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The Effect of CEO Overconfidence on Large Institutional Firm Performance

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Abstract

In the past decades, firms tend to hire overconfident CEOs. This research investigates what the effect of CEO overconfidence is on firm performance for large institutional firms within the United States. Using the option-based measure for overconfidence the overall effect, the effect with and without financial distress and the effect of high and low overconfidence is reported and discussed. Unfortunately, the results are insignificant and no conclusions can be drawn at all. However, this study aims to give insights on how the effects are measured and what potential influences CEO overconfidence has on firm performance.

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1. Introduction

“The traditional finance paradigm, which underlies many of the other articles in this handbook, seeks to understand financial markets using models in which agents are “rational”” (Thaler, 2005). In classical finance, rationality is the assumption that agents (investors, managers) make choices consistent with the expected utility framework. According to this framework, agents make decisions which maximize their utility based on the information available and past experiences. In his book, Richard H. Thaler elaborates on the fact that for a long period this was an unquestionable assumption. The classic finance models, which are based on the Efficient Market Hypothesis (EMH), were widely considered to be proven without doubt. For example, the famous Eugene F. Fama posted an article in 1970, *Efficient Capital Markets: A Review of Theory and Empirical Work*, which stated in its conclusion for market efficiency, that he encountered some anomalies like serial dependencies in stock market returns, thought pointing out how small the anomalies were.

Until a regular trading day in 1983, the stock prices made a downfall of 20% without any news causing this decline besides the crisis itself. This was not consistent with the EMH and thus researchers started to believe that other factors might play a role when assets are priced. Researchers started looking at the cognitive behaviour of investors and managers instead of the traditional explanations. This new field of research showed that psychological and sociological factors influence investors and managers in such a way that they do not behave consistent with what is considered rational in the classic models. Behavioral finance was born.

Behavioral finance literature is divided into two different approaches. The first approach emphasizes the effect of investor behaviour that is less than fully rational, and the second considers managerial behaviour that is less than fully rational. In this paper, the focus is on the second approach. The approach in which irrational managers operate in efficient capital markets. We are concerned with situations where the manager believes that he is actually close to maximizing firm value—and, in the process, some compensation scheme—but is in fact deviating from this ideal (Baker, Ruback, & Wurgler, 2004). There are two particular biases which managers are susceptible to: overconfidence and optimism. Weinstein (1980) defines optimism as: people believe that negative events are less likely to happen to them than to others, and they believe that positive events are more likely to happen to them than to others. Comparing this to

overconfidence, overconfidence can be usefully defined as the tendency to overestimate the probability of achieving one's objectives as a result of a presumptuous belief in one's abilities or attributes as they may be used to bring about a particular outcome (Fabre & Francios-Heude, 2009). Considering the definitions, it is interesting that optimism and overconfidence are connected, but in which overconfidence seems to have a negative influence on the managers state of mind.

Relating this to corporate finance, overconfident managers overestimate the returns to their investment projects and view external funds to be costly. Thus, they overinvest when they have abundant internal funds, but curtail investment when they require external financing (Malmendier & Tate, 2005). An overconfident CEO is willing to take on acquisitions which doesn't create any extra value and invests more in risky projects. Besides the fact that this can create negative value there are also positive influences of an overconfident CEO. Hirshleifer et al (2012) studied the question why firms hire overconfident managers: Using options- and press-based proxies for CEO overconfidence, they find that over the 1993–2003 period, firms with overconfident CEOs have greater return volatility, invest more in innovation, obtain more patents and patent citations, and achieve greater innovative success for given research and development expenditures. It is interesting to find out what kind of influence (positively/negatively) overconfident CEOs have on firms and to compare times with and without financial distress.

This results in the following research question:

What is the relationship of CEO overconfidence on large institutional firm performance?

This paper focuses on 37 large institutional firms within the top 60 of largest institutional firms in the United States (U.S.) from 2006-2010. Using panel data from the Execucomp and Compusat database, I compared the relationship before the crisis 2006- and 2007 and during the crisis of 2008-2010. Regarding the focus on CEOs in the U.S., CEOs are the key decision makers with the corporate policy and thus have a substantial influence on the firm. Graham et al (2013) suggest that U.S.-based CEOs and CFOs are more optimistic than their non-U.S. counterparts. This provides evidence on one channel

through which U.S. and non-U.S. firms differ: their executives differ in terms of attitudes and traits. Following these findings, the choice regarding the region was made.

