

Overconfidence and corporate acquisitions: a study to the role of overconfidence in corporate acquisitions in the United Kingdom

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Abstract

In this paper the relation between overconfidence and decisions made during corporate acquisitions is analysed, using a unique panel dataset of 360 deals, done by 174 different firms managed by 194 different CEOs, in the period 2003-2013 in the United Kingdom. Overconfidence is measured by outsiders perception based on press coverage, a measure of overconfidence that is introduced by Malmendier & Tate (2005b). This research provides empirical evidence that within the sample overconfidence is related to a set of decisions made during corporate acquisitions. Empirical evidence suggests a positive relation between overconfidence and takeover premium and serial acquisitions, supported by a robustness check. The empirical results indicate a positive relation between overconfidence and cross-border acquisitions, but a robustness check does not support this finding. The empirical evidence shows a negative relation between overconfidence and minority acquisition, indicating that overconfident CEOs are less likely to pursue a toehold strategy. A robustness check supports this finding. Empirical evidence suggests that there are interaction effects between overconfidence and the financial crisis of 2008 affecting the decision to do diversifying acquisitions and cross-border acquisitions.

Table of Contents

1. Introduction	3
2. Overconfidence – Theory and Hypotheses.....	5
2.1 Overconfidence and acquisition activity	7
2.2 Overconfidence and selection of the target	10
2.3 Overconfidence and valuation.....	11
2.4 Overconfidence and payment method.....	13
2.5 Overconfidence and the financial crisis of 2008	15
3. Research design.....	16
3.1 Variable description and construction	16
3.1.1 Measure of overconfidence	16
3.1.2 Dependent variables	18
3.1.3 Control variables	20
3.2 Methodology	24
3.2.1 Framework.....	24
3.2.2 Univariate analysis	25
3.2.3 Multivariate analysis	26
4. Data	28
4.1 Sample.....	28
4.2 Descriptive statistics.....	30
5. Results	33
5.1 Univariate analysis	33
5.2 Multivariate analysis	38
5.3 Robustness check	46
5.3.1 Measure of overconfidence & Descriptive statistics	46
5.3.2 Multivariate analysis	48
6. Discussion & Conclusion	51
Literature	60
Appendix	64

1. Introduction

For decades, the vast majority of academic research in the field of corporate finance was based on the fundamental assumption of rationality. However, recently several scholars in the field of corporate finance started to challenge this assumption and take a different perspective on corporate finance. From this new angle, concepts from psychology are incorporated in corporate financial models. This emerging field of research is called behavioural corporate finance (Shefrin, 2001). One of the concepts from psychological research that is influential in the field of corporate finance, is the concept of a state of overconfidence. De Bondt & Thaler (1995) mention overconfidence as ‘perhaps the most robust finding in the psychology of judgements’. Overconfidence is particularly related to corporate acquisitions, since the introduction of the ‘hubris hypothesis’ by Roll (1986), who argues that CEOs ‘infected by hubris’ are more likely to do an acquisitions and will tend to pay a higher premium, overconfidence is related to corporate acquisitions. Because a corporate acquisitions can be a key decision for a firm, and in potential can be value-destroying for the acquiring firm, such as the decision to acquire AOL by Times Warner, it is interesting to see how overconfidence affects decisions made during an acquisition. This research empirically analyses the effects of overconfidence on several decisions, that could determine the value created or destroyed by an acquisition. The analysis is based on a sample of 360 deals, done by 174 different firms managed by 194 different CEOs, in the UK in the period 2003-2013. This paper attempts to answer the following research question:

Is there a relation between a state of overconfidence of the CEO of the acquiring firm and decisions made during corporate acquisitions, for firms in the UK during the period 2003-2013?

The decisions of CEOs that this paper analyses, are decisions with respect to serial acquisitions, toehold strategies, diversifying acquisitions, cross-border acquisitions, takeover premium and payment method. Furthermore, this paper discusses the market response on acquisition announcement by overconfident CEOs and the effect of the financial crisis. The measure of overconfidence that this paper uses is based on the perception of outsiders, measured by press coverage, which is a measure introduced by Malmendier & Tate (2005b). The main finding of this research is that overconfidence is related to several decision made during an acquisition. The empirical evidence shows a positive relation, supported by a

robustness check, between overconfidence and takeover premium and serial acquisitions and cross-border acquisitions. The empirical results suggest a positive relation between overconfidence and cross-border acquisitions, however a robustness check does not support this finding. Empirical evidence shows a negative relation between overconfidence and minority acquisitions, indicating that overconfident managers are less likely to pursue a toehold strategy. A robustness check confirms this negative relation. Contrary to predictions based on empirical findings of previous research, the empirical findings of this research indicates a negative relation between overconfidence and diversifying acquisitions. However, the robustness check does not provide any significant relation between overconfidence and diversifying acquisition. Nevertheless, both findings with respect to diversifying acquisitions are opposite to the finding of Malmendier & Tate (2008) that overconfidence is positively related to diversifying acquisitions. Empirical evidence does not suggest a significant relation between overconfidence and market response, measured by cumulative abnormal returns of the acquirer, and between overconfidence and cash as payment method.

The academic contribution of this research is threefold: first, it is a replication of the research of previous research to overconfidence and corporate acquisition of Malmendier & Tate (2008), with respect to diversifying acquisitions and market response, but using a different sample, based on deals in a different country (the United Kingdom instead of the United States) in a different time-frame (2003-2013 instead of 1980-1994). Second, it is a replication of Hayward & Hambrick (1997), with respect to takeover premium. However, this paper uses a different measure of overconfidence (outsiders perception, instead of four proxies of overconfidence used by Hayward & Hambrick (1997)) and is based on a different sample, which consists of deals in United Kingdom instead of the United States, during 2003-2013 instead of 1989-1992. Third, the relations between overconfidence and decisions during corporate acquisitions with respect to serial acquisitions, toehold strategies, cross-border acquisitions and payment method are explored in this research. Literature with empirical evidence on the relation between overconfidence and these decisions are scarce, non-existing or still in progress. While several scholars, such as Billet & Qian (2008), argue that there is a relation between overconfidence and serial acquisitions, this research contributes to this discussion by empirically testing this proposed relation. This paper analyses the relations between overconfidence and toehold strategies, cross-border acquisitions and payment method, because these decisions can be key decisions made by CEOs, that requires their judgement and could add or destroy value for the firm. As overconfidence is a state of mind

that affects the judgements made by people, it is relevant to analyse if overconfidence also plays a role in making such decisions.

Besides the academic relevance, the purpose of this research is to provide insights for stakeholders, such as shareholders, board members and employees, of acquiring firms into overconfidence and acquisition strategies. For these stakeholders, it could be valuable information to know if certain decisions are related to overconfidence, because this might indicate that these kind of decisions are more likely to be motivated by overconfidence than by rational reasoning. Furthermore, as overconfident managers might believe that they are actually creating value for their firm, it requires different strategies to cope with overconfidence than the traditional incentives, such as stock compensation. The implications of this research could help them in decisions such as hiring a CEO, hiring other board members and voting in favour or against an acquisition.

The remainder of this paper is structured as follows. Section 2 discusses literature about managerial overconfidence, and more specifically literature that is related to the following aspects of corporate acquisitions: acquisition activity, selection of the target, valuation, the influence of the financial crisis and payment method. Based on existing literature and economic reasoning, the hypotheses are developed in this section. Section 3 describes the research design, in which the variables and the methodology are presented. Section 4 discusses the sample selection and presents the descriptive statistics. Section 5 presents the empirical results, and the results are subjected to robustness tests. Section 6 discusses the results, and the paper comes to a conclusion.

2. Overconfidence – Theory and Hypotheses

The concept of overconfidence receives much attention among scholars in the field of behavioural finance. Typically for behavioural finance, research on overconfidence tend to focus on the effects of overconfidence on the behaviour of either managers, such as Roll (1986) and Malmendier & Tate (2008), or the behaviour of investors, such as Grinblatt & Keloharju (2008). Because the focus of this research is on overconfident managers and their behaviour during acquisitions, the focus of the theoretical background is on papers that are related to the behaviour of managers. The purpose of this section is to give a review of the theory and empirical findings on managerial overconfidence and acquisitions. Furthermore, based on the theoretical background the hypotheses to be tested in this research are developed.

Overconfidence: overoptimism & miscalibration

The central theme of this research, overconfidence, is related to the research field of social psychology. The academic literature on overconfidence is comprehensive, and seems to identify several manifestations of overconfidence, of which overoptimism and miscalibration are prominent examples. Research of Svenson (1981) presents a striking illustration of overoptimism. Using a dataset of 81 US drivers and 80 Swedish drivers, Svenson finds that 88% of the US drivers and 77% of the Swedish drivers believes that he or she drives safer and more skilful than the median US or Swedish driver. Because statistically this cannot represent a realistic distribution of their driving skills, this result indicates that a substantial part of the people tend to overestimate their own driving skills. This behavioural bias is known as the 'better-than-average effect', or overoptimism. Larwood & Whittaker (1977) investigate this tendency of overoptimism in an organizational context. Using a sample of both management students and corporate executives, their research indicates that both groups tend to overestimate the future growth of their firm, and that they tend to think that their firm is doing better than average.

A bias related to overoptimism or the better-than-average-effect is miscalibration, or overprecision. In the psychological literature, miscalibration is described as having a high amount of confidence in the accuracy of the information that is available to make predictions. Therefore, people tend to overestimate their capability of forecasting, and the precision of their predictions (Lichtenstein, Fisschoff & Philips, 1982). Ben-David, Graham & Harvey (2010) investigate the presence of miscalibration among corporate managers. Using 13,300 predictions of U.S. financial executives in the period 2001-2011, their research shows that the distributions of the predications of the financial executives about future stock market returns are too narrow: realized stock market returns fall only in 36% of the cases within the 80% confidence interval of their predictions. Their research also indicates that miscalibration of exectutives about future stock market returns is related to miscalibration about predicions of future Internal Rates of Return of their own firm. Furthermore, Ben-David et al. find that the level of miscalibration is related to corporate financial policy of the firm. The more miscalibrated the executive is, the higher the level of investment is, and the more leverage the firm will use as a source of finance.

As academic literature indicates, overconfidence is a state of mind that can affect people's judgements. A critical decision that requires several important judgements to be made by a manager is an acquisition. Therefore, this research paper examines the effects of managerial

overconfidence on several aspects of an acquisition that require judgements and decisions by the CEO. The remainder of this section discusses the following aspects of an acquisition: acquisition activity, selection of the target, valuation, payment method and effects of the financial crisis of 2008.

2.1 Overconfidence and acquisition activity

Because acquisitions are major corporate events, that are the result of decisions made by managers who, as behavioural corporate finance literature indicates, might be subject to behavioural biases, an acquisition is an event that is widely covered by scholars in the field of behavioural finance. Malmendier & Tate (2008) state that overconfident CEOs overestimate their capability to generate returns in both their current firm and in possible takeover targets. An empirical analysis is conducted to test this statement. Malmendier & Tate use a sample of 477 U.S. firm over the period 1980-1994. A CEO is classified as being overconfident if the CEO holds an option until the last year before expiration, that is often highly in the money. This measure indicates how 'bullish' the CEO is about the firm under its control. Malmendier & Tate find that this measure of overconfidence is correlated to an alternative measure of overconfidence, based on the perception of the press about the CEO. To measure press coverage, they search for articles indicating overconfidence, such as optimistic and confidence, and keywords indicating the opposite, such as reliable and cautious. The articles that are used are published in reputable business press, such as *Financial Times* and *The Economist*. A CEO is classified as overconfident if more articles use words such as confident and optimistic than articles using words such as reliable and cautious. Their empirical analysis shows that CEOs that are classified as being overconfident, based on both measures of overconfidence, are more likely to undertake acquisitions. Furthermore, Malmendier & Tate find that diversifying acquisitions (acquisitions in a different industry) mainly contribute to this effect.

In addition to an increased likelihood of undertaking an acquisition, several researcher pay attention to the role of overconfidence in serial acquisitions. While influential scholars, such as Porter (1987), describes the potential benefits of serial acquisitions, this view is not always supported by empirical research. Research of Fuller (2002) shows, using a dataset of 539 acquirers in the period 1990-2000, that for serial acquirers that are acquiring public firms,

cumulative abnormal returns (CAR)¹ are declining from deal to deal. Billett & Qian (2008) investigate serial acquirers, using a dataset of 3,795 acquisitions in the U.S. in the period 1980-2002. They find that CEOs that made acquisitions in the past that resulted in positive CAR, are more likely to be a frequent acquirer, and that the consecutive acquisitions tend to result in negative CARs. Billet & Qian state that this declining CAR of the acquirer is related to self-attribution bias, which results in overconfidence of the serial acquiring CEO. However, the thesis that a declining CAR can be attributed to overconfidence is questioned by Aktas, Bodt & Roll (2009). Their alternative statement is that serial acquirers learn from deal to deal, they become more skilled in selecting the right target and the integrating process that results from the acquisition. As a result, the risk of failure of acquisitions decreases. As CEOs supposed to be risk averse, they are willing to pay a high premium in subsequent deals, because the probability of a successful acquisition also increases. The declining CAR from deal to deal is rather a reflection of a higher premium paid, than a reflection of an overconfident CEO doing an acquisition.

The existing literature on serial acquirers in the light of overconfidence so far mainly focused on negative CARs as a result of serial acquisitions. The attribution to overconfidence in the literature is mainly based on theoretical reasoning, and not on empirical findings. In an attempt to contribute to the discussion on serial acquisitions and overconfidence, the dataset in this paper is used to investigate if CEOs that are qualified as overconfident are more likely to be serial acquirers. This leads to the following research question:

1.1a Are overconfident CEO's more likely to be a serial acquirer?

To empirically analyse research question 1.1a, the following hypothesis is tested:

H_{1a} = Overconfidence is positively related to serial acquisitions

While the focus of hypothesis 1.1a is on more aggressive acquisition behaviour of overconfident CEOs, cautious behaviour in the form of taking a minority share in another firm has received much attention among scholars as well. Aghion & Tirole (1994) state that in certain situations, partial ownership, instead of a majority acquisition, is the optimal solution to generate maximum value from R&D activities. Their argument is that vertical integration imperils future technical innovation. Allen & Philips (2000) argue that minority acquisitions can be used to diminish the effects of incomplete contracts, and therefore can increase firm

¹ Cumulative Abnormal Return = $\sum Actual Return - Expected Return$

value by fruitful cooperation between two independent firms. This view is empirically supported by research of Fee, Hadlock & Thomas (2006), who study over 10.000 customer-supplier relationships in the period 1988-2001. They find that contractual incompleteness is an important reason for firms to take a minority stake in another firm. Furthermore, they find that the relationships in which a firm takes an equity stake in a supplier tend to last longer relative to relationships of firms that do not have an equity stake in their supplier.

Besides the discussion on how minority acquisitions can affect value creation in the supply chain of a company, Betton, Eckbo & Thorburn (2009) mention the effect of taking a minority position in the target firm in the bidding process. Betton et al. investigate the so-called toehold strategy among 7,076 bids in the period 1990-2002 in the US. A toehold strategy is a strategy in which less than 50% of the shares are acquired prior to taking a majority stake in the firm. The goal of this strategy is to reduce the takeover premium, because the acquiring firm already owns a substantial part of the shares before taking full control of the firm which decreases the amount of shares that have to be bought at a premium and it reduces the competitiveness of the bidding process. However, Betton et al. find that, even when this strategy should theoretically be appealing to acquiring firms and therefore should often be used by rational acquirers, it is not often observed in practice. Only 13% of the bids that they observed are classified as a toehold (measured by biddings on less than 50% of the shares), and only 3% acquire a toehold in the 6-months prior to the initial offer announcement.

Despite the potential benefits of taking a minority stake in another firms, overconfident CEOs, who theoretically will be more likely to take irrational decision, might overestimate their ability to improve the target firm, and might therefore be more willing to take a majority stake instead of a minority stake to take full control. Based on the theoretical discussion on minority acquisitions and a toehold strategy, and to test the attitude of overconfident CEOs towards a toehold strategy, the following research question is conducted:

1.1b Are overconfident CEO's less likely to pursue a toehold strategy?

