfident, and 0 if the bidder is non-overconfident. Firm size equals the natural logarithm of the asset value. The other control variables Investments, Cash_flow, Tobin’s_q, CEO_age are numerical values which are explained in section 3.3.1. CEO_gender is a dummy variable which equals 1 if the CEO is a male and 0 if the CEO is a female. The number under each coefficient represents the p-value. This is a measurement for the significance of each relationship.

<table>
<thead>
<tr>
<th></th>
<th>(1) (OLS)</th>
<th>(2) (OLS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAR</td>
<td>CAR</td>
</tr>
<tr>
<td>OC67</td>
<td>0.0131</td>
<td>0.0081</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.006</td>
</tr>
<tr>
<td>ln (firm size)</td>
<td>-0.0026</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.004</td>
</tr>
<tr>
<td>Investments</td>
<td>2.74E-06</td>
<td>0.217</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.217</td>
</tr>
<tr>
<td>Cash flow</td>
<td>-7.11E-07</td>
<td>0.050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.050</td>
</tr>
<tr>
<td>Tobin’s q</td>
<td>0.0006</td>
<td>0.537</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.537</td>
</tr>
<tr>
<td>CEO gender</td>
<td>0.0060</td>
<td>0.404</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.404</td>
</tr>
<tr>
<td>CEO age</td>
<td>0.0003</td>
<td>0.031</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.031</td>
</tr>
<tr>
<td>n</td>
<td>1960</td>
<td>1960</td>
</tr>
<tr>
<td>Adjusted-R²</td>
<td>1.40%</td>
<td>2.93%</td>
</tr>
</tbody>
</table>

The table shows that there is indeed a significant positive relationship between CEO overconfidence and merger performance. This means that on average an overconfident CEO performs better than its ‘rational’ counterparts. The coefficient 0.0131 means that if a CEO is considered as overconfident, the acquisition performs 1.31% better on average. As can be seen in the latter table, the first model is not very predictive. The adjusted R-squared amounts only 1.40%. Does this result change if the control variables are added in the regression? The second column in the previous table provides an answer.
Including the control variables does not lead to a higher coefficient of the overconfidence variable. Still, the table presents a positive and significant relationship between CEO overconfidence and the performance of M&As. However, the adjusted R-squared increased a bit to 2.93%. Considering the results, I reject hypothesis 1.

The regression output presents that Cash_flow significant influences CAR. The coefficient seems very small (=-7.11E-07), but the influence can be substantial. For example, the average cash_flow of the sample amounts 2,671.371 dollars. So, for such a firm the CAR, on average, decreases with 0.19% ($2,671.371 * -7.11E-07 = -0.0019). The other control variables (Investments, Tobin’s_Q, and CEO_gender) do not have a significant influence on the cumulative abnormal returns. However, since the coefficients are all positive, one can conclude that these control variables by all means do not influence merger performance negatively.

Older CEOs create, on average, more value when a merger is announced than its younger counterparts. The coefficient of CEO_age has a p-value of 0.031, and thus is significant at a 5%-level. This suggests that a 70-year old CEO performs, on average, mergers which create 2.10% value (70 * 0.0003 = 0.021), while a 40-year old CEO conduct mergers which create 1.20% value on average (40 * 0.0003 = 0.012). This is in line with Yim (2013) who stated that young CEOs conduct more and worse mergers than CEOs who are older.

At last, Firm_size shows a significant and negative relationship with CAR. The coefficient of -0.0026 is significant at 1%-level. This is similar to the conclusions of Moeller et al. (2004). To investigate this more thoroughly I split the whole sample in small and large firms as described in section 3.3.2. This will be done in section 5.4.

