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# How CEO overconfidence and gender affects the short-term stock returns of acquiring firms during M&A announcements

Behavioral event study associating behavioral finance and M&A events

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Tässä pro gradu -työssä on tarkoitus tutkia käyttäytymisrahoituksessa esiteltyä psykologista piirrettä "yli-itsevarmuus" ja kuinka se näkyy yhdysvaltalaisten toimitusjohtajien harjoittamissa yrityskaupoissa ja ostavien yritysten osaketuotoissa lyhytaikaisessa aikajänteessä. Hyödyntäen optioperusteista toimitusjohtajien palkitsemista yli-itsevarmuuden mittaamiseksi ja tapahtumatutkimusta lyhytaikaisen osaketuoton määrittämiseksi, tarkoitus on selvittää yli-itsevarmuuden vaikutus abnormaaliin osaketuottoon ja tarkastella erityisesti eroja nais- ja miestoimitusjohtajien välillä. Aineisto tutkimusta varten on koostettu Orbisin, LSEG Datastreamin, ExecuCompin sekä Yahoo Financen tietokannoista ja menetelminä yhdistyy tapahtumatutkimus ja pienimmän neliösumman regressiomenetelmä, joista jälkimmäisellä tarkastellaan yli-itsevarmuuden ja lyhytaikaisten osaketuottojen suhdetta, mitä kontrolloidaan muun muassa toimitusjohtajan sukupuolella. Vastoin aikaisempia tutkimuksia, työn valitulla menetelmällä ei löydetä tilastollisesti merkittävää yhteyttä toimitusjohtajan yli-itsevarmuuden ja lyhyen aikajänteen osaketuottojen välillä yrityskaupan julkistamisen yhteydessä, mikä voi johtua löyhemmistä yritysotoksen kriteereistä, yli-itsevarmuuden määritelmästä tai uudemmasta datasta. Sen sijaan tuloksista voidaan havaita, että naistoimitusjohtajien alaisuudessa julkaistut yrityskaupat tuottavat vähemmän osaketuottoja lyhyellä aikavälillä yrityskaupan julkaisun yhteydessä kuin miestoimitusjohtajien alaisuudessa. Sen lisäksi aikaisempien tutkimusten tavoin tuloksista voidaan todeta, että miehet voidaan määritellä naisia todennäköisemmin yli-itsevarmoiksi. Hyödyntämällä mahdollisimman uutta dataa, tutkielma tarjoaa syitä jatkaa yli-itsevarmuuteen ja toimitusjohtajiin liittyvää akateemista tutkimusta. Erityisesti erilaisten tutkimusasetelmien toteuttaminen ja niiden vertailu voi antaa uutta näkökulmaa verrattuna vanhoihin tutkimuksiin ja niissä käytettyihin menetelmiin.

**AVAINSANAT:** yrityskauppa, käyttäytymisrahoitus, yli-itsevarmuus, tapahtumatutkimus, sukupuolten väliset erot, osakkeen tuotto, toimitusjohtaja

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## Abbreviations

| | |
|---|---|
| BHAR | Buy-and-Hold Abnormal Return |
| CEO | Chief Executive Officer |
| CAR | Cumulative Abnormal Return |
| OLS | Ordinary Least Squares |
| M&A | Mergers & Acquisitions |
| US | United States |

# 1 Introduction

Mergers and acquisitions (M&As) are complex business decisions that involve significant financial and strategic risks. Companies could engage in M&As for a variety of reasons, including expanding their market share, diversifying their product lines, and achieving cost synergies. For acquiring firms, studies have found that M&As can be value-destroying to shareholders, potentially earning negative to zero abnormal returns in short-term (Dodd & Ruback, 1977) (Asquith, Bruner & Mullins, 1983) (Dennis & McConnell, 1986). Reasons for this have been studied from variety of aspects and from the field of behavioral finance, research suggests that overconfidence is a major factor that contributes to the "failure" of M&As (Roll, 1986) (Loughran & Vijh, 1997) (Doukas & Petmezas, 2007).

Overconfidence is a cognitive bias that leads individuals to overestimate their abilities and the accuracy of their judgments. In the context of M&As, overconfidence can manifest in several ways, such as overestimating the potential benefits of the merger or underestimating the costs and risks involved (Malmendier & Tate, 2005, 2008). Overconfidence can lead to overvaluation of the target company, resulting in the acquiring company paying too much for the acquisition (Shleifer & Vishny, 2003).

Behavioral finance is a relatively new field that studies the ways in which psychological factors influence financial decision-making. In recent years, researchers in behavioral finance have focused on understanding the role of overconfidence in financial decision-making, including M&As (Odean, 1998) (Barber & Odean, 1998). This research has shown that overconfidence can lead to suboptimal decisions that can have negative consequences for the acquiring company and its shareholders.

## 1.1 Purpose of the study

The purpose of this thesis is to explore the role of CEO overconfidence in M&A decisions and its impact on the market valuation of acquiring companies through short-term

abnormal returns and whether there is difference in overconfidence between genders. This study aims to review the literature on behavioral finance and CEO overconfidence, discuss the factors that contribute to CEO overconfidence and the ways in which it can influence financial decision-making and examine the existing research on the impact of overconfidence on M&A decisions. In empirical part of the thesis, we investigate the impact of CEO overconfidence on short-term returns utilizing event study methods, with a focus on the M&A deal announcements. The key setting is to create more heterogeneous sample than in previous studies by for example not examining only large-cap companies or deals above certain thresholds.

Specifically, we will examine three hypotheses:

*H1: Overconfident CEOs are more likely to create significant negative short-term returns through M&A activity and compared to non-overconfident CEOs.*

This hypothesis is based on the premise that overconfident CEOs may be more likely to pursue risky M&A strategies and overestimate their ability to manage the resulting integration challenges. We will test this hypothesis by examining the relationship between CEO overconfidence and cumulative abnormal returns during announcement event period.

*H2: Female CEOs are less likely to engage in risky M&A activity thus creating less abnormal returns on short-term performance*

and

*H3: Female CEOs are less likely to be classified as overconfident than their male counterparts*

Both hypotheses are based on studies that females are more risk averse investors than male investors and that M&A decisions by female CEOs can be perceived as less value-destroying yet smaller and thus reacted less positively.

Overall, these hypotheses will guide the investigation into the role of overconfidence in M&A decision-making and contribute to our understanding of the potential risks and benefits associated with this important strategic activity.

## 1.2 Structure of the study

The thesis will be structured as follows: First, we will review the literature on behavioral finance and overconfidence, discussing the factors that contribute to overconfidence and the ways in which it can influence financial decision-making, such as De Bondt & Thaler (1995) and Shefrin (2002). Second, we will examine the existing research on the impact of overconfidence on M&A decisions, including both own conducted data analysis and empirical studies, mainly focusing on CEO measurement by Malmendier and Tate (2005, 2008). We then discuss the results and review them against previous literature. Finally, we will discuss the implications of this research for the field of mergers & acquisitions, limitations of the empirical setting and suggest areas for future research.

In conclusion, the importance of understanding the role of overconfidence in M&A decisions cannot be overstated. By gaining a better understanding of the factors that contribute to overconfidence and the ways in which it can influence financial decision-making, companies can make better-informed decisions that are less prone to failure.

# 2 Theoretical Background

In this chapter we will go through the key elements and theoretical frameworks discussed throughout this thesis before covering the most relevant research about the topic in the more extensive literature review section of the thesis in chapter three. This section starts with the examination of the efficient market hypothesis, behavioral finance, and the relationship between them. We then examine the overconfidence bias, one of the psychological biases recognized in behavioral finance as it heavily relates to the thesis topic. Lastly the section presents some of the basics related to mergers and acquisitions (M&As) before moving onto the literature review.

## 2.1 Efficient Market Theory

The efficient market theory is a cornerstone of traditional finance, positing that markets are rational and that asset prices accurately reflect all available information (Fama, 1970). The theory suggests that it is impossible to consistently outperform the market because any new information is immediately reflected in the prices of assets. Therefore, according to this theory, it is impossible to consistently earn above-average returns, and investors should aim to create a diversified portfolio that mirrors the market.

The efficient market theory assumes that investors are rational and that they have access to all relevant information. The theory suggests that investors make decisions based on this information, and that the prices of assets accurately reflect the true value of those assets. The theory also suggests that any new information that becomes available is immediately reflected in the prices of assets, making it difficult for investors to consistently outperform the market.

To further explain this theory, Fama (1970) proposes three forms of market efficiency: weak, semi-strong and strong. In the weak form it is argued that current stock prices reflect all past information such as historical prices and volumes thus investors cannot seek excess returns using investment strategies which are based on past information.

This suggests that technical analysis and predicting stock prices using price patterns and movements is ineffective.

In addition to the past information, the semi-strong form takes all currently available public information in the stock price into account, as described in the beginning of this chapter. The public information includes, but is not limited to, fundamentals like earnings, dividends, and economic data, as well as news releases, financial reports, and changes in economic policy. According to this theory, fundamental analysis – analyzing a company's financial statements to determine its stock value – would also not give an investor an advantage, as the market price would already reflect all publicly known information.

Lastly, Fama (1970) argues that the strong form reflects all information in the stock prices, including the insider information. If markets are strong-form efficient, investors cannot consistently achieve higher returns, because all information, even that which is not publicly disclosed, is already reflected in stock prices. Despite this, Fama (1991) does state that markets may be efficient in the strong from only sometimes in practice.