An interesting complementary paper would be investigating CEO overconfidence in another region and to compare it with the U.S. This will be elaborated in the conclusion section further on. The proxy for firm performance is systemic risk¹, retrieved from vlab. Furthermore, in this paper the methodology of Malmendier and Tate (2005) is used for defining overconfidence and constructing the option-based measures. The overconfident measures are: Holder 67, Low Overconfidence and High overconfidence. This is used to determine whether a CEO is overconfident or not with distinctions between high and low overconfidence. The measures are based on the CEOs option exercise behaviour. When CEOs hold their options longer than 67% in-the-money value, the CEOs is classified as overconfident. The incentive for CEOs to hold the options longer in-the-money is when they expect high returns created by their corporate policy. The CEOs are confident to keep the stock price of their firm rising. Due to managerial overestimation, these CEOs are considered overconfident in this study.

This study contributes to existing Behavioral finance literature in the following ways. Hirshleifer, Low and Teoh (2012) have proven that there is a positive relationship between CEO overconfidence and firm performance. However, the study does not compare CEO overconfidence between time periods with different economic trends. The impact of CEO overconfidence on firm performance through investment decisions has been empirically tested by Ye and Yuan (2008) in the Chinese market, with management shareholding as overconfidence measure. This study emphasizes on the U.S. market with an option-based measure. Compared to Malmendier and Tate (2005) and the studies listed above, this paper has a unique feature. The proxy for firm performance is systemic risk instead of the widely used Tobins Q. Return on Assets and Tobins Q are used in this study to check for robustness. Further, the sample concentrates on the largest listed institutional firms in the US, which creates a relatively small sample of 37 firms compared to large samples of earlier studies. Considering the unique dataset, this study may contribute on the puzzle of hiring overconfident CEOs.

This paper is structured as follows. In Section 2 the literature, regarding the research question, is extensively reviewed. Section 3, the methodology is described. The

¹ Systemic risk will be explained in section 3.3

fourth Section is the empirical result section with robustness tests. Section 5 concludes our findings and covers the discussion and limitations.

2. Literature overview

This section begins with defining the variable Overconfidence. Thereafter, previous literature will be elaborated on the effect of overconfidence on corporate policies and decisions. Finally, the section concludes with a theoretical explanation on how the research question is constructed.

2.1 Overconfidence

As mentioned before, the methodology of Malmendier and Tate (2005) is used in measuring overconfidence. But what exactly is overconfidence?

This psychological cognitive bias is known for centuries and is studied thoroughly by scholars. Even today's decision-making behaviour is influenced by overconfidence. Overconfidence is often described as a miscalibration, that leads to an underestimation of a variance. Ben-David et al (2007) researched the miscalibration and recorded the following: Realized market returns are within the 80% confidence intervals only 37% of the time. This shows that the confidence intervals set by the manager were not realistic for the expected returns. Malmendier and Tate (2005) notes that CEOs, especially high ranked CEOs, in particular are prone for miscalibration. CEOs work, with high commitment, on complex and abstract projects. Managers tend to believe they have high control over the project and thus the outcome. All these factors make them more susceptible to overconfidence. As Van de Steen (2004) states, agents disproportionately believe that they will outperform others, overestimate the precision of their estimates and overestimate their control over the outcome. Understanding how overconfidence can create implications, in this example catastrophic, I looked at the crash of the space shuttle Challenger² in 1986. While the launch of the space shuttle was delayed several times, the world was waiting for the enormous event. Eager to show the success of the space shuttle program, the manager of the Challenger project agreed to launch despite the fact that several experts expressed their concerns. The consequence: a fatal crash. Regarding another example, Cooper et al (1988) suggest that in the US market, 81% of entrepreneurs believe their chances of success to be at least 70% and

² Interesting article about the Challenger crash: Groupthink of Irving Janis (1991)

that a third of those believe they will be successful with certainty. Unfortunately, at the time of the study, 66% of all newly founded businesses were failing.

