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CEO Overconfidence Effects on Mergers and Acquisitions

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Master's thesis

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Abstract of master's thesis

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Abstract

The purpose of the study is to extend further from the result studying overconfidence effects of CEOs on single deal of Malmendier and Tate (2008)'s article to study overconfidence effects of CEOs on multiple mergers and acquisitions. Based on the psychological and financial theories, the likelihood of overconfident CEOs acquiring a company is the net effect of two manifestations of overconfidence. The first manifestation is called miscalibration in psychology. Under this manifestation, overconfident CEOs overestimate the benefits and underestimate the costs of the merger. Thus, it increases the odds of overconfident CEOs undertaking the acquiring project. On the other hand, the second manifestation is called ''better-than-average'' effect. Under this manifestation, overconfident CEOs will curb investment to avoid external finance if the firms do not have sufficient internal fund. The reason for this biased decision is because overconfident CEOs believe that their firms are undervalued by the market. They want to avoid external finance so that the mispricing gap does not become greater. The net effect of the two manifestations of overconfidence on the probability of overconfident CEOs pursuing multiple mergers and acquisitions (M&A) is debatable. Malmendier and Tate (2008) empirically prove that overconfident CEOs are more likely to purchase another firm than non-overconfident colleagues in single deal. Moreover, the announcement effect of single deal by overconfident CEOs is significantly more negative than their rational counterparts' results.

The sample used in the study consists of 622 mergers of 306 firms occurred in the US during 2006-2013. The data is retrieved from SDC Platinum, Center for Research in Security Prices (CRSP) and Compustat.

I find no evidence about the acquisitiveness and the worse performance of overconfident CEOs compared to others in multiple M&As. My findings suggest that overconfident CEOs are equally acquisitive as non-overconfident CEOs in multiple deals. Their multiple M&A deals receive similar announcement returns to others' during the normal economic cycle. One interesting observation is that during the financial crisis overconfident CEOs are more acquisitive in multiple acquisitions than rational CEOs. Although the majority of overconfident CEO's mergers are diversifying, they still receive significantly positive abnormal returns as opposed to the non-overconfident counterparts'. The reason for the interesting findings can be either investor sentiment or the external support of a strong and independent board as well as CEO's personal trading experience.

Keywords CEO overconfidence, multiple mergers and acquisitions, acquisitiveness, financial crisis

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1. Introduction

Overconfidence in merger and acquisitions (M&A) is not a new concept. The overconfidence topic has received a massive amount of media coverage. For example, an article from Bloomberg describes Mark Zuckerberg as overconfident and another article from Forbes says his decision to buy Whatsapp at 19 billion USD is overoptimistic. Mark Zuckerberg ‘’have a lot of confidence but also a lot of ego and pride. They (Mark Zuckerberg) are not going to let someone else pioneer the future’’ (Bloomberg Business). The decision to buy WhatsApp at 19 billion USD of Mark Zuckerberg is considered overoptimistic: ‘’to justify 19 billion USD, WhatsApp would need to generate around 1 billion USD in annual cash flow by our model’s terminal year of 2018” and “we could arrive at 650 million USD in revenue. 1 billion USD is possible, but given the optimism already incorporated in a 650 million USD figure, it might seem a stretch’’ (Forbes).

In psychology, overconfidence is associated with the calibration and probability judgment. The term itself is often identical with one of the forms of miscalibration. The most essential extensions to this definition, are studies of overconfidence in the context of positive illusions. Positive illusions include the better-than-average effect, illusion of control and unrealistic optimism. Overconfidence has been defined as a specific form of miscalibration, of which ‘’the assigned probability that the answers given are correct exceeds the true accuracy of the answers’’ (Skala, 2008).

Consistent with this theory, Fischhoff, Slovic and Lichtenstein (1977)'s findings show that when asked questions of general knowledge, people are too often wrong when they are certain about the answer to a question. Illusion of control is when people believe that they are able to influence events which in fact are controlled mainly by chance (Taylor and Brown, 1988). A clear example of this cognitive bias is that a gambler insists on throwing a dice by himself as if it could lead to a more favorable result (Skala, 2008). The tendency of people to have an unrealistically positive view of themselves is called the better-than-average effect in psychology. For instance, Svenson (1981) shows evidence that a great portion of drivers have ‘’strong tendency to believe oneself safer and more skillful than the average driver’’.

Investors and managers afflicted with overconfidence often make mistakes in decision making. Chuang and Lee (2006) prove that overconfident investors overreact to private information and under-react to public information. Moreover, they find that market gains make overconfident

investors trade more aggressively in subsequent periods. Malmendier and Tate (2005) present that overconfident CEOs are more responsive to cash flow than their peers. When their financial resources are abundant, they tend to overestimate the return of their investing projects and over-invest on the projects. When firms are financially constrained, overconfident CEOs tend to reduce budget on investments. Furthermore, overconfident CEOs pay dividend back to shareholders less than non-overconfident CEOs. Since overconfident CEOs view external financing as the more costly option, they pay less dividend to build financial slack for future investment needs (Deshmukh, Goel and Howe, 2013).

Intuitively one could argue that overconfident CEOs would be similar to empire building CEOs. Empire builders are CEOs who like to buy companies to increase the size of the company under his/her management, even when the acquisition may be value destroying (Jensen, 1986). There is evidence that abnormal announcement return by cash rich bidders is significantly negative and decreasing in proportion with the amount of excess cash held by the bidders (Harford, 1999). However, unlike empire builders, overconfident CEOs make value destroying decisions because they believe they are maximizing shareholder value.

Malmendier and Tate (2008) distinguish between overconfident CEOs and entrenched CEOs by their decision in holding vested options. The authors argue that overconfident CEOs are willing to invest personally in their company by holding vested options until expiration while entrenched managers are not. The researchers want to find the answer to the research question whether overconfident CEOs are more likely to acquire other firms than non-overconfident CEOs. Another research question is that whether or not overconfident CEOs' deals will generate more negative abnormal return than deals made by others.

The likelihood of making acquisition deals in overconfident CEOs is the result of two manifestations of overconfidence that have opposing effects. The first manifestation is miscalibration. Overconfident CEOs may misevaluate the cost and benefits of the investments and go forward with even the negative synergy mergers. This manifestation increases the likelihood of acquiring other firms. The second manifestation is the better-than-average effect. Overconfident CEOs believe their firms are undervalued by the market, therefore, they try to avoid external finance to not further undermine their shareholder value. If their firms are financially constrained, they won't have enough resources to do mergers. Therefore, the likelihood of making acquisition deals by overconfident CEOs is decreasing in the second manifestation. The authors

find that the odds of making an acquisition are 65% higher if the CEO is classified as overconfidence. The market reaction at merger announcement is significantly more negative than for rational CEOs. The odds of an acquisition made by overconfident CEOs are the largest if the merger is diversifying and does not require external financing.

This thesis aims to employ the method in Malmendier and Tate (2008)'s study to examine overconfident CEOs in making merger and acquisition related decisions using the more recent data from 2006 to 2013. The major difference between this thesis and Malmendier and Tate (2008)'s research is while Malmendier and Tate (2008) focuses on the likelihood of a CEO making acquisitions (The sample size includes CEOs making no acquisition and CEOs making acquisitions), this study chooses to investigate the likelihood of a CEO making multiple acquisitions (The sample size includes CEOs with at least one acquisition).

Following the original study, I construct overconfidence variable based on CEO's option holding behavior. According to Lambert, Larcker and Verrecchia (1991), CEOs invest their human capital into the company and receive equity based compensation. Therefore, CEOs place considerable amount of their investment in their firm's stock performance. Risk averse CEOs should exercise options early if the stock price is sufficiently high. They shouldn't keep the options until expiration since CEOs cannot legally hedge the risk of their option holding by short selling company stock. Thus, if a CEO fails to exercise their options and hold them until expiration despite the fact that the options are deep in the money, he/she is classified as overconfidence (Malmendier and Tate, 2008).

After constructing overconfidence variables, I use multivariate regression model to examine the relationship between market reaction and overconfidence in multiple mergers. Although this model couldn't eliminate the time-invariant effects affecting the market abnormal return like the random and fixed effect models, it is sufficient for this study because of the small sample size. I find no evidence supporting the hypothesis that overconfident CEOs are more likely to acquire multiple firms than their rational counterparts in the normal economic cycle during the period from 2006 to 2013. In the normal economic cycle, overconfident CEOs are not more likely to acquire other firms than their rational counterparts. Moreover, their multiple acquisitions do not receive more negative abnormal return than their peers'. Probably, during the sample period, the borrowing costs are too high in the opinion of overconfident CEOs. Thus, the multiple merger acquisition likelihood is less than the single merger acquisition likelihood as in Malmendier and Tate (2008)'s outcome.

My contribution to this topic is the finding that during the financial crisis, overconfident CEOs are significantly more likely to acquire multiple firms, especially firms in other industries and those deals tend to have more positive abnormal returns. There are two possible explanations based on existing literature for the observed result. The first possible explanation is during the financial crisis, investors become more irrational and they prefer high risk companies and M&A deals (Baker and Wurgler, 2007). That explains why normally diversifying deals should receive negative abnormal return but in this study in 2008 and 2009 they receive significantly positive market response (Morck, Shleifer and Vishny, 1990). The second possible explanation is performance of overconfident CEOs has been enhanced during the difficult time because of the external help from their independent and small board (Kolasinki and Li, 2013).

This study relates to several areas of research. Already, many researchers find investors reacting differently to CEOs with different characteristics in M&A announcements (Lee and James, 2007; Huang and Kisgen, 2013; Custodio and Metzger, 2013; Fang, Francis and Hasan, 2012). In addition, this study links with literature of overconfidence of managers in corporate finance. Malmendier and Tate (2008) suggests that overconfidence in managers may lead to value destroying deals. Billet and Qian (2008) show the market reaction become negatives from the second deals onward with acquiring CEOs.

The thesis is structured as follow: section 2 shows the previous literature regarding the topic. Section 3 presents the hypotheses of this study. Section 4 introduces the data and section 5 reveals methods. Section 6 reports the results and section 7 discusses explanations and implications. Section 8 concludes the study and make suggestions for further study.

2. Literature Review

2.1. Market reaction to CEO characteristics

To be able to fully grasp the significance of the market reactions to multiple mergers made by overconfident CEOs, it is necessary to understand the background of the relationship between varied CEO characteristics and market reactions to corporate events. Whether it is CEO gender (Lee and James, 2007; Huang and Kisgen, 2013) or CEO industry expertise (Custodio and Metzger, 2013) or CEO social network (Fang, Francis and Hasan, 2012), such characteristics can have positive or negative effects on company stock price around the event announcement date. I will take up the discussion of different aspects of CEOs in detail in the following section.

2.1.1. CEO gender

Lee and James (2007) find that investors' responses to the announcements of appointing female CEOs are significantly more negative than those of their male counterparts. When investors react to the news of a succeeded CEO to be female, stock price go through a -2.47% abnormal return. On the other hand, the average abnormal return is only -0.5% in the case of a male CEO appointment. To make the argument more valid, the authors conduct a robustness check with press release surrounding the announcements of male and female CEOs. The results show that articles about the appointment of a female CEO tend to point out gender and gender related considerations while articles about the appointment of a male CEO tend to be gender-neutral and more job and organization focused. The findings verify stock market reactions to the appointment of CEOs change significantly depending on the gender of the CEOs.

Huang and Kisgen (2013) have pursued similar research topic in the field of finance to find somewhat contrary results. Despite the less favorable market reaction to female CEO appointment found in the previous research, the authors present that investors react more favorably to significant corporate financial decisions made by firms with female executives. They find evidence that women make different corporate financial and investment decisions than men. Firms with female executives grow more slowly and are less likely to make acquisitions. Yet, once acquisitions are made by female executives, they have greater announcement returns in comparison with those made by firms with male executives. For capital structure decisions, female executives are less likely to issue debt. Also, announcement returns for debt offerings are higher when the firm has a female executive. To sum up, market reaction to corporate financial and investment decisions is different by the gender of the firm executives.

2.1.2. CEO Industry Experience

Although a variety of studies show that CEOs affect corporate policies and corporate value, Custodio and Metzger (2013) acknowledge the relative ignorance of how CEOs create value when studying the effect of CEO industry expertise on acquisition returns. Acquirers' abnormal announcement returns are two to three times higher if the CEO has previous experience in the target industry. The researchers differentiate between the CEOs' abilities to create a larger merger surplus (value creation) and their abilities to capture a larger fraction of this surplus for their shareholders in the bargaining process (value capture). Their findings suggest that industry experts perform better in negotiating with a target, resulting in paying a significantly lower premium for the target shareholders' shares. The reason for the enhanced bargaining ability from

CEO industry experience is information based. Experienced CEOs are able to achieve significantly higher abnormal returns if the target is a private company where there is greater information asymmetry. All in all, market react more positively to CEOs with industry experience similar to target's industry than CEOs without the expertise.