5.3 Instrumental variable

To test if the OLS-estimator is consistent I conduct an instrumental variables regression. The previous section showed that there is a relationship between CEO overconfidence and merger performance. To consider the direction of the causation I impose the variable merger frequency. Appendix 8.4 shows how frequent each company in the dataset has conduct a merger. First, the relationship between OC67 and merger frequency is examined. Appendix 8.4 also shows the regression output of this relationship. This study shows a highly significant and positive relationship between CEO overconfidence and merger frequency (coefficient of 0.049). This is in line with Billet and Qian (2007) who state that managers who acquire more frequently are considered as more overconfident. Second, to test if the OLS estimator is consistent, I have to test if the instrumental is uncorrelated
with the error term. To satisfy this requirement, the coefficient of OC67 has to be significant when using the instrumental variable regression. The second table in appendix 8.4 shows that this is the case. Guest, Conn, and Hughes (2004) came up with the same results. They examined the relative performance effects of single and multiple acquirers. They found little difference between them. The next section tests hypothesis two.

5.4 Testing hypothesis 2

I created two subsamples: small bidder firms and large bidder firms. The next table presents some descriptive statistics of the small subsample. The small sample consists of 1554 acquisitions. These observations had a corresponding market capitalization which is lower than the 30\textsuperscript{th} percentile of the NYSE firms. The other 406 acquisitions are performed by companies which market capitalization is higher than the 30\textsuperscript{th} NYSE percentile. The 30\textsuperscript{th} percentile of NYSE firms’ market capitalization for each year is provided in the appendix (section 8.5). The next table shows that, on average, an acquisition of a ‘small’ bidder increases the stock price with 1.13\%. The table also shows that an OC67 mean of 0.3082. This means that 30.82\% CEOs of the subsample is regarded as overconfident.

<table>
<thead>
<tr>
<th>Small firms</th>
<th>Obs.</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>1554</td>
<td>0.011272</td>
<td>0.064428</td>
<td>-0.386326</td>
<td>0.307405</td>
</tr>
<tr>
<td>OC67</td>
<td>1554</td>
<td>0.308237</td>
<td>0.461914</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

The next table presents a descriptive summary for the large firm sample. The results seem to confirm the results of Moeller et al. (2004), since the average CAR of large bidders is lower than the average CAR of small bidders. The average CAR is -0.002. Thus, on average, an acquisition of a ‘large’ bidder decreases the stock price with 0.21\%. The table provides more evidence, since it reports that 36.95\% of the CEOs in the subsample are regarded as overconfident.

<table>
<thead>
<tr>
<th>Large firms</th>
<th>Obs.</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>406</td>
<td>-0.002116</td>
<td>0.045444</td>
<td>-0.19939</td>
<td>0.27439</td>
</tr>
<tr>
<td>OC67</td>
<td>406</td>
<td>0.369458</td>
<td>0.483254</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

At first sight there seems to be a relationship here. To be sure I drop every acquisition which is taken by a rational/non-overconfident CEO. The next table summarizes the descriptions. Logically, OC67 now equals 1 for every observation, since only overconfident acquirers are included. The sample now consists of 629 acquisitions which have a mean CAR of 1.31\%. Size is measured as a dummy variable, where 0 signifies small firms and 1 signifies large firms. A total of 23.85\% of the ‘overconfident’ acquisitions are undertaken by large firms.
To test the second hypothesis I will conduct a regression analysis. The results are provided in table 2.

**Table 2: Determinants of the bidder premium: overconfidence and size effect.** The independent variable is cumulative abnormal return. This measurement of merger performance is a numerical variable. The first column only reflects the direct relationship between firm size and merger performance. The second column includes the control variables. The variable Firm_size is a dummy variable, which equals 1 if the firm is large, and 0 if the firm is small. The control variables Investments, Cash_flow, Tobin’s_q, CEO_age are numerical values which are explained in section 3.3.1. CEO_gender is a dummy variable which equals 1 if the CEO is a MALE and 0 if the CEO is a FEMALE. The number below each coefficient represents the p-value. This is a measurement for the significance of each relationship.