Based on research question 1.1b, the following hypothesis is tested:

H_{1b} = Overconfidence is negatively related to minority acquisitions

2.2 Overconfidence and selection of the target

In the literature on strategic management, the question on whether to diversify or to focus on the core competencies of the firm is an important subject of discussion, (for example Porter, (1987), Campbell Goold & Alexander (1995), Collis and Montgomery (1995)). Particularly, this discussion became relevant in a response to the conglomerate merger wave during the 1960s and the 1970s. Diversifying acquisitions did not add much value to the acquiring companies according to Servaes (1996). Berger and Ofek (1995) present empirical evidence that diversifying mergers can even be value-destroying. Using a sample of 16,181 U.S. acquisitions in the period 1986-1991, Berger and Ofek find that after the acquisition the firm loses on average 13-15% of firm value, compared to the sum of the stand-alone values of the merging firms. Because these diversifying mergers are in potential value-destroying, and empirical evidence suggest that there is a 'diversification discount' for the stock of the acquiring firm, it could be argued that a rational manager would be less likely to do a diversifying acquisition. Empirical findings of a study of Malmendier & Tate (2008) support this view. They find that CEOs that they have classified as overconfident (both by personal portfolio and outsider's perspective) are more likely to be engaged in a diversifying merger than CEOs who are not classified as overconfident.

Compared to Malmendier & Tate (2008), the sample used in this research has a different time frame and a consists of firms from a different country. Because there might be country- and time-specific factors, while using a different dataset, affecting the appetite of CEOs to do diversifying mergers the following research question is analyzed:

1.2a Are overconfident CEOs more likely to do diversifying acquisitions?

Corresponding with research question 1.2a, the following hypothesis is tested:

H_{2a} = Overconfidence is positively related to diversifying acquisitions

A related discussion in the field of strategic management is the discussion on cross-border acquisition. Cross-border acquisitions are acquisitions in which the target firm is located in a different country than the acquiring firm. One of the main arguments against cross-border

acquisitions is that cultural differences would hinder the integration of the two merging firms. Jemison and Sitkin (1986) argue that the cultural distance between acquiring and target firm could lead to cultural ambiguity, which would hinder the organizational fit between the two firms. A major argument in favor of a cross-border acquisition that is used in the literature, is that cross-border acquisitions result in a transfer of knowledge. Morosini, Shane & Singh (1998) study a sample of 52 cross-border acquisitions in the period 1987-1992. They find a positive relation between the national cultural differences between the acquiring and the target firm and the performance of the acquisition, measured by percentage growth in sales of the firm in the following two years of the acquisition. Seth, Song & Pettit (2002) take an alternative view on reasons why Cross-Border might create or destroy value. Seth et al. argue that main reasons for a cross-border acquisition to create value are asset sharing, reverse internalization of valuable intangible assets and financial diversification. However, Seth et al. argue that value-destroying mergers are driven by managerialism and hubris of the acquiring manager. Using a sample of 4,796 deals in 17 countries (12 pacific-rim countries and 5 developed western countries) Bremer, Hoshi, Inoue & Suzuki (2015) link uncertainty aversion to cross-border acquisitions and find that firms from countries with 'more aversion towards uncertainty' are less likely to be engaged in cross-border acquisitions.

In the light of this discussion, this paper investigates if CEOs that are classified as overconfident are more likely to be engaged in cross-border acquisitions. This leads to the following research question:

1.2b Are overconfident managers more likely to do cross-border acquisitions?

To analyse research question 1.2b, based on the sample of this research, the following hypothesis is tested:

H_{2b} = Overconfidence is positively related to cross – border acquisitions

2.3 Overconfidence and valuation

One of the key judgements to be made for an acquisition is the value of the target firm, and subsequently the price that the acquirer is prepared to pay for the target firm. Overconfidence might lead to biased judgements, in particular during acquisitions with multiple bidders, leading to a bidding game. In such a setting, overconfident bidders could be particularly

vulnerable for the 'winners curse'. The concept of winners curse is first introduced by Capen, Clapp & Cambell (1971) who study the bidding for drill rights on land lots among oil firms. As the fundamental value of these drill rights are hard to estimate, and in that sense there is a situation of imperfect information, it is hard for bidder to determine the right price to pay. Therefore, winning the auction might not be beneficial for the bidder after all. Winning the auction might be 'cursed' in two ways: first, the bid that is necessary to overbid the other bidders might exceed the fundamental value of the drilling rights. Second, it might be that the fundamental value of the drilling rights is below the estimates of all the bidders. The concept of a winner's curses can also be applied in the setting of an acquisition, and in particular in a setting with overconfident acquirers. The fundamental value of a firm can be hard to estimate, which leads to a situation of imperfect information. Furthermore, because in an acquisition the value of the target is also dependent on the potential synergies that are created by the acquisition, the valuation is also dependent on the acquirer, which makes it even more complex. In addition, to reach the full potential of the synergies certain skills of the acquirer are required. Because an overconfident CEO might overestimate its abilities to create synergies by the merger, he could overestimate the value of the target, overpay for the acquisition and in that sense be subject to the winners curse.

Overconfidence and overbidding during acquisitions has been a widely discussed topic among scholars in the field of behavioural corporate finance. One of the most influential papers on overconfidence and the effects of it on valuation is written by Roll (1986), who introduces the 'hubris hypothesis'. This hypothesis states that managers that are being 'infected by hubris', will overestimate their ability to create value by the acquisition and are therefore more willing to pay a higher takeover premium. Using a sample of 106 large acquisition in the U.S. (over 100 million dollar) covering the period 1989 - 1992, research of Hayward & Hambrick (1997) empirically test the hubris hypothesis. Their research suggests that hubris of the CEO is related to the premium paid during an acquisition. In their research, hubris is measured by recent organizational success, recent media praise and CEO self-importance, measured by compensation of the CEO relative to the second-highest-paid officer. All three factors have a significant, positive effect on the premium paid for an acquisition. Furthermore, a 'hubris factor' is tested, based on the three measures for overconfidence, using factor analysis. This 'hubris factor' has a significant positive effect on takeover premium as well. As an extension of the findings of these papers, because the database used in this paper is covering firms in the U.K. and in a different period and with an alternative measure of overconfidence, this paper attempts to answer the following research question:

1.3a Do overconfident CEO's pay a higher premium?

To test how overconfidence affects the takeover premium in the sample of this research, the following hypothesis is tested:

$$H_{3a} = \textit{Overconfidence is positively related to takeover premium}$$

Furthermore, Roll states that the market is responding negative to announcements of investment decisions by CEOs who are infected by hubris, in which the acquirer is paying such a high premium, as investors recognize the value-destroying potential of acquisitions in which a high premium is paid. Malmendier & Tate (2008) find empirical evidence for this statement. Using a dataset of 477 U.S. firms over the period 1980-1994, they find that the market's reaction to the stock of the acquiring firm is significantly more negative when the acquiring firm has a CEO that is qualified as being overconfident.

Particularly, because the measure of overconfident in this research is based on the perception of outsiders, it would be interesting to see if this outsider's perception also results in a discount of the stock prices of the acquiring firm around the announcement day of the acquisition. A higher discount for acquisitions done by overconfident CEOs would indicate that the market believes that these acquisitions would create less value to the firm, compared to acquisitions done by CEOs that are not overconfident. To test if this effect also holds in the dataset used in this paper, with U.K. firms in a different time frame, the following research question is investigated:

1.3b Does the market respond negative on the announcement of an acquisition by an overconfident CEO?

To test how the market responds to acquisitions by overconfident CEOs in the period 2003-2013 in the UK, the following hypothesis is tested:

$$H_{3b} = \textit{Overconfidence is negatively related to cumulative abnormal returns of the acquiring firm around the announcement date}$$

2.4 Overconfidence and payment method

Capital structure choice is a major topic of research in the field of financial economics. One of the most influential theories is introduced by Modigliani & Miller (1958). In the framework of Modigliani & Miller, the capital structure does not affect the value of the firm under strict

assumptions, such as the absence of taxes, transaction costs, bankruptcy costs and the presence of symmetry of information between managers and investors. After the introduction of this framework, several influential papers have been published that deviate from this framework. For example Jensen & Meckling (1976) introduce the effects of agency costs, in which there exists a conflict of interest between shareholders and debt holders. Myers & Majluf (1984) introduce a framework, named the pecking order theory, in which asymmetric information affects the optimal capital structure choice. While there is an asymmetry of information between investors and managers, and managers know more about the firm than investors, investors do know that managers will only issue equity if the fundamental value of the firm is below the perception of the market. Therefore, issuing equity gives a negative signal to the market about the fundamentals of the firm, and is the least preferred source of finance for a manager. If external financing is necessary, debt is preferred over equity. Internal financing is most preferred, because it removes the problems of asymmetric information.

But what if the manager (irrationally) believes that the firm is being undervalued by the market? Malmendier, Tate & Yan (2007) investigate the effects of overconfident CEOs, who tend to overestimate their ability to generate value for the shareholders in the future, and could therefore believe that their firm is currently being undervalued by the market, on capital structure choices. Using the earlier mentioned database of 477 U.S. firms in the period 1980-1994, and using both measures of overconfidence (outsiders perception and stock options) Malmendier, Tate & Yan on the likelihood to use internal financing (cash) or external financing (debt or equity) to finance projects. The empirical analysis confirms the thesis that overconfident CEOs are less likely to issue equity, as they believe their firm is undervalued by the market, and are more willing to use debt as a source of finance, relative to their less overconfident peers.

An acquisition has to be financed, and this requires a similar decision as the choices that have to be made regarding capital structure (either use cash, equity or debt as a source of financing). For an overconfident CEO, who will be more likely to perceive the firm as undervalued, one would expect that an overconfident CEO would be more likely to use cash as payment method in an acquisition. This leads to the following research question:

1.4 Do overconfident CEO's use cash more often as a payment method?

To test how overconfidence affects the payment method in the sample used in this research, the following hypothesis is tested:

H₄ = Overconfidence is positively related to cash as payment method

2.5 Overconfidence and the financial crisis of 2008

Using a dataset of 2000-3000 financial executives in the U.S. over the period 2001-2007, Ben-David, Graham & Harvey (2007) document that confidence of executives is a time-persistent, individual characteristic. In a vast amount of literature on managerial overconfidence, this persistence of overconfidence is one of the assumptions. However, Malmendier, Tate & Yan (2011) argue that there could be a relation between important early-life life experiences and the level of overconfidence. Using a dataset of 477 U.S. firms, in the period 1980 - 1994, and using both stock options and outsiders perception (media coverage) to qualify CEO's as overconfident and they relate this dataset to three life experiences: witnessing the Great Depression (1929), World War II (1939-1945) and military experience. Their research indicates that these life experiences affect the corporate policy of a CEO. CEOs that experienced the Great Depression are more reluctant to external financing, in particular to leverage. On the other hand, CEOs that experienced World War II tend to have higher leverage ratios. Furthermore, CEOs with military experience are using more leverage in their financing policy. Malmendier, Tate & Yan state that these major personal events seems to have a lifelong impact on risk attitude.

The dataset used in this research covers the period 2003-2013. One could argue that the financial crisis of 2008 is a major event, that could have a personal impact beyond the economic implications of it, and that this personal impact could affect the risk attitude and confidence level of managers. This results in the following research question:

1.5a Are CEO's more often described as overconfident before than after the financial crisis of 2008?

To test whether the financial crisis affected the outsiders perception on CEOs, the following hypothesis is tested:

H_{5a} = The amount of articles that describe a CEO as confident is higher prior to th crisis than after the crisis

Furthermore, as an extension it would be interesting to see if the financial crisis affects the judgements that are made by overconfident CEOs. This leads to the following research question:

1.5b Is the relation between overconfidence of the CEO and corporate acquisitions different after the financial crisis?

Because the sample of this research is fairly balanced between acquisitions before and after the crisis, the following hypothesis can be tested:

H_{5b} = Overconfidence interacts with effects of the financial crisis of 2008

3. Research design

This section provides an explanation of the research design that is used to answer the research question. This section explains the dependent variables, independent variables and control variables that are included in the analysis. Furthermore, it presents the validity framework, and it discusses the methodology that is used to test the relations in the validity framework.

3.1 Variable description and construction

3.1.1 Measure of overconfidence

The core variable in this research is overconfidence. Because overconfidence is a subjective state of mind of an individual, overconfidence is a variable that is difficult to measure. Nevertheless, in the literature on overconfidence, several attempts are being made to classify CEOs as overconfident.

Malmendier & Tate (2005a) use data on stock options of the firm held by the CEO to classify a CEO as overconfident. Malmendier & Tate compare the choices that are made by the CEO with a 'rational benchmark', as introduced by Hall & Murphy (2002). Options in the firm are a common form of remuneration for CEOs at listed firms, in order to overcome the principal-agent problem by aligning the interest of the CEO with the interest of the shareholders. Furthermore, information about the options is publicly available. Therefore, Malmendier & Tate can investigate how these options are used by the CEOs of 477 listed firms in the U.S. Usually, these options have a vesting time, in which the option is not exercisable. A typical vesting time is around ten years. Hall & Murphy argue that because

CEOs have invested a large portion of their human capital in their own firm, CEOs with a rational level of risk aversion would not invest a large share of personal wealth into their own firm. Therefore, holding a large share of the firm's stock in their personal portfolio could reveal information about the risk aversion, but also about the confidence of the CEO in the future value of the firm under their own management. Malmendier & Tate share this view, and measure three different expressions of overconfidence in the CEO's personal portfolio. First, they classify a CEO as overconfident if the executive holds exercisable options (options become exercisable after the vesting period, of typically five years) that were at some point of time at least 67% in-the-money, which is according to Hall & Murphy the 'rational threshold' to exercise. Second, CEOs are classified as overconfident if they hold options that are exercisable until the last year of the duration of the option (usually ten years). Third, CEOs are classified as overconfident if they purchase additional stock of the firm.

A different measure of overconfidence is introduced by Ben-David, Graham & Harvey (2010). They use a survey among financial executives to classify CEOs as miscalibrated and overoptimistic. In this survey, the executives are asked to predict the market-wide one- and ten-year returns, and they are asked to conduct an 80% confidence interval of their forecast. Furthermore, the CFOs are asked to predict a distribution of Internal Rates of Return (IRR) of projects of the firm. Executives are classified as miscalibrated if the true returns (short- and long term returns of the market, and IRR of the firm) is more volatile than predicted volatility of the CEO, and are classified as overoptimistic if their standardized prediction is above true returns.

While the classifications of overconfidence by Malmendier & Tate (2005a) and Ben-David et al. (2010) focus on personal expressions of overconfidence, Malmendier & Tate (2005b) attempt to classify CEOs as overconfident based on the perception of outsiders. Articles about the CEO in prominent business papers, *Business Week*, *Financial Times*, *The Economist*, *New York Times* and *Wall Street Journal* are collected and scanned for keywords. 'Confident' and 'optimistic' are keywords to identify a confident CEO, 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical' are keywords to identify a less confident CEO. The articles are hand checked, to make sure that the keyword refers to the CEO of interest. If a CEO is more often described as confident than as less confident in the media, the CEO is classified as overconfident by Malmendier & Tate (2005b).

This paper uses the outsiders perception measure of overconfidence by Malmendier & Tate (2005b) to classify a CEO as overconfident. However, because the sample used in this

research is based on deals in the UK instead of the US, a different set of newspapers have to be used to collect a relevant set of articles about the CEO. In this research articles from the British newspapers *The Guardian*, *Daily Telegraph* and *The Financial Times* are used. These newspapers are selected because they have a reputation of ‘quality press’, and all three newspapers are described as having different political allegiance (BBC, 2009), which creates a more balanced view on outsiders perspective. Similar to Malmendier & Tate (2005b), a CEO is classified as overconfident if he or she is mentioned more often as ‘confident’ (a) or ‘optimistic’ (b) than as ‘reliable’ (c), ‘cautious’ (d), ‘frugal’ (e), ‘steady’ (f), ‘conservative’ (g) or ‘practical’ (h). All articles are manually checked, to make sure the articles refer to the CEO. This measure of overconfident is illustrated by the following equation:

$$Overconfident = \begin{cases} 1 & \text{if } a + b > c + d + e + f + g + h \\ 0 & \text{otherwise} \end{cases}$$

3.1.2 Dependent variables

To test research question 1.1a, a dummy variable (*SERIAL*) is created to identify serial acquirers. Serial acquirers are defined as acquirers who did at least two acquisitions in the past five years, at a CEO-level. This measure of serial acquirer is in accordance with the method of Billett & Qian (2008). In order to test research question 1.1b, a dummy variable (*MINORITY ACQUISITION*) is created that measures if the share owned by the acquiring firm after the acquisition is less than 50%, in accordance with the definition of Betton, Eckbo & Thorburn (2009).