2.1.3. CEO Social Network

Fang, Francis and Hasan (2012) admit that only a few studies have looked into the diversity of social contexts faced by managers, thus motivate themselves to study the market reaction to merger announcement by CEOs with varied heterogeneous social network. Heterogeneous group of people are those ''who themselves have different demographic attributes, intellectual backgrounds, occupational experiences and international experiences''. Their results consistently show that firms in which the old CEO is replaced with a new CEO with greater social network heterogeneity experience a significantly positive market response. They present robust evidence in both cases of diversified and focused M&A deals. To conclude, investment decisions of CEOs with a diverse social network are received by the market with higher positive abnormal returns than CEOs' with homogeneous social network.

2.2. Overconfidence

Research literature in psychology has for long studied overconfidence. Overconfidence in psychology is associated with calibration and probability judgment. The term itself is often identical with one of the forms of miscalibration. The most fundamental extension to this definition scope, are studies of overconfidence in the context of positive illusions, i.e. the better-than-average effect, illusion of control and unrealistic optimism (Skala, 2008). The first extended definition of overconfidence is the ''overestimation of one's actual ability, performance, level of control, or chance of success'' (''illusion of control'') (Langer, 1975; Clayson, 2005; Moore and Healy, 2007). The second extended version of overconfidence is when ''people believe themselves to be better than others, such as when a majority of people rate themselves better than the median'' (''better-than-average effect'') (Svenson, 1981; Taylor and Brown, 1988; Moore and Healy, 2007). The third extended way overconfidence has been measured is ''excessive certainty regarding the accuracy of one's beliefs'' (''unrealistic optimism'') (Weinstein, 1980; Moore and Healy, 2007). I will begin this section by reviewing psychology literature about how overconfidence affects laymen. Then I will continue to explore what are the impacts of overconfidence on professionals, which include investors in financial market and managers in corporate finance.

2.2.1. Overconfidence in psychology

a. Miscalibration

In psychology, calibration is usually studied based on how interviewees answer general knowledge questions presented by researchers. Experiment participants answer a set of questions and have to determine the probability that their answer was correct. Miscalibration is ‘’the difference between the accuracy rate and probability assigned’’ (that a given answer is correct) (Skala, 2008). One great example of miscalibration is Fischhoff, Slovic and Lichtenstein (1977)’s study. Their study suggests that for a collection of general knowledge questions (e.g. absinthe is a) a liqueur or b) a precious stone), subjects were persistently overconfident. To answer the questions, subjects first determine the most likely answer and then demonstrate their degree of certainty that the answer they had selected was, in fact, correct. Participants were so overconfident on their answers so that they were likely to stake money on their validity. The study concludes that people are too often wrong when they are certain about the answer to a question.

b. Illusion of control

Illusion of control is when people tend to believe they are able to affect events which in fact are controlled mainly, or purely by chance (Taylor and Brown, 1988). A clear example of this cognitive bias is a gambler’s request to throw a dice by himself/herself as if it could then show a more satisfactory result (Skala, 2008). The previous research on illusion of control shows that people often fail to respond differently to controllable and uncontrollable events. Controllable events require skills and uncontrollable events only need luck to succeed. However, their study sheds little light on which factors may systematically dictate this illusory control behavior. Langer (1975) acknowledges the void in previous research and pioneers in studying skill-situation-related factors and their effects. He predicts that factors from skill situations (competition, choice, familiarity, involvement) introduced into chance situations would make individuals feel inappropriately confident. He conducts six studies to examine his research question. Results of confidence in all six studies supported the predicted hypotheses.

Clayson (2005) finds evidence for the cause of illusion of control in students. Students consistently overestimate their performance on academic exams, with the estimation error being inversely related to their grades. But the true source of the effect whether it is a matter of competency of students or whether it is a matter of systematic errors in students’ past experience and

expectations, is unexamined. The author solves the question by carrying out different experiments in different classes. In nine classes, the author adopted a policy of telling students early in the selected courses that certain academic standards will be maintained regardless of the standards of any other class. In other undergraduate classes the author did not mention these expectations. Although the procedure did not totally eliminate the overestimation effect, in the nine classes that apply the policy, students expected a course average grade of 2.70 while actually receiving a grade of 2.85. In other classes without the policy, the students expected a grade of 2.69 and received 2.25. All in all, it is apparently clear that the part of the overestimation (illusion of control) is caused by a systematic effect. The systematic effect originates from the difference in perception of the students with actual grading standards.

c. Better-than-average effect

Psychological research has established that, in general, people tend to have an unrealistically positive view of themselves. When we compare ourselves to a group (of co-students, co-workers, random participants), most of us believe to be ‘’superior to an average representative of the group in various fields’’ (Skala, 2008). Svenson (1981) shows evidence supporting that conclusion from an experiment with one group of US participants and another group of Swedish participants. In the experiment, subjects were asked to compare themselves with a more well-defined population of drivers whose characteristics were at least partly known to the subjects (i.e. other participants in the room). Such comparisons should diminish possible effects of group stereotypes (Californians are better drivers). In the US group 88% and in the Swedish group 77% of participants believed themselves to be safer than the median driver. In the US sample 93% of the people believed themselves to be more skillful drivers than the median driver and 69% of the Swedish drivers shared this belief in association with their comparison group. In summary, there was a ‘’strong tendency to believe oneself safer and more skillful than the average driver’’ (Svenson, 1981).

d. Unrealistic optimism

Several findings in this area can be summed up as "The future will be great, especially for me" (Taylor and Brown, 1988). One great example of the tendency of people to be unrealistically optimistic about future life events is the article of Weinstein (1980) where he carried on two experiments. In experiment 1, 258 college students assessed how much their own chances of undergoing 42 events differed from the chances of their classmates. Overall, they rated their own chances to be above average for positive events and below average for negative events.

Experiment 2 considered the idea that people are unrealistically optimistic because they concentrate on factors that promote their own chances of achieving favorable outcomes and fail to recognize that others may have just as many factors on their side. Students listed the factors that they thought had an impact on their own chances of undergoing eight future events. When such lists were read by a second group of students, the amount of unrealistic optimism presented by this second group for the same eight events diminished significantly, although it was not eliminated.

2.2.2. Overconfidence in finance

The majority of literature concerning overconfidence not only concentrates around psychology aspect but also draws attention to financial market and corporate finance. In financial market, literature concerning overconfidence helps explain anomalous findings in characteristics of investors and its effects on investors. In corporate finance, literature is divided according to the mergers and acquisitions decisions and financing and investment decisions. I will discuss in detail the above divisions of overconfidence in these two areas of finance.

a. Overconfidence in asset pricing

Recently, several behavioral finance models based on the overconfidence hypothesis have been proposed to explain anomalous findings, including a short term continuation (momentum) and a long term reversal in stock returns. Chuang and Lee (2006) use US data to show empirically various effects of overconfidence. First, they find that if investors are overconfident, they overreact to private information and underreact to public information. Second, they present that market gains make overconfident investors trade more aggressively in subsequent periods. Third, excessive trading of overconfident investors in securities markets is a significant factor to explain the observed excessive volatility. Fourth, overconfident investors underestimate risk and trade more frequently in riskier securities.

Psychological research demonstrates that, in areas such as finance, men are more overconfident than women. Thus, Barber and Odean (2001) test the prediction that overconfident investors trade excessively by classifying investors on gender. Using account data for over 35,000 households from a large discount brokerage, they consider the common stock investments of both genders from February 1991 through January 1997. They document that men trade 45 percent more than women. Frequent trading diminishes men’s net returns by 2.65 percentage points a year compared to 1.72 percentage points for women.

b. Overconfidence in managers in corporate finance

There is a growing size of academic literature concerning the consequences of biased managers (Malmendier and Tate, 2005; Malmendier and Tate, 2008; Hribar and Yang, 2013). Biased managers may handle financing and investment decisions differently to other managers (Malmendier and Tate, 2005), may pursue value destroying acquisitions (Malmendier and Tate, 2008), may miscalibrate the future's earnings (Hribar and Yang, 2013), may be turned over faster than other CEOs (Goel and Thakor, 2008), etc. I am going to analyze the recent mentioned issues of overconfident managers in depth in the following section.

- *CEO optimisms on financing and investment decisions*

Overconfident CEOs handle company cash and stock differently from non-overconfident CEOs. While non-overconfident CEOs view project net present value and required rate of return as criteria to make investment decisions, overconfident CEOs will view external finance as costly and choose avoiding external finance as criteria. Hence, overconfident CEOs are more responsive to cash flow than their peers. When their internal fund is abundant, they tend to overestimate the return of their investing projects and overinvest on the projects. When firms are financially constrained, overconfident CEOs decrease budget on investment (Malmendier and Tate, 2005). Besides, overconfident CEOs will issue equity less than their peers because overconfident CEOs choose to depend financially heavily on cash. The reason for that is that they overestimate their firms' future cash flows and hence believe that their firms are undervalued by the market. If they have to use external finance, they prefer debt to equity, since equity prices are more sensitive to differences in opinions about future cash flows. All in all, overconfident CEOs are reluctant to access external financing which may result in ''low levels of risky debt relative to available interest tax deductions'' (Malmendier and Tate, 2011). Moreover, overconfident CEOs pay less dividend back to shareholders than non-overconfident CEOs. Since they consider the option of external financing more costly, they pay less dividend to build financial slack for future investment needs. Consistent with the main prediction, the authors find that the level of dividend payout is about one-sixth lower in firms managed by CEOs who are more likely to be overconfident. This reduction in dividends related to CEO overconfidence is higher in firms with lower growth opportunities and lower cash flow. The argument is enhanced by the evidence that the significance of the positive market reaction to a dividend-increase announcement is higher for firms with greater uncertainty about CEO overconfidence (Deshmukh, Goel and Howe, 2013). Last but not least, overconfident CEOs are statistically significantly more likely

to complete the intended share repurchase than non-overconfident CEOs because overconfident CEOs overestimate the value of their shares. Overconfident CEOs perceive their shares as undervalued and have a greater buyback completion rate (Andriosopoulis, Andriosopoulis and Hoque, 2013).

- *CEO optimisms on M&A*

Overconfident CEOs may make value destroying acquisitions compared to rational CEOs. Hubris on the part of individual decision makers in bidding firms can explain why bids are made even when a valuation above the current market price represents a positive valuation error. Bidding firms inflicted with hubris simply pay too much for their targets (Roll, 1986). There is a lot of evidence for hubris hypothesis. For instance, CEOs' first deal exhibit zero announcement effects while their subsequent deals exhibit negative announcement effects. In fact, previous positive performance does not prevent the negative wealth effects in subsequent deals. Interestingly, CEOs' net purchase of stock is greater preceding subsequent deals than it is for first deals (Billet and Qian, 2008). Another evidence is that the odds of making an acquisition are 65% higher if the CEO is categorized as overconfidence. The market response at merger announcement for overconfident CEOs (-90 basis point) is significantly more negative than for non-overconfident CEOs (-12 basis point). The chance of an acquisition made by overconfident CEOs is greatest if the merger is diversifying and does not require external financing (Malmendier and Tate, 2008). Overconfident CEOs help explain the frequencies of diversifying and non-diversifying deals and preference of cash as the main choice of bidder's payment not only in domestic mergers but also in international mergers (Ferris, Jayaraman and Sabherwal, 2013). In addition, companies whose CEOs withdraw from acquisition deals for price reason receive positive abnormal returns at deal withdrawal announcement. The deal withdrawal by the CEOs sends the positive signal to the market that CEOs are acting on the best of shareholders' interest. On the contrary, since overconfident CEOs overestimate merger synergies and misevaluate some merger opportunities with negative synergies to be value-creating, acquisitions made by overconfident CEOs concern the market that the CEOs overbid for the target and destroy shareholder values (Malmendier and Tate, 2008; Jacobsen, 2014).

Intuitively one could argue that overconfident CEOs would be similar to empire building CEOs. Empire builders are CEOs who would like to increase the size of the companies under his/her management even when the merger may be value destroying (Jensen, 1986). Cash-richness predicts that a firm will become a bidder after controlling for stock price performance and sales

growth. There is evidence that abnormal stock price reaction to acquisition bid announcements by cash rich bidders is significantly negative and decreasing proportionally with excess cash held by the bidders. Furthermore, the number of cash rich firms undertaking diversifying acquisitions are significantly greater than the number of cash poor firms doing so (Harford, 1999). However, unlike empire builders, overconfident CEOs may make value destroying and low synergy mergers because they believe they are maximizing shareholder value through the merger (Malmendier and Tate, 2008). They argue that overconfident CEOs are willing to invest personally in their company by holding vested options until expiration. Therefore, it is acknowledged that although sharing similarities with empire builders in merger deal characteristics, overconfident CEOs are different from empire builders who purposefully violate agency conflict of interest code.