However, overconfidence can have a positive influence as well. According to Gervais et al (2002), risk-averse rational managers will postpone the decision to exercise real options longer than is in the best interest of shareholders. Overconfident managers underestimate the risk and are therefore less likely to postpone the decision to undertake. Thus, moderately overconfident managers make decisions that are in the better interest of shareholders than rational managers do. In order to understand what kinds of influences irrational managers can have on firm performance, existing literature is contemplated

2.2 Previous literature

Due to the relatively short time period since the field of Behavioral Finance was discovered, existing literature discussing the effect of overconfidence on firm performance is still empirically limited. One of the first to link the managerial trait overconfidence to firm performance was Fairchild (2005). In the model with asymmetric information, overconfidence appears to be bad. Managers overestimate the probability of good states and underestimate the probability of bankruptcy. The consequences are higher levels of debt and thus higher financial distress costs. When moral hazard is included in the model, the effect of overconfidence is uncertain. Overall, the study concludes that moderately high managerial overconfidence is not necessarily bad for shareholders. An abundance of papers shows similar results. Gervais et al (2003) stress that moderate confidence levels mitigate underinvestment and avoid too high costs of distress, thus create an optimal outcome. Goel and Thakor (2008) and Hackbarth (2009) suggest that a certain optimal point of managerial overconfidence has a positive effect on firm performance. They report that a moderate level of confidence results in a positive relationship. Too high levels of confidence may result in taking on projects with a too low or negative present value. Other studies regarding different corporate policies show mixed results of CEO overconfidence. Besharov (2004) constructed a model with three biases (overconfidence, regret aversion and hyperbolic discounting). The variable overconfidence results in higher managerial effort levels. Schrand and Zechman (2012) state that firms with overconfident classified CEOs are more likely to commit financial reporting fraud. Concerning dividend policy, according

to Cordeiro (2009) overconfident managers are less likely to pay dividends than their non-overconfident counterpart.

Ye and Yuan (2008) empirically studied the effect of CEO overconfidence on firm performance. They focus on Chinese listed firms and also show how firm value has an effect on overconfidence. According to their results, firm value has a positive effect on overconfidence and vice versa. However, they imply a change from a positive to a negative effect if the optimal overconfidence level has been passed. According to Ye and Yuan (2008) the level of overconfidence effect on firm value suggests a U-shaped relationship. Hirshleifer et al. (2010) focus was on the U.S. market and finds, over the 1993 – 2003 time period, a positive relationship between firm value and CEO overconfidence, using the same option-based measure as this study. In their study, no distinction is made in high or low overconfidence.

Linking the results of the previous studies to different time periods and levels of financial distress has not been, to the authors knowledge, tested yet. Hirshleifer et al. (2010) did take the internet bubble crisis within his sample, however did not make a clear distinction in his conclusion. In our sample, the fall of the fourth largest investment bank in the U.S. the Lehman Brothers on the 15th of September 2008 is the start for the intensified financial crisis. This was a major shock for both the U.S. market as the global market. As mentioned above, it is interesting to test what the relationship of CEO overconfidence with firm performance is after the shock. Ho et al. (2016) show that banks with overconfident chief executive officers (CEOs) were more likely to weaken lending standards and increase leverage than other banks in advance of the crisis, making them more vulnerable to the shocks of the crisis. Involving earlier literature, this suggests that overconfident classified CEOs, who take on more riskier projects and increase the intensity of takeovers, tend to have a negative impact on firm value during the crisis. Malmendier and Nagel (2011) show that individual risk aversion is strongly influenced by moments of high financial distress in the past. This effect discourages agents to take risky investment decisions for a long-lasting period. Kaniel et al (2010) emphasize this, by showing that even though optimism is a largely fixed personality trait, optimism was negatively influenced by the crisis of 2008.

2.3 Hypotheses development

After analysing the existing literature, in the following subsection the hypotheses of the research are developed. As a reminder, our research question was:

What is the relationship between CEO overconfidence on large institutional firm performance

Overall, the previous literature still argues what the actual influence of CEO overconfidence is. However, there are more scholars that predict a positive relationship rather than negative. Our first hypothesis is in conformity with the majority of the studies. Resulting in our first hypothesis.