It can be argued that M&A related information, such as acquisition announcements, can be considered to represent the semi-strong form of market efficiency. Empirical evidence shows that M&A news directly affects the prices of common stocks of both the acquiring company and the target company. For example, Jensen & Ruback (1983) have shown that the target firms mostly earn a significant abnormal return whereas the returns of acquiring firms are insignificantly different from zero.

## 2.2 Behavioral Finance

Behavioral finance is a relatively new field of study that explores how cognitive biases and emotional factors can impact financial decision making. In contrary to the efficient market theory, it is based on the idea that investors are not always rational, and their behavior is influenced by emotions, past experiences, and other cognitive biases that can lead to suboptimal decision making (Barberis & Thaler, 2003).

Behavioral finance challenges the assumptions of the efficient market theory by suggesting that investors are not always rational and can be influenced by a variety of psychological factors that can impact their decision-making. Researchers in behavioral finance have shown that emotions such as fear, greed, and overconfidence can impact investment decisions (Kahneman & Tversky, 1979) (Odean, 1998).

The efficient market theory assumes that investors have access to all relevant information and make rational decisions based on that information. However, behavioral finance suggests that investors may not have access to all relevant information or may not always use that information effectively. Instead, they may be influenced by their emotions, cognitive biases, or other factors.

Behavioral finance challenges the assumptions of the efficient market theory by suggesting that markets are not always efficient and that asset prices can be influenced by factors other than just the available information. Behavioral finance suggests that investor behavior can lead to market inefficiencies, which can create opportunities for investors to earn above-average returns.

## 2.3 Overconfidence Bias

One of the most significant biases identified by behavioral finance researchers is overconfidence bias, which refers to the tendency of individuals to overestimate their abilities and the accuracy of their judgments (Barber & Odean, 1998). Overconfidence bias can lead investors to take on excessive risks or to overvalue certain assets.

Overconfidence bias is a common bias in financial decision-making, and it can have negative consequences for investors. Research has shown that overconfidence bias can lead investors to trade too frequently, resulting in lower returns (Odean, 1999). Overconfidence bias can also lead investors to hold onto losing investments for too long, hoping that they will eventually recover, resulting in lower returns (Daniel et al., 1998).

As it is relevant to the research question and hypotheses of the thesis, it is notable to mention that men are observed to be typically more overconfident than women and that the overconfidence is significantly task dependent when it comes to gender differences (Lundeberg, Fox and Punćcohaŕ, 1994). This is one of the motivations behind study by Barber & Odean (1998), in which they test whether overconfident investors trade too much proxying this by gender. They find that men trade 45 percent more than women and that excessive trading decreases net returns of men by 2.65 % per year while net returns of women are decreased by 1.72 %.

Because the matter of overconfidence and differences between male and female CEOs is one of the key aspects in this thesis, it is covered even more thoroughly in its own chapter in the literature review section of the thesis.

## 2.4 Mergers and acquisitions (M&As)

Mergers and acquisitions (M&A) as a term refers to the consolidations of companies through different financial transactions. The consolidation of the businesses may include only a portion of the acquiree's business assets or the business as a whole. Although the term is often used interchangeably the terms merger and acquisition differ from one another. Generally, acquisitions can be divided into five different types depending on the type of transactions and acquirer: merger, consolidation, tender offer, acquisition of assets, and buyout (Damodaran, 2002) (Miller & Segall, 2017).

An acquisition can be carried out by another firm or by outside investors and the firm's managers. In the scenario where a firm is acquired by another company, the acquisitions can be divided into four different types: merger, consolidation, tender offer, and acquisitions of assets. A merger is a restructuring process where two businesses are combined or merged, leading to the survival of one company and the dissolvement of the merged company. In a merger situation, the acquiree becomes part of the acquiring

firm. On the contrary, in consolidation, the acquiring firm and the target firm convert into a new company. Thus, the existence of the two firms partaking in the transaction ends and a new company is formed. (Damodaran, 2002) (Miller & Segall, 2017).

A tender offer refers to an acquisition where the acquiring firm makes an offer on the target firm's stocks, and this offer is relayed to the target firm's stockholders. The target firm's stockholders can make the decision to sell or hold on to the stocks. The acquiree continues to exist as its own company if there are objectors to the offer. When a tender offer is successful it ultimately leads to a merger situation. Finally, acquisition of assets refers to a situation where the target of the acquisitions is the assets of the acquiree instead of stocks. The target firm's assets are transferred to the acquiring company and the acquiree continues to exist as a shell company. This ultimately leads to the liquidation of the target company. (Damodaran, 2002).

The scenario where the firm is acquired by outside investors and its own managers is referred to as a buyout. In this type of acquisition, the acquiree continues to operate as a private firm under the new control of the acquirers. A buyout is often executed with a tender offer. (Damodaran, 2002).

The upcoming literature review section will have more comprehensive discussion about the relationship between CEO overconfidence and M&As and studies around it.

## 2.5 Overconfidence Bias in M&As

Overconfidence bias has been identified as a significant factor in mergers and acquisitions (M&A) decision-making. Research has shown that overconfidence bias can lead to overvaluation of the target company, resulting in the acquiring company paying a higher price than necessary (Meglio & Risberg, 2010). This can have negative consequences for the acquiring company and its shareholders if the acquisition does not perform as expected.

In contrast to the efficient market hypothesis, behavioral finance posits that individuals are not always rational in their decision-making and can be subject to a variety of biases and heuristics that lead to suboptimal choices. These biases include overconfidence, the tendency to rely on mental shortcuts, and the influence of emotions such as fear and greed (Barberis & Thaler, 2003).

One area of particular interest in the field of behavioral finance is the role of overconfidence in financial decision-making. Overconfidence refers to the tendency of individuals to overestimate their abilities and knowledge, leading them to take excessive risks and make suboptimal decisions (Barber & Odean, 2001).

Overconfidence was introduced as an explanation behind corporate takeover first by Roll (1986), which is also known as “Hubris Hypothesis”, suggesting that overconfident decision-makers in bidding firms often overpay for target firms due to valuation errors. This hypothesis reinterprets existing empirical evidence, proposing that observed takeover premiums reflect overpayments rather than genuine value increases. Roll's analysis questions the prevailing view that takeovers generate significant market value gains, suggesting these gains are overstated (Roll, 1986).

Empirical findings reviewed by Roll show mixed results for shareholder value in takeovers. While target firm shareholders typically benefit from significant gains, the effects on bidding firm shareholders are inconsistent, with some studies reporting small positive returns and others negative returns. These results align with the hubris hypothesis, indicating that takeover premiums often result from bidding errors rather than synergy or efficiency improvements (Roll, 1986).

The impact of overconfidence in M&A decision-making has been extensively studied in the literature afterwards. Research has found that overconfident managers are more likely to engage in M&A activity and pay higher premiums for target companies, leading to reduced returns for shareholders (Roll, 1986) (Malmendier & Tate, 2008). Overconfident managers also tend to overestimate their ability to integrate the two

companies, leading to poor post-merger performance (Hayward & Hambrick, 1997) (Baker & Pan, 2013).

In addition to overconfidence, other behavioral biases have also been found to influence M&A decision-making. For example, the availability bias, which refers to the tendency to overweight easily accessible information, can lead to the overvaluation of target companies if decision-makers focus too much on recent news or events related to the target company (Malmendier & Tate, 2008).

Overall, the field of behavioral finance offers valuable insights into the ways in which psychological factors can impact financial decision-making, including M&A decisions. By recognizing and accounting for these biases, decision-makers can make more informed and optimal choices that benefit both the acquiring company and its shareholders.

The next chapter of this paper will provide an overview of the relevant literature on the impact of CEO overconfidence on M&A decision-making.

# 3 Literature review

The field of behavioral finance has gained significant attention in recent years because of increasing interest in understanding the psychological factors that influence financial decision-making. Behavioral finance seeks to explain why individuals and organizations often make decisions that deviate from rational, optimal choices, and how these decisions can impact financial outcomes.

In particular, the role of overconfidence in financial decision-making has been the subject of much research in the field of behavioral finance. Overconfidence is a psychological bias in which individuals tend to overestimate their abilities, knowledge, or the accuracy of their judgments (Moore & Healy, 2008). This can lead decision-makers to be overly optimistic about the potential benefits of an investment, while underestimating the associated risks.

Studies have shown that overconfidence can have significant consequences in the context of M&A decision-making. For example, Odean (1998) found that overconfident investors tend to trade more frequently, resulting in lower returns on their investments. Barber and Odean (2001) similarly found that overconfident individual investors tend to have lower returns and higher trading costs than those who are less overconfident.

In the context of M&As, overconfidence can lead decision-makers to overestimate the potential benefits of the merger, leading them to pay a higher premium for the target company. This can result in a significant decrease in shareholder value and poor post-merger performance (Scharfstein & Stein, 1990). Furthermore, overconfident decision-makers may underestimate the complexity and challenges associated with integrating two companies, leading to the failure of the merger (Seth et al., 2000).

As such, understanding the role of CEO overconfidence in M&A decision-making is critical for investors, executives, and policymakers alike. By recognizing the potential

biases associated with overconfidence, decision-makers can take steps to mitigate its impact on financial decision-making and improve the likelihood of successful M&A deals.

## 3.1 CEO overconfidence

### 3.1.1 Factors contributing to CEO overconfidence

Several factors contribute to overconfidence in M&A decision-making. One of the primary factors is experience. Research has shown that experienced decision-makers are more likely to be overconfident than inexperienced ones, as they tend to rely on their past successes and underestimate the risks involved (Loughran & Ritter, 2004). In addition, optimistic CEOs are more likely to engage in M&As, as they are more confident in their ability to create value through the merger (Baker & Wurgler, 2002).