- *CEO optimisms and forecast*

Overconfident CEOs make earnings forecasts differently from non-overconfident CEOs. First, overconfident CEOs are more likely to issue earnings forecasts than non-overconfident CEOs although forecast issuance is voluntary. It is because overconfident CEOs overestimate firm future performance (miscalibration) and believe they are better than average (dispositional optimism) (Libby and Rennekamp, 2011). Furthermore, overconfident CEOs overestimate the mean of expected earnings. They issue more optimistic forecasts (miscalibration). Additionally, overconfident CEOs underestimate the variance of expected earnings. They are more likely to make point estimate compared to interval estimate (miscalibration) (Hribar and Yang, 2013). Last but not least, female executives who are believed to not suffer from overconfidence compared to their male colleagues, place wider bounds on earnings estimates than male executives (Huang and Kisgen, 2012).

- *CEO optimisms and other issues*

Previous empirical work on adverse consequences of CEO overconfidence raises the question of why firms hire overconfident managers. Theoretical research suggests a reason that is overconfidence can benefit shareholders by increasing investment in risky projects. Using options and press based proxies for CEO overconfidence, Hirshleifer, Low and Teoh (2012) find that over the 1993-2003 period, firms with overconfident CEOs have greater return volatility, invest more in innovation, obtain more patents and patent citations, and achieve greater innovative success for given research and development expenditures. However, overconfident managers

achieve greater innovation only in innovative industries. All in all, their findings suggest that overconfidence contributes to CEOs' exploiting innovative growth opportunities.

Goel and Thakor (2008) develop a model that shows that an overconfident manager has a greater likelihood than a non-overconfident manager of being deliberately promoted to CEO under value-maximizing corporate governance. Under the optimal CEO compensation contract, a rational, risk-averse CEO underinvests in projects relative to the shareholders' optimum. This underinvestment reduces firm value. The researchers show that ''a moderately overconfident risk-averse CEO increases firm value by mitigating the underinvestment problem'' (Goel and Thakor, 2008). The reason is that an overconfident CEO overestimates the precision of her private information and overreacts to it. Thus, she invests in a project even when her positive information about the project is such that she would not invest in the project if she were rational.

Gervais, Heaton and Odean (2011)'s findings complement the work of Goel and Thakor (2008), who show that moderate level of manager overconfidence creates positive value for shareholders, while extreme levels of overconfidence destroy shareholder value. Gervais, Heaton and Odean (2011)'s analysis shows that the introduction of labor markets in the model leads to similar results about the welfare of managers. Overconfident CEOs are more likely to implement risky projects that are benefitting shareholders since a risk-averse manager's overconfidence makes him less conservative. ''A modest amount of performance-based compensation is then sufficient to realign the manager's incentives'' (Gervais, Heaton and Odean, 2011). When a competitive labor market is present, the firms have to compete to attract the mildly overconfident CEO by increasing the safer portion of his compensation. If the manager's excessively overconfident, the firms should increase his performance-based compensation to shift risk onto the managers. To sum up, overconfident managers are more attractive to firms than their rational counterparts because overconfidence motivates and commits them to undertake valuable risky projects. However, extreme overconfidence is harmful to the manager because the compensation contract will expose him to excessive risks.

Although overconfidence is an international phenomenon, Ferris, Jayaraman and Sabherwal (2013) establish a number of important findings regarding common demographic and country characteristics in the global distribution of overconfident CEOs. The authors find that ''overconfident CEOs tend to lead firms headquartered in Christian countries''. The researchers also find that the Hofstede (1980), (2001) measures of national culture are significant factors to explain geographical patterns in the distribution of overconfident CEOs. CEOs operating in

countries whose cultures focus on a long-term orientation tend to have less overconfidence. In conclusion, CEO overconfidence is an international phenomenon, although there are distinct patterns in its global distribution.

Little evidence exists on whether overconfident CEOs can improve on their merger and acquisition performance. Kolasinki and Li (2013) provide evidence that strong and independent boards help overconfident CEOs avoid honest mistakes when they seek to acquire other companies. In addition, the authors find that once-overconfident CEOs make better acquisition decision after they experience personal stock trading losses, providing evidence that a manager's recent personal experience, and not just educational and early career experience, influences firm investment policy.

3. Research Questions

3.1. Research Question 1

Overconfident CEOs are more likely to undertake mergers and acquisitions since they are more likely to undertake risky projects (Gervais, Heaton and Odean, 2011). They overestimate the benefits of the projects and underestimate the costs and risk of the project. Moreover, they underinvest in information production. An overconfident manager overvalues the precision of his signal, and so is overly-inclined to pursue (abandon) the project when his information is positive (negative) (Goel and Thakor, 2008). This is the first manifestation of overconfidence in managers. According to psychology literature this is called unrealistic optimism and ''better-than-average'' effect.

On the other hand, overconfident CEOs are more responsive to cash flow than their rational counterparts. Overconfident CEOs systematically overvalue the returns to their investment projects. If their financial budget for investment is abundant and they are not disciplined by the capital market or corporate governance mechanisms, they overinvest relative to the first-best. If they are financially constrained, however, they are reluctant to issue new equity because they perceive the stock of their company to be undervalued by the market. As a result, they diminish their investment. Additional cash flow provides an opportunity to invest closer to their desired level (Malmendier and Tate, 2005). This is the second manifestation of overconfidence in managers. In psychology theories, it is also originated from the ''better-than-average'' effect.

These two manifestations of overconfidence play as opposing forces against each other. Although the net effect of the two manifestations of overconfident CEOs making single M&A has been empirically proved by Malmendier and Tate (2008), the net effect of the two manifestations on the willingness of overconfident CEOs making multiple mergers and acquisitions, therefore, remains unexplored.

Thus, the first research question is ‘’Are overconfident CEOs more likely to make multiple mergers and acquisitions than non-overconfident CEOs?’’

The null hypothesis H1 is ‘’Overconfident CEOs are not more likely to make multiple acquisitions than their rational counterparts’’.

If the null hypothesis H1 is rejected, the alternative hypothesis H2 is ‘’Overconfident CEOs are more likely to make multiple acquisitions than their rational counterparts’’.

3.2. Research Question 2

Overconfidence also has implication for the value creation by mergers. Overconfident CEOs are subject to miscalibration. If overconfident people are asked to estimate probability to the experimental questions, in both easy and difficult questions, ‘’their assigned probability that the answers given are correct exceeds the true accuracy of the answers’’ (Skala, 2008). Thus, in this light it is natural that they overvalue the merger synergies. For instance, they could misperceive mergers with little or negative synergies into those with positive synergies (Malmendier and Tate, 2008). Furthermore, the above synergy misevaluation is continued by their underinvestment in information production. Since overconfident CEOs overestimate the precision of their information, they are more inclined to go forward with the merger providing that their deal-related information is positive (Goel and Thakor, 2008).

Moreover, overconfident CEOs may have ‘’too high reservation price to bid for the mergers’’ (Malmendier and Tate, 2008). Overconfident CEOs are more likely to overpay for the deal when there are competitors for the target companies in the bidding process. The evidence for that is market rewards the announcement of deal withdrawal of rational CEOs. The reason for the deal withdrawal is the asking price of the target is too high compared to the bidding price of the acquiring companies (Jacobsen, 2014). This probability of overconfident CEOs overpaying for the acquisition is a result of two manifestations of overconfidence which are miscalibration and ‘’better-than-average’’ effect.

Therefore, the second research question is ‘’as long as overconfident CEOs are more inclined to do multiple mergers than their rational counterparts, the mergers will be value destroying to shareholders measured by the market reaction around deal announcement’’.

The null hypothesis H3 is ‘’Multiple mergers made by overconfident CEOs will receive more negative market reaction at deal announcement’’.

If the null hypothesis is rejected, the alternative hypothesis H4 is ‘’Multiple mergers made by overconfident CEOs will receive about the same or more positive market reaction at deal announcement’’.

3.3. Differences in research questions between Malmendier and Tate (2008) and this thesis

There are two ways to measure overconfidence in Malmendier and Tate (2008). One of the methods is to measure overconfidence proxy from press release. Press may describe CEOs as overconfidence by using words such as confident and optimistic, or as non-overconfidence by using words such as reserved and cautious. From the collected group of CEOs from press, Malmendier and Tate (2008) find their M&A deals and their results. The authors use them as the sample for regression later. By that way, the sample size of Malmendier and Tate (2008) includes both CEOs making no acquisition, CEOs making one acquisition and CEOs making multiple acquisitions.

But in this thesis, I employ a different approach to collect my sample. I first collect M&A deals that satisfy the criteria about the country origin, deal completeness, deal size, etc. Then I retrieve the information of the CEOs working in the company while the M&A deals occur. I use Malmendier and Tate (2008)’s definition of overconfident CEOs to classify the CEOs in the sample. By approaching the data from this way, my sample size includes CEOs making an acquisition and CEOs making multiple acquisitions. My sample size doesn’t include CEOs making no acquisition as in Malmendier and Tate (2008). Therefore, the research questions in the original article focus on the likelihood of CEOs making single acquisition (when their sample size includes CEOs making no acquisition) and their M&A results. My research questions focus on the likelihood of CEOs making multiple acquisitions (when my sample size includes CEOs making an acquisition and multiple acquisitions) and their M&A results.

4. Data

4.1. Sample selection

4.1.1. Event data

I extract our acquisition sample from Securities Data Corporation's (SDC) U.S. Mergers and Acquisitions database. The database provides a platform specifically to retrieve merger and acquisition related information. I choose the time period between January 1, 2006 and December 31, 2013 because in Execucomp, Compustat, the option holding information of CEO is only available for the time period. Malmendier and Tate (2008) use private data so that they can collect a vast range of time period for option holding data from 1980 to 1994. I identify 956 acquisitions made by 728 firms between January 1, 2006 and December 31, 2013 that meet the following criteria:

a. Acquirer nation is US.
b. Acquirer public status is public.
c. The acquisition is completed.
d. The acquirer controls less than 50% of the target's shares before the announcement and owns 100% of the target's shares after the transaction.
e. The deal is not classified as acquisition of partial interest, acquisition of remaining interest, repurchase and recapitalization.
f. Acquisition techniques are not classified as bankruptcy acquisition, leveraged buyout and self-tender.
g. The deal is not classified as going privates.
h. The deal value disclosed in SDC is more than $50 million and is at least 1% of the acquirer's market value of equity on the 11th trading day before the announcement date.

In SDC, I obtain the following variables. They are deal announcement date, acquirer name, target name, acquirer CUSIP, acquirer and target industry SIC codes, transaction value, target public status and method of payment. The companies retrieved from merger and acquisition deals from SDC will serve as a basis sample for my data retrieval since it contains specific event date information.

4.1.2. Stock market and accounting data

After obtaining the event data from SDC Platinum, I use CRSP to extract stock market data that is necessary in my thesis. CRSP accumulates historical US stock market data from 1926 to date, and is a worldwide database used in financial research. From the database, I collect monthly

stock price of my sample companies. I use SDC company CUSIP code as an identifier to look up for information in CRSP. Before being able to use the same CUSIP code between the two databases, I transform CUSIP code in CRSP from 9 digits into 6 digits to make them consistent in the two sources. I end up with 159,884 monthly observations from CUSIP for 728 firms from 2006 to 2013. I calculate the average-calendar-monthly stock price of the sample firms from CRSP and assume it to be their fiscal-year-end stock price. For each company, only one entry is kept for one year (the average-calendar-monthly stock price). Other monthly stock price entries of a year are then eliminated. The same fiscal-year-end stock price with the acquisition date is used to calculate Tobin's q of which formula is following Masulis, Wang and Xie (2007) and specified in Appendix.

In addition to stock market data, certain accounting items are used in the regression analysis in my thesis. The accounting data is retrieved from Compustat data source which maintains a global report of financial, statistical and market information from 1950 to date. I use Compustat to collect the following accounting information, i.e. total assets, common equity, number of common shares outstanding, debt in current liabilities and long term debt to calculate Tobin's q and firm leverage. The formula to calculate the above indicators are reported in the Appendix 1. For the set of sample firms, I retrieve annual calendar-year-end data. I apply the same method as extracting stock market data from CRSP by transforming CUSIP identifier to obtain firms consistently reported with SDC Platinum.