Question 1.2a requires a definition of a diversifying acquisition, and a dummy variable (*DIVERSIFY*) based on this definition. In this research, an acquisition is defined as a diversifying acquisition if the target operates in a different industry than the acquiring firm, according to the SIC codes provided by Thomson One Banker. SIC stands for Standard Industrial Classification, and is a classification introduced by the US government that is also used by the UK’s Companies House (Companies House, 2007). To answer question 1.2b, a dummy variable (*CROSS – BORDER*) is created to classify a merger as cross-border if the target firm is located in a different country than the acquiring firm.

Question 1.3a (*TAKEOVER PREMIUM*) and 1.3b (*MARKET RESPONSE*) require a more advanced measuring method. According to good practices by scholars who do an event study to merger & acquisitions, the takeover premium is measured by the Cumulative

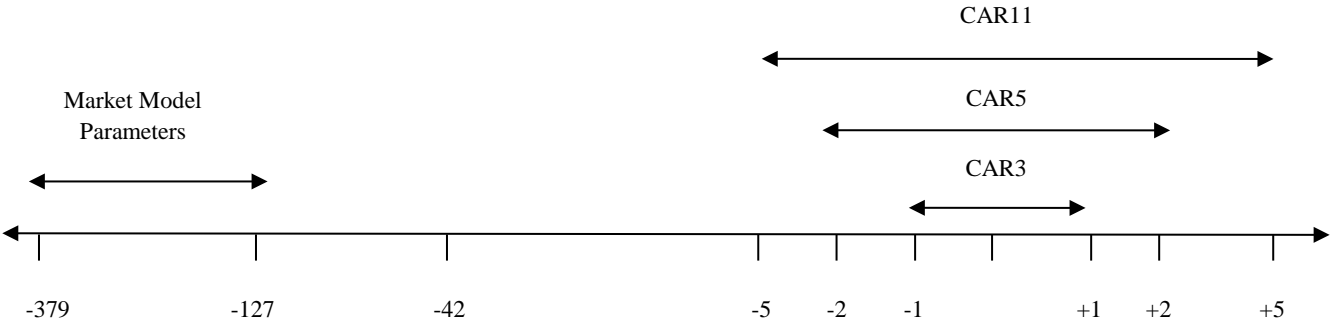
Abnormal Return of the target firm around the announcement date. Cumulative Abnormal Returns measure the cumulative returns of a firm during a certain time frame around a certain event relative to a benchmark, which is the ‘normal return’, based on market parameters. This leads to the following formula, as proposed by Brown & Warner (1985):

$$CAR_{i,K,L} = \sum_{t=K}^L AR_{i,t}$$

In this formula, i is the firm and (K,L) is the timeframe that is used to measure the Cumulative Abnormal Return. The Abnormal Return (AR) is the return above or beneath the benchmark return (normal return). This ‘normal return’ is inspired by the Capital Asset Pricing Model by Sharpe (1964), and the formula for abnormal return is as follows:

$$AR_{it} = R_{it} - (\beta_{it} * R_{Market Index})$$

R_{it} is the return of the firm, β_{it} is the Beta of the firm of interest, based on market model parameters of respectively 379 until 127 days before the announcement date of the acquisition. The time window of minus 379 until 127 days to measure the market model parameters is used in accordance with the research method of Schwert (1996), a research method that is used by a lot of scholars in the field of financial economics doing event studies. β_{it} is multiplied by $R_{Market Index}$, which is the market return of the stock exchange on which the firm is listed. In this research, for the acquiring firm this is always the FTSE, and given that the dataset also includes cross-border acquisitions, for the target firm this is the local stock exchange on which the firm is listed. Accumulating these abnormal returns based on time windows of three, five and eleven days around the announcement date result in the cumulative abnormal returns. Data on stock and market returns are retrieved from Datastream. The calculation of the cumulative abnormal returns is further illustrated by the following timeline:



Cumulative Abnormal Return is also used to measure the market response to an acquisition done by an overconfident CEO, in order to answer question 1.3b. Because not all targets in the sample are publicly listed, unfortunately it is not possible to calculate the cumulative abnormal returns of all targets, leading to missing observations.

Question 1.4 is answered by creating a dummy variable (*CASH PAYMENT*) that identifies the payment method, as reported by Thomson One Banker. Three categories are made by Thomson One Banker: Cash, Stock and Hybrid (which is a combination of cash and stock). Because hybrid also partly consists of stock as payment method, which theoretically would be less likely to be used by overconfident CEOs, cash is used as the dependent variable.

To answer question 1.5a, a split in the data is made between articles published about the CEO before and after the start of the financial crisis. The split of the articles is set at the collapse of the Lehman Brothers (15 September 2008). While the exact starting date or peak of the financial crisis is a subject of discussion, a commonly accepted date by scholars, such as Ivashina & Scharfstein (2010) and Brunnermeier (2008), is the fall of the Lehman Brothers on September 15, 2008. Furthermore, to test question 1.5b, a split in observations of deals is made for the univariate analysis, and an interaction term (*OVERCONFIDENT * AFTERCRISIS*), between overconfidence and a dummy variable (*AFTER CRISIS*), is included to test interaction effects between overconfidence and the financial crisis of 2008 on the other dependent variables analysed in this research.

3.1.3 Control variables

To increase the precision of the regression, several control variables are included in the regression. Firm size (*FIRM SIZE*) is included as a control variable, because it is expected that this variable is related to the different dependent variables included in this research. First, one would expect that large firms are more likely to have a serial acquiring CEO, for two reasons. First, larger firms have more capacity to do frequent acquisitions. Second, it could be that larger firms hire more experienced CEOs, who are more likely to have done more than one acquisition in their career. Furthermore, Gorton, Kahl & Rosen (2009) find that larger firms tend to do acquisition to make sure that they do not lose any private benefits. This would suggest that larger firms are more likely to be a serial acquirer, as they are more likely

to do acquisitions in the first place, and that larger firms are less likely to do a minority acquisition, as larger stakes provide larger private benefits. One could also expect that a larger firm is more likely to be a diversifying acquirer. With a larger capacity, it might be more likely that a firm engages in an acquisition that diversifies their portfolio of activities, aiming to reduce the risk of the firm, as suggested by Amihud & Lev (1981). In that same light, one would expect that larger firms have the capacity to engage in cross-border acquisitions, and are therefore more likely to do a cross-border acquisition, as an attempt to diversify and reduce idiosyncratic risk of the firm's portfolio of activities. Moeller, Schlingemann & Stulz (2004) find that firm size of the acquirer is related to negative announcement effect of a merger. Roll (1986) also find a cross-sectionally relation between firm size and percentage loss of the shares of the bidding firm, and that larger firms are more likely to pay higher premia. As Martin (1996) argues, one would expect that a larger firm is less likely to use stock as a payment method, and more likely to use cash, as they are more likely to have more cash available and they would prefer internal financing of the acquisition in accordance with the pecking order theory of Myers (1984). Firm size is measured by book value of the assets of the acquiring firm at the end of the year. Because the distribution of this variable could be skewed due to outliers in the sample, a log-transformation is applied on this variable.

A second control variable (*LEVERAGE*) that is included in the regressions is the leverage ratio of the acquiring firm. As the large amount of literature, such as Modigliani & Miller (1958), Jensen & Mackling (1976) and Myers (1984), on capital structure choice suggests, leverage ratios are expected to affect the activities, such as acquisitions. A higher leverage ratio will pressure the availability of cash, as there are obligations of repayments and interest rate payments. Research, such as Harford (1999), indicates that the availability of cash is positively related to the acquisitiveness of a firm. Furthermore, a higher leverage ratio will mean a relatively lower availability of stock to swap for an acquisition. Therefore, one would expect that a firm with a high leverage ratio is less likely to be engaged in an acquisition, due to restrictions on the availability of both payment methods (cash and stock), and therefore will be less likely to be a serial acquirer. With respect to minority acquisitions, it could be that firms with a high leverage ratio are more likely to take a cautious approach if they are engaged in acquisition activity, due to their obligations. Therefore, a positive relation between leverage ratio and minority acquisition could be observed. This same cautiousness and discipline created by the higher leverage ratio, and the lack of cash and stock available to do acquisitions, would result in a negative relation between leverage ratio and diversifying and cross-border acquisitions. Due to the limited availability of cash and stock, one would

also expect a relatively lower takeover premium paid by firms with a higher leverage ratio. As a result of lower takeover premia paid by higher leveraged firms, one would expect that the market responds less negative to an acquisition announcement by a higher leveraged firm. This view is empirically supported by research of Masulis, Wang & Xie (2007) who find that there is a significant positive relation between leverage ratio and bidders announcement returns, using a sample of 3,333 acquisitions in the US in the period 1990-2003. The effect of leverage ratios on the payment method used in an acquisition is ambiguous. On the one hand, one would expect that if a higher leveraged firm does engage in an acquisition, it would be more likely to use cash as a payment method, because there is less equity available for a stock swap. However, on the other hand, regarding the pecking order theory, a high leverage ratio would reflect a limited availability of cash, as cash would be the most preferred source of finance. Leverage ratios are measured by dividing total liabilities to total assets. Related to leverage ratios, cash flow (*CASH*) is included as a control variable as well. However, it is expected that cash flow will have opposite effect on the dependent variables, if the reasoning on the effects of leverage ratio on the dependent variables holds. Due to the availability of cash, one would expect a positive relation on the likelihood of being a serial acquirer, a negative relation on the likelihood of doing a minority acquisition, a positive relation on the likelihood of doing a diversifying acquisition and/or a cross-border acquisition and a positive relation on the premium paid. As the market might recognize the effect of the availability of cash on risky acquisition behaviour, the availability of cash might be negatively related to the market response on an acquisition announcement. In accordance with the pecking order theory by Myers (1984), one would expect that the availability of cash reduces the likelihood of using stock as a payment method and increases the likelihood of using the available cash as payment method in an acquisition. Cash flow is measured by cash and short-term investments at the end of the year.

Finally, a set of control variables controlling for deal characteristics is included in the regressions. A dummy variable (*HOSTILE*) that indicates if an acquisition is a hostile takeover or not, as classified by Thomson One Banker, is included. It is likely that the nature of an acquisition, friendly or hostile, influences other factors of the acquisition as well. Schwert (2000) provide empirical evidence that the nature of an acquisition influences other aspects of the acquisition. The research shows that hostile takeovers are related to a higher premium and a higher discount of bidder's pre-announcement stock prices. Furthermore, the research provides evidence that cash is used more often as a method of payment in a hostile takeover. Therefore, a positive relation between hostile and cash payment is expected, and a

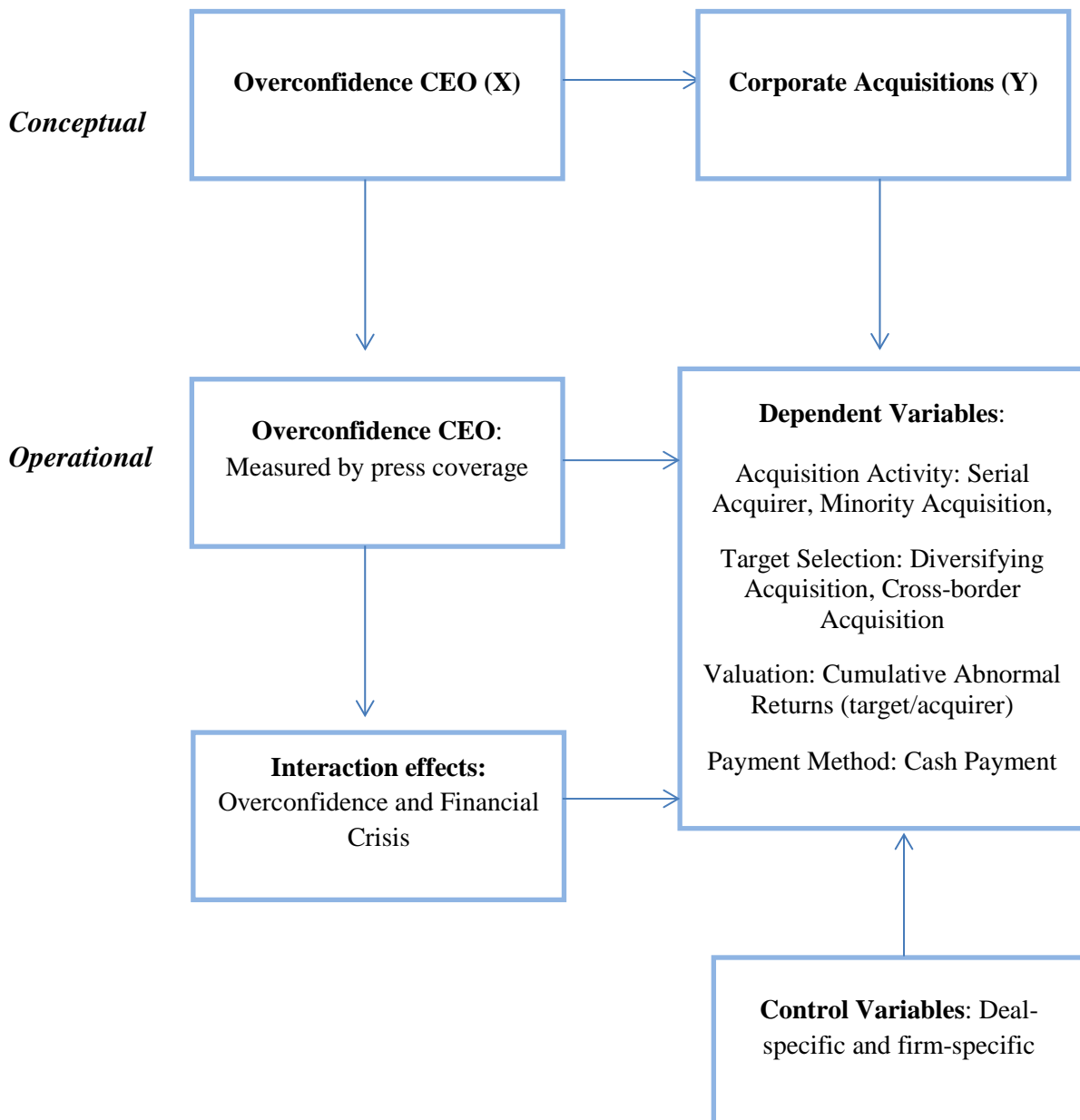
negative relation between hostile and stock payment. Moreover, Betton, Eckbo & Thorburn (2009) argue that ‘toeholds are the norm in hostile bids’, indicating that there is a positive relation between hostile bids and minority acquisitions. Literature does not indicate if hostile takeover are more likely to take place within an industry or within a country. Therefore, no clear predictions on the effect of including hostile in the regression on diversify and Cross-Border can be made. A control variable for the payment method (*CASH PAYMENT*) is included in the regression. On the one hand, it could be argued that that cash payment is positively related to a serial acquirer. A series of acquisitions could be the result of a high availability of cash, and therefore it is more likely that these acquisitions are paid with cash, an argument that is related to the paper of Jensen (1986). On the other hand, it could be that a series of acquisitions might be triggered by overvaluation of the acquiring firm, leading to a ‘window of opportunity’ for the acquiring firm to use stock as a payment method for a series of acquisitions, an argument that is based on the empirical findings of Schleifer & Vishny (2003). It is expected that minority acquisitions are more likely to be paid with cash, based on the empirical findings of Betton, Eckbo & Thorburn (2009). It can be argued that cash payment is positively related to both diversifying and cross-border acquisitions, because shareholders of target firms in a different sector or a different country might be less interested in stock of the acquiring firm, as they probably made their decision to allocate money to stocks of the target firm in that particular sector and/or country. Based on empirical findings of Eckbo & Langohr (1989), cash payment is expected to be positively related to takeover premium. Empirical findings of Travlos (1987) indicate that cash payment is positively related to market response.

The regressions are controlled for year specific effects. As the sample covers ten years, it could be that certain events in certain years, such as the financial crisis in 2008 might affect several aspects of the acquisition process.

3.2 Methodology

3.2.1 Framework

The following validity framework illustrates the theoretical relations that are tested in this research:



Based on the validity framework, table 1 provides an overview of all variables used in this paper, and the expected effect on the dependent variables.