Another factor that contributes to overconfidence is information availability. Decision-makers often have incomplete or inaccurate information about the target company, which can lead to overconfidence in their assessment of the company's value and potential benefits of the merger (Saffi & Sigurdsson, 2011). Furthermore, decision-makers may selectively process and interpret information in a way that supports their pre-existing beliefs, leading to further overconfidence (Kahneman & Tversky, 1972).

In addition to these factors, personality traits can also contribute to overconfidence in M&A decision-making. For example, research has shown that narcissistic CEOs are more likely to engage in M&As and pay higher premiums for the target company, as they have an inflated sense of their own abilities and are more likely to overestimate the benefits of the merger (Ahearne et al., 2013). Similarly, hubristic CEOs are more likely to engage in risky M&As, as they believe they are invulnerable to the negative consequences of their decisions (Hayward & Hambrick, 1997).

### 3.1.2 Ways in which overconfidence can influence financial decision-making

Overconfidence can influence financial decision-making in several ways. One of the most common ways is through overestimation of the potential benefits of the merger. Research has shown that decision-makers often overestimate the synergies and cost savings that can be achieved through the merger, leading to unrealistic expectations (Roll, 1986) (Doukas & Petmezas, 2007).

In addition, decision-makers may underestimate the costs and risks involved in the merger, such as integration costs, cultural differences, and employee resistance (Malmendier & Tate, 2008). This can lead to inadequate planning and preparation, resulting in suboptimal outcomes. Furthermore, decision-makers may be overconfident in their ability to successfully integrate the two companies, leading to poor post-merger performance (Seth et al., 2000).

Another way in which overconfidence can influence financial decision-making is using heuristics, or mental shortcuts, that can lead to biased decision-making. For example, the availability heuristic, which involves making decisions based on the information that is most readily available, can lead to overconfidence in the assessment of the target company's value (Tversky & Kahneman, 1973).

### 3.1.3 Measuring CEO overconfidence

CEO overconfidence can appear in different forms, such as overestimation of the precision of their knowledge (miscalibration), overplacement (believing they are better than others), and overprecision (excessive certainty regarding the accuracy of their beliefs). This psychological trait influences CEOs to overestimate their ability to generate returns, control events, and influence outcomes more favorably than reality might suggest. The measurement of CEO overconfidence is typically tied to observable corporate actions that imply a deviation from rational, optimal decision-making based on economic and financial principles.

One way of measuring the CEO overconfidence is by examining the investment and financing decisions made by the CEOs. Heaton (2002) showed that optimistic managers' overestimation of investment returns may be the cause of typical distortions in corporate investment. He proposes that managers often reject the risk-neutral valuation of risky prospects, thus overvaluing their own projects leading to investment decisions which could have negative net present value. In addition, overconfident managers may prefer financing using debt over equity. According to Heaton (2002) this is due to that managers anticipate future capital to be cheaper, thus debt can be managed with future profits. These types of decisions increase the financial leverage of the firm, significantly raising the risk of financial distress if optimistic projects turn out to be unprofitable.

Another way to measure overconfidence, which will be utilized in this thesis, is an option-based measure introduced by Malmendier and Tate (2005). They build their study based on Roll (1986) and Heaton (2002) and propose that overconfidence can be gauged through the exercise patterns of CEO stock options. CEOs typically receive stocks and options as part of their compensation, but they are not allowed to short sell the company stock, which prevents hedging the risk, or to trade the options. Therefore, it is suggested that risk-averse CEOs exercise these options early if the stock price is presumably high (Lambert, Larcker & Verrecchia, 1991) (Hall & Murphy, 2002). In 2008 study of Malmendier and Tate, they compute three different kinds of option-based measures: (i) *Longholder* measure is dummy variable of 1, when CEO at least once during their tenure hold an exercisable and 40 % in-the-money option until the final year of expiration. (ii) *Pre-/Post-Longholder* measure where *Post-Longholder* gets value of 1 when 40 % in-the-money option is held for the first time until expiration and *Pre-Longholder* gets value of 1 for the rest of the tenure. (iii) *Holder 67* measure, where CEO is classified as overconfident when they fail to exercise 67 % in-the-money option while there is five years till expiration.

Third way to measure overconfidence is to utilize press coverage by creating proxy from news articles. Malmendier and Tate (2008) did this to further test their CEO

overconfidence interpretation. They used hand-collected business-related news publications and identified characteristics such as “confident” versus “cautious” associated with CEOs and found out that when CEOs were described as confident or optimistic, it had a significant positive correlation with the portfolio measures of optimistic beliefs in their study.

Previous studies suggest that overall value the mergers create might not be captured by announcement effects because of inefficient markets (Shleifer & Vishny, 2003) (Mithcell, Pulvino & Stafford, 2004) but Malmendier and Tate (2008) argue that reactions to deals by Longholder CEOs could be statistically independent and therefore able to capture the value differences better.

## 3.2 Impact of CEO overconfidence on M&A decisions

Empirical studies have shown that CEO overconfidence can have a significant impact on M&A decisions. For example, Saffi and Sigurdsson (2011) found that overconfident CEOs are more likely to engage in value-destroying M&As and pay higher premiums for the target company, resulting in poor post-merger performance. Similarly, a study by Baker and Wurgler (2002) found that overconfident CEOs tend to acquire larger companies, pay higher premiums, and engage in riskier deals, resulting in lower long-term stock returns for their companies.

Furthermore, overconfidence can lead to a "winner's curse" phenomenon, where the acquiring company overpays for the target company due to its overestimation of the potential benefits of the merger (Roll, 1986). This can result in a decrease in the acquiring company's stock price and a decrease in shareholder value.

Additionally, overconfidence can also lead to the failure of the merger itself, as decision-makers may be overconfident in their ability to successfully integrate the two companies (Seth et al., 2000). This can result in a decrease in the combined company's overall performance and a loss of shareholder value.

The literature on behavioral finance and CEO overconfidence in M&A decision-making highlights the importance of understanding the psychological factors that influence financial decision-making. Overconfidence can lead to suboptimal decisions, resulting in negative consequences for the acquiring company and its shareholders. Factors such as experience, information availability, personality traits, and heuristics can all contribute to overconfidence in M&A decision-making. The impact of CEO overconfidence on M&A decisions can be significant, resulting in value-destroying deals, overpayment for the target company, and the failure of the merger itself. To mitigate the negative effects of overconfidence, decision-makers should be aware of their biases and limitations, seek diverse opinions and information, and engage in thorough planning and preparation before engaging in M&As.

## 3.3 Differences in overconfidence and risk-aversion between male and female CEOs

As already introduced in the chapter 2, early psychological studies such as Lundeberg, Fox and Punćcohaŕ (1994) have shown men to be more overconfident than women and based on this, Barber and Odean (1998) find men to trade more excessively than women up to 45 percent. Although the study focused on stock investment, it provides evidence of gender differences in overconfidence, which can be extrapolated to corporate decision-making scenarios such as M&As.

Huang and Kisgen (2013) conduct one of the first studies examining differences in corporate finance decisions made by male and female executives to test whether male executives are more overconfident. With a difference-in-differences empirical framework, they find that female executives are less likely to make acquisitions but that those acquisitions have higher announcement returns than acquisitions by firms with male executives. In addition to this, capital structure decisions have similar results as female executives do not issue debt as their male counterparts do and even the

announcement returns for debt issuing are higher with firms with a female executive. Their results are consistent with overall declarations that men are more overconfident than women, but Huang and Kisgen (2013) also take into consideration that there could be other explanations, thus they test the robustness of their results in four ways: (i) examining earnings forecasts of firms with male executives, (ii) how likely male executives are replaced compare to female, (iii) by replicating the stock option based overconfidence measure by Malmendier and Tate (2005) and (iv) how likely the acquisition destroys the value of the acquirer, as overconfident male executives are supposed to make value-destroying M&A decisions. All evidence from these tests are consistent with that male executives are more overconfident, as (i) volatility of earnings forecasts are narrower with male executives, (ii) male executives are more likely to be replaced than female when less than four years in tenure, (iii) male executives are more often classified as longholders and (iv) male executives' acquisition decisions are found to be more value-destroying than acquisitions by female executives.

Levi, Li and Zhang (2014) ask two questions int their study: (i) how the number of female directors on the board is associated with the acquisitiveness and (ii) the financial significance. With 20 000 firm-year observations from 1997 to 2009, they find a significant negative association in both. Firstly, they find that with every unique female director the amount of acquisitiveness decreases by 7.6 % per each. Secondly, the bid premium paid for the target company decreases by 15.4 % for every unique female director.

With their results, Levi, Li and Zhang (2014) argue that there is a consistency with studies capturing women being less overconfident thus female executives are more likely to create more shareholder value by influencing the acquisition decisions. However, they do recognize some limitations regarding the results:

> We cannot, however, go beyond demonstrating the associations and the consistency of these findings with women being less overconfident, and with other gender-based behavioral characteristics identified in other contexts. This is because our investigation shares similar endogeneity concerns to those faced in the majority of investigations relating to corporate boards (Adams et al., 2010,

> Hermalin and Weisbach, 1988, Hermalin and Weisbach, 1998). For example, one could argue that an entrenched CEO prefers a “quiet life” and thus chooses women board members whom they believe will be less acquisitive. (s. 186)

Faccio, Marchica and Mura (2016) show in their study how managerial characteristics impact business decisions by demonstrating that companies led by women typically have lower leverage, less volatile earnings and a higher likelihood of surviving than comparable companies led by men. In addition, they find that the transition from a male to a female CEO is associated with a significant reduction in corporate risk-taking, while the reverse transition sees an increase in risk-taking. These outcomes persisted even after controlling for endogenous matching between firms and CEOs through several robust econometric techniques. First, they used a propensity score matching method to create a control sample of firms with male CEOs comparable to those with female CEOs based on observable characteristics such as country, industry, year, and firm attributes. This aims to mitigate selection bias by ensuring the matched firms were virtually indistinguishable except for the CEO's gender. Secondly, they employed a sample of firms undergoing CEO transitions (from male to female and vice versa) to compare the same firms' risk-taking behaviors under different CEO genders, controlling for time-invariant firm-specific characteristics. Additionally, the study used a treatment effects model, a variation of the Heckman two-step approach, to account for self-selection. They used an instrumental variable to predict the likelihood of appointing a female CEO based on male directors' familiarity with female CEOs in other firms. This aims to isolate the impact of CEO gender on risk-taking from endogenous matching factors. Overall, these methodologies ensured that differences in corporate risk-taking and capital allocation efficiency were attributable to CEO gender rather than other variables.