In addition to stock market and accounting information data to calculate the control variables in my thesis, I retrieve daily stock prices of the sample firms from Thomson to calculate the dependent variable in my analysis (cumulative abnormal stock return). I also obtain daily stock prices of S&P 500 from Thomson (Ritter, 1991). The reason that I choose Thomson to extract daily stock prices to calculate this dependent variable is that Thomson integrated interface in Excel customizes itself for various-day stock price retrieval systematically whereas CRSP does not. Thomson uses 8-digit-CUSIP to classify companies. Thus, I have to adjust 9-digit-CUSIP company list of SDC into 8-digit-code before being able to retrieve from Thomson.

Matching the data collected from different databases proves to be a straightforward task thanks to the CUSIP identifiers and choosing a database as a benchmark in the first place. Since I use the sample companies from SDC as the basis sample, first I match stock market data and accounting information data from each of the sources CRSP, Compustat and Thomson with SDC with the common CUSIP identifiers. For instance, I have 2127 matched observations between

SDC and Compustat, 1998 matched observations between SDC and CRSP, 957 matched observations between SDC and Thomson. After that, I sync all the data together. Observations with missing values in any of the mentioned database will be removed from the final sample. I also examine the data and remove observations with extreme values. If eliminating missing values and outliers, the final data consists of 622 mergers made by 306 acquirers during the sample period.

4.2. Summary statistics

In figure 1, there are a total number of 622 mergers in the sample. The merger trend in the sample was increasing during 2006 and 2007. During that time, there was a strong economic boom. In 2008 and 2009, the merger activity plunged severely due to the financial crisis and economic recession. Later on from 2010 and 2013, as the economy recovered, the merger activity saw an increasing trend again.

In figure 2, there are 491 deals made by overconfident CEOs while there are only 131 deals made by non-overconfident CEOs. The number of mergers made by overconfident CEOs is 3.75 times of that by non-overconfident CEOs. Interestingly, in 2009 where the economic situation was bad, the ratio of the number of mergers made by overconfident CEO was about 6 times of that by non-overconfident CEOs. From 2008 to 2009, when non-overconfident CEOs reduced merger activity by half compared to the previous year, overconfident CEOs kept merger activity about the same level compared to the previous year.

Table 1 is the summary statistics of some variables for non-overconfident CEOs and overconfident CEOs. Non-overconfident CEOs prefer to finance the mergers by stock. The mean of Some Stock dummy variable is 0.4046 for non-overconfident CEOs compared to 0.2444 for overconfident CEOs. Overconfident CEOs prefer to finance the mergers by cash. The mean of Cash Only dummy variable is 0.3359 for non-overconfident CEOs while it is 0.5886 for overconfident CEOs. Both of the cognitive bias and rational CEOs seem to have a similar preference in choosing target that shares the same industry.

Table 2 is summary statistics of cumulative abnormal return for 11-day event window around deal announcement CAR (-5, +5) variables for overconfident and non-overconfident CEOs from 2006 to 2013. It is notably interesting that most of the time mean of CAR (-5, +5) for rational CEOs is lower than mean of CAR (-5, +5) for overconfident CEOs. For instance, mean of CAR (-5, +5) for the rational counterparts is -0.0197 while mean of CAR (-5, +5) for overconfident CEOs is -0.0073 in 2006. The rest of the 7 years in the sample period experience the

same tendency except for the year 2010. In 2010, mean of CAR (-5, +5) for overconfident CEOs is 0.0261 and mean of CAR (-5, +5) for non-overconfident CEOs is 0.0474.

Table 3 is the summary statistics of dependent and independent variables for all CEOs. There is a great difference in acquirer size between my sample and Malmendier and Tate (2008)'s sample. While the average acquirer size in Malmendier and Tate (2008)'s is 5979.06 million USD, the average acquirer size in my sample is about four time greater, which is 25189.9 million USD. In other words, acquirers in my sample are very large companies compared to the average company in the former researchers' merger pool. On the other hand, Tobin's q in the two sample is about the same. Tobin's q in my sample is 1.808 compared to 1.42 in Malmendier and Tate (2008)'s sample. Merger bid related variables in my sample are similar to Malmendier and Tate (2008)'s sample. For example, relatedness variable is almost the same in the two samples. Relatedness is 0.371 in my sample compared to 0.386 in the original article. There are more diversifying mergers than same-industry mergers in my sample. Furthermore, mean of CAR (-1, +1) is -0.003 in Malmendier and Tate (2008)'s sample compared to -0.009 for CAR (-3, +3) in my sample. Negative CAR (-3, +3) in the sample means that on average merger deal announcements are responded unfavorably by the market. In addition, negative CAR (-3, +3) means that on average mergers destroy acquiring shareholders' value.

Table 4 is the correlation coefficient of portfolio measures.

5. Methodology

5.1. Likelihood of overconfidence CEOs making acquisitions: Logit analysis

The first stage of the analysis which is whether or not overconfident CEOs are more likely to do mergers during the sample period is investigated using a binary choice logit model. The purpose is to verify the result of previous literature that overconfident CEOs are more acquisitive than the rational counterparts (Malmendier and Tate, 2008). While Malmendier and Tate (2008) study the likelihood of overconfident CEOs making single acquisition (the sample size includes CEOs with some acquisitions and CEOs with no acquisition), this thesis studies the likelihood of overconfident CEOs making multiple acquisitions (the sample size contains CEOs with at least one acquisition). In the logit model, maximum likelihood estimation is used to evaluate the determinants of the probability of CEOs making at least a merger in one year. Logit

estimation with multiple explanatory variables hypothesizes that the probability of a given occurrence is determined by the standardized normal distribution:

$$p = F\ (Z_i)$$

where Z_i is based on the following linear function:

$$\begin{aligned} Z_i = \ \alpha + \ \beta_1 Overconfidence + \ \beta_2 Relatedness + \ \beta_3 Subsidiary\ Target \\ + \ \beta_4 Public\ Target + \ \beta_5 Private\ Target + \ \beta_6 Log\ Acquirer\ Size \\ + \ \beta_7 Leverage + \ \beta_8 Tobin's\ q + \ \beta_9 Cash\ Only \\ + \ \beta_{10} Partially\ Stock\ Financed \end{aligned}$$

where

Z_i is a dummy variable that equals one for an identified manager making at least one acquisition in a year and is zero otherwise

Overconfidence is a dummy variable that equals one for a CEO that holds an option that is at least 40% in the money entering its final year and is zero otherwise

Relatedness is a dummy variable that equals one for the target sharing the first two numbers in the SIC code with the acquirer and is zero otherwise

Subsidiary target is a dummy variable that equals one for the target being a subsidiary and is zero otherwise

Public target is a dummy variable that equals one for the target being a public company and is zero otherwise

Private target is a dummy variable that equals one for the target being a private company and is zero otherwise

Log acquirer size is the logarithmic transformation of acquirer size

Leverage is the leverage of the acquirer and equals sum of debt in current liabilities and long term debt of acquirer

Tobin's q is the ratio between market value of assets over book value of assets of acquiring company

Cash only is a dummy variable and that equals one for the merger financed by cash only and is zero otherwise

Partially stock financed is a dummy variable that equals one for the merger financed by a combination of cash and stock or by stock only and is zero otherwise

5.2. Announcement abnormal return by overconfident CEOs: Multivariate analysis

The second stage in examining the general impact of overconfidence on shareholder value creation, particular by the market response to the deal announcement effect, is based on a multivariate approach. There is a significant difference in the choice of the model to analyze the effect of overconfidence on value creation for shareholders in this paper and the original paper by Malmendier and Tate (2008). In the original paper, the authors choose random and fixed effect models. The advantage of the random and fixed effect models is that any time-invariant variable that has an effect on the dependent variable (which is the value creation measured by market response in this case) is eliminated from the models. The disadvantage of the random and fixed effect models is that the models require that to be included in the sample a company must have at least one non-overconfident CEO and one overconfident CEO, or one non-overconfident CEO who later switches to be overconfident during the sample period (Malmendier and Tate, 2008). That condition shrinks the sample size considerably. Due to the already relatively small sample size of 622 observations without missing values compared with 3911 observations in the original article, I choose to examine the relationship between the two main interested variable by multivariate regression.

The multivariate model is a linear function which includes the interested dependent variable, interested independent variable and control variables. It has the form of:

$$\begin{aligned} G_i = \alpha + \beta_1 Overconfidence + \beta_2 Relatedness + \beta_3 Subsidiary\ Target \\ + \beta_4 Public\ Target + \beta_5 Private\ Target + \beta_6 Log\ Acquirer\ Size \\ + \beta_7 Leverage + \beta_8 Tobin's\ q + \beta_9 Cash\ Only \\ + \beta_{10} Partially\ Stock\ Financed \end{aligned}$$

where

G_i is cumulative abnormal return around deal announcement. This variable is calculated based on event study method and is discussed in the later section.

Overconfidence is a dummy variable that equals one for a CEO that holds an option that is at least 40% in the money entering its final year and is zero otherwise

Relatedness is a dummy variable that equals one for the target sharing the first two numbers in the SIC code with the acquirer and is zero otherwise

Subsidiary target is a dummy variable that equals one for the target being a subsidiary and is zero otherwise

Public target is a dummy variable that equals one for the target being a public company and is zero otherwise

Private target is a dummy variable that equals one for the target being a private company and is zero otherwise

Log acquirer size is the logarithmic transformation of acquirer size

Leverage is the leverage of the acquirer and equals sum of debt in current liabilities and long term debt of acquirer

Tobin's q is the ratio between market value of assets over book value of assets of acquiring company

Cash only is a dummy variable and that equals one for the merger financed by cash only and is zero otherwise

Partially stock financed is a dummy variable that equals one for the merger financed by a combination of cash and stock or by stock only and is zero otherwise

5.3. Explanations of the variables in the two models

Before going to regress the above formula, it is necessary to understand how the variables are constructed. This section will begin with how the dependent variable is formulated, then how the independent variable is built and finally how the control variables are produced.

5.3.1. Dependent variable

I will discuss in this section how I construct cumulative abnormal return variable using event study method.

- Event study method

Following Campbell, Lo and Mackinlay (1997), Mackinlay (1997), Ball and Torous (1988), Brown and Warner (1985) and Thompson (1985), I conduct an event study using the market model to estimate cumulative abnormal return around announcement date of US acquirers in the sample.

The abnormal return to acquiring company j on day t (AR_{jt}) is given by:

$$AR_{jt} = R_{jt} - (\alpha\hat{}_j + \beta\hat{}_j R_{mt})$$

where R_{jt} is the stock return to company j at day t

R_{mt} is the stock return for market at day t. In this case I follow Dennis et al (2003) and use S&P 500 return

$\alpha\hat{}_j$ and $\beta\hat{}_j$ are the estimates of the market model using 120 day estimation window. To be precise, the estimation window is from day 150 prior to the announcement date to day 31 prior to the deal announcement date. Market model formula is

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt}$$

where R_{jt} denotes the actual stock return to company j at day t,

R_{mt} is the market return for S&P 500 at day t,

$\alpha_j \; and \; \beta_j$ are coefficients of the market model

ε_{jt} is the model's error term.

Cumulative abnormal return for company j for (t_1, t) event window which means from day t_1 prior to the announcement date to day t after the announcement date is:

$$CAR_{jt} = \sum_{t_1}^{t} AR_{jt}$$

5.3.2. Independent variable

- Overconfidence

I construct overconfidence variable based on option holding behavior since previous literature have shown a strong correlation between overconfidence and CEOs' late exercise tendency despite their options being deep in the money (Malmendier and Tate, 2008; Huang and Kisgen,

2013; Chen, Ho, Ho, 2014). Before analyzing how previous articles measure overconfidence, it is essential to acquire knowledge about background of CEO incentive based compensation and optimal timing to exercise an executive option.

First of all, overconfident CEOs receive compensation differently from non-overconfident CEOs. For instance, flatter compensation contracts with more weight on performance based compensation can make overconfident CEOs better off given that they have moderate levels of overconfidence and the compensation automatically adjusts to reflect outside opportunities. Yet, ‘’too much overconfidence is detrimental to the manager since it leads him or her to accept highly convex compensation contracts that expose him or her to excessive risk’’ (Gervais, Heaton and Odean, 2011). Besides, it is common that overconfidence CEOs receive statistically significantly less total compensation than their rational colleagues. Since board recognizes overconfident CEOs from their option exercising and forecast issuance behaviors, board takes advantage of overconfident CEOs by designing incentive contract (Otto, 2014). For instance, overconfident CEOs receive more option intensive compensation than non-overconfident CEOs. (Humphery, Lisic, Nanda and Silveri, 2014). To sum up, characteristics of CEOs are exploited by board. Risk averse CEOs are better off than excessive overconfident CEOs in terms of remuneration.