Table 1: Overview variables

Table 1 provides an overview of the independent and control variables used in this research, and their expected relation with the dependent variables. CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO.

Serial Acquirer is a dummy variable indicating that the CEO did at least two acquisitions in the past five years. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversify is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Takeover premium is the cumulative abnormal return of the target around the announcement date. Market response is the cumulative abnormal return of the acquirer around the announcement date. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition. Firm size is the Log of the value of the total assets of the acquiring firm, measured in US Dollar at the end of the fiscal year. Leverage is the ratio between total leverage and total assets, at the end of the fiscal year, of the acquiring firm. Hostile is a dummy variable indicating that the acquisition is classified as hostile by Thomson One Banker. Overconfident*AfterCrisis is an interaction variable between Overconfident, and a dummy variable AfterCrisis, indicating that the deal took place after the financial crisis of 2008.

	Serial Acquirer	Minority Acquisitions	Diversify	Cross-border	Takeover Premium	Market Response	Cash Payment Method
<i>Independent Variable</i>							
Overconfidence	+	-	+	+	+	-	+
<i>Acquirer Characteristics</i>							
Firm Size	+	-	+	+	+	-	+
Leverage	-	-/+	-	-	-	-/+	-
Cash Flow	+	-/+	+	+	+	-	+
<i>Deal Characteristics</i>							
Hostile		-	-/+	-/+	+	-	+
Payment Method Cash	-/+	+	+	+	+	+	
<i>Interaction Effects</i>							
Overconfidence * After Crisis	-	+	-	-	-	-	-/+

3.2.2 Univariate analysis

To test if CEOs that are perceived by outsiders as overconfident make different judgements and decisions regarding the selected dependent variables, this paper uses univariate analyses. The hypotheses H_{1a} , H_{1b} , H_{2a} , H_{2b} , H_{4a} , H_{4b} , H_{5a} and H_{5b} compare the proportions of two categorical variables. This requires a proportion z-test, which is specified as follows:

$$Z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1 - \hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

In this equation, \hat{p}_1 and \hat{p}_2 represent the proportions of the categories that are being tested. n_1 and n_2 represent the size of the groups that are compared. \hat{P} is equal to:

$$\hat{p} = \frac{Y_1 + Y_2}{n_1 + n_2}$$

In which Y_1 and Y_2 are the number of observations in each category.

Besides a two proportion z-test, a mean-comparison test is required to test H_{3a} and H_{3b} . The Welch's t-test (Welch, 1947) seems to be the most appropriate form of univariate analysis in this case, because it is likely that Cumulative Abnormal Returns are not normally distributed, and the Welch's t-test accounts for unequal variances and a non-normal distribution. The formula of the Welch's t-test is specified as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

In this formula \bar{X}_1 and \bar{X}_2 are the sample means of the groups that are compared. s_1^2 and s_2^2 are the standard deviations of the groups that are compared, and N_1 and N_2 represent the size of the groups that are compared. The degrees of freedom are calculated by the following formula (Welch, 1947):

$$v = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$$

3.2.3 Multivariate analysis

While the univariate analysis gives a first indication whether CEOs that are perceived as overconfident by outsiders do behave different with respect to the different aspects of acquisitions that are analysed in this research, this analysis does not control for some important factors. Therefore, in addition to the univariate analysis, regressions are used to test the hypotheses. To test hypotheses H_{1a} a logit regression, that allows a regression to have a categorical dependent variable, is used. According to Petersen (2009) residuals could be correlated across time or across firms in a panel dataset. In the panel dataset used in this research, standard errors might be correlated across CEOs, because some CEOs appear

several times in the dataset. Therefore, standard errors in all regressions are clustered by CEO.

This leads to the following regressions, to test H_{1a} and H_{1b} :

$$\begin{aligned} \text{Serial} = & \alpha + \beta_1 \text{Overconfident} + \beta_2 \text{Firm Size} + \beta_3 \text{Leverage} + \beta_4 \text{Cash} + \\ & + \beta_5 \text{Diversify} + \beta_6 \text{Payment Method Cash} + \beta_{7-17} \text{Fixed Year Effects} + \varepsilon \end{aligned}$$

$$\begin{aligned} \text{Minority Acquisition} = & \alpha + \beta_1 \text{Overconfident} + \beta_2 \text{Firm Size} + \beta_3 \text{Leverage} + \\ & \beta_4 \text{Cash} + + \beta_5 \text{Diversify} + \beta_6 \text{Payment Method Cash} + \\ & \beta_{7-17} \text{Fixed Year Effects} + \varepsilon \end{aligned}$$

To test hypotheses H_{2a} and H_{2b} , the following logit regressions are used:

$$\begin{aligned} \text{Diversify} = & \alpha + \beta_1 \text{Overconfident} + \beta_2 \text{Firm Size} + \beta_3 \text{Leverage} + \beta_4 \text{Cash} + \\ & \beta_5 \text{Payment Method Cash} + \beta_{6-16} \text{Fixed Year Effects} + \varepsilon \end{aligned}$$

$$\begin{aligned} \text{Cross Border} = & \alpha + \beta_1 \text{Overconfident} + \beta_2 \text{Firm Size} + \beta_3 \text{Leverage} + \beta_4 \text{Cash} + \\ & + \beta_5 \text{Diversify} + \beta_6 \text{Payment Method Cash} + \beta_{7-17} \text{Fixed Year Effects} + \varepsilon \end{aligned}$$

To test H_{3a} and H_{3b} , a regression in accordance with the principles of Ordinary Least Squares is used. This leads to the following regressions, in which j represents the target firm, k represents the acquiring firm and i represents the event window, which is three, five or eleven days around the announcement day of the acquisition.

$$\begin{aligned} \text{CAR}_{j,i} = & \alpha + \beta_1 \text{Overconfident} + \beta_2 \text{Firm Size} + \beta_3 \text{Leverage} + \beta_4 \text{Cash} + \\ & + \beta_5 \text{Diversify} + \beta_6 \text{Payment Method Cash} + \beta_7 \text{Hostile} + \\ & \beta_{8-18} \text{Fixed Year Effects} + \varepsilon \end{aligned}$$

$$\begin{aligned} \text{CAR}_{k,i} = & \alpha + \beta_1 \text{Overconfident} + \beta_2 \text{Firm Size} + \beta_3 \text{Leverage} + \beta_4 \text{Cash} + \\ & + \beta_5 \text{Diversify} + \beta_6 \text{Payment Method Cash} + \beta_7 \text{Hostile} + \\ & \beta_{8-18} \text{Fixed Year Effects} + \varepsilon \end{aligned}$$

To test hypothesis H_4 following logit regression is used:

$$(4) \quad \text{Cash Payment} = \alpha + \beta_1 \text{Overconfident} + \beta_2 \text{Firm Size} + \beta_3 \text{Leverage} + \beta_4 \text{Cash} + \beta_5 \text{Diversify} + \beta_{6-16} \text{Fixed Year Effects} + \varepsilon$$

To test hypothesis H_{5b} , all regressions are replicated with an interaction term (*OVERCONFIDENT * AFTER CRISIS*) between overconfidence and a dummy variable (*AFTER CRISIS*) included in the regression. A Chi-Square test is used to test the interaction effect for the logit regressions and an F-test is used to test the interaction effect for the OLS regressions.

4. Data

This section presents the data. The section discusses the sample, the dependent variables, independent variables and control variables. Furthermore, this section elaborates on how the sample is retrieved, which datasets are used and it presents descriptive statistics.

4.1 Sample

Deals Sample

In this paper, the analysis is based on a sample of 360 UK acquisitions in the period 2003 – 2013. It is a merged dataset, and the data is retrieved from the following databases: Thomson One Banker, Compustat, Capital IQ, LexisNexis and Datastream. The sample of deals is retrieved from Thomson One Banker, which provides 360 acquisitions in the UK in the period 2003-2013. For the collection of the sample several conditions are set, in order to specify the sample. The first condition is that the sample only covers deals that are completed in the period 1st of January 2003 – 31st of December 2013. The period restriction is used to make sure that there is a balance between deals that occur before and after the crisis. Furthermore, this timeframe allows this research to analyse the effects of overconfidence on acquisitions in a different timeframe compared to existing literature. The next restriction is that all acquiring companies should be firms from the UK. This restriction is set to make sure that there are no country specific factors that could affect the acquiring firm. The UK is chosen because it is known for having a well-developed financial market (as mentioned by for example Porta, Lopez-de-Silanes, Schleifer & Vishny (1996), is known for an active M&A market and there is sufficient data available for deals in this country. Furthermore, it enables to compare the

results of this research to previous research, that mainly focuses on deals in the United States. A minimum market capitalization of the acquirer of 500 million pound is set as a condition, to make sure there is sufficient media coverage available about the CEO. The dataset only covers acquisitions that are made by listed, public firms, which also helps to construct a sample of acquisitions that are made by CEOs that are sufficiently covered in the media. Table 2 shows the descriptive statistics of the sample of deals by year and deal value (in Million). Furthermore, the data provides additional information about the deal, such as payment methods, acquirer and target's industry and the relative size of the stake that is acquired.

Overconfidence

Capital IQ is used to find the CEO of the acquiring firm at the moment of acquisition. Because of a relatively high amount of missing observations, data from Capital IQ is complemented through manual search. Data about the outsiders perspective on the CEO is retrieved from LexisNexis, using keywords in combination with the CEO name. Keywords that are used to find articles describing the CEO as confident are 'optimistic' and 'confident'. Keywords that are used to find articles that describe the CEO as less confident are 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical'. Articles are retained from *The Financial Times*, *Daily Mail* and *Guardian*, and are manually checked to make sure that the keyword is referring to the CEO.

Other Variables

To strengthen the statistical analysis, Compustat is used to retrieve financial data about the acquiring dataset in this sample. Based on this financial data, several control variables can be included in the regression analysis, such as firm size, leverage, and cash. Data about payment method, and the nature of the acquisition (either friendly or hostile) are retrieved from Thomson One Banker. Data about the stock market response to the announcement of an acquisition, in order to construct the cumulative abnormal returns of both the acquirer and the target are retrieved from Datastream.

4.2 Descriptive statistics

Table 2 provides an overview of the amount of deals, total deal value and average deal value of the deals in the sample in the period 2003-2013. This table indicates that the amount of deals are fairly balanced over time, with a relatively high amount of deals in 2007, and a relatively low amount of deals in 2009, 2012 and 2013. Total deal value and average deal value is relatively high during 2007 and during 2010. This can partly be explained by a couple of outliers, such as the acquisition of ABN-AMRO by Barclays in 2007.

Table 2: Descriptive Statistics Deals (in Million USD)

Table 2 is an overview of the amount of deals, the total deal value (in US\$) and average deal value (in US\$) of the deals in the sample over the years. The sample consists of 360 deals in the UK, in the period 2003-2013.

Deal Characteristics			
Year	Frequency & Size		
	N	Total Deal Value	Average Deal Value
2003	33	25121.25	761.25
2004	34	26020.2	765.30
2005	34	49427.16	1453.74
2006	37	76631.81	2071.13
2007	48	195492.96	4072.77
2008	40	92079.2	2301.98
2009	28	20207.6	721.70
2010	36	102239.64	2839.99
2011	37	80663.7	2180.10
2012	21	19816.02	943.62
2013	12	18124.92	1510.41
Total	360	705824.46	1783.82

Figure 1 illustrates the evolution of proportion of deals done by overconfident CEOs over time within the sample used in this research. This figure seems to indicate that in the years before the crisis, the proportions were fairly more balanced compared to the proportions after the crisis.

Figure 1: Proportion of deals done by overconfident CEOs over time

Figure 1 illustrates the proportions of deals in the sample used in this research that are done by CEOs that are classified as overconfident/not overconfident, based on outsiders perception measured by media coverage. The vertical axis represents the absolute amount of deals, the horizontal axis represents years. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO.

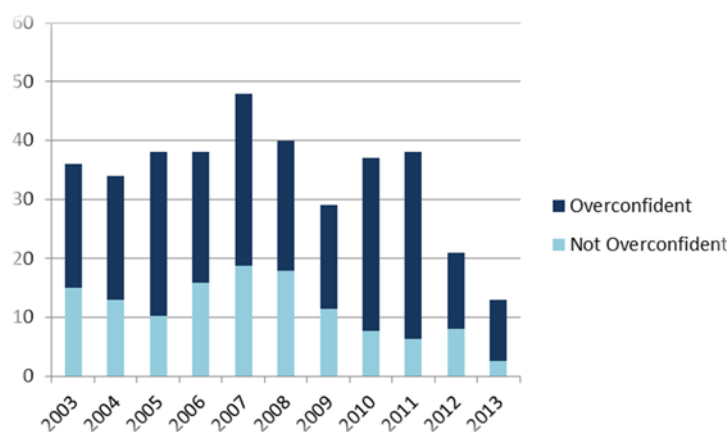


Table 3: Overview of proportions of categorical variables

Table 3 gives an overview of the proportions of the categorical variables used in this research. CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Serial is a dummy variable indicating that the CEO did at least two acquisitions in the past five years. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition.

Proportions variables		
Variable	Observations	Proportion
<i>Independent Variable</i>		
Overconfident	239	0.6638
<i>Dependent Variables</i>		
Serial	165	0.4583
Minority Acquisition	80	0.2222
Diversifier	135	0.3750
Cross-Border	226	0.6277
Cash Payment	180	0.5000

Table 3 provides an overview of the proportion of observations of the categorical variables in the sample of deals. 66.38% of the deals are done by CEOs that are classified as overconfident. Furthermore, 45.83% of the deals in this sample are done by an acquirer who did at least two acquisitions within a period of five years, 22.22% of the deals are minority

acquisitions and 37.50% of the deals are classified as diversifying acquisitions. The majority (62.77%) of deals in this sample are cross-border acquisitions, and in 50% of the acquisitions cash is used as the method of payment.

Table 4: Correlation Table

Table 4 provides the correlations between the variables used in this research. The significance level of the correlation is provided in each cell, in which * = 10% significance, ** = 5% significance and *** = 1% significance. CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Serial is a dummy variable indicating that the CEO did at least two acquisitions in the past five years. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker.. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Firm size is the Log of the value of the total assets of the acquiring firm, measured in US Dollar at the end of the fiscal year. Leverage is the ratio between total leverage and total assets, at the end of the fiscal year. Hostile is a dummy variable indicating that the acquisition is classified as hostile by Thomson One Banker. Payment Cash is a dummy variable indicating that the acquisition is completely paid with cash, according to Thomson One Banker.

Correlation Table									
Variable	Overconfident	Serial	Minority Acquisition	Diversifier	Cross Border	Firm Size	Leverage	Hostile	Payment Cash
Overconfident	1.00								
Serial	.1470***	1.00							
Minority Acquisition	-0.1141**	0.0678	1.00						
Diversifier	-.0743	-.1757***	0.0581	1.00					
Cross-Border	.2243***	-.0240	0.0582	.3487***	1.00				
Firm Size	0.0702	.3395***	0.0339	0.0849	.3719***	1.00			
Leverage	0.0140	-.0466	-.0538	0.0482	-.0878	.3377***	1.00		
Hostile	.0652	.0383	-.0490	.1183*	-.0558	-.0358	.0491	1.00	
Payment Cash	0.02	0.0686	.1182**	-.0302	.1113**	.1099*	-.0258	0.0306	1.00

Table 4 provides the correlations² between the different variables in this research. Regarding the core variable of interest in this research, overconfident, is as expected positively related to the dummy variables Serial and Cross-border, and negatively related to the dummy variable Minority Acquisition. However, no significant correlation between Overconfident and Diversifier, and Overconfident and Payment Cash is observed, while a positive relation between overconfident and both diversifier and payment cash was expected. Furthermore, the correlation matrix shows that several control variables are significantly correlated, such as Firm Size and Leverage, and Firms Size and Cross-Border. This has to be taken into account when interpreting and constructing the regressions, due to the problem of multicollinearity. Multicollinearity can lead to misleading standard error's, conservative t-values and a model that is vulnerable to minor changes (Stock & Watson, 2012). Therefore, Serial, Minority

² Test-statistic correlations: $t = r \sqrt{\frac{n-2}{1-r^2}}$, in which n represents the sample size and r is the sample correlation coefficient

Acquisition and Cross-Border are not included as control variables in the regressions, as they are significantly correlated to the core variable of interest of this research, overconfidence.

5. Results

This section provides the empirical findings of the research. The results of the univariate analysis and the multivariate analysis are presented and discussed. Furthermore, a robustness check on the results is conducted in this section.