# 4 M&As and measurement of stock performance

Understanding how CEO overconfidence affects M&A decisions is critical for comprehending the broader impact on firm value and stock performance of the acquiring firm. This chapter presents some common methods used in studies to assess the effects of acquisitions on acquiring firm's stock performance, offering insights into the relationship between financial decisions by CEOs and shareholder value and ultimately how CEO overconfidence affects this relation through the empirical part of the thesis. The focus is mostly on the event study approach as it will be utilized in the thesis, although other methods are presented as well to extend the suggestions for possible further research.

## 4.1 Event study method

One of the most common methods used in academic research focusing on stock-based performance of M&As is the event study method, which foundational work was done by Brown and Warner in 1985. They studied the performance of daily stock returns in event studies and came to conclusion that daily data provides better results than monthly stock returns as there is higher frequency and more observations. Their study demonstrated the effectiveness of using the market model to calculate abnormal returns, which involves estimating normal returns based on the relationship between the firm's stock return and the market return during a pre-event estimation period.

In a standard event study, the purpose is to calculate abnormal returns of the stock in question by comparing the difference of the actual stock returns around a selected event window to the expected returns of the stock as if the event didn't happen. After the abnormal returns are calculated, one must calculate the cumulative abnormal returns (CAR) for the selected event window (Ali-Yrkkö, 2002). The expected returns are often estimated using a market model, which regresses the firm's historical stock returns against the returns of a market index (MacKinlay, 1997). CAR can be interpreted so that

positive CAR implies stock overperforming the expected market return while negative CAR suggests stock returns not fulfilling expectations.

Returns of a stock without expected returns can be written as

$$A_{it} = R_{it}, \quad (1)$$

where $A_{it}$ is the abnormal return on stock $i$ at time $t$ and $R_{it}$ is the return on stock $i$ at time $t$.

According to Brown and Warner (1985), expected returns can be calculated using the following three different excess return methods: mean-adjusted returns, market-adjusted returns and OLS market model method. For the mean-adjusted returns, one must choose a period in which no information related to the event (such as M&A announcement) is released and the average return is then estimated for the chosen period (Ali-Yrkkö, 2002).

The mean adjusted returns are calculated using the formula

$$A_{it} = R_{it} - \bar{R}_i, \quad (2)$$

where $\bar{R}_i$ is the daily average return on stock $i$ during the chosen estimation period.

In the market-adjusted returns model, the expected return of stock $i$ is assumed to be equal to the relevant index return for the same period. This is a simple approach as any stock-specific factors are not considered:

$$A_{it} = R_{it} - R_{mt}, \quad (3)$$

where $R_{mt}$ is the market return at time $t$.

The third method called as the OLS market model (or just the market model) considers the risk associated with the market and mean returns assuming a constant relationship between the returns of the stock and the market, which can be disadvantageous:

$$A_{it} = R_{it} - a_i - \beta_i R_{mt}, \quad (4)$$

where $a_i$ (alpha) is the return of stock $i$ that cannot be explained by market movements (or "intercept term" in terms of OLS values) and $\beta_i$ (beta) is the coefficient measuring the sensitivity of the return of stock $i$ to the market return (or "slope term" in terms of OLS values).

Finally, as mentioned earlier, the abnormal returns are used to calculate CAR by calculating abnormal returns over the chosen event window and summing them (Ali-Yrkkö, 2002):

$$CAR_t = \sum_{t=1}^{t} A_{it}, \quad (5)$$

where $CAR_t$ is the cumulative abnormal returns and $t$ denotes the number of abnormal returns during the event window (observations equal to the number of days).

Important thing to take into consideration with an event study is the length of the event window and estimation window. The event window should be adjusted around the event so that it captures effectively the whole event without too much noise nor that it already starts to return to the state before the event. The estimation window should be long enough to be appropriate for the expected state where the event does not occur, and it also shouldn't include the event days. For daily stock returns, Barber and Brown (1985) propose a maximum of 250-day window. Typically, a window of at least 120 days is used, proposed by MacKinlay in 1997, but in the end the window is defined by the research and one approach for empirical research could be to compare different windows.

Although this thesis focuses on short-term returns to capture immediate market reactions, Short-term event windows may not fully reflect the strategic and operational consequences of M&A decisions. For this reason, long-run performance measures—typically spanning one to five years post-acquisition

## 4.2 Long-run performance analysis

The event study method and CAR are considered as effective ways to measure immediate market reactions to M&A announcements, capturing the investor sentiment and expectations (Campbell, Lo, & MacKinlay, 1997). In contrast, it is argued not to fit for measuring performance in the long-term, as short-term event windows may not fully reflect the strategic and operational consequences of M&A decisions.

Ritter (1991) was one of the first to talk about the idea that CAR and buy-and-hold abnormal returns (BHAR) are suitable to answer different questions. Barber and Lyon (1997) argue in their study that the standard event study for example and calculating CAR for several months is “conceptually flawed or lead to biased test statistics”, when it is used as a tool to measure the long-rung abnormal stock returns. Instead, they propose that BHAR should be used over CAR when observing the long-term effects of an event.

BHAR is calculated using the following formula:

$$BHAR_i = \prod T(1 + R_{it}) - \prod T(1 + R_{mt}),$$

where $BHAR_i$ is the buy-and-hold abnormal return of stock $i$ at time $t$ and $\prod T(1 + R_{it})$ is the compounded return on stock $i$ at time $t$ and $\prod T(1 + R_{mt})$ is the compounded return on a comparative portfolio used as benchmark over the same period.

Long-run analyses could be relevant in studies of CEO overconfidence, as overconfident managers may pursue acquisitions that appear value-neutral in the short term but

exhibit poor long-run performance due to integration challenges, overpayment, or synergies that fail to materialize.

# 5 Data and methodology

This part of the thesis explains the data and methodology utilized in examination of the CEO overconfidence and the relation to CAR. The first section describes sources and sampling methods used to create the final sample for regression analysis of the event study. The second section presents the statistical methodology, details of the event study and descriptive statistics of the final sample.

## 5.1 Data

The thesis joins together two different datasets: public US companies which have completed acquisitions between 2013 and 2022 and corresponding data of the CEOs at the time of the acquisition announcement and determination of their overconfidence. Year and country selection for the thesis were due to data availability, as ExecuComp database has the necessary CEO option exercising data only for US companies and Orbis database, utilized for some CEO characteristics data, only has the most recent 10-year data. M&A deal data is extracted from LSEG Datastream and consists total of 134 273 announced deals.

The initial filtering process is conducted for the deal data to sample the acquirors. First, the acquiror must be a public company so that there is historical stock price data available to determine CAR on the announcement date. Second, to include only meaningful acquisitions, the deal status must be completed and the percentage of target shares held at the announcement must be less than 50 % & more than 50 % afterwards, hence this necessary data must be available. Lastly, only deals with deal value available were selected for sample.

After the sampling of the acquirors, data of the CEOs at the time of announcements is extracted from ExecuComp database by querying and joining with ticker of the company and year of the deal announcement date. Following data is extracted from the database:

CEO name, gender, age, date of becoming CEO, date of left as CEO, amount of unexercised exercisable options, exercise price, expiration date and fiscal year end closing price. This leaves out the acquirors which don't have stock option plans for CEOs or there is no data of it available in ExecuComp. Descriptive statistics is presented in the following chapter.

For the companies which the right CEO data was available, historical stock price data to calculate CAR on the announcement date is extracted from yfinance Python library. Companies which are for example delisted or acquired by other company since the sample M&A deal are filtered out from the final sample as yfinance does not have the historical stock price data available anymore. This leaves us with a final sample of 3 156 deals and 1 003 unique acquirors, presented with firm-level and deal-level statistics in Table 1 and Table 2 below.