<table>
<thead>
<tr>
<th></th>
<th>(1) (OLS)</th>
<th>(2) (OLS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAR</td>
<td>CAR</td>
</tr>
<tr>
<td>Firm size</td>
<td>-0.0140</td>
<td>-0.0124</td>
</tr>
<tr>
<td></td>
<td>0.012</td>
<td>0.039</td>
</tr>
<tr>
<td>Investments</td>
<td>-3.63E-06</td>
<td>0.531</td>
</tr>
<tr>
<td>Cash flow</td>
<td>1.48e-07</td>
<td>0.854</td>
</tr>
<tr>
<td>Tobin’s q</td>
<td>0.0022</td>
<td>0.202</td>
</tr>
<tr>
<td>CEO gender</td>
<td>-0.0089</td>
<td>0.498</td>
</tr>
<tr>
<td>CEO age</td>
<td>0.0004</td>
<td>0.132</td>
</tr>
<tr>
<td>n</td>
<td>629</td>
<td>629</td>
</tr>
<tr>
<td>Adjusted-R²</td>
<td>0.84%</td>
<td>5.52%</td>
</tr>
</tbody>
</table>
Table 2 presents two regressions. The first presents a direct relationship between merger performance and firm size. The second includes some control variables. Without the control variables, there is a clear negative relationship between firm size and CAR. Being overconfident in a large firm decreases the firm’s value with 1.40%. This result is significant at a 5%-significance level. Including the control variables increases the adjusted R-squared from 0.84% to 5.52%. This means that the control variables add some predictive power to the model. Unfortunately, the results are somewhat disappointing since no controls are considered to have a significant influence on cumulative abnormal return. However, the main relationship still holds after the control variables are added. The table shows that overconfident CEOs of large firms, on average, lose 1.24% when a merger is announced.

5.4 Conclusion
This chapter provided some surprising and interesting results. Despite the former theory, this analysis concludes somewhat the opposite. A positive relationship between overconfidence and merger performance is obtained from the sample. Since small firms perform better than large firms in this study, the size effect seems to hold. The next section discusses these results.
Chapter 6: Discussion

6.1 Introduction
This chapter aims to discuss the outcomes in a complete and clear way. The conclusions must result from the findings in the study, and have to give a clear answer to the main research question of this thesis. Besides a discussion, this chapter also provides some practical implications. The implications section tries to include interesting and relevant recommendations for scholars, managers, and bidder and target firms. At last, this chapter acknowledges some potential limitations of the study.

6.2 Discussion
Chapter 5 provided results which are inconsistent with Roll’s hubris hypothesis. The hubris hypothesis state that due to overconfidence, managers pay too much for the targets. As a result, investors react negatively to the merger announcement and the stock prices are reduced. This section discusses this discrepancy between the outcomes and the theory. It also introduces theories which help to understand the results better.

For the time period 2000 to 2009 the bidding firms’ value increases with 0.85% on average. This number pretends to be small, but is relatively large in comparison with former studies. It seems that the time frame chosen in this research is important. Several reasons are considered here. (1) According to Bouwman, Fuller, and Nain (2009) a clear link between M&A activity and stock prices exist. When a market is booming, more mergers are undertaken than when a market is depressed. Bouwman et al. (2009) further argue that acquisitions in periods of booming stocks markets are fundamentally different from those in periods of depressing stock markets. Consequently, acquirers buying during a boom have significantly higher abnormal returns than those buying during a recession. From 2003 to late-2007 the sixth merger wave occurs in the United States. This may explain the relatively high announcement returns of the sample. (2) Besides, the newest merger wave includes some unique features. Alexandridis et al. (2012) state that it is conventionally believed that the valuations during this wave were based more on sound fundamentals, rather than over-optimistic expectations. In addition, Rhodes-Kropf, Robinson, and Viswanathan (2005) found out that the valuation diversity between acquirers and targets was narrower relative to the fifth merger wave during the 1990s. During the fifth merger wave, bullish managerial behavior and investor sentiment made acquirers bid more aggressively. Conclusive evidence is provided by Billet and Qian (2008). They showed that acquisitions by frequent acquirers, a method which is commonly associated with
managerial hubris, were 35% less common during the sixth merger wave. Moreover, Malmendier and Tate (2008) found a lower level of CEO overconfidence in the latter merger wave. Taking all these results into account, one can conclude that managers did not pay as much for a target as they did before. Therefore investors react less negative to a merger announcement which leads to relatively high announcement returns for the bidder.