In this light, it seems natural to discuss about incentive contract of executive compensation. Executive options have ‘’10-year lives, are granted at the money, and gradually vest to become exercisable over three or four years’’ (Ofek and Yermack, 2000). Merton (1973) suggests that investors should not exercise options early, especially European call options, because time value is nonnegative for non-dividend paying stocks. However, the argument is not valid for executive option. Option pricing formulas are based on the assumption that the riskiness of the option’s payoff can be perfectly hedged by constantly and costlessly modifying a portfolio composed of call options, common shares of stock, and riskless bonds over time. An inability to diversify the firm-specific component of his firm’s stock return will affect the manager’s valuation of any payoff since executive options are non-tradable, and CEOs cannot hedge legally the risk of their holdings by short selling company stock. Besides, CEOs invest their human capital into the company and receive equity based compensation. As a result, much of the investment of CEOs is concentrated on the performance of company stock price. Therefore, a risk-averse CEO should exercise options early if the stock price is sufficiently high (Lambert, Larcker and Verrecchia, 1991; Hall and Murphy, 2002).

Hall and Murphy (2002) develop a model of which 40% is the threshold for the increase in option price that rational CEOs should exercise their options. The model assumptions are that CEOs have a constant relative risk aversion of three and that 67% of their wealth is in the firm's stock. Therefore, longholder is a dummy variable which takes a value of 1 (overconfidence) if CEOs keep an option until the year of expiration although that option was at least 40% in-the-money entering its final year. Yet, at the same time, Malmendier and Tate (2008) show that the particular choice of parameter values does not affect their results. They construct another variable, holder 67 in which CEOs fail to exercise their option entering its final year despite 67% in-the-money of the option. The holder 67 variable is as robust as long holder variable using the 40% in-the-money threshold.

The limitation of longholder variable is that it may cause forward-looking bias. For example, consider a CEO with a tenure from 2006 to 2013. If the CEO is categorized as risk averse from 2006 to 2012 since he always exercises options early as long as they are vested. But in 2013 for the first time he keeps an option until expiration even though the option is at least 40% in-the-money. If applying the definition of longholder on the CEO, the CEO is named as overconfidence from 2006 to 2013 (Chen, Ho and Ho, 2014). To cover for the possible bias in the long holder variable, Malmendier and Tate (2008) construct another variable, postlongholder. Postlongholder classifies CEOs as overconfident only after the year that they for the first time keep an option that ever exceeded 40% in-the-money until expiration. However, due to the scope of this thesis, only longholder variable which follows Malmendier and Tate (2008) is formulated for regression later.

5.3.3. Control variables

In this section I will elaborate on the chosen control variables following the previous literature.

a. Leverage

Jensen (1986) explains the benefits of debt in reducing agency costs of free cash flows. Additional debt improves efficiency by forcing organizations with large cash flows but few high-return investment projects. The debt helps prevent such firms from wasting resources on low return projects. Leverage also provides incentives for managers to boost firm performance, since managers have to transfer significant control to creditors and often lose their jobs if their firms fall into financial distress according to Masulis, Wang and Xie (2007).

b. Acquirer size

Moeller, Schkingemann and Stulz (2004) find the announcement return for acquiring firm shareholders is approximately two percentage points greater for small acquirers regardless of the form of financing and whether the acquired firm is public or private. The size effect is robust to firm and deal characteristics, and it is not reversed over time. One of the explaining hypothesis is managers of bidding firms may suffer from hubris by Roll (1986). On the other hand, Masulis, Wang and Xie (2007) explains the acquirer size effect by managerialism. Large firm size serves as a very effective takeover defense, since it takes more capital to acquire a larger target. Thus, they expect that managers of larger firms are more entrenched and more likely to make value detrimental acquisitions.

c. Tobin's q

Lang, Stulz and Walking (1991) in a sample of successful tender offers, find a positive correlation that is firms with higher q values receive more favorable announcement effect. Firms with high cash flow and a low Tobin's q destroy shareholder's wealth because ''the price paid for the target reflects synergies available only to competing bidders'' (Lang, Stulz and Walking, 1991). It could probably be because the acquisition reveals negative information about bidder's management or investment opportunities. Servaes (1991) confirms the result in a sample of takeover deals. However, Moeller, Schlingemann and Stulz (2004) find a negative relation of Tobin's q and returns in a comprehensive sample.

d. Market relatedness

The returns to bidding shareholders are lower when their firm diversifies in M&A as documented in Morck, Shleifer and Vishny (1990). Moreover, self-interested managerial objectives can drive bad acquisitions. DePamphilis (2014) says ''most successful mergers in developed countries are those that focus on deals that promote the acquirer's core business, largely reflecting their familiarity with such businesses and their ability to optimize investment decision''. Related acquisitions may even be more likely to generate greater announcement return than unrelated acquisitions, since related firms are more likely to be able to realize operational cost saving due to overlapping departments and product lines than unrelated firms. Two firms are in the same industry if the target and the acquirer share the same first two digit SIC code (Ritter, 1991).

e. Target public status

Fuller, Netter, Stegemoller (2002) show results implying bidder shareholders gain when purchasing a private firm or a subsidiary but lose when acquiring a public firm. When bidders acquire private firms or subsidiaries, they are purchasing assets in a relatively illiquid market. Thus, the valuation of those assets exhibits a liquidity discount, resulting in a greater return to bidder shareholders. Grossman and Hart (1980) find that shareholders of public firms get a better deal when their firm is acquired than the shareholders of private firms do.

f. Method of payment

DePamphilis (2014) documents in the US, ‘’all equity financed takeovers of public firms frequently exhibit negative abnormal returns and underperform all-cash bids’’. Myers and Majluf (1984) build a model to show that the equity payment indicates overvaluation of the acquirers. Fuller, Netter and Stegemoller (2002) find the return is positive if the acquiring firm offers stock to private and subsidiary targets. The high return may result from tax consideration and monitoring benefits. If target owners receive stock to compensate for their ownership stake, the owners delay their tax liability. In addition, if the stock transfer results in a large blockholder in the bidding firm, the bidder shareholders may receive value from ability of that owner to monitor the activities of the firm.

6. Empirical results

In this chapter I introduce the empirical results of my thesis. The empirical methodology, its reasons and used data are addressed in detail above in Data and Methodology, along with two suggested research questions. This chapter is began with introducing the outcomes and indications of the empirical analyses. Then I continue by evaluating the robustness of my findings. I end this chapter by addressing my results and linking them with the previous literature.

6.1. Result for hypothesis 1 - the likelihood of overconfident CEOs making acquisitions

The first research question is about what is the net effect of their misestimating of the costs and benefits of a merger investment. Their constrained perception on their firm being undervalued and external finance being expensive on the willingness to undertake acquisitions can also change the net effect. The null hypothesis H1 was that overconfident CEOs are not more likely to make multiple acquisitions than their rational counterparts. The alternate hypothesis H2 was

that overconfident CEOs are more likely to make multiple acquisitions than their counterparts. The logistic model was used to examine which hypothesis is true in this thesis.

Overall, I find no statistically significant relationship between overconfidence and the likelihood to carry on multiple mergers and acquisitions between 2006 and 2013. Although the z statistics for overconfidence variable is positive (0.66) which proves a slightly positive tendency in the examined relationship, it is clear that it is not highly positive enough to be statistically significant. Thus, the null hypothesis H1 that overconfident CEOs are not more likely to make multiple acquisitions than their counterparts is accepted.

Still, if I take a closer look at the data by dividing the sample into 2 subsamples which include one subsample of the financial crisis 2008 and 2009 and another subsample without the financial crisis from 2006 to 2007 and from 2010 to 2013, the results change. In the first sub sample between 2008 and 2009, coefficient for Overconfidence variable is 1.6444 and is statistically significant at 10%. In the second subsample from 2006 to 2013 except for the economic downturn time, coefficient for overconfidence is negative but not highly negative enough to be statistically significant. The results show that overall overconfident CEOs are not more likely to make multiple acquisitions than their peers but during the economic downturn overconfident CEOs are more likely to make multiple acquisitions than the rational CEOs. Explanations for the findings will be addressed in Discussion.

6.2. Results for hypothesis 2 – announcement abnormal return of overconfident CEOs

The second research question is to verify the literature that if overconfident CEOs are more willing to make multiple acquisitions than their colleagues, their mergers will receive more negative market response around deal announcement. The null hypothesis H3 is multiple mergers made by overconfident CEOs will receive more negative market reaction at deal announcement. The alternative hypothesis H4 is multiple mergers made by overconfident CEOs will receive about the same or more positive market reaction at merger announcement. OLS multivariate regression was employed to find the true hypothesis.

In contrast to previous research, I find positive and statistically significant between overconfidence variable and cumulative abnormal return around multiple merger announcements. T statistics for overconfidence variable is 2.40 and the t statistics is significant at 5%. Therefore, the alternative hypothesis H4 is accepted. Multiple mergers made by overconfident CEOs received favorable market reaction at deal announcement. However, model R squared is only 0.0404 so any interpretation of the result should be taken carefully.

When taking closer investigation at the result by dividing the whole period from 2006 to 2013 into 2 subgroups, one from 2008 to 2009, another from 2006 to 2013 except for 2008 and 2009, many interesting outcomes can be drawn from. For the first subgroup from 2008 to 2009, overconfidence is positively related to the cumulative abnormal return CAR (-5, +5) and the result is statistically significant at 5%. The model R squared is also much improved than the previous model at 37%. For the second subgroup of the rest of the years in the sample period, overconfidence is positively related to market response around multiple deal announcement but t statistics is too small to be statistically significant. The R squared for this model is minimal at 4.70% only, which requires careful interpretation of the variables in the model. Therefore, it is concluded that overall overconfidence doesn't have an effect on the market response at multiple merger announcements during 2006 and 2013 except for 2008 and 2009. Only during the economic downturn, overconfidence is positively related to market response at multiple deal announcements. The statistically significant result found in the period between 2006 and 2013 was biasedly influenced by the outcome of the financial crisis period. Leaving the financial crisis alone, the outcome of the relationship between overconfidence and market reaction at merger announcements is insignificant. The reasons for the above results will be evaluated in the Discussion section.

6.3. Further analysis

I choose to make further investigation for the relationship between the variable of interest (Overconfidence) and dependent variable (CAR (-5, +5)) between 2008 and 2009 to understand more about its characteristics. I suspect that the regression coefficient of Overconfidence variable predicting CAR (-5, +5) would be higher for related deals than for diversifying deals since previous literature documents that abnormal return at announcement is higher for related deals than for diversifying deals (Morck, Shleifer and Vishny, 1990). Therefore, I divide the sub group of 2008 and 2009 into two smaller groups. One group consists of related deals only and another group includes diversifying deals. Then I run the multivariate regression model for each of the group. On the contrary to my belief, the result shows that the Overconfidence variable is a stronger predictor of CAR (-5, +5) for diversifying deals (0.1166) than for related deals (0.0047). To test whether the difference between the two overconfidence coefficients in each group is statistically significant, I construct an interaction variable which equals Overconfidence * Relatedness. If the coefficient of the interaction variable is statistically significant, I interpret that the null hypothesis that the coefficient for overconfident CEOs in related deals equals the coefficient for overconfident CEOs in diversifying deals is rejected. In Table 12, I

find the coefficient of the interaction variable is statistically significant at 5%. Therefore, I can conclude that Overconfidence is a stronger predictor for positive abnormal returns in diversifying deals than in related deals and possible reasons are discussed in the Discussion.

6.4. Robustness check

To further test the newly found result, I run the same multivariate regression between overconfidence variable and cumulative abnormal return CAR (-30, 30) and CAR (-3, 3) controlled for other possible factors that may have an effect on the relationship in two subgroups. One subgroup is between 2008 and 2009 and another subgroup is between 2006 and 2013 except for 2008 and 2009. In the former subgroup between 2008 and 2009, it is interesting to note that the result for the long term effect of overconfidence on market reaction CAR (-30, 30) is positive but the t statistic is too small to be statistically significant.

The reason for insignificant investigated relationship for the 61-day event window will be explained as follow. It has been empirically demonstrated that a short event window will usually capture the significant effect of an event (Ryngaert and Netter, 1990). Mitchell and Netter (1989) found that the stock market reacted within 90 minutes to news wire stories announcing proposed federal tax legislation. Because it is much more difficult to control for confounding effects when long windows are used, an event window should be as short as possible. It should be long enough to capture the significant effect of the event, but short enough to exclude confounding effects (McWilliams and Siegel, 1997). Thus, one can argue that the market response to overconfidence is statistically significant in 2008 and 2009. Although the relationship for the 61-day event window is insignificant, it can happen because that event window is too long to examine this relationship.