**Table 1.** Descriptive statistics of firm-level variables

| | *Count* | *Mean* | *Median* | *Standard Deviation* |
|---|---|---|---|---|
| *TOTAL ASSETS* | 3156 | 29 493.01 | 4 849.17 | 117 464.30 |
| *FIRM SIZE* | 3156 | 15.45 | 15.39 | 1.75 |
| *MARKET CAPITALIZATION* | 3156 | 21 814.15 | 4 924.04 | 47 511.17 |
| *MARKET PRICE - YEAR END* | 3156 | 72.29 | 46.30 | 100.98 |
| *SHARES OUTSTANDING* | 3156 | 380.01 | 101.09 | 987.29 |
| *EQUITY* | 3156 | 6 689.80 | 1 550.20 | 16 066.61 |
| *SHORT TERM DEBT* | 3156 | 2 081.75 | 37.87 | 15 723.39 |
| *LONG TERM DEBT* | 3156 | 6 458.74 | 1 106.61 | 23 806.63 |
| *LEVERAGE* | 3156 | 0.28 | 0.26 | 0.20 |
| *CASH & SHORT TERM INVESTMENTS* | 2890 | 3 879.28 | 301.94 | 24 777.14 |
| *CASH / ASSETS* | 3156 | 0.13 | 0.07 | 0.15 |
| *OPERATING CASH FLOW* | 3156 | 1 701.24 | 360.56 | 4 400.54 |
| *CASH FLOW / ASSETS* | 3156 | 0.09 | 0.09 | 0.09 |
| *CAPITAL EXPENDITURES* | 3156 | 550.68 | 96.85 | 1 811.63 |
| *TURNOVER* | 3156 | 1 011.04 | 180.28 | 2 596.00 |
| *ROA* | 3156 | 0.05 | 0.05 | 0.12 |
| *FREE CASH FLOW / ASSETS* | 3156 | 0.06 | 0.06 | 0.10 |
| *TOBIN'S Q* | 3156 | 2.27 | 1.79 | 3.81 |
| *Board Size* | 3150 | 8.09 | 9.00 | 4.82 |
| *Value - Board Structure/Independent Board Members* | 3150 | 66.30 | 81.82 | 34.32 |

Table 1 presents the firm-level financial variables for all acquiror during each deal, thus when company has multiple deals per year, the variables repeat. Financial variables are joined together with deals as lagged thus sample deals are presented at time $t_i$ and joined with financial variables at time $t_{i-1}$.

The variables are extracted from LSEG Datastream and some additional variables are derived from them, e.g. they are normalized by scaling with assets. Financial variables extracted from Datastream and **presented in thousands** include total assets (WC0299), market capitalization (MV), equity (WC03501), short-term debt (WC03051), long-term debt (WC03255), cash & short-term investment (WC02003), operating cash flow (WC04601), capital expenditures (WC04601) and turnover (WC01751). Other variables from Datastream include the year-end market price (WC08001), board size (BOARD_SIZE) and board independence ratio (BOARD_INDEP_RATIO).

Firm size is calculated as the natural logarithm of total assets thus normalized by that. Leverage is computed by adding short- and long-term debt together and dividing by assets. Free cash flow is calculated by subtracting capital expenditures from cash flow. ROA is the basic return on assets, calculated by dividing turnover with assets. Tobin's Q is calculated with simplified market-to-book ratio by subtracting equity from total assets, adding market capitalization and dividing with total assets at the end.

Every monetary financial variable of the sample indicates extreme right-tail skewness, as the mean is far above the median. For example, total assets' mean of 29 493 thousand is over 6 times the median of 4 849 thousand. This is expected, as the data for the thesis isn't limited to large cap acquirors. Skewness regarding firm size is further reinforced with the shares outstanding. Normalized firm size responses to skewness well as the median (15.39) and mean (15.45) are much closer. Tobin's Q suggest many growth firms in the sample as the median (1.79) and the mean (2.27) are above 1, thus firms may have active investment strategies which is consistent with data consisting of acquirors.

The financial variable "cash & short-term investments" is the only variable, which observations are less than others (3 156 vs. 2 890). Dropping these observations would reduce the sample size and potentially introduce selection bias, as missingness is more common among smaller firms and firms with different reporting practices. Because the variable is used only to compute the cash-holdings ratio and is not essential for other aspects of the model, observations with missing cash values are retained in the regression.

**Table 2.** Descriptive statistics of deal-level variables

| | *Deal Value* | *Relative deal size* | *Diversifying deal* | *Public* | *Cross-border acquisition* | *Cash* | *Stock* | *Mixed* |
|---|---|---|---|---|---|---|---|---|
| Mean | 1339.72 | 0.000208 | 0.45 | 0.18 | 0.22 | 0.32 | 0.04 | 0.22 |
| Standard Error | 92.12 | 0.000033 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| Median | 217.61 | 0.000049 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mode | 100.00 | 0.000049 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Standard Deviation | 5175.18 | 0.001874 | 0.50 | 0.38 | 0.41 | 0.47 | 0.21 | 0.41 |
| Sample Variance | 26782460.28 | 0.000004 | 0.25 | 0.15 | 0.17 | 0.22 | 0.04 | 0.17 |
| Kurtosis | 129.55 | 2669.078966 | -1.96 | 0.89 | -0.13 | -1.40 | 17.30 | -0.16 |
| Skewness | 10.22 | 49.896840 | 0.20 | 1.70 | 1.37 | 0.78 | 4.39 | 1.36 |
| Range | 86831.15 | 0.101107 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Minimum | 0.01 | 0.000000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maximum | 86831.16 | 0.101107 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Count | 3156 | 3156 | 1423 | 556 | 688 | 1007 | 142 | 692 |

Table 2 presents the data of each deal within the sample. Deal value is presented in the millions, while relative deal size is the deal value lagged by total assets. All other variables are dummy variables. Diversifying deal gets a value of 1, when target's mid industry is different from acquiror's mid industry and 0 when they are the same. Public is value of 1, when the target is a public target and 0, when it's either private or subsidiary. Cross-border acquisition is 1, when the target's nation is other than United States. Rest of the variables are related to payment method: cash or stock gets value of 1 when the deal is done 100 % with the other, mixed gets value of 1 when either of the cash or stock is used for the payment, but the percentage is under 100 %

These descriptive statistics indicate that deal sizes are extremely right skewed. This can be interpreted from the mean (1 339.72) being six times higher than the median (217.61) and the skewness of 10.22. The extremely large kurtosis (129.55) indicates that the sample has extreme outliers, which is expected as there are deals over tens of billions alongside mid-market transactions. Relative deal size supports the right-skewness. As the deal value is lagged with total assets, the mean can be interpreted so that average deal is 0.021 % of the acquiror's total assets. This reflects the fact that most transactions in the sample are small relative to the acquirer. The maximum value of 0.10 suggests

that a small number of deals are economically large, representing approximately 10 % of acquiror's assets.

The mean of the payment method dummy variables can be interpreted straight as percentage amounts, hence 32 % of the deals are cash deal, 4 % are stock deals and 22 % are a mix of both. For many transactions, only one payment method was disclosed, while the other remained missing. To avoid misclassification, deals with a disclosed payment percentage below 100 % and a missing value for the alternative component were reclassified as mixed-payment deals. This approach assumes that partially reported deals necessarily include a second (non-disclosed) payment instrument.

The table also shows that for some deals the payment method remains totally unknown, in this case 42 % of them. To avoid losing these observations, a dummy variable of unknown payment is included in the regression. This approach allows retention of the full sample while controlling the potential systematic differences of deals with non-disclosed payment structures.

## 5.2 Methodology

### 5.2.1 Market excess returns during the M&A announcement event window

In this thesis, every deal is treated as an event to capture immediate market reactions and purpose is to find out whether CEO overconfidence and gender of the CEO play any role in them. This is done by using CAR of acquiror stock $i$ as the dependent variable during the event window around the announcement date of the deal.

The event window chosen for this thesis is [-5, 5], enabling the capture of extended price adjustments around the event. For the estimation period, the thesis aims for 120 days before the event window, thus [-125, -5]. However, as the sample includes some companies which don't have that much historical data, the absolute minimum used for

estimation period is 30 days. The event window descriptive statistics of CAR for the sample deals are presented below in Table 3.

The abnormal returns of stock $i$ for each deal are computed using the OLS market model formula, presented in chapter 4.1 (Formula 4). The market parameters for the formula are computed using the estimation window returns of stock $i$ and S&P500 as benchmark index, as the sample companies are traded either in NYSE or Nasdaq.

**Table 3.** Cumulative abnormal returns

| | *CAR [-5, +5]* |
|---|---|
| Mean | 0.005 |
| Standard Error | 0.001 |
| Median | 0.003 |
| Mode | 0.013 |
| Standard Deviation | 0.083 |
| Sample Variance | 0.007 |
| Kurtosis | 14.829 |
| Skewness | 1.185 |
| Range | 1.387 |
| Minimum | -0.587 |
| Maximum | 0.801 |
| Sum | 16.786 |
| Count | 3158 |

Table 3 shows that the average CAR across all events is small but positive (+0.5 %) while median being slightly less (+0.3 %). The distribution is, however, heavily right-skewed with skewness of 1.815, thus the data has more large positive outliers than negatives. In addition, the distribution is extremely heavy-tailed with kurtosis of 14.829 and indicates many extreme events which are quite typical in event studies. These results suggest that many events do nothing, but a few cause massive positive abnormal returns while few cause extremely negative returns. This can be seen from minimum (negative) return of -58.7 % and maximum (positive) return of 80.1 %.

### 5.2.2 Longholder CEOs and other CEO characteristics

The CEO overconfidence is the crucial variable of the thesis, as it serves as the independent variable of the final regression while the CEO gender is utilized as a key control variable to observe differences between male and female CEOs. In the thesis, the foundational work of Malmendier and Tate (2005) to determine overconfidence with option-based measures is used. The variable for overconfidence is set as a dummy variable, 1 indicating overconfident CEO and 0 for non-confident.

The dummy variable is computed combining both *Longholder* and *Holder 67* indicators: CEO is classified as overconfident, when he/she holds an option until the last year of expiration and the option is at least 67 % in-the-money. For simplicity in data collection, moneyness is calculated using the ExecuComp fiscal year-end stock price rather than retrieving the stock price from one year prior to each option package's expiration date. This creates some randomness in days between, as the expiration dates vary and the fiscal year-end isn't always same as the calendar year-end for companies in the sample.