Hypothesis 1: The effect of CEO overconfidence on large institutional firm performance is positively influenced.

As mentioned before, Ho et al. (2016) signal a positive relationship between firms with incentives to expand their firm and the value reduction of their assets during the crisis. Overconfidence shares the eager to expand the firm, as the manager believes this maximises shareholder value and overestimates the expected returns. The incentive for constructing the next hypothesis concerns the fact that risk taking decisions are discouraged during times with high financial distress. Existing literature regarding the differences in time periods are rather scarce and thus might this research contribute in what the influence of CEO overconfidence is on firm performance. Our next hypothesis reflects the risk-aversion behaviour during the financial crisis.

Hypothesis 2: The effect of CEO overconfidence on large institutional firm performance is negatively influenced after the fall of the Lehman Brothers in 2008.

Following the studies of Ye and Yuan (2008), Goel and Thakor (2008) and Hackbarth (2009) and Gervais et al (2003, when an optimal overconfidence level is reached firm value is positively influenced. CEOs with high overconfidence levels are prone to miscalibrate the available information, neglect obtaining extra information and tend to overinvest in projects. On the contrary, low overconfidence managers may underinvest

in profitable projects which otherwise would increase shareholder value. Both overconfidence levels reduce firm value. Moderate confidence levels are reported as a mid-way and thus are considered as the optimal overconfidence level.

Hypothesis 3: High and low overconfidence levels negatively influence firm performance on large institutional firms.

3. Emperical Overview

In this chapter, the model used to empirically test the research question is explained. Firstly, the research method and model are introduced. Thereafter, the sample and database are described. Finally, the variables are thoroughly explained.

3.1 Model

First of all, we like to note that this study is a quantative research. The effect of CEO overconfidence on firm performance is evaluated and reported. Pre-existing data called panel data is modified and analysed to measure the influence of CEO overconfidence. Figure 1 represents the model used. The independent variable is CEO overconfidence measured by Holder 67 and High and Low overconfidence, the dependent variable Firm performance measured by Systemic Risk, Tobins Q and Return on Assets (ROA) and the control variables are Firm Size, CEO compensation and CEO ownership.

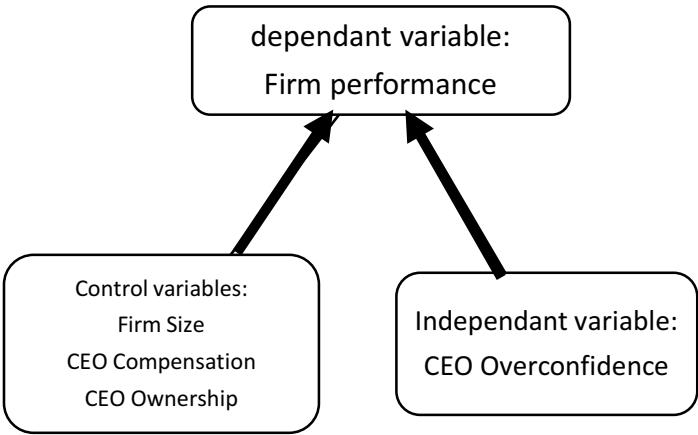


Figure 1

3.2 Sample

The panel data in this research consists of 37 institutional firms listed in the U.S. The number of firms was determined by looking at vlabs database using the systemic risk³ analysis on U.S. financials in the period of 2005 until 2010. The top 50 with the highest systemic risk in the given time period was extracted from V-Lab. Companies considered to be a systemic risk are institutions that make up a significant part of the total industry, in this case the financial market. Due to incomplete data, the sample data declined to 37 firms. The databases used to extract the remaining data were ExecuComp and Compusat. The ExecuComp database is used to construct the independent and control variables. The Compusat database also delivers data for the independent variable as well as for the dependent variable.

3.3 Variables

Firm performance

Starting off with the dependent variable in this research, firm performance is measured through the proxies Systemic Risk, Tobin's Q and the ROA method.

Systemic Risk, as mentioned above, is retrieved from V-Lab. V-Lab analyses the capital shortfall for each financial firm when the market declines with 40%. This is called systemic risk and defines the possibility that an event (in this sample, the financial crisis) triggers the collapse of an entire industry or injects severe instability. Taking into account the second hypothesis, we find this performance measure a suited proxy.