Apparently, the result for the short term effect of the cognitive bias variable on market response at multiple merger announcement CAR (-3, 3) confirms the conclusion that overall overconfidence doesn't have a statistically significant impact on the market reaction to the multiple merger announcements. In the first regression for the former subgroup between 2008 and 2009, the result for the short term effect of the cognitive bias variable on market response at multiple merger announcement CAR (-3, 3) is positive and statistically significant at 5%. In the second regression for the later subgroup between 2006 and 2013 except for 2008 and 2009, overconfidence doesn't have a statistically significant effect on the abnormal stock returns around multiple merger dates. In the third regression for the whole period between 2006 and 2013, the

relationship between overconfidence variable and CAR (-3, +3) is positive and statistically significant at 10%. R squared result for the first regression between 2008 and 2009 is 34.62% whereas R squared result for the third regression between 2006 and 2013 is insignificant at 4.19%. The t statistics and R squared result verify the conclusion that overconfidence only has a statistically significant effect on market reaction during the financial crisis. The variable of interest doesn't influence the dependent variable in the overall period.

7. Discussion

I divide this discussion of results in two parts to differentiate the main findings between the two study periods. One is between 2006 and 2013 except for the financial crisis. Another is between 2008 and 2009.

7.1. From 2006 to 2013 except for 2008 and 2009

7.1.1. The first research question: The likelihood of overconfident CEOs making multiple acquisitions

The model indicators for the likelihood of overconfident CEOs making multiple acquisitions compared to non-overconfident CEOs doing multiple mergers is insignificant. This result is different with Malmendier and Tate (2008)'s outcome which presents evidence that overconfident CEOs are more acquisitive than their rational colleagues in single deal. There is one explanation for the result of my thesis. The explanations is presented as follow.

As mentioned earlier, the chance of overconfident CEOs doing multiple mergers depends on two manifestations of overconfidence. The first manifestation is that overconfident CEOs misperceive the costs and benefits of the investment. They believe the investment is more profitable than it actually is. This manifestation is called miscalibration (Malmendier and Tate, 2008). This miscalibration increases the chance that acquisition deals are made by overconfident CEOs. On the other hand, overconfident CEOs also believe that their firms are undervalued by the market. If overconfident CEOs must access external finance, they will be more reluctant to undertake the acquisitions. In that case, their inclination to do mergers persists if their perceived benefits of the acquisitions are greater than their perceived loss of borrowing debt or issuing new equity. This manifestation is named "better-than-average" effect. The two manifestations' outcome are two opposing forces on the chance of overconfident CEOs initiating multiple mergers.

The model indicators show evidence for this explanation. In the logistic model for the study period between 2006 and 2013 except for two economic crisis years, variable leverage is statistically significant at 5%. The coefficient for the variable is 2.12 which means after applying the marginal effect formula, the marginal effect at the mean value of the leverage variable is 0.2177 (Dougherty, 2002) (See appendix for calculation details). In other words, at the sample mean, a one-point increase in leverage increases the probability of CEOs conducting multiple mergers by 21.77%. It is noteworthy that in this period I find that overconfident CEOs are not more likely to undertake multiple mergers than non-overconfident peers. However, in the 2008 and 2009 period where overconfident CEOs are more acquisitive in multiple mergers than others, leverage variable is statistically insignificant and it bears a negative sign instead of a positive sign. The varied results of leverage variable in the two periods are the evidence for the claim that overconfident CEOs believe their firms are undervalued and are not willing to use external finance. This claim is consistent with the findings of Malmendier and Tate (2005).

Therefore it is possible that during 2006 and 2013 except for 2008 and 2009, overconfident CEOs are financially constrained. They don't have enough internal resources to finance the deals. In order to commence on M&As, they must obtain external finance in which the borrowing costs undervalue their perceived value on their companies remarkably. Overconfident CEOs choose to forego the projects despite some misestimating that the benefits outweigh the costs of the projects. That is the first explanation for why overconfident CEOs are not more likely to do multiple mergers than their colleagues.

7.1.2. The second research question: Announcement abnormal return of overconfident CEOs

The multivariate regression model between overconfidence and cumulative abnormal returns in multiple mergers in both short and long time indicates a statistically insignificant relationship after controlling for confounding variables between 2006 and 2013 except for the economic downturn period. The result is inconsistent with Malmendier and Tate (2008)'s findings in single merger which indicate that their single merger receive more negative abnormal returns than their rational counterpart' deals. Since overconfident CEOs are as much acquisitive as other CEOs in multiple mergers for the above reason in the previous section, they have sufficient resources of time and effort to invest in the projects. Furthermore, after Malmendier and Tate (2008)’s result is published, overconfidence in CEO may receive more attention from the board. With the help of a small and independent board, overconfident CEOs can improve on merger performance (Kolasinki and Li, 2013). Overconfident CEOs may realize their miscalibration and adjust their bias to value the deal synergies better. Thus, I hypothesize that with the external

help of a strong board, market reacts to the mergers by overconfident and non-overconfident CEOs in multiple mergers similarly.

7.2. From 2008 to 2009

7.2.1. The first research question: The likelihood of overconfident CEOs making multiple acquisitions

The logistic model indicate that overconfident CEOs are more likely to make multiple acquisitions than non-overconfident CEOs during the economic crisis. Coefficient for Overconfidence variable is 1.6444 which means after applying the marginal effect formula, the marginal effect at the mean value of the overconfidence variable is 0.2002 (Dougherty, 2002) (See appendix for calculation details). In other words, at the sample mean, a one-point increase in overconfidence increases the probability of CEOs conducting multiple mergers by 20.02%. In the period from 2006 to 2013 except for 2008 and 2009, overconfidence coefficient is statically insignificant. The change of the variable of interest is a result of the change of the two opposing manifestations of overconfidence. The first manifestation is the miscalibration in which overconfident CEOs misevaluate the costs and benefits of the merger as discussed in section 7.1.1. The second manifestation is called ‘’better-than-average effect’’ where CEOs believe market undervalues their firm, therefore, try to avoid external finance to not destroy their shareholder’s value (Malmendier and Tate, 2008).

If the first manifestation is greater than the second manifestation, the net effect will be an increasing probability for overconfident CEOs to initiate a merger. I cannot measure the first manifestation but I can measure the second manifestation based on leverage variable. Indeed, the second manifestation of overconfidence on the likelihood of M&A has decreased. In this period between 2008 and 2009, coefficient for leverage is -2.8810. Although it is not statistically significant, the coefficient implies a negative relationship between leverage and the likelihood to undertake multiple acquisitions. In the previous period between 2006 and 2013 except for 2008 and 2009, the coefficient for leverage is 2.12. It is statistically significant and hints a positive relationship between leverage and probability of commencing multiple M&A deals. If we assume the first manifestation of overconfidence remains the same in the two period, a decrease in the second manifestation between the two periods will increase the chance of overconfident CEOs conducting multiple mergers. Therefore, overconfident CEOs do not use much of leverage in the investment decisions. To conclude, during the financial crisis, overconfident

CEOs have more internal fund available to finance the acquisitions which increases their chance of making multiple mergers and the number of successful mergers.

7.2.2. The second research question: Announcement abnormal return of overconfident CEOs

The model presents a positive relationship between short term abnormal returns (CAR (-5, +5)) and overconfidence indicator in 2008 and 2009 only. This positive relationship is not present in any other period in this thesis. There are two main theories explaining for this result. One explanation is that investor sentiment during the volatile time causes this positive relation. Another explanation is that together with the monitor of a strong board, overconfident CEOs show their skills during the difficult time and receive positive reaction from the market. The difference of the two explanations is that in the first explanation, the abnormal return is because of the market irrationality not because of the superior skill of overconfident CEOs, while in the second explanation, the positive abnormal return is led by the superior skill of overconfident CEOs. Each explanation has its own merit; however, the investor sentiment has more merit from the theoretical point of view to be the reason for the investigated outcome. They are going to be analyzed in depth as follow.

a. First explanation

My first argument is based on Baker and Wurgler (2007)'s finding. According to the authors, stocks of low capitalization, younger, unprofitable, high volatility, non-dividend paying, growth companies, or stocks of firms in financial distress, are likely to be disproportionately sensitive to broad waves of investor sentiment. There is a possibility that overconfident CEOs miscalibrate the costs and benefits of the mergers, especially diversifying mergers during the financial crisis. When the difficulty level of evaluation task is greater in the financial crisis compared to the normal time, overconfident CEOs are subject to overvalue the probability of success of the project (Suantak, Bolger and Ferrell, 1996). They misestimate the synergies generated by the diversifying mergers and are more likely to make diversifying deals (Malmendier and Tate, 2008). Yet, market at that moment was not in a good shape and easily affected by sentiment by companies or deals with high volatility (Baker and Wurgler, 2007). Therefore, market reacted to the news differently from it would normally. This leads to the higher abnormal returns in diversifying deals (0.1166) than in related deals (0.0047) of overconfident CEOs which are statistically significant at 5%.

b. Second explanation

My second argument is that overconfident CEOs has superior skills such as willingness to take on risky projects. An overconfident CEO may ‘’end up capturing more economic surplus than an otherwise identical but rational manager’’ does since moderately overconfident CEOs mitigate the underinvestment problem of firms compared to rational risk-averse CEOs (Goel and Thakor, 2008). Moreover, ‘’they commit them to exert effort to learn about projects’’ (Gervais, Heaton and Odean, 2011). This leads to the fact that there are greater abnormal returns in diversifying deals than in related deals of overconfident CEOs in the regression model in Table 11. Another benefit of overconfident CEOs is that one of overconfidence manifestation (the ‘’better-than-average effect’’) can be changed. Kolasinki and Li (2013) suggest empirically that ‘’outsider-dominated boards that are moderately sized attenuate the effect of CEO overconfidence on making value destroying acquisitions’’. The strong board helps overconfident CEOs adjust their evaluation of their company’s true value to replace ‘’undervalued’’ as they would have believed. The improvement is further enhanced if recently the overconfident CEOs experience personal trading loss on their firm stock (Kolasinki and Li, 2013). This effect is very likely to occur because of the financial crisis in 2008 and 2009. It helps overconfident CEOs improve in their performance of mergers and acquisitions and generate more value for their shareholders. In return, market reacts more positively to deal announcements by overconfident CEOs. However, one may argue that if this superior skills of overconfident CEOs are true, why they only persist in the financial crisis and not after the crisis. Thus, the probability of this explanation to be the true reason behind the positive relationship between overconfidence and market reaction is not very high from a theoretical point of view.

8. Conclusion

Previous research has studied the effect of overconfidence on CEO decision making in corporate transactions. The researchers have found overconfidence makes manager more acquisitive and that characteristic is punished with negative abnormal return when the affected managers undertake an acquisition (Malmendier and Tate, 2008). Compared to the original article on the subject, I find that overall overconfidence doesn’t have an effect on the likelihood of CEOs making multiple mergers using the more recent data from 2006 to 2013. Moreover, during that same period, the market react similarly and consistently to multiple merger announcements of overconfident CEOs and non-overconfident CEOs. One interesting observation is the above result is not true for the financial crisis period in 2008 and 2009. During the economic downturn,

overconfident CEOs are more likely to make multiple acquisitions than rational counterparts. Their deals also receive statistically significant positive market response compared to their peers'.

The reason for the effect of overconfidence on the probability of doing multiple mergers being similar to their rational counterparts' is that overconfident CEOs in my sample study seem to lack internal resource to fund for the investment activity. Because of the better-than-average effect, they are reluctant to use external finance. Overconfident CEOs believe their firms are already undervalued by the market. They don't want to issue new debt or equity since it will make the mispricing become even bigger in their opinion. During the sub period 2008 and 2009, however, overconfident CEOs have access to abundant internal cash flow so that they can do mergers without the fear of further underestimating their firm value by using external resources. The evidence for this explanation is the change from positive to negative sign of coefficient of the leverage variable in the maximum likelihood model in the two periods.

Regarding the difference in market response of Malmendier and Tate (2008) and my thesis during the normal economic cycle from 2006 to 2007 and from 2010 to 2013, it is probably because after the former study published its result, overconfident CEOs receive more help from the small and independent board to improve on their calibration ability. Besides, since my study focuses on multiple deals of overconfident CEOs and Malmendier and Tate (2008) choose to research about single deal of overconfident CEOs, the difference in the results is possible.

There are two explaining hypotheses for overconfidence and the positive abnormal return of mergers during the financial crisis. Firstly I hypothesize that investor sentiment is high during highly volatile economic situations that they react to the same business news differently than normally they would. That explains why diversified deals made by overconfident CEOs received positive abnormal returns while it should have received negative ones as in Morck, Shleifer and Vishny (1990). Secondly I hypothesize that overconfident CEOs have valuable and superior skills on selecting multiple merger deals during financial crisis. Their skills are attributed to their moderately higher risk taking attitude compared to rational CEOs and with the help of the board and personal experience. I find the first hypothesis is more likely to happen than the second hypothesis. Further empirical evidence is in need to verify which hypothesis is the true reason for the observed relationship.