In-the-moneyness of 67 % for CEO option packages is checked by dividing the underlying stock price with the option exercise price:

$$1.67 \geq \frac{S_i}{K_i}, \tag{6}$$

where $S_i$ is the stock price of stock $i$ at fiscal year-end $K_i$ is the exercise price of the stock option. In addition, the expiration date is checked against the data row's date so that days between are less than one year. When CEO is classified as overconfident once, he/she remains overconfident in the sample for the remaining time since.

**Table 4.** Descriptive statistics of CEOs (1166 unique CEOs)

| | *Age* | *Male* | *Female* | *Tenure* | *Business education* | *Technical education* | *Options* |
|---|---|---|---|---|---|---|---|
| Mean | 56.94 | 0.95 | 0.05 | 10.31 | 0.20 | 0.15 | 534.79 |
| Median | 57.00 | 1.00 | 0.00 | 8.42 | 0.00 | 0.00 | 173.69 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Std. Dev. | 6.74 | 0.23 | 0.23 | 10.95 | 0.40 | 0.36 | 1556.41 |
| Obs. | 3148 | 2984 | 172 | 3156 | 623 | 473 | 3156 |

**Table 5.** Descriptive statistics of *Longholder* CEOs (308 unique CEOs)

| | *Age* | *Male* | *Female* | *Tenure* | *Business education* | *Technical education* | *Options* |
|---|---|---|---|---|---|---|---|
| Mean | 58.61 | 0.99 | 0.01 | 13.30 | 0.19 | 0.19 | 609.43 |
| Median | 59.00 | 1.00 | 0.00 | 10.92 | 0.00 | 0.00 | 244.75 |
| Std. Dev. | 6.82 | 0.11 | 0.11 | 11.80 | 0.39 | 0.39 | 1276.77 |
| Obs. | 872 | 862 | 11 | 873 | 168 | 163 | 873 |

Table 4 presents the descriptive statistics of CEO observations in each deal, consisting of total 1 166 unique CEOs. Table 5 presents the same data, but for CEOs classified as *Longholders*. Tenure is computed from ExecuComp data variables "BECAMECEO", day of becoming CEO, and LEFTOFC, day of leaving as CEO. Educational information is extracted from Orbis. Column "Business education" consists of variable DMMajor values including such words as "business", "economics", "finance" & "accounting" and "Technical education" consists of DMMajor value words such as "engineering", "computer science", "technology" & "industrial". DMMajor not included were for example "government" and "history", thus types that doesn't fit the chosen classifications. "Options" column includes the amount of unexercised exercisable options CEO has.

The total number of female CEO observations remains substantially small as they represent 5 % of the total CEO appearances. Therefore, the significancy of gender plays a crucial role in the regression and will be tested as it is one of the main hypotheses of this thesis.

### 5.2.3 Ordinary Least Squares regression (OLS) approach

As the thesis' main purpose is to conduct an event study with CAR as dependent variable, the most suitable regression model is Ordinary Least Squares (OLS) regression, which is

a type of a linear regression. The study will be conducted with different models, where first model, or baseline model, includes the important independent variables regarding the research question: CEO overconfidence and gender. The other models are modified versions of the baseline model, in which different types of control variable groups are added, such as other CEO characteristics, firm-level control variables, deal-level control variables and governance variables.

The first model, or baseline model:

$$CAR_{it} = \alpha + \beta_1(Overconfidence)_i + \beta_2(Female)_i, \tag{7}$$

where CAR is the cumulative abnormal return of the acquiror company $i$ in the deals sample and $\beta_1$ is the dummy variable of CEO overconfidence and $\beta_2$ is the dummy variable of CEO gender being female.

The second model:

$$\begin{aligned} CAR_{it} = \alpha &+ \beta_1(Overconfidence)_i + \beta_2(Female)_i \\ &+ \beta_3(CEO\ control\ variables)_i \\ &+ \beta_4(Firm - level\ control\ variables)_i, \end{aligned} \tag{8}$$

where $\beta_3$ includes the CEO's age, tenure, education & number of unexercised exercisable options and $\beta_4$ includes the firm size, leverage, cash holdings, cash flow, ROA, free cash flow and Tobin Q of the acquiror company.

The third model:

$$\begin{aligned} CAR_{it} = \alpha &+ \beta_1(Overconfidence)_i + \beta_2(Female)_i \\ &+ \beta_3(CEO\ control\ variables)_i \\ &+ \beta_4(Firm - level\ control\ variables)_i \\ &+ \beta_5(Deal - level\ control\ variables)_i, \end{aligned}$$

(9)

where $\beta_5$ includes the relative deal size, payment dummies, public target dummy, cross border dummy and diversifying dummy.

The fourth model:

$$CAR_{it} = \alpha + \beta_1(Overconfidence)_i + \beta_2(Female)_i + \beta_3(CEO\ control\ variables)_i + \beta_4(Firm - level\ control\ variables)_i + \beta_5(Deal - level\ control\ variables)_i + \beta_6(Governance\ controls)_i,$$

(10)

where $\beta_6$ includes the size of the board and average weighted board independence ratio.

We introduce a variety of control variables for several reasons. Larger firms may have more resources to execute M&A deals, and the market may react differently to deals involving larger acquirers. In study by Moeller, Schlingemann and Stulz (2004) it is suggested that larger firms experience less value gains from acquisitions around announcements than small firms. Similary they find that Tobin's Q is associated with negative relationship on CAR. Malmendier and Tate (2008) use same variables in their study.

Regarding deal controls, some contary studies have been conducted regarding the size of the deal. Asquith, Bruner and Mullins (1983) find that there is positive relationship between acquistion performance and deal size where as Travols (1987) suggests the opposite. Therefore it is reasonable to control the model using relative deal size. Previous M&A research has also found positive effect on internally financed mergers using cash rather than equity due to the signalling effect, which implies to the investors that acquiring company's management thinks their stock is overvalued compared to internal funds (Andrade et al., 2001) (Travlos, 1987) (Myers & Majluf, 1984). Therefore

we construct the different payment dummies. Regarding information about the target companies as the deal-level variables, there has been evidence that especially cross-broder targets have negative relationship with the performance on announcements (Moeller, Schlingemann & Stulz, 2004) (Malmendier & Tate, 2008). Also specific for this thesis, we introduce the public dummy variable, which is equal to 1 when the target is a public firm. The sample used in this thesis differs from many others as we include also the private and subsidiary target deals. This way we might find contribution to the existing theory on information availability and how it affects stock performance, as markets ought to have much more information on M&A deals in which the target is publicly traded as well.

The next chapter presents the OLS regression results & robustness tests and discuss about the implications of the result, but further contributions of the thesis as a whole is presented more throughly in the conclusion chapter of the thesis

# 6 Results

In this chapter we interpret the correlation matrices, the results from OLS regression and how they correspond with the hypotheses and make some robustness tests.

## 6.1 Regression analysis

**Table 6.** Regression results of each model

| | *(1) Baseline* | *(2) +CEO +Firm* | *(3) +Deal* | *(4) +Governance* |
|---|---|---|---|---|
| Intercept | 0.007*** | 0.079*** | 0.071*** | 0.069** |
| | (3.87) | (3.09) | (2.91) | (2.49) |
| Overconfidence | -0.003 | -0.002 | 0.000 | 0.000 |
| | (-1.15) | (-0.50) | (0.09) | (0.14) |
| Female | -0.017** | -0.020*** | -0.020*** | -0.019** |
| | (-2.44) | (-2.61) | (-2.62) | (-2.51) |
| Age | | 0.000 | 0.000 | 0.000 |
| | | (1.16) | (0.89) | (0.84) |
| Tenure | | -0.000* | -0.000 | -0.000 |
| | | (-1.85) | (-1.45) | (-1.59) |
| Business education | | -0.003 | -0.003 | -0.002 |
| | | (-0.97) | (-0.72) | (-0.67) |
| Technical education | | -0.003 | -0.002 | -0.001 |
| | | (-0.64) | (-0.54) | (-0.33) |
| Options | | 0.000 | 0.000 | 0.000 |
| | | (0.32) | (0.64) | (0.52) |
| FIRM SIZE | | -0.006*** | -0.005*** | -0.005*** |
| | | (-5.30) | (-4.84) | (-3.55) |
| LEVERAGE | | 0.016* | 0.017* | 0.017* |
| | | (1.70) | (1.85) | (1.89) |
| CASH HOLDINGS | | -0.001 | 0.016 | 0.016 |
| | | (-0.06) | (0.92) | (0.95) |
| CASH FLOW | | 0.012 | -0.010 | -0.010 |
| | | (0.14) | (-0.14) | (-0.13) |
| ROA | | -0.063 | -0.044 | -0.044 |
| | | (-1.28) | (-1.29) | (-1.26) |

| | *(1) Baseline* | *(2) +CEO +Firm* | *(3) +Deal* | *(4) +Governance* |
|---|---|---|---|---|
| FREE CASH FLOW | | 0.047 | 0.073* | 0.078** |
| | | (0.90) | (1.86) | (1.97) |
| TOBIN Q | | -0.001 | -0.007** | -0.007** |
| | | (-0.17) | (-2.46) | (-2.35) |
| Relative deal size | | | 13.759* | 13.643* |
| | | | (1.79) | (1.71) |
| Cash | | | 0.020** | 0.020** |
| | | | (2.13) | (2.14) |
| Mixed | | | 0.015* | 0.016* |
| | | | (1.65) | (1.72) |
| PaymentUnknown | | | 0.013 | 0.013 |
| | | | (1.38) | (1.41) |
| Public | | | -0.018*** | -0.018*** |
| | | | (-3.81) | (-3.75) |
| Cross border acquisition | | | -0.007** | -0.007** |
| | | | (-2.04) | (-1.97) |
| Diversifying deal | | | 0.002 | 0.001 |
| | | | (0.60) | (0.42) |
| Board size | | | | 0.001 |
| | | | | (1.38) |
| Board independence ratio | | | | -0.000** |
| | | | | (-2.08) |
| R-squared | 0.002 | 0.026 | 0.053 | 0.053 |
| R-squared Adj. | 0.002 | 0.022 | 0.046 | 0.046 |
| Observations | 3156 | 3148 | 3148 | 3142 |

*Estimations use OLS with heteroskedasticity-robust (HC3) standard errors. T-statistics are reported in parentheses under each coefficient. Superscripts correspond to statistical significances at p < 0.01 ***, p < 0.05 ** and p < 0.10 * levels.*

Tabel 6 presents the results of each model explained in chapter 6.2.3. First model column is the baseline model, which includes the overconfidence determination and female dummy as only variables. In second column the CEO and firm control variables are added into model, third has the deal-level variables and last column includes the governance variables.