5.1 Univariate analysis

Table 5 provides the results of proportion tests, that compare the proportions of the independent variables between the group of CEOs that are classified as overconfident, and the group of CEOs that is not classified as overconfident.

Table 5: Univariate Analysis: proportion tests

This table provides the results of the proportion tests of the categorical variables Serial, Minority Acquisition, Diversifier, Cross-Border and Stock Payment. CEOs are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Serial is a dummy variable indicating that the CEO did at least two acquisitions in the past five years. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition. * = 10% significance, ** = 5% significance and *** = 1% significance.

Univariate Analysis				
	All CEOs	Not Overconfident	Overconfident	Difference
Serial ³	.1761 ³	.1039 ⁴	.2241 ⁵	.1202**
Minority Acquisition	.2222	0.2892	0.1885	(.1007)**
Diversifier	.3750	.4545	.3347	(.1198)**
Cross-Border	.6277	.4793	.7092	.2234***
Cash Payment	.5000	.4876	.5062	.0187
N	360	121	239	

A first striking result is that the proportion of CEOs that is classified as a serial acquirer is significantly higher in the group of overconfident CEOs. This indicates that based

³ Based on unique observations of CEOs (193 observations)

⁴ Proportion based on unique observations of not-overconfident CEOs (77 observations)

⁵ Proportion based on unique observations of overconfident CEOs (116 observations)

on the univariate analysis, H_{1a} should be accepted, CEOs that are classified as overconfident are more likely to be a serial acquirer. It is important to notice that the univariate analysis of H_{1a} is based on observations of CEOs qualified as a serial acquirer to make sure that observations are not double-counted. This leads to a relatively lower amount of observations (193). In the next section a multivariate analysis is used to further analyse H_{1a} , which is based on observations of deals.

A second result that table 5 indicates is that the proportion of minority acquisition is significantly lower in the group of CEOs that are classified as overconfident. This indicates that H_{1b} could be accepted based on the univariate analysis. Overconfident CEOs seems to be less likely to do a minority acquisition in the sample of this research.

The univariate analysis does not provide enough evidence to accept H_{2a} . There is a significant negative difference observed in the proportion of diversifying mergers between the group of CEOs classified as overconfident and the CEOs that are not classified as overconfident. This result deviates from the result found by Malmendier & Tate (2008), who find that overconfident CEOs are more likely to do diversifying mergers. However, the fact that the univariate analysis does not cluster the observations by CEO, but by deal, could affect this results. Particularly, this could be caused by a group of CEOs in the dataset that are classified as overconfident, who did multiple acquisitions within its own industry during the sampling period. An example of this is Graham Mackay of SAB Miller who did several acquisitions within the beer industry during the sampling period of 2003-2013.

Based on the univariate analysis as presented in table 5, H_{2b} should be accepted: the proportion of Cross-Border acquisitions is significantly higher in the group of CEOs classified as overconfident compared to the group of CEOs that is not classified as overconfident. This indicates that overconfident CEOs in this sample are more likely to do Cross-Border acquisitions.

Table 5 does not provide empirical evidence to accept H_4 . While the proportion of acquisitions that are paid with cash is slightly higher in the group of CEOs classified as overconfident, the difference is insignificant.

Table 6 provides the mean-comparison tests of Cumulative Abnormal Returns of the acquirer and the target, between acquisitions done by overconfident CEOs and CEOs that are not overconfident. It is important to note that it was not possible to retrieve cumulative abnormal returns of the acquirer and/or the target for all 360 deals in the sample. For the cumulative abnormal returns of the target firms the main reason for missing observations is

that a part of the target firms are not listed firms. While this might be related to the takeover premium paid, the method of calculating takeover premium used in this research cannot be used for calculating the takeover premium paid for a private target. Therefore, when interpreting the results, the reader should be aware that the results regarding takeover premium paid only holds for listed firms. Furthermore, observations of cumulative abnormal returns of the acquirer are missing. There is no indication that the reason for the missing observations is related to the value of the missing observations.

The univariate analysis does provide sufficient evidence to accept H_{3a} . Based on the mean-comparison tests, overconfident CEOs are paying a significant higher takeover premium, measured by cumulative abnormal returns. This significant difference holds for the three different measuring periods of cumulative abnormal returns of the target, respectively three, five and eleven days around the announcement date. This finding corresponds to the hubris hypothesis of Roll (1986) and the empirical findings of Hayward & Hambrick (1997). The multivariate analysis further analyses this relation.

The mean-comparison test does not provide enough evidence to accept H_{3b} , the difference between the cumulative abnormal returns of overconfident acquirers is not significantly different from cumulative abnormal returns of acquirers that are not overconfident. This result deviates from the findings of Malmendier & Tate (2008). In their research the market response on acquisition announcements by overconfident CEOs is significantly lower compared to announcements by CEOs who are not overconfident.

Table 6: Mean-Comparison Test: Numerical dependent variables

Table 6 provides a mean-comparison test between cumulative abnormal returns (CARs) of acquirers and targets during acquisitions done by overconfident CEOs and CEOs, based on a Welch's T-Test. CEOs are qualified as overconfident, based on outsiders perception, measured by articles in the media. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. * = 10% significance, ** = 5% significance and *** = 1% significance.

Univariate Analysis				
Independent Variable	All CEOs	Not Overconfident	Overconfident	Difference
CAR3 Acquirer	.0150	.0121	.0164	.0043
CAR5 Acquirer	.0135	.0089	.0157	.0067
CAR11 Acquirer	.0215	.0165	.0239	.0073
CAR3 Target	.1371	.1033	.1546	.0512**
CAR5 Target	.1515	.1203	.1675	.0471*
CAR11 Target	.1777	.1384	.1979	.0594**

Table 7 provides a mean-comparison test that compares the average number of articles describing the CEOs in the sample as cautious or as confident. Based on this mean-comparison test, H_{5a} can be accepted. The average number of articles describing a CEO as confident is significantly higher before the crisis. An opposite effect is observed with respect to articles that describe a CEO as cautious. The average number of articles that describe a CEO a cautious after the crisis is significantly higher than before the crisis.

Table 7: Mean-Comparison Test: Outsiders perception before and after crisis

Table 7 provides a mean-comparison test between the average number of articles are classifies CEOs as cautious before and after the crisis, and a mean-comparison test between the articles that classifies a CEO as confident before and after the crisis. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Before crisis indicates that the article is written before the fall of the Lehman Brothers, on September 15, 2008, after crisis indicates that the article is written at or after September 15, 2008. * = 10% significance, ** = 5% significance and *** = 1% significance.

Mean-Comparison Test						
	Cautious			Confident		
	Before Crisis	After Crisis	Difference	Before Cris	After Crisis	Difference
Average Mentions	1.0027	1.8438	.8411***	4.9178	3.4958	1.4219***

In order to analyze research question 1.5b, a split in the data between acquisitions that occur before the crisis and after the crisis is made. The results of this analysis, regarding the categorical dependent variables is presented in table 8:

Table 8: Univariate Analysis: Comparison before and after crisis categorical dependent variables

This table provides the results of the proportion tests of the variables Serial, Minority Acquisition, Diversifier, Cross-Border and Stock Payment. CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Serial is a dummy variable indicating that the CEO did at least two acquisitions in the past five years. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition. A split in the data is made between observations before and after the crisis. Acquisitions done before or in 2008 are classified as 'Before the Crisis'. * = 10% significance, ** = 5% significance and *** = 1% significance.

	Before the Crisis				After the Crisis			
	All CEOs	Overconfident	Overconfid	Difference	All CEOs	Overconfident	Overconfident	Difference
Serial	.4488	.2394	.5454	.3060***	.4741	.36	.5411	.1811**
Minority Acquisition	0.2311	.3098	.1948	-.1150**	0.2074259	.26	.1765	-.0835
Diversifier	0.3517	.4245	.3181	-.1043**	0.4145593	.5	.3643	-.1353**
Cross-Border	0.5555	.3521	.6493	.2972***	0.7481481	.66	.8	.1400**
Cash Payment	0.5066	.4507	.5324	.0818	0.4888741	.5400	.4588	-.0811
N		71	154			50	85	

The difference in proportion of deals that are part of a series of acquisitions between overconfident and non-overconfident CEOs seems to be persistent, and this difference is observed both before and after the crisis. However, this difference declined after the crisis, which is mainly caused by an increase of serial acquisitions in the group of CEOs that are not overconfident. It is important to notice that proportion comparison of table 8 is deals-based, contrary to the comparison of table 5. The comparison of table 8 is deals-based, because CEOs that are serial acquirers, might do a series of acquisitions both before and after the crisis. This could make a proportion comparison before and after the crisis based on CEOs misleading. Regarding the proportion of minority acquisitions, the difference between overconfident and not overconfident CEOs is not significant for deals after the crisis. While the difference in proportion of minority acquisitions between overconfident CEOs and CEOs that are not overconfident is slightly declining after the crisis, this might also be caused by a decrease in observations, particularly of acquisitions by overconfident CEOs (from 154 to 85), after the crisis, leading to a decrease in statistical power. The significant difference in proportion of diversifying mergers between the group of overconfident CEOs and the group of CEOs that are not overconfident seems to be persistent, and is significant both before and after the crisis. While the difference in the proportion of Cross-Border acquisitions between the two groups declines after the crisis, the difference is still significant in both periods. The convergence is mainly caused by an increase of Cross-Border acquisitions by CEOs that are not classified as overconfident. With respect to the payment method, the difference is insignificant both before and after the crisis.

Table 9 provides mean-comparison tests of the numerical dependent variables, with a split in the data between acquisitions that occur before the crisis and after the crisis, in order to analyze research question 1.5b.

The difference between cumulative abnormal returns of overconfident and not overconfident acquirers changes after the crisis. Where the difference is insignificant before the crisis, with all estimation periods of the cumulative abnormal returns, the market response on acquisition announcements by overconfident CEOs after the crisis is significantly lower, compared to announcements of acquisitions by CEOs that are not overconfident, when an event window of three days (CAR3) is used. However, when the other event windows are used, no significant difference in announcement effects are observed.

With respect to takeover premiums, before the financial crisis of 2008 the mean takeover premium paid by the group of overconfident CEOs is significantly higher, for all estimation periods of cumulative abnormal returns. However, not all differences remain significant after the crisis. This might be explained by the relatively lower amount of observations after the crisis. However, when an event window of 11 days is used, the mean takeover premium paid by the group of overconfident CEOs is significantly higher. Furthermore, it is worth noticing that the mean takeover premium observed after the crisis were on average higher than before the crisis, both for the group of overconfident CEOs and the group of CEOs that are not overconfident.

Table 9: Univariate Analysis: Comparison before and after crisis numerical dependent variables

This table provides the results mean-comparison tests of the numerical dependent variables, based on a Welch's T-Test. A dataset of 350 acquisitions in the period 2003-2013 in the UK is used. CAR3 Acquirer, CAR5 Acquirer and CAR 11 Acquirer represent the cumulative abnormal return of the acquirer on respectively 3, 5 or 11 days around the announcement date of the acquisition. CAR3 Target, CAR5 Target and CAR Target represent the cumulative abnormal returns of the target respectively 3, 5 or 11 days around the announcement date of the acquisition.

CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Firm size is measured by the log value of the total assets at the end of the year. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available.. * = 10% significance, ** = 5% significance and *** = 1% significance.

	Before the Crisis				After the Crisis			
	Not				Not			
	All CEOs	Overconfid	Overconfident	Difference	All CEOs	Overconfid	Overconfident	Difference
CAR3 Acquirer	.0173	.0079	.0212	.0172	.0111	.0181	.0069	-.0110*
CAR5 Acquirer	.0137	.0032	.0183	.0151	.0130	.0173	.0104	-.0068
CAR11 Acquirer	.0258	.0158	.0301	.0144	.0138	.0177	.0115	-.0062
N	203	61	142		114	42	72	

	Before the Crisis				After the Crisis			
	Not				Not			
	All CEOs	Overconfident	Overconfident	Difference	All CEOs	Overconfident	Overconfident	Difference
CAR3 Target	.1172	.0754	.1394	.1172*	.1718	.1384	.1950	.0566
CAR5 Target	.1328	.1019	.1459	.0440*	.1838	.1435	.2119	.0684
CAR11 Target	.1609	.1243	.1765	.0522*	.2068	.1563	.2420	.0857*
N	97	29	68		56	23	33	

5.2 Multivariate analysis

To control for several factors that could affect the relation between the dependent variables and the main variable, overconfident, several regressions are conducted. Table 10 provides the

results of the logit regressions that are used to test H_{1a} , H_{1b} , H_{2a} , H_{2b} and H_4 . Table 17, in the appendix, shows the results of these regressions without fixed year effects. It is important to note that compared to the univariate analysis, the amount of observations used for the multivariate analysis dropped from 360 to 296. This is caused by missing observations for one or more of the control variables that are retrieved from Compustat (Log Size, Leverage and Cash). There are several reasons for these missing observations, such as a mismatch between the identifiers given by Thomson One and required by Compustat. There is no indication that the reason for these missing observations is related to the values of the missing observations. Particularly, because the sample already only consists of acquirers that are relatively large and publicly listed in the UK, it is not expected that the missing of these observations is related to firm size, , the capital structure of these firms (leverage) or the availability of cash. Furthermore, due to the low amount of observations of hostile acquisitions, this control variable is automatically dropped by Stata because it would be a perfect predictor in this logistic regression.

Based on regression 1, H_{1a} should be accepted. Overconfidence is positively related to serial acquisitions, at a 10%-significance level. Given that this is a logit regression, with a binary dependent variable, and that the main variable of interest, overconfident, of this research is a binary variable as well, the coefficient of .8464 can be interpreted as follows (UCLA: Statistical Consulting Group, 2016). The coefficients that are presented in this logistic regression are the logarithmic transformation of the ratio of the odds of an overconfident CEO relative to a CEO that is not overconfident to be a serial acquirer. This means that the odds of an overconfident CEO to be a serial acquirer is about 133%⁶ higher than of a CEO that is not overconfident. This result is in line with the univariate analysis as presented in table 5, which shows that the probability of an overconfident CEO to be a serial acquirer is significantly higher compared to a CEO that is not overconfident. However, one should be aware of the different nature of both analyses. The univariate analysis tests if an overconfident CEO is more likely to be a serial acquirer as well. In this analysis the dependent variable is related to characteristics of the CEO, and sample is based on observations of CEOs. The multivariate analysis tests if there is a relation between deals that done by CEOs that are classified as serial acquirer, indicating that the CEO did at least two acquisitions in the past five years, and overconfidence. In this case the dependent variable is based on observations of deals, which leads to a higher amount of observations. In order to correct for correlation of standard errors

⁶ $e^{.8464} = 2.3314$

across CEOs in the multivariate analysis, which is very likely in this case, clustered standard errors are used.

Regression 2, as presented in table 10 confirms that there is a negative relation between overconfident CEOs and minority acquisitions, at a 5%-significance level. The coefficient of $-.6477$ of the variable *overconfident* indicates that the odds of an overconfident CEO to do a minority acquisition are about 48%⁷ lower compared to CEOs that are not overconfident. Therefore, based on both the univariate analysis and the multivariate analysis, H_{1b} should be accepted: overconfidence is negatively related to minority acquisitions.

The multivariate analysis also confirms the remarkable negative relation between overconfidence and diversifying mergers, based on regression 3. The coefficient of $-.7177$, with a significance level of 5%, indicates that the odds of an overconfident CEO to do a diversifying acquisition is about 51%⁸ lower compared to the odds to do a diversifying acquisition of a CEO that is not overconfident. Both the univariate analysis and multivariate analysis indicate this negative relation, which is opposite to previous empirical research by Malmendier & Tate (2008) and the expected relation *ex ante*. Therefore, H_{2a} should be rejected based on the empirical results of this research. Overconfident CEOs are actually less likely to do diversifying mergers. Possible explanations for this opposite findings are a clustering of observations of overconfident CEOs doing several acquisitions within their own industry, or a shift in paradigm regarding diversifying acquisitions, that also affects the view of overconfident CEOs on diversifying acquisitions.

Regression 4 of table 10 shows that based on the multivariate analysis, H_{2b} should be accepted. Overconfidence is positively related to cross-border acquisitions, at a 1%-significance level. The coefficient of 1.3444 indicates that the odds of an overconfident CEO to do a cross-border acquisition are 283%⁹ higher than the odds of a CEO that is not overconfident to do a cross-border acquisition. This corresponds to the expectations *ex ante*, and the results of the univariate analysis.