Limitations and Recommendation

Intuitively one can argue the reason behind the decreasing coefficient for leverage in 2008 and 2009 is due to the recent financial crisis. During that time, banking system was in deep trouble of underwriting significant amount of their assets. Therefore, banks couldn't help finance the buying procedure for acquiring companies as they could normally. Thus, it is not necessarily true that the second manifestation of overconfidence is decreasing so that the net effect on the likelihood of overconfident CEOs going forward with mergers is increasing. That argument holds some validity and I suggest that further research is in need to prove the reasons behind the increasing probability of undertaking multiple M&As by overconfident CEOs during the financial crisis.

Another limitation is the way Tobin's q is measured in this thesis. According to Masulis, Wang and Xie (2007), Tobin's q is measured using the fiscal year end stock price before the acquisition date. However, due to the scope of this thesis, Tobin's q is measured using the fiscal year end stock price at the same year with the acquisition date. Thus, some of the Tobin's q can be misevaluated.

Unfortunately, this thesis scope isn't large enough to show empirically which explanation for the positive relationship between deal announcement and overconfidence during the economic downturn is valid, whether it is the investor sentiment theory or the overconfident CEOs with risk taking attitude theory. Therefore, further research can dig deeper on this point to find the ultimate answer to this unexpected outcome of this study. For instance, one can collect investor sentiment proxy and add into the regression model to test the investor sentiment theory (Baker and Wurgler, 2007). Another example is that one can conduct a multivariate model controlled for the size of the board and whether board consists of mostly outsiders or insiders from the companies (Kolasinki and Li, 2013). By constructing more control variables regarding the board and CEOs' personal trading result, one may gain interesting insight as to the question why the positive effects of the board and personal trading experience only persist in the financial crisis not after the crisis.

Last but not least, I cannot use the random and fixed effect models because of the small sample size. Therefore, some of the time-invariant effects such as varied merger trend across industries and varied merger trend across different years, etc. that affect the dependent variable (market reaction) are not removed from the model. That partly explains why the R squared of the multivariate regression between overconfidence and market response during 2006 and 2013 except

for 2008 and 2009 is at 4%. Further study can collect a larger sample size to complement this thesis on that limitation.

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Figure 1: Number of mergers across the sample period

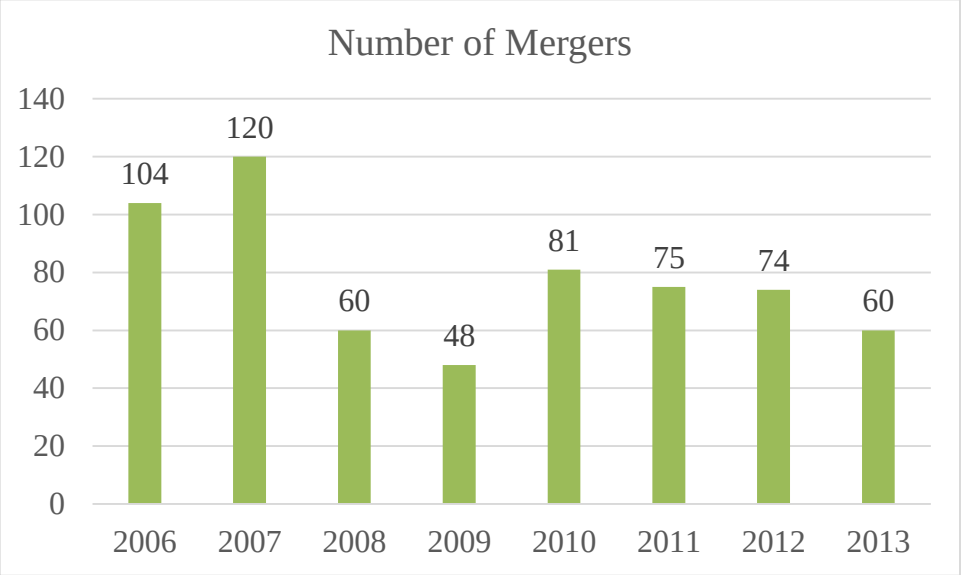

Figure 2: Number of mergers among non-overconfident and overconfident CEOs

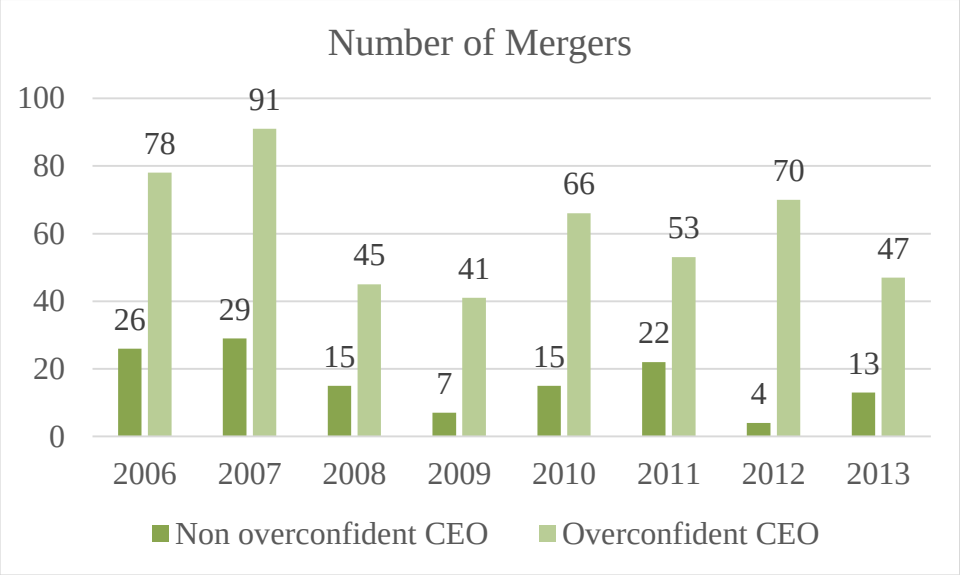

Table 1: Summary statistics of some control variables for non-overconfident and over-confident CEOs

Relatedness is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry. It takes a value of 0 otherwise. Cash only is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only. It takes a value of 0 otherwise. Some stock is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock. It takes a value of 0 otherwise.

Panel A. Non-overconfident CEO

Variables	Mean	Standard deviation	Min	Max
Relatedness	0,3359	0,4741	0	1
Cash only	0,3359	0,4741	0	1
Some stock	0,4046	0,4927	0	1

Panel B. Overconfident CEO

Variables	Mean	Standard deviation	Min	Max
Relatedness	0,3809	0,4861	0	1
Cash only	0,5886	0,4926	0	1
Some stock	0,2444	0,4302	0	1

Table 2: Summary statistics of some dependent variables for non-overconfident and over-confident CEOs

CAR (-5, +5) is the cumulative abnormal return of 11 days around the deal announcement date.

Panel A. Non-overconfident CEO						
Year	Variable	Obs	Mean	Std. Dev.	Min	Max
2006	CAR (-5, +5)	15	-0,0197	0,0411	-0,0729	0,0742
2007	CAR (-5, +5)	18	-0,0274	0,0476	-0,0981	0,0889
2008	CAR (-5, +5)	13	-0,1007	0,1166	-0,2443	0,0587
2009	CAR (-5, +5)	7	-0,076	0,0759	-0,1868	0,0264
2010	CAR (-5, +5)	10	0,0474	0,1162	-0,1128	0,1863
2011	CAR (-5, +5)	18	-0,0078	0,0776	-0,1219	0,1888
2012	CAR (-5, +5)	3	-0,0087	0,0151	-0,0174	0,0087
2013	CAR (-5, +5)	11	0,0057	0,0613	-0,0516	0,1044

Panel B. Overconfident CEO						
Year	Variable	Obs	Mean	Std. Dev.	Min	Max
2006	CAR (-5, +5)	61	-0,0073	0,0692	-0,2663	0,2363
2007	CAR (-5, +5)	71	-0,0165	0,0749	-0,1672	0,2211
2008	CAR (-5, +5)	33	-0,0694	0,0978	-0,2641	0,0418
2009	CAR (-5, +5)	32	-0,0092	0,1206	-0,5382	0,113
2010	CAR (-5, +5)	56	0,0261	0,0718	-0,154	0,171
2011	CAR (-5, +5)	41	0,0019	0,103	-0,266	0,2328
2012	CAR (-5, +5)	57	-0,0011	0,0947	-0,3407	0,196
2013	CAR (-5, +5)	44	0,0299	0,0809	-0,0994	0,212

Table 3: Summary statistics of dependent and independent variables for all CEOs

Relatedness is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Cash only is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0. Tobin's Q is market value of assets over book value of assets. Leverage is book value of debts over market value of assets. Acquirer size is market value of assets. Log acquirer size is logarithmic transformation of market value of assets. Overconfidence is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. The dependent variable CAR (-30, +30), CAR (-5, +5), CAR (-3, +3) is calculated based on the parameters estimated from (-150, -31).

Panel A. Deal related characteristics

Variable	Obs	Mean	Standard deviation	Min	Max
Relatedness	622	0,371	0,484	0	1
Private target	622	0,129	0,335	0	1
Public target	622	0,778	0,416	0	1
Subsidiary target	622	0,088	0,284	0	1
Cash only payment	622	0,535	0,499	0	1
Partially stock payment	622	0,278	0,448	0	1

Panel B. Acquirer related characteristics

Variable	Obs	Mean	Standard deviation	Min	Max
Tobin Q	535	1,808	0,88	0,909	7,636
Leverage	530	0,149	0,122	0	0,598
Acquirer size	582	25189,9	50667,05	164,446	322334
Log acquirer size	582	8,597	1,772	5,103	12,683
Overconfidence	622	0,789	0,408	0	1

Panel C. Cumulative abnormal return around deal announcement

Variable	Obs	Mean	Standard deviation	Min	Max
CAR (-30,+30)	490	-0,012	0,199	-0,954	0,813
CAR (-3,+3)	490	-0,009	0,082	-0,381	0,233
CAR (-5,+5)	490	-0,007	0,089	-0,538	0,236

Table 4. Correlation of portfolio measures

	Tobin Q	Leverage	Log acquirer size	Overconfidence	Relatedness	Private target	Public target	Subsidiary target	Cash only payment	Some stock payment
Tobin Q	1,000									
Leverage	-0,425	1,000								
Log acquirer size	0,338	-0,209	1,000							
Overconfidence	0,152	-0,155	0,075	1,000						
Relatedness	0,043	0,049	0,158	0,026	1,000					
Private target	0,065	0,038	-0,312	-0,035	-0,008	1,000				
Public target	-0,094	-0,010	0,353	-0,021	0,006	-0,717	1,000			
Subsidiary target	0,040	-0,031	-0,139	0,065	-0,002	-0,131	-0,581	1,000		
Cash only payment	0,166	-0,082	0,178	0,193	0,130	-0,009	-0,049	0,084	1,000	
Some stock payment	-0,153	0,083	-0,141	-0,157	-0,124	-0,006	0,155	-0,147	-0,656	1,000

Table 5: Probability that overconfident CEOs will make at least an acquisition a year from 2006 to 2013

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

```
Logistic regression                               Number of obs   =        510
                                                  LR chi2(10)     =      23.81
                                                  Prob > chi2     =     0.0081
Log likelihood = -283.85279                       Pseudo R2       =     0.0402
```

dummyanyacq~e	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.Overconfi~t	.1934038	.2925443	0.66	0.509	-.3799726	.7667801
1.relatedne~y	.4347404	.2108828	2.06	0.039	.0214178	.8480631
1.dummytarg~3	-.6352067	1.458655	-0.44	0.663	-3.494117	2.223704
1.dummytarg~4	-.8771511	1.450447	-0.60	0.545	-3.719975	1.965673
1.dummytarg~5	-.4421277	1.469458	-0.30	0.764	-3.322212	2.437956
logacquirer~e	.0577561	.0681045	0.85	0.396	-.0757263	.1912386
leverage	1.187657	.9758169	1.22	0.224	-.7249093	3.100222
tobinq	.3338642	.1309658	2.55	0.011	.077176	.5905524
1.dummymeth~1	.6230073	.3108116	2.00	0.045	.0138278	1.232187
1.dummymeth~8	.6787096	.3617437	1.88	0.061	-.0302949	1.387714
_cons	-2.404951	1.593298	-1.51	0.131	-5.527758	.717855

Table 6: Probability that overconfident CEOs will make at least an acquisition a year from 2008 to 2009