Next to the high announcement returns, this research also found a significant and positive relationship between CEO overconfidence and merger performance. This link states the opposite of Roll’s hubris hypothesis, and it therefore needs to be reconsidered. Several potential explanations are presented here. At first, there are some limitations regarding the measurement of overconfidence. Malmendier and Tate (2005) state that overconfidence is a trait that, once adopted, is likely to persist for a persons’ lifetime. This, however, seems to be not entirely true. Deaves, Lüders, and Schröder (2010) found that while overconfidence is persistent, people do exhibit some degree of rational learning which could lead to a ‘de-bias’. This means that frequent acquirers who overpaid for a target in the past, may not excessively overpay again because of rational learning. This statement supports the findings of Alexandridis et al. (2012) who suggest that managers may have learned from the experience of the fifth merger cycle. Another drawback regarding the measurement of overconfidence is the implicit assumption of CEO power. Decision processes are complex. In some firms, the CEO makes all the major decisions. In other firms, the decision reflects a consensus which is achieved by the top executives (Adams, Almeida, and Ferreira, 2005). In the latter case, it is possible that the CEO himself is not overconfident, but its fellow board members are. In that situation, a CEO is considered as rational, while the firm actually pays too much for the target.

When Richard Roll developed the hubris theory, he was convinced of the efficient market hypothesis. He did not state that all the players in the financial market are rational, but that there are mainly irrational investors which behavior cancels out in the aggregate. This means that combining the under- and overvaluations of irrational investors still leads to a rational price. However, when financial events present only individual prices, for example in a takeover bid, the market is commonly exposed to irrational behavior. According to Roll (1986), irrational behavior in acquisitions is due to managerial overconfidence (hubris). As a result, Roll (1986) concludes that the market is rational, and corporate managers are not. As described in chapter 5, the results of this study are not consistent with Roll’s theory. In earlier research, Loughran and Vijh (1997) also found results which were inconsistent with the efficient market hypothesis. They discovered that the market does not react
correctly to the news of a merger. To explain these inconsistencies, Shleifer and Vishny (2003) presented a model of mergers and acquisitions which is based on stock market misvaluations. This behavioral model differs fundamentally from Roll’s theory, since it argues that the financial market is inefficient. Therefore some firms are valued incorrectly. As a result, corporate managers take advantage of these misvaluations through merger and acquisition decisions. Applying this behavioral model to the results implies that investors are wrong in their stock price valuations. Investors whose behavior is irrational do not understand a particular acquisition of a rational manager and underestimate the value of the combined firm. A problem with the model of Shleifer and Vishny (2003) is that it ignores managerial irrationality. Recent studies have tried to combined the models of Roll (1986) and Shleifer and Vishny (2003) by examining the combined effects of managerial overconfidence and market misvaluations (Brown (2006); Baker, Ruback, and Wurgler (2007)). These researchers claim that ‘the irrational manager and irrational investor can certainly coexist’. This could mean that overconfident managers do pay too much for target firms, but that this overpayment is misjudged by the market. This could be a reason why this study found a positive relationship between CEO overconfidence and merger performance. At last, the hubris theory is not robust. Since earlier research mainly considered the 1980s and 1990s, this thesis considered the first ten years after the millennium.

This study found some evidence in favor of accepting hypothesis 2. This hypothesis stated that small firm bidders perform better at the merger announcement than large firm bidders.

The regression analyses showed that firm size and merger performance are negatively related. This is in line with the findings of Moeller, Schlingemann, and Stulz (2004). They discovered the size effect in mergers and acquisitions. On average, the small subsample firm has a CAR of 1.13%, while the large firm subsample has a CAR of -0.02%. This result also holds for firms which are led by overconfident CEOs. This can be explained by Roll’s hubris hypothesis. Large firm managers had to overcome more obstacles/competition to become a CEO than managers of small firms. Therefore they can be seen as more successful, and it is likely that they are more prone to overconfidence.