Across all four models, the CEO overconfidence determined in this thesis does not appear to have statistically significant effect on CAR. The coefficients are close to zero,

ranging from -0.003 to 0.000 and t-values below significance thresholds. Therefore, we cannot reject the null hypothesis, meaning that hypothesis one is false and within our sample overconfident CEOs do not significantly affect short-term returns during the M&A announcements.

However, female CEOs are associated with significant relationship in all four models by having negative effect on CAR. In the baseline model, female CEOs have -1.7 % lower announcement returns and the results remain robust when adding more controls, coefficients ranging from -1.9 % to -2.0 %. This suggests that on average M&A deals under female CEOs create slightly lower abnormal returns compared to their male counterparts, hence supporting our second hypothesis. The negative association may reflect differences in negotiation strategy, deal choice or market perception. Still, the analysis is correlational thus further work is required to establish mechanisms.

After adding CEO variables in model 2, tenure is the only variable to have statistical significance, but only at 10 % level and as the coefficient is close to zero, tenure has almost no economic impact on CAR. The significancy disappears after controlling the model with deal variables in model 3. This suggests that any effect of tenure on CAR is not independent of the types of deals undertaken by more experienced CEOs. Overall, tenure does not appear to play an economically meaningful role in explaining short-term market reactions. Also, how tenure is computed may have an effect as we only measure tenure as CEO per company. This does not consider any experience as CEO in other companies or experience in other management roles within the company.

From firm control variables, logarithmic firm size and leverage have significant relationship in models 2 to 4. Firm size is highly significant at 5 % level with coefficients from -0.006 to -0.007, suggesting that larger companies experience smaller abnormal returns during M&A announcements, which is in line with previous literature. The leverage is only marginally positive and significant at 10 % level across the models, thus economic impact cannot be evaluated thoroughly with these results. After controlling

for deal variables, both Tobin's Q and free cash flow become significant. Tobin's Q has negative relationship of -0.007 in both models at significancy level of 5 % and free cash flow has positive relationship in both models and is significant at 10 % level in model 3 and rises to level of 5 % after controlling for governance variables. High Q firms may undertake acquisitions that investors view sceptically, for example due to concerns over overpayment. Regarding free cash flow, firms with greater available cash could be better positioned to finance value-enhancing deals. The increased significance of free cash flow after including governance variables may indicate that strong governance reassures investors that free cash will be allocated efficiently.

The models improve the most after controlling with deal variables. Between models 2 and 3, the $R^2$ increases the most (0.026 to 0.053) and increase is similar with adjusted $R^2$, although it remains lower, suggesting that some variables have weak explanatory power, thus improved model fit doesn't necessarily need that many variables relatively.

Both cash and mixed payment methods have positive impact on CAR (+2.0 % and +1.5 %), which are significant at 5 % level and 10 % level. Relationship remains positive and significant after adding governance controls. In previous literature (e.g. Travlos, 1987) cash payments are often seen as a strong signal for deal credibility. It reduces uncertainty about financing and in addition don't dilute the existing shares. In this light the regression results are logical. Acquisitions of public targets (highly significant statistically) and cross-border deals (significant at 5 % level) are associated with negative CARs (-1.8 % and -0.7 %), reflecting market concerns over overpayment, integration, and information asymmetry. Public targets are more transparent because there is more information available for them, but they can also be more expensive regarding market valuation and premiums on valuation and lead to overpayment (Shleifer & Vishny, 2003). Cross-broder acquisitions are studied to have higher integration and cultural risks, information asymmetry and foreign exchange uncertainty. Diversifying deals have no detectable effect, and relative deal size shows a small positive impact.

Corporate governance variables show only limited impact. Board size isn't significant and although the board independence ratio is highly significant statistically, the relationship is close to zero thus the impact itself isn't significant economically. Corporate governance control doesn't improve the model either, as the $R^2$ and adjusted $R^2$ to remain the same between models 3 and 4. It is plausible though that highly independent board may discourage risky acquisitions, leading to lower investor sentiment.

What comes to the research question and this thesis, against the first hypothesis we don't find significant association between short-term stock returns for investors and CEO overconfidence during M&A announcements like previous studies do, such as Malmendier and Tate (2005, 2008). This could be due to various reasons and especially related to sampling. First, Malmendier and Tate (2005, 2008) only examine large publicly traded US firms utilizing work of Hall and Liebman (1998) and Yermack (1995). One of the main purposes of this study was to have a heterogeneous sample, thus there were no selection criteria related to firm or deal sizes, only data availability. We also constructed only one CEO overconfidence measure which was also a bit simplified compared to Malmendier and Tate (2005, 2008) *Longholder* measure, as we didn't derive specifically the exact one-year prior expiration moneyness of the option but rather the last available fiscal year end price before the expiration date. The fiscal year end price had to be within the 365-day period.

Regarding another aspect of the thesis, the presence of female CEO does have significant, slightly negative effect on abnormal returns and is robust across all four models, thus the second hypothesis is supported. The negative effect is somewhat contrary with previous studies. For example, Huang and Kisgen (2013) find female CEOs to tend to have higher announcement returns than men. Their empirical method is however a lot different and focus more on long-term performance as they use the DiD approach in their study where we are particularly interested only in the short-term performance in this thesis.

Results after controlling for different variables behave as expected, highlighting the importance on firm size and several deal characteristics and consistent with previous studies (Andrade et al., 2001) Asquith, Bruner and Mullins (1983) (Myers & Majluf, 1984).

## 6.2 Robustness test

To further strength the main regression results, we perform two different tests for robustness: First, we winsorize continuous variables in the models such as CAR, deal value and firm size, which were shown through descriptive statistics to be right-skewed and possibly having extreme outliers. Second, we perform a logit regression over CEO overconfidence to further test CEO overconfidence difference between female and male CEOs and whether female CEOs are less likely to be classified as overconfident compared to their peers.

The logit regression is computed with CEO overconfidence as dependent variable using the following formula:

$$Overconfidence_i = \alpha + \beta_2(Female)_i + \beta_3(CEO\ control\ variables)_i \quad (11)$$

**Table 7.** Regression results after winsorizing continuous variables

| | *(1) Baseline* | *(2) +CEO +Firm* | *(3) +Deal* | *(4) +Governance* |
|---|---|---|---|---|
| Intercept | 0.0061*** | 0.0981*** | 0.0741*** | 0.0681*** |
| | (3.80) | (5.60) | (3.75) | (3.22) |
| Overconfidence | -0.0022 | 0.0000 | 0.0005 | 0.0006 |
| | (-0.81) | (0.00) | (0.16) | (0.20) |
| Female | -0.0146** | -0.0154*** | -0.0158*** | -0.0150** |
| | (-2.50) | (-2.58) | (-2.64) | (-2.51) |
| Age | | 0.0001 | 0.0000 | 0.0000 |
| | | (0.26) | (0.18) | (0.12) |
| Tenure | | -0.0002* | -0.0002 | -0.0002 |

| | *(1) Baseline* | *(2) +CEO +Firm* | *(3) +Deal* | *(4) +Governance* |
|---|---|---|---|---|
| | | (-1.67) | (-1.39) | (-1.52) |
| Business education | | -0.0034 | -0.0030 | -0.0028 |
| | | (-1.09) | (-0.99) | (-0.91) |
| Technical education | | -0.0022 | -0.0023 | -0.0015 |
| | | (-0.55) | (-0.58) | (-0.37) |
| Options | | 0.0000 | 0.0000 | 0.0000 |
| | | (0.31) | (0.59) | (0.46) |
| FIRM SIZE | | -0.0056*** | -0.0047*** | -0.0040*** |
| | | (-6.73) | (-5.30) | (-3.82) |
| LEVERAGE | | 0.0106 | 0.0073 | 0.0075 |
| | | (1.42) | (0.96) | (0.98) |
| CASH HOLDINGS | | 0.0043 | 0.0013 | 0.0005 |
| | | (0.36) | (0.10) | (0.04) |
| CASH FLOW | | -0.0653 | -0.0760* | -0.0742* |
| | | (-1.50) | (-1.73) | (-1.69) |
| ROA | | -0.0123 | -0.0172 | -0.0214 |
| | | (-0.37) | (-0.51) | (-0.63) |
| FREE CASH FLOW | | 0.1062*** | 0.1103*** | 0.1218*** |
| | | (2.91) | (2.97) | (3.27) |
| TOBIN Q | | -0.0039*** | -0.0040*** | -0.0038*** |
| | | (-2.79) | (-2.77) | (-2.60) |
| Relative deal size | | | 9.2930 | 10.0334 |
| | | | (1.29) | (1.39) |
| Cash | | | 0.0190** | 0.0189** |
| | | | (2.31) | (2.31) |
| Mixed | | | 0.0151* | 0.0155* |
| | | | (1.83) | (1.88) |
| PaymentUnknown | | | 0.0120 | 0.0124 |
| | | | (1.44) | (1.48) |
| Public | | | -0.0159*** | -0.0158*** |
| | | | (-3.66) | (-3.65) |
| Cross border acquisition | | | -0.0081*** | -0.0078** |
| | | | (-2.65) | (-2.57) |
| Diversifying deal | | | 0.0020 | 0.0015 |
| | | | (0.75) | (0.55) |
| Board size | | | | 0.0004 |
| | | | | (1.01) |
| Board independence ratio | | | | -0.0001** |
| | | | | (-1.97) |

| | *(1) Baseline* | *(2) +CEO +Firm* | *(3) +Deal* | *(4) +Governance* |
|---|---|---|---|---|
| Winsorized | 1%–99% | 1%–99% | 1%–99% | 1%–99% |
| R-squared | 0.0022 | 0.0218 | 0.0333 | 0.0340 |
| R-squared Adj. | 0.0015 | 0.0174 | 0.0268 | 0.0269 |
| Observations | 3156 | 3148 | 3148 | 3142 |