Tobin's Q and ROA are used as performance measure to check for robustness. In existing literature Tobin's Q is generally accepted as a proxy for firm value. Chung and Priutt (1994) compared different firm value measures and concluded that Tobin's Q is the most widely used proxy. Tobin's Q is calculated with the following formula, according to the method of Malmendier and Tate (2005).

$$\frac{\text{total assets} + (\text{market value of equity}) - (\text{book value of equity})}{\text{book value of assets}}$$

³ Systemic risk will be explained in the variable section.

Market value of equity is calculated by multiplying the number of shares outstanding with the current share price. Book value of equity is defined as Total Stockholders Equity plus Deferred Taxes.

ROA is calculated as Earnings Before Interest, Taxes, Depreciation and Amortization divided by book value of assets. For simplicity reasons, we replace book value of assets with Total assets in the formula for Tobin's Q and ROA

CEO Overconfidence⁴

In measuring our independent variable, we follow the definition of Malmendier and Tate (2005) concerning overconfidence called, Holder67. Unfortunately, they constructed the measurement with patented data, thus with the data available in this study it is not possible to recreate the variable. Campbell et al (2011) acknowledged this problem and validated the construction of the option-based measure with data from ExecuComp. Hirshleifer et al (2012) corrected the option-based measure for robustness and we follow their final measure. The average option moneyness is calculated and the Holder67 defines whether a CEO is classified as overconfident.

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

When the average moneyness of held options is at least 0.67 in our sample, it reports that CEOs are overconfident according to the threshold of Malmendier and Tate (2005). The dummy variable Holder67 takes the value one if classified as overconfident and zero otherwise. As previously stated, overconfidence is a fixed personality trait and therefore the value stays one after the classification. Regarding hypothesis 1, Holder67 is expected to have a positive influence on firm performance. Hypothesis 2 is measured in a period of high financial distress and Holder67 has a negative influence on firm value. To test this hypothesis, a dummy variable is constructed called LehmanCrash which defines the fall of the Lehman Brothers in 2008.

Regarding our last hypothesis, a distinction needs to be made between high and low overconfidence. Campbell et al (2013) constructed two dummy variables called Low_OC and High_OC, in the sample Holder30 and Holder100 respectively. Holder100 is

⁴ The conclusion section highlights other confidence measures.

our High overconfidence variable and is calculated using the same formula as Holder67. CEOs are classified as high overconfident when the average moneyness of held options exceed 100% in-the-money for at least one observation. Holder100 takes the value one if high overconfident and zero otherwise. Low overconfident CEOs exercise their options when it is below 30% in-the-money. According to Campbell et al (2013) the proxy for Low_OC or Holder30 is the following.

$$\frac{\frac{\text{value realized on exercised options}}{\text{number of acquired shares on exercised options}}}{(\text{stock price at fiscal year end} - \frac{\text{estimated value of unexercised exercisable options}}{\text{number of unexercised exercisable options}})}$$

When the value is below 0.3 the CEO is classified as low overconfident. The dummy variable takes the value one if below 30% otherwise the value reports 0. The third and last hypothesis expects high and low overconfidence levels to harm firm value and thus reduces it.

Control variables

Firm size, CEO Compensation and CEO ownership are used as control variables. The construction of the control variables is defined as in Hirschleifer et al (2012).

For calculating firm size we take the log of total assets. CEO compensation is total CEO compensation plus grants extracted from the ExecuComp database. The CEO ownership variable is constructed by taking shares possessed by the CEO divided by the total shares outstanding. CEO ownership is expected to have a positive influence on firm value as CEOs incentives increases with more ownership (Griffith, 1999). According to Hall and Weiss (1967), firm size and profitability is related to each other. However, the exact influence is still uncertain. CEO compensation tends to have the same uncertainty.

The model also controls for unobserved year characteristics that might affect CEO overconfidence and firm performance. In this research, the year fixed effect dummy variable controls for an unobserved factor that might influence the relationship between the dependent and independent variable, in our case CEO overconfidence and firm performance. A dummy variable is constructed for each year and is included in the model. The year FE estimates the effect of year-specific characteristics common to all institutions. Similarly, the effect of year t is fixed across all institutions.