6.3 Implications

The first results of this study are not in line with the existing theory. Therefore it is hard, and one must be very careful, to provide recommendations. Considering the results of this study, I should
recommend the opposite of Malmendier and Tate’s (2008) : ‘standard incentives such as stock- and options-based compensation are unlikely to mitigate the effects of managerial overconfidence. As a result, the board of directors may need to employ disciplinary measures which can suffice to constrain CEO overconfidence.’ It would be very rigorous, and not logical, to recommend that firms should employ measures which reinforces the overconfidence bias of CEOs. However, if large firms are led by overconfident CEOs, these results implicate the same as Moeller, Schlingemann, and Stulz (2004). Since large firms perform worse than small firms, it is important to (re-)structure the governance in such a way, that managers of large firms are somewhat constrained in their decision-making (in particular, to reduce the agency costs).

6.4 Limitations

The conclusions and practical implications of this study are not without limitations. These statements should be interpreted with caution, because of the following reasons. First, the regression analyses should include some ‘deal controls’. These controls. particular deal attitude (hostile, neutral, or friendly) and deal payment (cash, stock, hybrid), are variables which do influence the investigate relationships. Because of a lack of data, it was not possible to add these important parameters to the dataset. This is unfortunate, since I think that it had increased the predictive power of the model. The second limitation is about the construct CEO overconfidence. The database Execucomp did not give me more detailed information about the option packages. If I had more information about the vesting periods and expiration dates, it should have been easier to classify CEO as overconfident. Third, the outcomes of this study cannot be perfectly generalized. The time period in which the hypotheses have been investigated is found to be very specific. As explained, the sixth merger wave occurred during the time period in this sample. Moreover, a large part of this period yields a booming stock market, where managers and investors were acting more rational than before. Therefore, one should act very prudently when applying these outcomes to other merger situations.

6.5 Conclusion

This study has found a positive relationship between CEO overconfidence (hubris) and merger performance. This yields that CEOs who are affected with hubris perform better when a merger is announced than its rational counterparts. Moreover, this study shows that overconfident CEOs of smaller firms perform better than overconfident CEOs of larger firms. This result is in line with the theory known as the size effect in M&As.
Chapter 7: References


Chapter 8: Appendices

This chapter presents all the appendices.

Appendix I: do-file Event Study

First, I had to prepare the data for event studies using STATA. I had two files:

1. Event_dates: which includes company_id, and event_date.
2. Stock_data: which includes company_id, stock_return_date, stock_return, and S&P500_return.

```
use eventdates, clear
by company_id: gen eventcount=_N
by company_id: keep if _n==1
sort company_id
keep company_id eventcount
save eventcount

use stockdata, clear
sort company_id
merge company_id using eventcount
tab _merge
keep if _merge==3
drop _merge
expand eventcount
drop eventcount
sort company_id date
by company_id date: gen set=_n
sort company_id set
save stockdata2

use eventdates, clear
by company_id: gen set=_n
sort company_id set
save eventdates2
use stockdata2, clear
merge company_id set using eventdates2
tab _merge
list company_id if _merge==2
keep if _merge==3
drop _merge
egen group_id = group(company_id set)
```
The second step is performing the actual event study. Therefore I used the following codes:

```stata
sort company_id date
by company_id: gen datenum=_n
by company_id: gen target=datenum if date==event_date
egen td=min(target), by(company_id)
drop target
gen dif=datenum-td
by company_id: gen event_window=1 if dif>=-1 & dif<=1
egen count_event_obs=count(event_window), by(company_id)
by company_id: gen estimation_window=1 if dif<-30 & dif>=-60
egen count_est_obs=count(estimation_window), by(company_id)
replace event_window=0 if event_window==.
replace estimation_window=0 if estimation_window==.
tab company_id if count_event_obs<3
tab company_id if count_est_obs<30
sort id date
gen abnormal_return=ret-market_return if event_window==1
by id: egen cumulative_abnormal_return = sum(abnormal_return)
```
Appendix II: Elements of each database

The table below shows which ‘accession number’ is needed in order to find the appropriate data for each database.