*Estimations use OLS with heteroskedasticity-robust (HC3) standard errors. T-statistics are reported in parentheses under each coefficient. Superscripts correspond to statistical significances at p < 0.01 ***, p < 0.05 ** and p < 0.10 * levels.*

Table 7 presents the results of all four OLS regression models after winsorizing continuous variables using 1-99 % threshold. The main results remain the same, as overconfidence is still statistically insignificant dependent variable and on the other binary female variable remains as statistically significant across all models. The negative coefficient moves a bit close to zero (-2 % to -1.7 % vs. -1.58 % to -1.46 %) after winsorizing, but only marginally. These results suggests that the findings are not driven by extreme outliers.

From financial control variables, leverage lost its statistical significancy after winsorizing at 1-99% threshold. This indicates that the initially observed relationship was driven by a small number of firms with extremely high leverage values. Thus, the effect of leverage is not robust and should not be interpreted as a general pattern across the sample. Winsorization also affects the coefficients of Free Cash Flow and Tobin's Q. Before winsorizing, both variables exhibit unstable and only marginally significant effects on CAR, which indicates considerable noise driven by extreme outliers. After winsorizing at 1-99% threshold, these outliers are removed, and Free Cash Flow becomes strongly positive and highly significant across all specifications. This suggests that the true underlying relationship was previously masked by extreme outliers.

Tobin's Q shows a similar pattern. In the non-winsorized regressions, the effect of Q is only significant after controlling for deal variables, reflecting the heavy right-tail of firms with extremely high valuation ratios. Once these distortions are capped, Tobin's Q becomes consistently negative and significant at the 1% level. This indicates that high-

growth acquirers generate lower announcement returns, consistent with the notion that these firms may overinvest or pursue value-destroying acquisitions. Overall, the winsorized results reveal cleaner, more stable economic relationships that were obscured by extreme outliers in the raw data.

Relative deal size is the only deal-level control variable, which lost its significance at the 10 % level. This indicates that for most acquisitions, relative deal size does not systematically affect announcement returns.

**Table 8.** Logit regression results of CEO overconfidence and gender

| | *(1) Baseline* | *(2) +CEO* |
|---|---|---|
| Intercept | -0.901*** | -3.543*** |
| | (-22.30) | (-9.66) |
| Female | -1.783*** | -1.638*** |
| | (-5.67) | (-5.17) |
| Age | | 0.039*** |
| | | (6.16) |
| Tenure | | 0.026*** |
| | | (5.88) |
| Business education | | 0.068 |
| | | (0.64) |
| Technical education | | 0.397*** |
| | | (3.56) |
| Options | | 0.000 |
| | | (1.21) |
| Pseudo R-squared | 0.014 | 0.049 |
| Observations | 3156 | 3148 |

*The model reports McFadden's pseudo R-squared, which compares the log-likelihood of the fitted model to that of a null model containing only an intercept. T-statistics are reported in parentheses under each coefficient. Superscripts correspond to statistical significances at p < 0.01 ***, p < 0.05 ** and p < 0.10 * levels.*

Table 8 shows the logit regression results, in which CEO overconfidence is the dependent variable. The results further strength the hypothesis 2 and supports the third hypothesis. Results suggest that gender is a strong predictor of CEO overconfidence, being significant

at the 1 % level. Results remain the same, even after controlling for age, tenure, education and options amount. Among the other characteristics, age and tenure are positively associated with overconfidence, suggesting that more experienced or longer-serving CEOs tend to develop stronger self-belief. Technical education is also positively related to overconfidence, while business education and option holdings do not significantly explain variation in overconfidence. The models have McFadden's pseudo R-squared values of 0.014 and 0.049, indicating modest but meaningful improvements in explanatory power when CEO characteristics are added.

Overall, the results highlight that demographic and human-capital attributes, particularly gender, play an important role in shaping CEO overconfidence. It is also very much in line with previous behavioral finance studies suggesting that male executives are more prone to be classified as overconfident than female although the female CEO observations is quite small in this thesis compared to male CEOs.

# 7 Conclusion

In this thesis, we examine how CEO overconfidence affects short-term stock returns of acquiring companies around M&A announcement date and whether there are differences between female and male CEOs. The data is composed of U.S. companies and their CEOs due to data-availability regarding the utilized overconfidence measurement, which is based on CEO's behavior on exercising exercisable stock options granted within the company. Alongside the empirical part, some common theories regarding both M&A and behavioral finance are discussed and common methodologies used to measure stock performance, both short and long, are presented. Hypothesis are based on existing literature about CEO overconfidence and differences between female and male in general regarding investment behavior. Chosen methodology is based on both existing finance literature as well as previous studies regarding CEO overconfidence.

Previous studies have found that overconfident CEOs are more active in making acquisitions, are prone to pay higher premiums on target companies and therefore engage more often into value-destroying mergers. In addition, study by Huang and Kisgen (2013) is one of the first to examine the differences between females and males. Their findings show that female CEOs indeed engage into less-value destroying M&As and that stock returns are higher on announcements when compared to male executives. However, much of the existing literature concentrates on large firms and deals involving public targets, leaving gaps in understanding how these behavioral traits manifest across a broader sample of acquisitions. Therefore, the key to this thesis is to populate a more heterogeneous sample, especially by not excluding acquiring companies based on market capitalization.

In the end, the empirical results of this thesis show no evidence that CEO overconfidence affects short-term cumulative abnormal returns surrounding M&A announcements. Our overconfidence dummy remains economically small and statistically insignificant throughout different specifications, such as firm-level and deal-level controls. These findings suggest that, contrary to some earlier studies, overconfidence may not

systematically influence the market's immediate reaction to acquisition announcements, at least in the broader and more heterogeneous sample examined here.

In contrast, the analysis reveals a consistent and statistically significant negative relationship between CEO gender and announcement returns. Deals led by female CEOs are associated with approximately 1.7 % lower cumulative abnormal returns in the announcement window. This pattern remains robust after controlling variables and after applying winsorization to mitigate the influence of outliers. While these results diverge from earlier studies suggesting that female CEOs engage in less value-destroying acquisitions, they may reflect contextual differences in deal characteristics, industry composition, or the evolving market perceptions of female leadership over time.

The logit regression examining the determinants of overconfidence indicates that female CEOs are significantly less likely to be classified as overconfident, while age and tenure are positively associated with overconfidence. These patterns align with previous studies and behavioral theories linking experience, authority, and self-attribution to elevated confidence levels.

This thesis contributes to existing literature in following ways. First, it broadens the scope of research on CEO overconfidence by examining effects on short-term stock returns during announcements across a more diverse and recent set of deals than many previous studies, which often focus on large acquirors or public targets. Second, it revisits the role of gender in M&A performance, using a recent sample and a wide set of controls that include CEO-level, firm-level, deal-level, and governance characteristics. The consistent significance of the female dummy offers evidence that gender-related differences in market reactions persist, even after accounting for a wide range of controls. Third, the thesis provides a deeper examination of the determinants of CEO overconfidence itself. The results from the logit regression show that variables such as gender, age, and tenure are systematically associated with the likelihood that a CEO is classified as overconfident.

This contributes to a growing literature that seeks to understand where managerial behavioral traits originate and how they relate to observable personal characteristics.

The thesis has also its limitations that should be acknowledged. Firstly, we examine only *Longholder* CEO overconfident measure, which is even little simplified from the original, although the option-based measure is widely used. Second, sample only includes US executives, thus the results are not generalizable to other countries. Lastly, while the event study method is suitable for examining short-term stock performance, the thesis does not capture the long-term value implications of CEO overconfidence or acquisition decisions. It is possible that the effects of overconfidence or gender manifest more strongly over longer horizons, which remain outside the scope of this analysis. Furthermore, the relatively low representation of female CEOs in the sample may limit statistical power, even though the gender variable remains significant across models.

Based on the limitations, there are several directions for future research to extend this work. One of the possibilities is to examine the relation of long-term stock performance and CEO overconfidence utilizing BHAR instead of CAR to assess whether CEO overconfidence or gender influences value creation beyond the short event window. Future studies could also analyze how market perceptions of female executives change over time and whether these perceptions differ for example by industry, firm size or deal characteristics. Additionally, cross-country comparisons could shed light on how institutional environments, governance structures, and cultural norms moderate the effects of CEO characteristics on M&A performance.

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