Again, the multivariate analysis does not provide enough evidence to accept H_4 , based on regression 5. There is no significant relation between overconfidence and cash as payment method in an acquisition.

⁷ $e^{-.6477} = .5232$

⁸ $e^{-.7177} = .4878$

⁹ $e^{1.3444} = 3.8361$

Table 10: Multivariate Analysis: Categorical Dependent Variables

This table provides the results of a logit multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. Serial is a dummy variable indicating that the CEO did at least two acquisition in a five year period. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition..

CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Z-scores, based on standard errors that are clustered by CEO, are provided between the brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis					
	Serial	Minority Acquisition	Diversify	Cross-Border	Cash Payment
	(1)	(2)	(3)	(4)	(5)
Overconfident	.8464*	-.6477**	-.7177**	1.3444***	-.0584
	(1.67)	(-1.97)	(-1.96)	(3.85)	(-.21)
Firm Size	.6507	-.0186	.0191	.5539	.1471
	(3.89)	(-.22)	(.16)	(4.53)	(1.95)
Leverage	-3.59	-.9524	.4569	-3.1996**	-.6059
	(-3.22)	(-1.35)	(.49)	(-2.47)	(-.87)
Cash	.0001	.0003**	.0003*	-.0008	-.0002
	(.36)	(2.51)	(1.86)	(-.50)	(-.25)
Diversifier	.0444	-.1583		.0250	-.0032
	(.10)	(.47)		(.02)	(-.01)
Payment Cash	.0463	.7151**	-.0015	.3740	
	(.15)	(2.07)	(-.01)	(1.25)	
Regression	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT
Fixed Effects Years	YES	YES	YES	YES	YES
Constant	-6.393	-1.8243	-.1596	-3.9203	.4117
N	296	296	296	296	296
R ²	.2706	.0923	.0513	.2518	.0305

In table 11 the results of the multivariate analysis to test H_{3a} and H_{3b} are presented. Table 18, in the appendix, shows the results of these regressions without fixed year effects.

Table 11: Multivariate Analysis: Numerical Dependent Variables

This table provides the results of an Ordinary Least Squares (OLS) multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. CAR3 Acquirer, CAR5 Acquirer and CAR 11 Acquirer represent the cumulative abnormal return of the acquirer on respectively 3, 5 or 11 days around the announcement date of the acquisition. CAR3 Target, CAR5 Target and CAR Target represent the cumulative abnormal returns of the target respectively 3, 5 or 11 days around the announcement date of the acquisition.

CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Hostile is a dummy variable indicating that the acquisition is classified as hostile by Thomson One Banker. T-values, based on standard errors that are clustered by CEO, are provided between brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis						
	CAR3 Target	CAR5 Target	CAR11 Target	CAR3 Acquirer	CAR5 Acquirer	CAR11 Acquirer
	(6A)	(6B)	(6C)	(7A)	(7B)	(7C)
Overconfident	.0663** (2.00)	.0570 (1.64)	.0816** (2.14)	-.0035 (-.48)	-.0011 (-.16)	-.0005 (-.06)
Firm Size	.0125* (1.89)	.0127* (1.82)	.0107 (1.35)	-.0035** (-2.25)	-.0025 (-1.54)	-.0041** (-2.05)
Leverage	-.1111* (-1.90)	-.0971 (-1.63)	-.1125* (-1.72)	-.0074 (-.48)	.0037 (.23)	-.0076 (-.36)
Cash	-.0005 (-0.52)	-.0005 (-.45)	-.0009 (-.83)	-.0003 (-1.32)	-.0009** (-2.18)	.0002 (.09)
Diversifier	-.0071 (-.25)	-.0053 (.02)	.0011 (.03)	.0002 (.04)	.0022 (.34)	-.0007 (-.09)
Payment Cash	-.0109 (-.34)	.0005 (.002)	.0155 (.45)	-.0017 (-.30)	-.0005 (-.08)	.0003 (.05)
Hostile	.2382*** (2.36)	.2704*** (2.92)	.2217*** (3.07)	.0056 (.23)	.0031 (.11)	.0085 (.26)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Fixed Effects Years	YES	YES	YES	YES	YES	YES
Constant	.1521	.1586	.2077	.0550	.0381	.0558
N	143	143	143	268	268	268
R ²	.1349	.1236	.1194	.1033	.1214	.0470

Based on event windows of three and eleven days around the announcement date, as presented with regression 6A and 6C table 11 does provide sufficient evidence to accept H_{3a} , overconfidence is positively related to takeover premium, at a 5%-significance level. The coefficients indicate that the cumulative abnormal returns of targets firms that are acquired by a firm with an overconfident CEO, are respectively 6.63% (based on an event window of three days) till 8.16% higher (based on an event window of eleven days). However, with an event window of five days (CAR5) the relation between overconfidence and takeover premium is not significant. This result deviates from the result of the univariate analysis, as presented in table 6, which indicates that overconfidence is positively related to CAR5.

Regarding the control variables, it is worth noticing that regression 6A, 6B and 6C all show a significant positive relation between hostile takeovers and takeover premium. This result corresponds with the findings of Schwert (2000).

The results of regressions 7A, 7B and 7C indicate that there is not sufficient evidence to accept H_{3b} , there is no significant relation between overconfidence and returns of the acquirer around the announcement date, based on the multivariate analysis. This result corresponds with the findings of the univariate analysis, and deviates from the expectations ex ante, which predicted a negative relation between the dummy variable overconfident, and cumulative abnormal returns of the acquiring firm.

Table 12 presents the logit regressions in order to test H_5 , regarding the categorical dependent variables.

To test whether there is an interaction effect between overconfidence and after crisis, a chi-square test is conducted. The chi-square test measures if there is a significant association between two categorical variables, in this case overconfidence and after crisis, significantly affecting the dependent variable. Based on the results of table 12, and the chi-square tests that are presented, it seems that there is an interaction effect between overconfidence and after crisis affecting the dependent variables Diversify and Cross-Border, and because the interaction effect is in both cases negative, it seems that the financial crisis amplified the negative relation between overconfidence and diversify and diminished the effect of overconfidence in the case of Cross-Border acquisitions. This indicates that H_{5b} can only partly be accepted, the financial crisis only seems to interact with the effect of overconfidence for the variables Diversify and Cross-Border.

Table 12: Multivariate Analysis: Categorical Dependent Variables

This table provides the results of a logit multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. Serial is a dummy variable indicating that the CEO did at least two acquisition in a five year period. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition..

CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. After Crisis is a dummy variable indicating that the deal took place after the financial crisis of 2008. Overconfident*AfterCrisis is an interaction variable between Overconfident, and a dummy variable AfterCrisis, indicating that the deal took place after the financial crisis of 2008. Z-scores, based on standard errors that are clustered by CEO, are provided between brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis					
	Serial	Minority Acquisition	Diversify	Cross-Border	Cash Payment
	(8)	(9)	(10)	(11)	(12)
Overconfident	1.000	-.5259	-.4594	1.5761***	.1717
(η_1)	(1.53)	(-1.21)	(-1.11)	(3.55)	(.46)
Firm Size	.6684***	-.0202	.0153	.5510***	.1429
	(3.89)	(-.23)	(.13)	(4.53)	(1.89)
Leverage	-3.5434***	-.9068	.5388	-3.0819	-.5233
	(-3.18)	(-1.31)	(.58)	(-2.36)	(-.74)
Cash	.0001	.0003**	.0003*	-.0007	-.0001
	(.37)	(2.51)	(1.93)	(-.44)	(-.14)
Diversifier	.0370	-.1668		-.0051	-.0212
	(.09)	(-.49)		(-.01)	(-.08)
Payment Cash	.0306	.7091**	-.0203	.3504	
	(.10)	(2.04)	(-.08)	(1.17)	
After Crisis	-1.9756	-1.5225	1.3269	-.1244	1.5248*
	(-1.61)	(-1.25)	(1.51)	(-.15)	(1.75)
Overconfident * AfterCrisis	-.3665	-.3290	-.6321	-.6431	-.5721
(η_2)	(.45)	(-.48)	(-.95)	(-.95)	(-1.02)
Regression	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT
Fixed Effects Years	YES	YES	YES	YES	YES
Constant	-4.2564	-.2118	-1.2606	-3.5817	-.9056
N	296	296	296	296	296
Pseudo-R ²	.2715	.0931	.0546	.2543	.0333
χ^2 ($\eta_1 + \eta_2 = 0$)	.97	2.58	3.39*	3.01*	.89

Table 13 presents the OLS regressions in order to test H_{5b} , with respect to the numerical dependent variables.

Table 13: Multivariate Analysis: Numerical Dependent Variables

This table provides the results of an Ordinary Least Squares (OLS) multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. CAR3 Acquirer, CAR5 Acquirer and CAR 11 Acquirer represent the cumulative abnormal return of the acquirer on respectively 3, 5 or 11 days around the announcement date of the acquisition. CAR3 Target, CAR5 Target and CAR Target represent the cumulative abnormal returns of the target respectively 3, 5 or 11 days around the announcement date of the acquisition.

CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition. After Crisis is a dummy variable indicating that the deal took place after the financial crisis of 2008 Overconfident*AfterCrisis is an interaction variable between Overconfident, and a dummy variable AfterCrisis, indicating that the deal took place after the financial crisis of 2008. T-values, based on standard errors that are clustered by CEO, are provided between brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis						
	CAR3 Target	CAR5 Target	CAR11 Target	CAR3 Acquirer	CAR5 Acquirer	CAR11 Acquirer
	(13A)	(13B)	(13C)	(14A)	(14B)	(14C)
Overconfident	.0665	.0389	.0518	-.0032	-.0026	.0003
(η_1)	(1.61)	(.82)	(1.02)	(-.31)	(-.23)	(.02)
Firm Size	.0125*	.0131*	.0113	-.0035**	-.0025	-.0041**
	(1.76)	(1.68)	(1.34)	(-2.05)	(-1.60)	(-2.07)
Leverage	-.1110*	-.1035	-.1230	-.0074	.0032	-.0073
	(-1.72)	(-1.43)	(-1.55)	(-.43)	(.20)	(-.37)
Cash	-.0005	-.0004	-.0009	-.0003*	-.0009***	.0003
	(-.50)	(-.41)	(-.77)	(-1.72)	(-3.23)	(.10)
Diversifier	-.0071	-.0029	.0049	.0001	.0023	-.0008
	(-.32)	(-.09)	(.13)	(.03)	(.37)	(-.09)
Payment Cash	-.0109	.0017	.0175	-.0018	-.0004	.0003
	(-.32)	(.05)	(.48)	(-.29)	(-.07)	(.04)
Hostile	.2383**	.2650***	.2129***	.0056	.0031	.0084
	(2.48)	(3.19)	(3.41)	(.34)	(.18)	(.37)
AfterCrisis	.0946	.0599	.0754	-.0006	.0084	.0024
	(.92)	(.57)	(.67)	(-.03)	(.35)	(.10)
Overconfident * AfterCrisis	-.0004	.0443	.0728	-.0005	.0034	-.0022
(η_2)	(-.01)	(.65)	(1.04)	(-.04)	(.26)	(-.13)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Fixed Effects Years	YES	YES	YES	YES	YES	YES
Constant	.0577	.0816	.1042	.0560	.0414	.0638
N	143	143	143	268	268	268
R ²	.1349	.1262	.1257	.1033	.1216	.0470
F ($\eta_1 + \eta_2 = 0$)	1.27	2.30	5.13**	.18	.01	.03

Based on the regressions 13A, 13B and 13C presented in table 13, it seems that there is only an interaction effect between overconfidence and the financial crisis of 2008 with respect to takeover premium paid, based on an event window of eleven days around the announcement date, used in regression 13C. Because the interaction term is positive, it seems that the financial crisis amplified the difference in takeover premium paid between overconfident CEOs and CEOs that are not overconfident. With respect to announcement effects, no interaction effect between the financial crisis and overconfidence is observed, based on regressions 14A, 14B and 14C.

5.3 Robustness check

Overconfidence is a complex state of mind of the CEO that is difficult to capture in one measure. Particularly, it is possible that relations between the dependent variables investigated in this research and the measure of overconfidence used in this research, which is based on outsiders perception, are simultaneous. For example, CEOs who do frequent acquisitions during the sampling period might be more likely to be perceived as overconfident by outsiders because they are doing frequent acquisitions. Therefore, this section provides a robustness check, in which the measure of overconfidence is replaced by an alternative measure of overconfidence.

5.3.1 Measure of overconfidence & Descriptive statistics

Alternative measure of overconfidence

Previous literature provides several suggestions for an alternative measure of overconfidence. While it would be logical to follow Malmendier & Tate (2008), and use the option-based measure of overconfidence, no dataset is available for this research that consists of data about the personal portfolio of CEOs in the UK. Instead, this paper uses a measure of overconfidence suggested by Hayward & Hambrick (1997) for a robustness check. This measure of overconfidence is called self-importance, and is a ratio based on the salary of the CEO relative to the salary of the second-highest paid officer of the firm:

$$\text{Self – Importance} = \frac{\text{Salary CEO}}{\text{Salary second – highest paid officer}}$$

The ideas behind this alternative measure of overconfidence is that CEOs can influence the level of their own salary, but also on the level of salary of the other executives. A high ratio of its own salary, relative to the second-highest paid officer would be a reflection of a CEO finding him or herself relatively more important than the other executives, compared to CEOs that have a lower ratio. According to Hayward & Hambrick, a high level of ‘self-importance’ is a reflection of a personal trait of hubris or overconfidence.

Descriptive statistics

Table 14 provides an updated correlation table¹⁰, in which the variable self-importance is added, relative to the correlation table provided in table 4. Table 14 shows that there is a significant, negative relation between self-importance and minority acquisition, which corresponds with the correlation between overconfident and minority acquisition.

Furthermore, it is worth noticing that the relation between overconfident and self-importance is positive, but insignificant. This indicates that the variable self-importance does not exactly measure the same effect as the variable overconfident.

Table 14: Correlation Table

Table 5 provides the correlations between the variables used in this research. The significance level of the correlation is provided in each cell, in which * = 10% significance, ** = 5% significance and *** = 1% significance.

Self-Importance is the ratio between the annual salary of the CEO and the second-highest paid officer. Serial is a dummy variable indicating that the CEO did at least two acquisitions in the past five years. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Firm size is the Log of the value of the total assets of the acquiring firm, measured in US Dollar at the end of the fiscal year. Leverage is the ratio between total leverage and total assets, at the end of the fiscal year. Hostile is a dummy variable indicating that the acquisition is classified as hostile by Thomson One Banker. Payment Cash is a dummy variable indicating that the acquisition is completely paid with cash, according to Thomson One Banker.

Correlation Table									
Variable	Self-Importance	Serial	Minority Acquisition	Diversifier	Cross Border	Firm Size	Leverage	Hostile	Payment Cash
Self-Importance	1.00								
Serial	.0892	1.00							
Minority Acquisition	-.02143***	0.0678	1.00						
Diversifier	-.0553	-0.1757***	0.0581	1.00					
Cross Border	-.0667	-.0240	0.0582	.3487***	1.00				
Firm Size	-.2647***	.3395***	0.0339	0.0849	.3719***	1.00			
Leverage	-.1071	-.0466	-.0538	0.0482	-.0878	.3377***	1.00		
Hostile	.1413*	.0383	-.0490	.1183*	-.0558	-.0358	.0491	1.00	
Payment Cash	.0887	0.0686	.1182**	-.0302	.1113**	.1099*	-.0258	0.031	1.00
Overconfident	0.1165	.1470***	-0.1141**	-.0743	.2243***	0.0702	0.0140	.0652	0.02

¹⁰ Test-statistic correlations: $t = r \sqrt{\frac{n-2}{1-r^2}}$, in which n represents the sample size and r is the sample correlation coefficient

With respect to the control variables, a significant negative relation between self-importance and firm size is found. This deviates from the results as presented in table 4. A possible explanation for this negative relation could be that for larger firms the second-highest paid officer (usually the CFO) is relatively more important than for smaller firms, because larger firms are more complex to manage, leading to a relatively higher salary for the second-highest paid officer and a smaller gap between the CEO and the second-highest paid officer. Table 14 also shows a significant positive relation between self-importance and hostile. Because self-importance is significantly correlated to two control variables, of which it is significantly correlated at a 1%-level to one of the control variables, including both control variables in the robustness check would probably lead to multicollinearity, as the effect of self-importance is significantly correlated to two control variables, leading to large standard-errors and low t-values. Therefore, firm size and hostile are excluded as control variables in the robustness check. However, excluding these variables leaves the problem of omitted variable bias, in which the independent variable, in this case self-importance, is correlated with the error term. This omitted variable bias occurs if important control variables are excluded from the regression, and could lead to biased estimators (Stock & Watson, 2008). Therefore, the appendix presents a regression in which firm size and hostile are included as control variables, to check how this effects the coefficient of self-importance in the regression.