<table>
<thead>
<tr>
<th>Database</th>
<th>Ticker (problematic since tickers can be reused)</th>
<th>CUSIP (6 digit is company level; 8 and 9 digit issue level)</th>
<th>GVKEY (Compustat accession number)</th>
<th>PERMNO (CRSP accession number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDC - Mergers</td>
<td>Yes</td>
<td>6 digit</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CRSP Stocks</td>
<td>Yes</td>
<td>CUSIP=Latest 8 digit Cusip; NCUSIP=Historic (original ipo)</td>
<td>No (Use CRSP/Compustat Merged Database)</td>
<td>Yes; Main Identifier</td>
</tr>
<tr>
<td>Compustat Industrial</td>
<td>Yes (SMBL)</td>
<td>CUSIP = latest 9 Digit Cusip</td>
<td>Yes; Main Identifier</td>
<td>No (Use CRSP/Compustat Merged Database)</td>
</tr>
<tr>
<td>Execucomp</td>
<td>Yes</td>
<td>8 digit</td>
<td>Yes; Main Identifier</td>
<td>No (Use CRSP/Compustat Merged Database)</td>
</tr>
</tbody>
</table>
Appendix III: regression output STATA

For hypothesis 1:

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>0.108142924</td>
<td>1</td>
<td>0.108142924</td>
<td>F( 1, 1959) = 28.73</td>
</tr>
<tr>
<td>Residual</td>
<td>7.37405345</td>
<td>1959</td>
<td>0.003764193</td>
<td>Prob &gt; F = 0.0000</td>
</tr>
<tr>
<td></td>
<td>7.48219637</td>
<td>1960</td>
<td>0.003817447</td>
<td>R-squared = 0.0145</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adj R-squared = 0.0140</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Root MSE = 0.06135</td>
</tr>
</tbody>
</table>

| cumulative-n | Coef.  | Std. Err. | t   | P>|t|  | [95% Conf. Interval] |
|--------------|--------|-----------|-----|------|---------------------|
| H67          | 0.0131121 | 0.0024463 | 5.36| 0.000 | 0.0083145 - 0.0179098 |

For hypothesis 2:

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 629</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>0.022387399</td>
<td>1</td>
<td>0.022387399</td>
<td>F( 1, 627) = 6.35</td>
</tr>
<tr>
<td>Residual</td>
<td>2.21145155</td>
<td>627</td>
<td>0.003527036</td>
<td>Prob &gt; F = 0.0120</td>
</tr>
<tr>
<td></td>
<td>2.23383894</td>
<td>628</td>
<td>0.003557068</td>
<td>R-squared = 0.0100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adj R-squared = 0.0084</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Root MSE = 0.05939</td>
</tr>
</tbody>
</table>

<p>| cumulative-n | Coef.  | Std. Err. | t   | P&gt;|t|  | [95% Conf. Interval] |
|--------------|--------|-----------|-----|------|---------------------|
| Size         | -0.0139995 | 0.0055567 | -2.52| 0.012 | -0.0249115 - 0.0030875 |
| _cons        | 0.0164507  | 0.0027135 | 6.06| 0.000 | 0.0111219 - 0.0217794 |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 629</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>.150313279</td>
<td>6</td>
<td>.025052213</td>
<td>F( 6, 623) = 7.12</td>
</tr>
<tr>
<td>Residual</td>
<td>2.19166859</td>
<td>623</td>
<td>.003517927</td>
<td>Prob &gt; F = 0.0000</td>
</tr>
<tr>
<td>Total</td>
<td>2.34198187</td>
<td>629</td>
<td>.003723342</td>
<td>R-squared = 0.0642</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adj R-squared = 0.0552</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Root MSE = .05931</td>
</tr>
</tbody>
</table>