4. Results

In the next section the results of the research are stated and described. At first the descriptive statistics are shown and discussed. Secondly, the correlation between the variables are reported. At last the results, of simple OLS regressions are discussed and reported as well.

4.1 Descriptive statistics

An overview of the descriptive statistics of this study can be found in Table 1 in the Appendix. The variable Holder67 reports a mean of 0.1069. This defines, of the 159 observations, that 10.69% of the CEOs are classified as overconfident. Holder30 and Holder100 report that of the overconfident managers, 75.47% is classified as low overconfident and 20% as high overconfident respectively. Comparing this to earlier studies⁵, a low confidence level is reported. This may be caused by the relatively small sample used in this study. In comparison with the studies mentioned before, a high Low Overconfidence level is reported as well. This is not in line with the too big to fail assumption (O'Hara & Shaw, 1999). Furthermore, the standard deviation of the control variables is relatively large compared to the mean. This can be explained by the huge differences in size between the largest institutional firms in the US. The bigger the firm, the higher the compensation granted to the CEO.

4.2 Correlations

Comparing the dependent variables in Table 2, we report that the correlation between Systemic Risk and Tobin's Q is -0.7959. This indicates a negative relationship between the two variables. Relating this to the definitions of the two variables, this agrees with the line of thought. The correlation between Systemic Risk and ROA reports -0.3401, which confirms the above but with a less powerful relationship. Furthermore, the correlation of the dependent variable Systemic Risk and the independent variable Holder67 is -0.1946. This indicates a low negative relationship between overconfidence and firm performance. Holder30, the low overconfidence measure, reports a higher positive relationship with the performance variable. Holder100, the high overconfidence measure, similarly reports a lower relationship with Systemic risk. Tobin's Q and the

⁵ Hirschleifer (2012) and Malmendier and Tate (2005) report 61% and 51% of the CEOs classified as overconfident.

overconfidence measures Holder67 and Holder100 indicate to be highly related. ROA reports similar results as Systemic Risk. Nonetheless, the correlations cannot be considered as high in any cases.

4.3 Regression Results

Table 3 reports three simple regressions of the overconfidence measure Holder67 on the different performance measures with year effects included. In Table 4, the crash of the Lehman Brothers is induced to measure the effect on firm performance using the same method as Table 3. The final table distinguishes between high and low overconfidence and reports the effect on firm performance with the different measures.

In Table 3 the Holder67 coefficient is positive but yet insignificant. The positive coefficient indicates that the average increase in firm performance will be 0.1147 for large institutional firms with overconfident CEOs relative to non-overconfident CEOs. Comparing this to our Tobin's Q and ROA ambiguous results are reported. With the Tobin's Q, the Holder67 coefficient is positive. The ROA variable reports a negative coefficient with Holder67. Regarding hypothesis 1, performance is expected to will rise when a CEO is classified as overconfident. Two out of three performance measures report a positive increase and thus provide evidence in favour of our first hypothesis. However, the results are insignificant for all performance measures. When trying to substantiate insignificance, this research uses a different sample than previous literature. Particularly, all previous studies drop financial institutions from their sample. As a reminder, this research focusses on large institutional firms only. This calls upon further research upon how financial institutions differ and how CEO overconfidence affect financial CEOs.

Table 4 discusses the same method as Table 3, but the effect after a major event. In this case, the crash of the Lehman Brothers on the 15th of September 2008. Regarding hypothesis 2, CEO overconfidence is expected to have a negative influence on firm performance during the crisis. The LehmanCrash coefficient reports the value of -0.03840 for Systemic Risk at a significance level of 1%. This indicates that CEO overconfidence, after the Lehman Brothers crash, has on average a negative influence on firm performance. However, the Tobin's Q coefficient is positive at a significance level of 5%. Oddly, the positive effect is higher than the effect in Table 3. This suggests that CEO overconfidence after the crash increases firm performance on average more than before.

ROA has an insignificant slightly positive coefficient. The empirical results from Table 4 report ambiguous results.