5.3.2 Multivariate analysis

Table 15 presents the robustness check of the categorical dependent variables. It is important to note that the amount of observations is lower in this robustness check, compared to the multivariate analysis presented in table 10, 11, 12, and 13. This is caused by missing observations about the remuneration of CEOs, provided by Capital IQ. There is no indication that the missing of the observations is related to the value of the observations.

Table 15: Robustness Check Categorical Dependent Variables

This table provides the results of a logit multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. Serial is a dummy variable indicating that the CEO did at least two acquisition in a five year period. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition..

Self-Importance is the ratio between the annual salary of the CEO and the second-highest paid officer. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Z-scores, based on standard errors that are clustered by CEO, are provided between the brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis					
	Serial	Minority Acquisition	Diversify	Cross-Border	Cash Payment
	(1)	(2)	(3)	(4)	(5)
Self-Importance	1.9761*	-.8917*	-.1667	.1296	1.0190**
	(1.66)	(-1.68)	(-.26)	(.20)	(2.31)
Leverage	-2.3286	-1.8483	1.1202	-4.5274***	-1.7212
	(-1.35)	(-1.59)	(.92)	(-2.97)	(-1.41)
Cash	.0003**	.0004**	.0001	.0004	.0003**
	(2.25)	(2.55)	(.95)	(1.46)	(2.28)
Diversifier	-.0899	-.1054		-.1248	-.0240
	(-.18)	(-.19)		(-.26)	(-.07)
Payment Cash	-.2563	.9420*	-.0295	.3187	
	(-.64)	(1.84)	(-.09)	(.75)	
Regression	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT
Fixed Effects Years	YES	YES	YES	YES	YES
Constant	-2.3094	1.9219	.2494	2.6467	-.3050
N	152	152	152	152	152
Pseudo-R ²	.2024	.1702	.0493	.1676	.0512

Regression 1 shows a significant positive relation between self-importance and serial, which corresponds with the findings of regression 1 presented in table 10. In regression 2, a significant negative relation between self-importance and minority acquisition is presented, which corresponds with regression 2 in table 10. The result of regression 3 deviates from the result of regression 3 in table 10. While table 10 shows a significant negative relation between overconfidence and diversify, the relation between self-importance and diversify is insignificant. The same holds for the relation between self-importance and cross-border. The insignificance of this relation indicates that there is no sufficient evidence to state that the negative relation between overconfidence and diversifying acquisition, and positive relation between overconfidence and cross-border acquisitions is robust. Regression 5 shows a significant, positive relation between self-importance and cash payment. This is remarkable, as regression 5 of table 10 does not show such a significant positive relation, while this positive relation between overconfidence and cash payment was expected ex ante.

Table 19 in the appendix provides the regressions but with an inclusion of the control variable firm size, to test how omitting an important control variable like firm size affects the estimator of self-importance. The coefficients of self-importance in the regressions presented table 19 are similar to the estimators of self-importance as presented in table 15. Furthermore, self-importance remains a significant predictor of the dependent variables serial, minority acquisition and cash payment. While the regressions as presented in table 15 suffer from omitted variable bias, particularly with respect to regression 1, as firm size is a significant predictor of the dependent variable serial, it seems that omitting this control variable does not have a strong impact on the estimators of self-importance.

Table 16: Robustness Check Numerical Dependent Variables

This table provides the results of an Ordinary Least Squares(OLS) multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. CAR3 Acquirer, CAR5 Acquirer and CAR 11 Acquirer represent the cumulative abnormal return of the acquirer on respectively 3, 5 or 11 days around the announcement date of the acquisition. CAR3 Target, CAR5 Target and CAR Target represent the cumulative abnormal returns of the target respectively 3, 5 or 11 days around the announcement date of the acquisition.

Self-Importance is the ratio between the annual salary of the CEO and the second-highest paid officer. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. T-values, based on standard errors that are clustered by CEO, are provided between brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis						
	CAR3 Target	CAR5 Target	CAR11 Target	CAR3 Acquirer	CAR5 Acquirer	CAR11 Acquirer
	(6A)	(6B)	(6C)	(7A)	(7B)	(7C)
Self-Importance	.0918*	.1158**	.1035*	-.0074	-.0047	-.0201
	(1.89)	(2.04)	(1.68)	(-.69)	(-.41)	(-1.55)
Leverage	-.1433	-.1988	-.2517	.0136	.0269	-.01787
	(-1.07)	(-1.29)	(-1.58)	(.59)	(1.10)	(-.51)
Cash	.0001	.0002	.0001	-.0007***	.0001***	-.0004
	(.94)	(1.09)	(.89)	(-3.23)	(3.97)	(-1.43)
Diversifier	-.0462	-.0462	-.0172	.0136*	-.0113	-.0127
	(-.87)	(-.87)	(-.29)	(1.80)	(-1.36)	(-1.21)
Payment Cash	-.0010	-.0010	-.0024	.0059	.0062	.0086
	(-.02)	(-.02)	(-.002)	(.81)	(.76)	(.81)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Fixed Effects Years	YES	YES	YES	YES	YES	YES
Constant	-.0426	-.0426	.0295	.0298	.0205	.0735
N	67	67	67	149	149	149
R ²	.1778	.1902	.2201	.1635	.2197	.1484

Table 16 provides the robustness checks of the regressions with numerical dependent variables. The results of regressions 6A and 6C correspond with the findings presented in table 11; a significant positive relation between self-importance and takeover premium, measured by Cumulative Abnormal Returns of the target firm, is observed using an event

window of respectively three and eleven days. While regression 6B in table 11 does not show a significant positive relation between overconfidence and takeover premium paid, based on an event window of five days (CAR5 Target), table 16 does show a significant positive relation between self-importance and CAR5 Target. Regressions 7A, 7B and 7C correspond with the findings presented in table 11. No significant relation between self-importance and the cumulative abnormal returns of the acquirer is found based on these regressions.

Regressions in which firm size and hostile are included as control variables are provided in table 20 in the appendix. As expected, after the inclusion of both firm size and hostile, the estimator self-importance is not a significant predictor for the cumulative abnormal return of the target, based on all three event windows, due to large standard errors caused by multicollinearity. Nevertheless, the coefficients for self-importance presented in table 20 for regressions 6A, 6B and 6C are comparable to the coefficients provided in table 16. The same observation holds for regressions 7A, 7B, 7C. What is remarkable, is that after the inclusion of hostile and firm size, self-importance is a significant negative predictor of cumulative abnormal returns of the acquirer, using an event window of eleven days. However, given that in all other regressions this relation is not found, there is no sufficient evidence to state that based on the empirical results of this research there is a relation between overconfidence and cumulative abnormal returns of the acquirer.

6. Discussion & Conclusion

This section provides a discussion on how overconfidence is related to decisions made during an acquisitions with respect to different aspects of the acquisition, based on the empirical findings of this research. Furthermore, this section provides a discussion on the practical implications of these findings for overconfident managers and decision influencers, such as board members and shareholders. Suggestions for further research are made, and the paper comes to a conclusion.

Overconfidence and acquisition activity

Based on both the univariate analysis and the multivariate analysis, H_{1a} can be accepted. Furthermore, this observations is supported by the robustness check. Therefore, the empirical analysis does provide sufficient convincing evidence to state that within the sample used in

this research, overconfident CEOs are more likely to be a serial acquirer. Based on the empirical findings, further research on the relation between overconfidence and serial acquisitions can be recommended. Particularly, in order to gain more knowledge on the relation between overconfidence and serial acquisitions, it would be useful to analyse if this is a causal relation. Because overconfidence is a variable that is difficult to measure, it requires different research methods and an in-depth analysis of overconfidence to be able to analyse if this relation is indeed causal. A collaboration between scholars in the field of social psychology and in the field of financial economics would strengthen this analysis. If a causal relation between overconfidence and serial acquisitions can be confirmed, this would have important implications. Particularly, shareholders of a firm that is doing a series of acquisition should be aware of this information, if they have to vote for the next acquisition in a series of acquisitions. The decision by the CEO to do another acquisition might rather be caused by overconfidence than by rational reasoning. Likewise, for board members of a firm that is doing serial acquisitions this would be valuable information, when evaluating an acquisition proposal by a CEO.

The empirical analyses of this research does confirm a significant relation between minority acquisitions and overconfidence. Both univariate analysis and multivariate analysis confirm this relation, and therefore H_{1b} should be accepted, a finding that is supported by the robustness check. This is an extension of the findings of Betton, Eckbo & Thorburn (2009) who suggest that a toehold strategy does pay off, but is not often pursued by acquirers. The data in this research indeed confirms that minority acquisitions are not very often observed (22.25% of the deals in the dataset are qualified as minority acquisitions), and overconfident CEOs are even less likely to do a minority acquisition and in that sense pursue a toehold strategy. This could be interpreted as a missed opportunity by overconfident CEOs in the bidding process to lower the takeover premium. Furthermore, it might be a missed opportunity as Aghion & Tirole (1994) argue that majority acquisitions could imperil technical innovation, a view that is empirically supported by findings of Fee, Hadlock & Thomas (2006). Based on these results, a first suggestion would be for overconfident CEOs to consider pursuing a toehold strategy more often. Their key decision influencers, board members and shareholders, could use to information to influence the overconfident manager to consider a toehold strategy.

Overconfidence and selection of the target

Based on the empirical findings of both the univariate and the multivariate analysis, H_{2a} should not be accepted. In the sample used in this research, overconfident CEOs are not more likely to do diversifying acquisitions. In fact, the empirical analysis finds a significant negative relation between overconfidence and diversifying acquisitions, indicating that overconfident CEOs are less likely to do a diversifying acquisition. However, the robustness check does not support this finding, and indicate no relation at all between overconfidence and diversifying acquisitions. Nevertheless, both finding are contrary to the findings of Malmendier & Tate (2008). There are several possible explanations for this finding. First, it might be that there is a concentration within the sample period of acquisitions within an industry by overconfident CEOs. Graham Mackay of SAB Miller is an example of a CEO that is classified as overconfident, who did serial acquisitions within the beer industry during the sampling period. Second, the opposite relation between overconfidence and diversifying acquisitions found in this research might be caused by the fact that the sampling period of this research deviates from the research of Malmendier & Tate. As mentioned by Davis, Diekmann & Tinsley (1994), the conglomerate firm was a dominant corporate form in the 1980s in the US. They also state that the popularity of this corporate form declined after 1990. Because Malmendier & Tate (2008) use a dataset of deals in the US, from 1980-1994, it is likely that the popularity of building conglomerates by diversifying acquisitions during their sampling period influenced their findings. Contrary, the sampling period of this research is in the period 2003-2013, a period in which conglomerates are more criticised, by scholars such as Lamont & Polk (2002) and Laeven & Levine (2007) and by strategy consultants such as Chris Zook & James Allen (2001). This shift in paradigm might explain the deviating results found in this research, compared to the findings of Malmendier & Tate (2008), the group of overconfident CEOs share the view of these scholars and strategy consultants on diversifying acquisitions.

The empirical findings, both the univariate analysis and the multivariate analysis, do suggest that there is a relation between overconfidence and cross-border acquisitions. Therefore, based on the empirical analysis H_{2b} should be accepted, overconfident CEOs are more likely to do a cross-border acquisition. However, the robustness check does not find a significant relation between self-importance and cross-border acquisitions. Therefore, while the empirical evidence suggests that overconfident CEOs are more likely to do a cross-border acquisition, this finding is not robust when using an alternative measure of overconfidence.

The focus of this research is not on which measure is most accurate in measuring overconfidence, however this leaves a suggestion for further research. If in the future a robust measure of overconfidence is constructed, it would be interesting to test the relation between that measure of overconfidence and cross-border acquisitions to give a decisive answer on this research question.

Overconfidence and valuation

The empirical analysis does provide sufficient evidence to accept H_{3a} , there is a positive relation between overconfidence and takeover premium, and this finding is supported by a robustness check. This finding corresponds with the hubris theory of Roll (1986) that states that CEOs that are infected by hubris tend to overpay for an acquisition. It is difficult to argue that overconfident CEOs overpay for acquisitions, because ‘overpaying’ implies that there is a right price to pay, which would be difficult to define for all deals in this sample. Still, it is striking that overconfident CEOs are paying a higher takeover premium, compared to CEOs that are not overconfident. This finding corresponds with the empirical findings of Hayward & Hambrick (1997), who find a similar relation, using a sample of deals in the US in a different period (1989-1992), and using a different measure of overconfidence. That this relation is also found in a sample that covers deals about 25 years later, in a different country, strengthens the statement that overconfident CEOs tend to pay a higher takeover premium compared to CEOs that are not overconfident. The implication for this finding is that board members and shareholders should be aware that overconfident CEOs tend to pay a higher takeover premium. This could also mean that they are more likely to suffer from a winner’s curse, and that these overconfident CEOs are more likely to ‘overpay’ for acquisitions which would be value-destroying for the acquiring firm.

The empirical findings do not provide sufficient evidence that announcement of acquisitions by overconfident CEOs are related to lower cumulative abnormal returns around the announcement date. Furthermore, the robustness check does not find a significant relation between self-importance and cumulative abnormal returns of the acquiring firm around the announcement date. Therefore, H_{3b} should not be accepted. This is remarkable because Malmendier & Tate (2008) did find a negative relation between overconfidence and announcement effects, using the same measure of overconfidence and also using cumulative abnormal returns to measure the market response. This deviating finding might be explained by the following arguments: first, the sample of this research is based on deals in a different

country (UK instead of the US), in a different time-frame (2003-2013 instead of 1980-1994). Therefore, both country and time-specific factors could affect the findings. Second, the sample used in this research is smaller than the sample used by Malmendier & Tate (2008), which leads to a relatively lower statistical power. Nevertheless, when the data is split between deals before and after the crisis, acquisitions announced by overconfident CEOs are related to more negative cumulative abnormal returns, measured three days around the announcement are used. However, the other event windows (CAR5 with 5 days around the announcement date, and CAR11 with 11 days around the announcement days) do not provide a significant difference between overconfident CEOs and CEOs that are not overconfident. The relatively low amount of observations should be taken into account when evaluating these results. While most of the t-tests are insignificant, it is worth noticing that for all event windows, the difference changes from positive to negative after the crisis. This indicates that announcement effects of acquisitions by overconfident CEOs were positive before the crisis, and negative after the crisis, relative to announcement effects of acquisitions by CEOs that are not overconfident. This could be a signal that the perception of the market on acquisitions by overconfident CEOs became more negative after the crisis. This might be explained by a more cautious attitude of investors after the crisis, particularly toward firms with CEOs that are perceived as overconfident. If further research could confirm these divergent announcement effects before and after the crisis, it would be something to be taken into account by overconfident managers and their key decision influencers, when announcing and communicating an acquisition.

Overconfidence and payment method

The empirical analysis does not provide sufficient evidence to accept H_4 . No relation between overconfidence and payment method of the acquisition is found in the sample used in this research. While the limited amount of observations might play a role, the difference is small and far from significance, which indicates that a larger amount of observations would not necessarily give significant results. This finding is opposite to expectations based on theory on overconfidence and capital structure. However, the robustness check does show a significant positive relation between self-importance and cash as payment method, which corresponds with the predictions ex ante. As overconfident CEOs theoretically would be more likely to perceive their firm as undervalued by the market, one would expect that overconfident CEOs would be less likely to use stock as a payment method during an

acquisition, as this is an ‘undervalued currency’. On the other hand, it could be that even if CEOs perceive stock as an undervalued currency, they would still be more willing to use it as a payment method, than not doing an acquisition at all.

Because the two measures of overconfidence show a different result, and it would be beyond the scope of this research to argue which of both measures of overconfidence is the most accurate, this research does not provide sufficient evidence to state that overconfidence is significantly related to cash as a payment method.