| cumulative-n | Coef.  | Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|--------------|--------|-----------|-------|------|---------------------|
| Size         | -.0124415 | .0060217 | -2.07 | 0.039 | -.0242668 to -.006162 |
| investments  | -3.63e-06| 5.79e-06 | -0.63 | 0.531 | -.000015 to 7.74e-06 |
| cash_flow    | 1.48e-07 | 8.03e-07 | 0.18  | 0.854 | -1.43e-06 to 1.72e-06 |
| Q            | .0022196 | .0017376 | 1.28  | 0.202 | -.0011927 to .0056319 |
| gender       | -.0088776| .013106  | -0.68 | 0.498 | -.0346148 to .0168596 |
| page         | .0003559 | .0002358 | 1.51  | 0.132 | -.0001071 to .0008189 |
Appendix IV: merger frequency

<table>
<thead>
<tr>
<th>Number of mergers</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td>126</td>
</tr>
<tr>
<td>3</td>
<td>78</td>
</tr>
<tr>
<td>4</td>
<td>63</td>
</tr>
<tr>
<td>5</td>
<td>51</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
</tr>
</tbody>
</table>
Regression output: Merger frequency on CEO overconfidence.

**STATA—code: probit H67 frequency**

```
Iteration 0:  log likelihood = -1230.0171
Iteration 1:  log likelihood = -1192.4604
Iteration 2:  log likelihood = -1192.3892
Iteration 3:  log likelihood = -1192.3892

Probit regression
Number of obs = 1960
LR chi2(1)   = 75.26
Prob > chi2  = 0.0000
Log likelihood = -1192.3892  Pseudo R2 = 0.0306

+------------------------------------------------------------------+
|                     H67          Coef.     Std. Err.   z   P>|z|   [95% Conf. Interval] |
+------------------------------------------------------------------+
| frequency               .0494001   .0058177    8.49   0.000   .0379975  .0608026 |
| _cons                   -.7884175   .0483613  -16.30   0.000  -.8832038  -.6936311 |
+------------------------------------------------------------------+

Regression output: CEO overconfidence on CAR, with Merger frequency as instrumental variable.

**STATA-code: ivreg CAR (H67=frequency)**

```
Source          SS      df   MS
Model           0.046261444   1   0.046261444
Residual       7.43593493   1959  .003795781
Total          7.48219637   1960  .003817447

Number of obs = 1960
F( 1, 1959) = .
Prob > F = .
R-squared = .
Adj R-squared = .
Root MSE = .06161

+-------------------------------+------------------------+------------------------+------------------------+
|                     CAR          Coef.     Std. Err.   t   P>|t|   [95% Conf. Interval] |
+-------------------------------+------------------------+------------------------+------------------------+
| H67                           .0230309    .0045108   5.11   0.000   .0141844  .0318773 |
+-------------------------------+------------------------+------------------------+------------------------+

Instrumented: H67
Instruments: frequency
Appendix V: 30\textsuperscript{th} percentile NYSE market capitalization

<table>
<thead>
<tr>
<th>Year</th>
<th>NYSE 30\textsuperscript{th} percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3347.874</td>
</tr>
<tr>
<td>2001</td>
<td>4371.867</td>
</tr>
<tr>
<td>2002</td>
<td>4244.622</td>
</tr>
<tr>
<td>2003</td>
<td>6328.515</td>
</tr>
<tr>
<td>2004</td>
<td>7590.693</td>
</tr>
<tr>
<td>2005</td>
<td>8112.083</td>
</tr>
<tr>
<td>2006</td>
<td>9967.296</td>
</tr>
<tr>
<td>2007</td>
<td>9353.232</td>
</tr>
<tr>
<td>2008</td>
<td>5772.761</td>
</tr>
<tr>
<td>2009</td>
<td>8994.120</td>
</tr>
</tbody>
</table>