Table 5 makes a distinction between high and low overconfidence. Hypothesis 3 states that high and low overconfidence have a negative influence on firm performance. When contemplating the results, the high overconfidence variable Holder100 has an insignificant negative coefficient and the low overconfidence variable Holder30 has an insignificant positive coefficient for Systemic Risk. For Tobin's Q and ROA the results are insignificant as well. Holder100 is positive for Tobin's Q and negative for ROA. Holder30 reports a negative coefficient for Tobin's Q and a positive coefficient for ROA. Altogether, the results indicate that two out of three performance measures report a negative influence for high overconfidence, but a positive influence for low overconfidence. This indication is adjacent for hypothesis 3 regarding the low overconfidence part of the hypothesis. The empirical results thus partly favour hypothesis 3. The reasons for insignificance are mentioned earlier in this section.

In all tables, the control variables are approximately equal to zero for all performance measures. Firm Size and CEO ownership are significant in all tables at a 5% level and CEO compensation is only significant with ROA at the same level. Altogether, the control variables barely have an influence on firm performance.

5. Conclusion

During this research, the focus was on the irrational manager approach. Ultimately, the goal was to shed light upon the question what the effect of CEO overconfidence on firm performance is for large institutional firms. This is based on the phenomena that firms hire overconfident managers. Obtaining these valuable insights may help to explain and even predict what effect an overconfident manager can have on a particular firm. This study emphasized on large institutional firms and the CEOs of the firms. The effect of CEO overconfidence on firm performance for the large institutional firms is overall positive but insignificant. Insignificance provides us with no credible evidence regarding the effect on firm performance. After the crash of the Lehman Brothers the results are ambiguous and thus cannot give a clear conclusion. Yet, the results were significant which provides insight that the managerial trait influences firm performance in financial times of distress. The High and Low overconfidence variables report mixed results with no significance. Insignificance provides us with no credible evidence

regarding the effect of overconfidence on firm performance. However, this raises new questions that should be studied in the future.

First of all, in all previous literature financial firms are taken out of the sample due to their specific nature. This suggests that CEO overconfidence might not occur within financial institutions due to heavy regulation or other idiosyncratic factors. Secondly, the results might be regionally biased. The recommendation for future research is, as mentioned before, to compare the results within regions. Overconfidence might occur more/less often in different cultures. Comparing the results gives a valuable insight whether firms hire overconfident CEOs on a global scale and why. Lastly, defining CEO overconfidence was one of the most important features of this research. The option-based overconfidence measure was used, as constructed in Malmendier and Tate (2005). Malmendier and Tate (2005b) used in a follow-up paper another proxy for overconfidence, the press-based measure. This is based on the portrayal of the CEO by the media. Ye and Yuan (2008) introduced a management shareholder overconfidence measure. The different proxies can be used in further research to compare the differences in results. Campbell et al. (2011) discovered that there is an optimal overconfidence level which maximizes firm performance. In this research, the optimal level may not have been reached. Further, the control variables and overconfidence variable in this model state that they have an effect on firm performance. In any case, overconfidence has an effect on CEO compensation, Firm size and CEO ownership as well. These imperfections might influence the results and are noticed but not taken into account in this research. Research on different corporate policies might also give a unique insight on which policies overconfident CEOs accelerate and on which policies they flout compared to non-overconfident CEOs

Unfortunately, the previously mentioned results were not able to achieve significant results and thus to draw conclusions regarding the goal of the research. However, the study shows good insights on the overall potential effect of CEO overconfidence on firm performance, how the effect can deviate in a period of financial distress and what effect high and low overconfidence can have on firm performance. The research shows room for future research and calls upon others to contemplate.

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Appendix

Table 1: Descriptive statistics

The following table gives an overview of the variables used for the number of observations, means, standard deviations, minimum value and maximum minimum included in this study.