Overconfidence and the financial crisis of 2008

The empirical results presented in table 8 suggest that H_{5a} should be accepted. In the media CEOs are more often described as overconfident before the crisis than after the crisis. Furthermore, this table shows that after the crisis, CEOs are more likely to be described as cautious after the crisis. This could be an indicator that the confidence level of all CEOs is affected by the financial crisis. This corresponds with research of Malmendier, Tate & Yan (2011), that states that major life events, such as the Great Depression, World War II and military experience can affect people’s confidence level. While the financial crisis of 2008 clearly did not have the same impact as World War II, it did have a major impact on the global economy, on the businesses that the executives are leading and it might have affected the personal lives of executives as well, in the form of job security, personal investments and housing. The observation that the executives in the sample are more often described as confident before relative to after the crisis, and more often as cautious after the crisis relative to before the crisis could be a reflection of the impact of the financial crisis on their confidence levels.

Based on the empirical analysis, H_{5b} can only partly be accepted. The multivariate analysis indicates that the effect of overconfidence on diversifying acquisitions amplifies after the financial crisis after 2008 and the effect of overconfidence on cross-border acquisitions diminished after the financial crisis of 2008. These results correspond with the findings of the univariate analysis; the difference in proportion of diversifying acquisitions between overconfident CEOs and CEOs that are not overconfident increased after the financial crisis. Furthermore, the difference in proportion of cross-border acquisitions between overconfident CEOs and CEOs that are not overconfident declined after the financial crisis. The observation that overconfident CEOs were even less likely to conduct a diversifying acquisitions after the financial crisis, compared to CEOs that are not overconfident is quite surprising. Again, this

might be explained by a clustering of acquisitions by overconfident CEOs within their industry. An example of this is Andrew Witty of GlaxoSmithKline PLC who did serial acquisitions within the pharmaceutical industry after the financial crisis. Because of the relatively lower amount of observations after the financial crisis, the weight of these observations increased after the financial crisis. The observation that the difference in proportion of cross-border acquisitions between overconfident CEOs and CEOs that are not overconfident declined after the financial crisis is a bit surprising, particularly because the proportion of cross-border acquisitions increased after the financial crisis, for both overconfident CEOs and CEOs that are not overconfident. As argued by Bremer et al. (2015), cross-border acquisitions bring relatively more uncertainty compared to domestic acquisitions. One would expect that due to increased levels of economic uncertainty after the financial crisis, all CEOs would be more averse towards cross-border acquisitions during more uncertain times. However, it could be that CEOs with higher levels of uncertainty aversion did less acquisitions after the financial crisis, both domestic and cross-border, and the CEOs who still did acquisitions after the financial crisis are less prone to uncertainty bias, leading to a higher proportion of cross-border acquisitions within both groups.

Limitations

This research has several limitations. First of all, the sample is based on a limited amount of observations. This caused by the restrictions in the sample selection, only larger, listed acquirers in the UK are part of the sample. These restrictions are mainly set under the assumption that CEOs of larger, listed firms get enough publicity, to make sure that there is sufficient media coverage on the CEO to construct the overconfidence measure. Furthermore, because the construction of the measure of overconfidence used in this research is time-consuming, particularly with the limited resources of a graduation thesis, an expansion of the sample by using a larger time frame, or using more countries was not possible. The consequence of this limited amount of observations is that the empirical evidence misses some statistical power, which potentially could lead to type-2 errors (in which relations that are actually present are rejected by the statistical test on the sample). A second limitation of this research is the issue of endogeneity, with respect to the measure of overconfidence. While the empirical evidence of this research shows that there is a significant relation between overconfidence and several aspects of acquisitions, such as takeover premium and a toehold strategy, it cannot be concluded from the results that this is a causal relation. Particularly,

because outsiders perception is used as a measure of overconfidence, it might be that CEOs who make certain decisions, such as paying a relatively high takeover premium, are also more likely to be described as overconfident in the media. While the robustness check attempts to overcome this problem with using an alternative measure of overconfidence, this alternative measure of overconfidence has several limitations. It is rather a proxy of overconfidence than a direct measure, and self-importance as a measure of overconfidence has several limitations. First, it could be that the ratio of salary of the CEO relative to the second-highest paid officer is a reflection of a firm actively selecting overconfident CEOs. Furthermore, the relatively high salary of the CEO could also be used by the firm to attract skilled CEOs and rather be a reflection of a CEO that is highly competent. Finally, self-importance measures a ratio of highest and second-highest salary within the firm, and is therefore not an absolute measure. Still, it is used as a measure to compare CEOs across different firms. As the discussion on both measures of overconfidence used in this research illustrate, it is challenging to construct a measure of overconfidence that does not suffer from the endogeneity or other issues. A collaboration between psychologists and financial economists might be the best way to overcome these issues, enabling the financial economist to use a more precise measure of overconfidence, to analyze the effects of overconfidence on decisions during corporate acquisitions. A third limitation is that the analysis is limited to certain decisions made by overconfident CEOs. It does not evaluate the consequences of these decisions, and how these decisions generate or destroy value for their firm. The finding that overconfidence is related to certain decisions, should not be interpreted as evidence that these kind of decisions are necessarily bad decisions for the acquiring firm. The results are rather descriptive and not prescriptive. In future research, it would be valuable to further analyze the outcomes of certain decisions that characterize overconfident CEO, and evaluate if this generates or destroys value for the firm.

Conclusion

This research provides empirical evidence that overconfidence is related to certain decisions made by CEOs during acquisitions. A significant positive relation between overconfidence and serial acquisitions and takeover premium is found in this research, supported by a robustness check. A significant positive relation between overconfidence and cross-border acquisitions is found, but is not supported by a robustness check. A significant negative relation between overconfidence and minority acquisitions is found, a relation that is also

found in a robustness check. Furthermore, this research indicates that the financial crisis might have affected levels of overconfidence, and it suggests that there are interaction effects between the financial crisis and overconfidence affecting the decision to do diversifying acquisitions and cross-border acquisitions. Furthermore, empirical evidence suggests that the financial crisis might affected the market perception on acquisitions by overconfident CEOs. The findings of this paper can have implications for stakeholders who are affected by, and might influence the decisions made by CEOs during corporate acquisitions. Even though a causal relation cannot be confirmed based on this research, the finding that certain decisions are significantly related to overconfidence could indicate that these kind of decisions are rather the result of overconfidence than motivated by rational reasoning. While this research has several limitations, it provides a starting point for further future research to the relation between overconfidence and corporate acquisitions. Collaboration between scholars in the field of psychology and scholars in the field of financial economics can be recommended, in order to find a more robust measure of overconfidence. Furthermore, the empirical results and robustness checks of this research do not provide a clear view on the relation between overconfidence and the selection of the target. Further research is necessary to clarify if there is a relation between overconfidence and cross-border acquisitions. While the empirical results indicate a significant negative relation between overconfidence and diversifying acquisitions, the robustness check does not find any significant relation between overconfidence and diversifying acquisitions. Both results are opposite to earlier empirical findings of Malmendier & Tate (2008). Further research should clarify if there is any relation between overconfidence and diversifying acquisitions. If a negative or insignificant relation can be confirmed, it would be interesting to investigate which factors, for example factors related to the country or the period that is analyzed, cause the results to deviate from earlier findings.

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Appendix

Table 17: Multivariate Analysis: Categorical Dependent Variables Without Fixed Year Effects

This table provides the results of a logit multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. Serial is a dummy variable indicating that the CEO did at least two acquisition in a five year period. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition..

CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Z-scores, based on standard errors that are clustered by CEO, are provided between the brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis					
	Serial	Minority Acquisition	Diversify	Cross-Border	Cash Payment
	(1)	(2)	(3)	(4)	(5)
Overconfident	.8891*	-.5997*	-.6374*	1.1778***	-.0224
	(1.70)	(-1.86)	(-1.67)	(3.60)	(-.08)
Firm Size	.6444	-.0321	.0167	.5572	.1374*
	(3.80)	(-.41)	(.13)	(4.57)	(1.84)
Leverage	-3.4491	-.8613	.4597	-3.1996**	-.5074
	(-3.13)	(-1.29)	(.49)	(-2.84)	(-.79)
Cash	.0001	.0003**	.0003*	-.0008	-.0002
	(.42)	(2.59)	(1.59)	(-.41)	(-.28)
Diversifier	.0301	-.2150		.0557	.0238
	(.07)	(-.68)		(.17)	(.09)
Payment Cash	-.0289	.6733**	.0285	.3482	
	(-.10)	(2.09)	(.11)	(1.22)	
Regression	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT
Fixed Effects Years	NO	NO	NO	NO	NO
Constant	-4.7355	.6058	-.7313	-3.1627	-.8811
N	296	296	296	296	296
R ²	.2494	.0595	.0406	.2042	.0134

Table 18: Multivariate Analysis: Numerical Dependent Variables Without Fixed Year Effects

This table provides the results of an Ordinary Least Squares (OLS) multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. CAR3 Acquirer, CAR5 Acquirer and CAR 11 Acquirer represent the cumulative abnormal return of the acquirer on respectively 3, 5 or 11 days around the announcement date of the acquisition. CAR3 Target, CAR5 Target and CAR Target represent the cumulative abnormal returns of the target respectively 3, 5 or 11 days around the announcement date of the acquisition.

CEOs that are classified as overconfident, based on outsiders perception measured by media coverage. Articles that classify a CEO as cautious consist on or more of the following keywords: 'reliable', 'cautious', 'frugal', 'steady', 'conservative' and 'practical', referring to the CEO of interest. Articles that classify a CEO as confident consist one or more of the following keyword: 'confident' and 'optimistic', referring to the CEO of interest. Articles are obtained from *The Guardian*, *Financial Times* and *The Daily Telegraph*, and are manually checked to make sure the article is referring to the CEO. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Hostile is a dummy variable indicating that the acquisition is classified as hostile by Thomson One Banker. T-values, based on standard errors that are clustered by CEO, are provided between brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis

	CAR3 Target (6A)	CAR5 Target (6B)	CAR11 Target (6C)	CAR3 Acquirer (7A)	CAR5 Acquirer (7B)	CAR11 Acquirer (7C)
Overconfident	.0483 (1.56)	.0426 (1.28)	.0583 (1.65)	-.0028 (-.40)	.0003 (.001)	-.0010 (-.13)
Firm Size	.0103 (1.29)	.0117 (1.37)	.0102 (1.07)	-.0028* (-1.77)	-.0019 (-1.26)	-.0036* (-1.94)
Leverage	-.0983 (-1.23)	-.0940 (-1.14)	-.1051 (-1.16)	-.0064 (-.39)	.0022 (.15)	-.0072 (-.38)
Cash	-.0002 (-0.27)	-.0004 (-.40)	-.0007 (-.68)	-.0004** (-2.03)	-.0001*** (-3.11)	.0001 (.47)
Diversifier	-.0121 (-.32)	-.0087 (-.24)	-.0042 (-.10)	.0013 (.22)	.0046 (.57)	-.0015 (-.18)
Payment Cash	-.0121 (-.36)	-.0005 (-.002)	.0111 (.29)	-.0021 (-.36)	-.0003 (-.06)	.0010 (.14)
Hostile	.2482* (1.72)	.2742** (2.15)	.2087** (2.20)	-.0001 (-.02)	-.0004 (-.05)	.0032 (.21)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Fixed Effects Years	NO	NO	NO	NO	NO	NO
Constant	.0843	.0797	.1107	.0456	.0292	.0562
N	143	143	143	268	268	268
R ²	.0714	.0733	.0658	.0509	.0716	.0147

Table 19: Robustness Check Categorical Dependent Variables

This table provides the results of a logit multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. Serial is a dummy variable indicating that the CEO did at least two acquisition in a five year period. Minority Acquisition is a dummy variable indicating that the acquirer acquired less than 50% of the shares of the target firm. Diversifier is a dummy variable indicating that the acquirer acquired a firm in a different industry, based on a SIC-Code provided by Thomson One banker. Cross-Border is a dummy variable indicating that the target firm is a firm outside the UK. Cash Payment is a dummy variable indicating that the acquirer only uses cash to pay for the acquisition..

Self-Importance is the ratio between the annual salary of the CEO and the second-highest paid officer. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Z-scores, based on standard errors that are clustered by CEO, are provided between the brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis					
	Serial	Minority Acquisition	Diversify	Cross-Border	Cash Payment
	(1)	(2)	(3)	(4)	(5)
Self-Importance	1.9943*	-.9042*	-.1600	.0460	.9884**
	(1.67)	(-1.68)	(-.25)	(.07)	(2.23)
Leverage	-2.5366	-1.9069	.1279	-6.3137	-1.8043
	(-1.45)	(-1.63)	(.94)	(-4.21)	(-1.56)
Cash	.0001	.0002*	.0001	-.0001	.0001
	(1.54)	(1.66)	(1.07)	(-.79)	(1.21)
Diversifier	-.1166	-.0924		-.1049	-.0137
	(-.24)	(-.17)		(-.21)	(-.04)
Payment Cash	-.3421	.8924*	-.0206	.1307	
	(-.83)	(1.70)	(-.06)	(.30)	
Firm Size	.5197***	.1527	-.0401	.8607	.1458
	(2.72)	(.85)	(-.29)	(4.61)	(1.05)
Regression	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT
Fixed Effects Years	YES	YES	YES	YES	YES
Constant	-6.6549	-.6904	1.0225	-3.9799	-2.2924
N	152	152	152	152	152
Pseudo-R ²	.2592	.1755	.0498	.3189	.0586

Table 20: Robustness Check Numerical Dependent Variables

This table provides the results of an Ordinary Least Squares(OLS) multivariate analyses. A dataset of 360 acquisitions in the period 2003-2013 in the UK is used. CAR3 Acquirer, CAR5 Acquirer and CAR 11 Acquirer represent the cumulative abnormal return of the acquirer on respectively 3, 5 or 11 days around the announcement date of the acquisition. CAR3 Target, CAR5 Target and CAR Target represent the cumulative abnormal returns of the target respectively 3, 5 or 11 days around the announcement date of the acquisition.

Self-Importance is the ratio between the annual salary of the CEO and the second-highest paid officer. Leverage is measured by the ratio Total Liabilities/Total Assets. Cash is the log of the cash and investments available. Diversifier is a dummy variable indicating that the target operates in a different industry than the acquirer, based on a SIC-code. Cash payment is a dummy variable indicating that the acquisition is fully paid with cash. Firm size is measured by the log value of the total assets of the acquiring firm at the end of the year. Hostile is a dummy variable indicating that the acquisition is classified as hostile by Thomson One Banker. T-values, based on standard errors that are clustered by CEO, are provided between brackets. * = 10% significance, ** = 5% significance and *** = 1% significance.

Multivariate Analysis

	CAR3 Target	CAR5 Target	CAR11 Target	CAR3 Acquirer	CAR5 Acquirer	CAR11 Acquirer
	(6A)	(6B)	(6C)	(7A)	(7B)	(7C)
Self-Importance	.0671 (1.26)	.0890 (1.40)	.0775 (1.11)	-.0089 (-.85)	-.0063 (-.55)	-.0221* (-1.83)
Leverage	-.1257 (-.91)	-.1867 (-1.18)	-.2401 (-1.47)	.0123 (.56)	.0254 (1.08)	-.0183 (-.63)
Cash	.0009 (-.40)	-.0008 (-.03)	-.0004 (-.15)	-.0005* (-1.85)	-.0001*** (-2.93)	.0001 (.37)
Diversifier	-.0367 (-.75)	-.0220 (-.40)	-.0120 (-.21)	-.0149** (-2.00)	-.0125 (-1.50)	-.0153 (-1.49)
Payment Cash	.0027 (.05)	.0129 (.21)	.0028 (.04)	.0068 (.97)	.0068 (.86)	.0110 (1.13)
Firm Size	.0320** (2.12)	.0261 (1.63)	.0252 (1.35)	-.0028 (-1.00)	-.0019 (-.71)	-.0086*** (-2.99)
Hostile	.1641* (1.78)	.2004* (1.95)	.1948 (1.65)	.0304* (1.77)	.0299* (1.78)	.0474*** (2.64)
Regression	OLS	OLS	OLS	OLS	OLS	OLS
Fixed Effects Years	YES	YES	YES	YES	YES	YES
Constant	-.2161	-.1112	-.0550	.0470	.0319	.1420
N	67	67	67	149	149	149
R ²	.2347	.2286	.2454	.1807	.2277	.2022