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

```
Logistic regression                                 Number of obs   =         91
                                                    LR chi2(8)      =      18.10
                                                    Prob > chi2     =     0.0205
Log likelihood = -43.449601                         Pseudo R2       =     0.1724
```

dummyanyacq~e	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.Overconfi~t	1.644417	.9159165	1.80	0.073	-.150746	3.439581
1.relatedne~y	1.25382	.5689979	2.20	0.028	.1386047	2.369035
1.dummytarg~3	-.5926416	.9875443	-0.60	0.548	-2.528193	1.34291
1.dummytarg~4	0	(omitted)				
1.dummytarg~5	0	(empty)				
logacquirer~e	-.0560357	.1611408	-0.35	0.728	-.3718659	.2597945
leverage	-2.881013	3.049688	-0.94	0.345	-8.858292	3.096265
tobinq	.6172303	.4886131	1.26	0.207	-.3404337	1.574894
1.dummymeth~1	1.207931	1.144715	1.06	0.291	-1.035668	3.45153
1.dummymeth~8	1.717639	1.195554	1.44	0.151	-.6256028	4.060881
_cons	-4.476743	2.163786	-2.07	0.039	-8.717686	-.2358008

Table 7: Probability that overconfident CEOs will make at least an acquisition a year from 2006 to 2013 except for 2008 and 2009

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

```
Logistic regression                                 Number of obs   =        411
                                                    LR chi2(10)     =      22.34
                                                    Prob > chi2     =     0.0135
Log likelihood = -229.56959                         Pseudo R2       =     0.0464
```

dummyanyacq~e	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.Overconfi~t	-.0726848	.3252717	-0.22	0.823	-.7102056	.564836
1.relatedne~y	.2136201	.2366968	0.90	0.367	-.2502972	.6775374
1.dummytarg~3	-.4752094	1.463029	-0.32	0.745	-3.342694	2.392275
1.dummytarg~4	-.8770299	1.451275	-0.60	0.546	-3.721477	1.967417
1.dummytarg~5	-.0879649	1.472131	-0.06	0.952	-2.973289	2.797359
logacquirer~e	.0683149	.077536	0.88	0.378	-.0836529	.2202827
leverage	2.121189	1.042854	2.03	0.042	.0772315	4.165146
tobinq	.379227	.1413229	2.68	0.007	.1022391	.6562149
1.dummymeth~1	.5931235	.3304268	1.80	0.073	-.0545011	1.240748
1.dummymeth~8	.5036585	.3972192	1.27	0.205	-.2748769	1.282194
_cons	-2.380392	1.618487	-1.47	0.141	-5.552568	.7917833

Table 8: Multivariate models of cumulative abnormal return around deal announcements CAR (-5, +5) from 2006 to 2013

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

Equation	Obs	Parms	RMSE	"R-sq"	F	P
CAR55	402	11	.09219	0.0404	1.647383	0.0914

CAR55	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.Overconfi~t	.0298688	.0124363	2.40	0.017	.0054183	.0543192
1.relatedne~y	-.0155967	.0099317	-1.57	0.117	-.0351229	.0039296
1.dummytarg~3	-.0376363	.0669778	-0.56	0.574	-.169318	.0940453
1.dummytarg~4	-.0265694	.0665055	-0.40	0.690	-.1573225	.1041837
1.dummytarg~5	-.0110596	.0676605	-0.16	0.870	-.1440836	.1219644
logacquirer~e	.0014972	.0031044	0.48	0.630	-.0046063	.0076006
leverage	-.0313967	.0458528	-0.68	0.494	-.1215455	.0587521
tobinq	-.0124551	.0065198	-1.91	0.057	-.0252733	.000363
1.dummymeth~1	.0157787	.0126177	1.25	0.212	-.0090283	.0405858
1.dummymeth~8	.01674	.0152649	1.10	0.273	-.0132715	.0467515
_cons	-.0010266	.072668	-0.01	0.989	-.1438956	.1418424

Table 9: Multivariate models of cumulative abnormal return around deal announcements CAR (-5, +5) from 2008 to 2009

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

Equation	Obs	Parms	RMSE	"R-sq"	F	P
CAR55	79	10	.0964174	0.3701	4.504595	0.0001

CAR55	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.Overconfi~t	.0652843	.0264208	2.47	0.016	.0125763	.1179923
1.relatedne~y	-.0964513	.024045	-4.01	0.000	-.1444198	-.0484828
1.dummytarg~3	.1011268	.0485899	2.08	0.041	.0041925	.1980611
1.dummytarg~4	.0993346	.0418807	2.37	0.020	.0157849	.1828842
1.dummytarg~5	0	(omitted)				
logacquirer~e	.0155227	.0075073	2.07	0.042	.000546	.0304993
leverage	-.2668403	.1312453	-2.03	0.046	-.5286674	-.0050131
tobinq	-.0305164	.0220396	-1.38	0.171	-.0744841	.0134513
1.dummymeth~1	.0422465	.0310819	1.36	0.179	-.0197602	.1042532
1.dummymeth~8	.0426352	.036516	1.17	0.247	-.0302123	.1154826
_cons	-.2391809	.0872206	-2.74	0.008	-.4131812	-.0651805

Table 10: Multivariate models of cumulative abnormal return around deal announcements CAR (-5, +5) from 2006 to 2013 except for 2008 and 2009

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

Equation	Obs	Parms	RMSE	"R-sq"	F	P
CAR55	323	11	.0825012	0.0470	1.539351	0.1243

CAR55	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.Overconfi~t	.015431	.0130593	1.18	0.238	-.0102645	.0411265
1.relatedne~y	.0035815	.0099718	0.36	0.720	-.016039	.023202
1.dummytarg~3	-.007567	.0604968	-0.13	0.901	-.1266002	.1114663
1.dummytarg~4	-.0119914	.0596964	-0.20	0.841	-.1294499	.1054671
1.dummytarg~5	.0284294	.060967	0.47	0.641	-.0915292	.1483879
logacquirer~e	-.0019293	.0031299	-0.62	0.538	-.0080876	.0042291
leverage	.0264487	.0448919	0.59	0.556	-.0618804	.1147778
tobinq	-.0082465	.0062247	-1.32	0.186	-.0204941	.0040011
1.dummymeth~1	.0172415	.0125518	1.37	0.171	-.0074553	.0419383
1.dummymeth~8	.0247673	.0154629	1.60	0.110	-.0056574	.055192
_cons	.0081807	.0662262	0.12	0.902	-.1221257	.1384871

Table 11: Comparison of regression coefficients for overconfidence to explain market reaction between 2 groups (related deals and diversifying deals) from 2008 to 2009

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

Panel A: Group 1 – Diversifying deals

```
-> relatednessdummy = 0
note: 1.dummytargetpublicstatus5 omitted because of collinearity

Equation           Obs   Parms        RMSE    "R-sq"          F        P
------------------------------------------------------------------------------
CAR55               49       9    .0812171    0.3378   2.551045   0.0239

------------------------------------------------------------------------------
       CAR55 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
1.Overconfi~t |   .1165707   .0283044     4.12   0.000     .0593654    .1737761
1.dummytarg~3 |   .0843487   .0481449     1.75   0.087    -.0129558    .1816532
1.dummytarg~4 |   .0509872   .0393478     1.30   0.202    -.0285376     .130512
1.dummytarg~5 |          0  (omitted)
logacquirer~e |   .0113369   .0089027     1.27   0.210    -.0066561    .0293299
     leverage |   .0092122   .1506288     0.06   0.952      -.29522    .3136444
        tobinq |  -.0426575   .0283467    -1.50   0.140    -.0999484    .0146333
1.dummymeth~1 |  -.0082258   .0315847    -0.26   0.796    -.0720609    .0556093
1.dummymeth~8 |  -.0268111   .0388044    -0.69   0.494    -.1052378    .0516156
        _cons |   -.173769   .0906505    -1.92   0.062    -.3569806    .0094426
```

Table 11: Comparison of regression coefficients for overconfidence to explain market reaction between 2 groups (related deals and diversifying deals) from 2008 to 2009 (continued)

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

Panel B: Group 2 – Related deals

```
-> relatednessdummy = 1
note: 1.dummytargetpublicstatus5 omitted because of collinearity
```

Equation	Obs	Parms	RMSE	"R-sq"	F	P
CAR55	30	9	.0762771	0.7705	8.811792	0.0000

CAR55	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.Overconfi~t	.0046537	.0437186	0.11	0.916	-.0862642	.0955716
1.dummytarg~3	.3940427	.0927711	4.25	0.000	.2011146	.5869708
1.dummytarg~4	.4072893	.0850206	4.79	0.000	.2304793	.5840993
1.dummytarg~5	0	(omitted)				
logacquirer~e	.0160918	.0122254	1.32	0.202	-.0093323	.0415159
leverage	-.4878959	.1698946	-2.87	0.009	-.8412112	-.1345807
tobinq	-.0422012	.0277828	-1.52	0.144	-.0999787	.0155763
1.dummymeth~1	.0818091	.0650437	1.26	0.222	-.0534567	.2170749
1.dummymeth~8	.0717483	.0658469	1.09	0.288	-.0651879	.2086845
_cons	-.5674023	.1494293	-3.80	0.001	-.8781576	-.2566469

Table 11: Comparison of regression coefficients for overconfidence to explain market reaction between 2 groups (related deals and diversifying deals) from 2008 to 2009 (continued)

Overconfident (Overconfi~t) is a dummy variable which takes a value of 1 if a CEO is overconfident, otherwise 0. Relatedness (relatedne~y) is a dummy variable which takes a value of 1 if the acquirer acquires a target which shares the first 2 digit of Fama French industry, otherwise 0. Overconfident * Relatedness (Overconfi~d) is a dummy interaction variable which takes a value of 1 if an overconfident CEO is making a related acquisition, otherwise 0. Private target (dummytarg~3) is a dummy variable which takes a value of 1 if the target is privately owned, otherwise 0. Public target (dummytarg~4) is a dummy variable which takes a value of 1 if the target is publicly owned, otherwise 0. Subsidiary target (dummytarg~5) is a dummy variable which takes a value of 1 if the target is a subsidiary, otherwise 0. Log acquirer size (logacquirer~e) is logarithmic transformation of market value of assets. Leverage is book value of debts over market value of total assets. Tobin's Q is market value of assets over book value of assets. Cash only (dummymeth~1) is a dummy variable which takes a value of 1 if the bidder pays for the transaction in cash only, otherwise 0. Partially stock (dummymeth~8) is a dummy variable which takes a value of 1 if the bidder pays for the transaction involved stock, otherwise 0.

Panel C: Interaction variable

Equation	Obs	Parms	RMSE	"R-sq"	F	P
CAR55	79	11	.0929821	0.4227	4.978509	0.0000

CAR55	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.Overconfi~t	.1122013	.0316962	3.54	0.001	.0489525	.1754502
1.relatedne~y	.0095391	.0484949	0.20	0.845	-.087231	.1063091
1.dummytarg~3	.1207971	.0475207	2.54	0.013	.025971	.2156232
1.dummytarg~4	.0965929	.0404035	2.39	0.020	.015969	.1772168
1.dummytarg~5	0	(omitted)				
logacquirer~e	.0216871	.0076519	2.83	0.006	.006418	.0369562
leverage	-.2476933	.1268027	-1.95	0.055	-.5007242	.0053376
tobinq	-.0464678	.0221999	-2.09	0.040	-.0907669	-.0021687
1.dummymeth~1	.0377666	.0300285	1.26	0.213	-.0221543	.0976875
1.dummymeth~8	.0265946	.0358	0.74	0.460	-.0448432	.0980325
1.overconfi~d	-.1431984	.0575436	-2.49	0.015	-.2580248	-.0283719
_cons	-.2940445	.0869543	-3.38	0.001	-.4675591	-.1205299

Appendix 1: Formula to calculate the control variables

1. Tobin q = Market value of assets over book value of assets

= (Total assets – Common equity + Number of common shares outstanding * Price (fiscal year) (monthly average)) / Total assets

= (Item 6 – item 60 + item 25 * item 199) / item 6

2. Leverage = Book value of debts over market value of total assets

= (Debt in current liabilities + Long term debt) / (Total assets – Common equity + Number of common shares outstanding * Price (fiscal-year-end stock price))

= (Item 34 + item 9) / (Item 6 – item 60 + item 25 * item 199)

Appendix 2: Formula to calculate the marginal effect at the mean value of the explanatory variables of log likelihood model (Dougherty, 2002)

$$f(Z)\beta_i = \frac{e^{-Z}}{(1+e^{-Z})^{\mathbf{2}}}\beta_i$$

where β_i is the coefficient for variable i

Z is the Z value of coefficient β_i