Variable	Number of observations	Mean	Standard Deviation	Minimum value	Maximum value
Firm performance					
Systemic Risk	159	0.1028	0.3716	-0.1239	0.0672
Tobin's Q	159	1.0111	0.0488	0.9178	1.1987
ROA	159	0.0170	0.0168	-0.0892	0.0582
Overconfidence					
Holder67	159	0.1069	0.3100	0	1
Holder30	159	0.7547	0.4316	0	1
Holder100	159	0.2	0.4011	0	1
Control variables					
Firm Size	159	260869.7	463448.1	2142.187	2223299
CEO Compensation	159	4525.197	6412.315	32.171	52938.91
CEO Ownership	159	4.606	16.56127	0	151.2104

Table 2: Correlations

The table reports the pairwise correlations between the different firm performance measures and the different measures of CEO overconfidence.

	Systemic risk	Tobin's Q	ROA	Holder67	Holder30	Holder100
Systemic Risk	1.0000					
Tobin's Q	-0.7959	1.0000				
ROA	-0.3401	0.3989	1.0000			
Holder67	-0.1946	0.3161	0.1476	1.0000		
Holder30	0.4345	-0.4043	-0.2098	-0.6035	1.0000	
Holder100	-0.1679	0.3031	0.1741	0.7733	-0.4667	1.0000

Table 3: OLS Regression

This table consists of three simple OLS regressions adjusted for year fixed effects for CEO overconfidence (Holder67) on Firm performance (Systemic risk, Tobin's Q and ROA). The t values are written between the parentheses. *, **, and*** are respectively 10%, 5% and 1% significance levels.

Variables	Systemic risk	Tobin's Q	ROA
Holder67	0.1147 (1.09)	0.0092 (0.75)	-0.0018 (-0.60)
Firm size	0.0071 (4.72)***	-0.0055 (-2.27)**	-0.0018 (-1.42)
CEO compensation	-3.61e-07 (-0.91)	5.69e-07 (1.13)	8.51e-07 (3.16)***
CEO Ownership	-0.0003 (-2.89)***	0.0003 (1.12)	0.0001 (2.40)**
Constant	-0.1238 (-6.58)***	1.1277 (38.67)***	0.0438 (3.18)***
Year fixed effects	Yes	Yes	Yes
Adjusted R²	0.5560	0.4647	0.2269
Number of observations	159	159	149

Table 4: OLS regression during the crisis

This table reports the effect of CEO overconfidence after the Lehman crash on the 15th of September 2008. The table consists of three simple OLS regressions adjusted for fixed year effects. The t values are written between the parentheses. *, **, and*** are respectively 10%, 5% and 1% significance levels.

Variables	Systemic risk	Tobin's Q	ROA
LehmanCrash	-0.03840 (-3.23)***	0.0297 (2.01)**	0.0022 (0.56)
Firm size	0.0078 (4.73)***	-0.0056 (-2.28)**	-0.0018 (-1.41)
CEO compensation	-4.04e-07 (-1.02)	6.02e-07 (1.17)	8.54e-07 (3.14)***
CEO Ownership	-0.0003 (-2.95)***	0.00033 (1.14)	0.0001 (2.41)**
Constant	-0.1256 (-6.60)***	1.1291 (38.53)***	0.0439 (3.16)***
Year fixed effects	Yes	Yes	Yes
Adjusted R²	0.5620	0.4668	0.2279
Number of observations	159	159	149

Table 5: OLS regression, High and Low overconfidence

This table reports the effect of high and low CEO overconfidence on firm performance. The table consists of three simple OLS regressions adjusted for fixed year effects. The t values are written between the parentheses. *, **, and*** are respectively 10%, 5% and 1% significance levels.

Variables	Systemic risk	Tobin's Q	ROA
Holder100	-0.0158 (1.08)	0.0120 (0.68)	-0.0003 (-0.07)
Holder30	0.0036 (0.51)	-0.0021 (-0.20)	0.0011 (0.38)
Firm size	0.0081 (4.66)***	-0.0057 (-2.37)**	-0.0018 (-1.32)
CEO compensation	-4.71e-07 (-1.06)	6.53e-07 (1.33)	8.38e-07 (2.91)***
CEO Ownership	-0.0003 (-2.89)***	0.00031 (1.04)	0.0001 (2.41)**
Constant	-0.1271 (-6.33)***	1.1338 (43.09)***	0.0438 (2.96)***
Year fixed effects	Yes	Yes	Yes
Adjusted R²	0.5579	0.4622	0.2279
Number of observations	159	159	149