CEO compensation and the effect of the financial crisis

Master Thesis

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1. Introduction

Because of the current financial crisis and the many announcements about redundancies and bankruptcies, the discussion about executive compensation starts over again. There are many theses and papers written about this actual topic, also due to the fact that the CEO pay rose enormously over the past 30 years. Also the worldwide media is picking up this topic, where banks often got blamed for the collapse of the financial market. The pay-for-performance theory states that the bonus part should be somehow linked to the performance of the executive and thus to the firm. Hence the stock return could somehow play a role in the executive remuneration policy. This combines three interesting things to one topic, executive compensation, the current financial crisis and stock returns. Therefore I have chosen this topic to write my master thesis about.

On Monday May 27th, Dutch finance minister Jeroen Dijsselbloem said in answer to questions: *"Executive pay levels at banking group ING could be cut given the challenges in the financial sector. Although executive salaries at ING are lower than in similar European banks, this does not mean they should be raised. It is no more than logical that both the board and the rest of the workforce have more sober pay deals. This is only reasonable considering the large amount of support the Dutch state has extended to the financial sector."*
ING's CEO Jan Hommen received in 2012 a salary of €1.4 million while CFO Patrick Flynn was paid €0.75 million. Both executives did not get a bonus, because the Dutch government ruled out bonuses until the bank has completely repaid its debt to the state. The stock price of ING grow in 2012 from €7.51 to €9.49 (+23.4%) at the Dutch exchange market in Amsterdam.

Although that these executives could probably earn a higher salary in other firms, the Dutch finance minister thinks that their remuneration should not get raised and bonuses are temporary banned out in this firm, even now when the stock price rose with 23%. This is an interesting topic with some questions popping up. What determines the amount of executive compensation? And what determines the amount of the bonus? And why is it quite normal to reward the executives with bonuses? Is it

the age of the executive, its tenure, skills, or bargaining power that influences his remuneration? Is it linked to the stock price of the firm and are there any changes since the recent crisis?

Murphy (1999) and Core et al. (2003) documented available research papers about pay-for-performance and they conclude an overall positive relationship between firms performance and executive compensation. Most of the empirical analyses are done for U.S. based firms and all of them are done for the period prior the current financial crisis. In contrast to that, Duffhues and Kabir (2008) studied the widespread belief that executive pay should reflect firm performance for Dutch listed companies. They conclude that their empirical analysis fails to detect a positive pay-performance relationship. Thus, years later and for another market, the pay-for-performance theory does not hold. In the year 2008 the recent credit crisis reached its nadir, including the fall of Lehman Brothers. Due to this credit crisis I would expect that shareholders are more aware of the risks and less willing to pay their executives with massive salaries. Many corporations reduced their workforce and decreased salaries. Lower amounts of bonuses and stricter targets to reach them are a logical result of the bankruptcy of Lehman Brothers. Therefore I would like to investigate if the pay-for-performance relationship still holds for U.S. corporations since the recent credit crisis. Because Lehman Brothers was one of the largest banks in the U.S., I expect that especially other banks and corporations active in the financial market have more sober executive remuneration from 2009, because the whole industry is hit hard by the credit crisis. But also corporations that are active in other industries might be influenced by the bankruptcy of this huge player in the financial market. I am going to do this research for large and publically traded firms in the U.S., therefore my sample will consist out of the 500 firms which are in the Standard & Poor's 500 index.

My main research question will be:
What are the explanatory variables for executive compensation since the recent credit crisis and what are the major changes since the fall of Lehman Brothers for other industries?

By answering the main research question, I have set up some hypothesis what are going to be tested. The first one is that the bonus of the CEO depends on the

performance of the firm. This will be tested by regression analysis with data before- and after the bankruptcy of Lehman Brothers. Hereby could be drawn some conclusions about major differences between the two periods. The second hypothesis is that the size of the firm and the tenure of the executive both have a positive influence on the executives' compensation. Recent studies by Zhou (2003) and Cremers & Palia (2011) have showed that size and tenure have a positive impact on executive compensation in the past. I want to add my research to this literature to test this with new data as from 2009. My third and final hypothesis is that the fall of Lehman Brothers influenced the remuneration for other industries negatively. This implies that, due to the crisis in the financial world, also corporations that are not active in the financial service are hit by the crisis by reducing executive compensation. Hereby I am going to make a distinction between 20 different industries. Ending, the main research question will be answered using the results of hypothesis as mentioned above, supported by the empirical results of the regressions.

To answer the previous questions, I collected my required data from 3 different sources: Execucomp (WRDS), Thomson Reuters Datastream and Compustat. Daily information about stock returns is collected from Thomson Reuters Datastream. The Execucomp database allows me to download variables according to executive- and firm characteristics and executive compensation. Accounting variables for controlling my regressions, like total assets, profitability, debt, equity and total sales are downloaded from the Compustat database.

After collecting the data from the different sources, they are merged together and variables like leverage, tenure, ROA, ROS, RET are calculated. Firstly I will calculate and report descriptive statistics about my variables by averages, means, medians, standard deviations, minimums and maximums. These tables will be visually supported by graphs showing the movement over time. The first hypothesis will be tested due to regression analysis with basis salary and incentive payment for compensation as the dependent variable and return on sales, -assets and -stock markets variables for firm performance as the independent variable. Of course there will be added variables for controlling for other factors, like firm size, leverage and executive characteristics. Those control variables allow me to test for hypothesis 2 and discover any changes between the period before- and after the credit crisis.

Thirdly, there will be tested for major changes in executive compensation since 2008 for different industries. It is expected that the fall of Lehman Brothers influenced the CEO pay for financial firms, but what are the consequences for other firms? That question will be answered in the third hypothesis by creating some specific descriptive statistics about the different industries and a regression analysis with dummy variables per industry.

My data shows me that before the fall of Lehman Brothers the return on assets and the return on the stock market are the two explanatory variables to explain the amount of bonus paid to the executive. For the period as from 2008, the data shows me that the return on sales looses its significance and that the return on sales becomes one of the two significant explanatory performance variables explaining the amount of bonus. Although stock returns were very volatile in my dataset, the coefficients are quite equal in both sub-samples. A 1% increase in the stock market leads on average to a 0.3% increase in bonus payments to its CEO, ceteris paribus. My data also shows me that the constant term in my regressions is for the period after 2008 higher than for the period before 2008. Hereby I can conclude that the pay-for-performance theory holds for both periods and that the bonus payment to the CEO depends on firm performance.

In all regressions, before and after the crisis, the coefficients of tenure are significantly negative or insignificantly very close to zero. This allows me to conclude that CEO tenure is not positively related to CEO compensation, not for his basis salary and not for his optional bonus. On the other hand firm size, which I measured by total assets and total sales, is significantly related to CEO compensation for the period before the crisis for the amount of total assets. This counts as well for the basis salary as the optional bonus. The amount of sales is statistically not significant related to CEO compensation for the period before the crisis. After the credit crisis, the amount of total assets explains the basis salary in a negative way. For the bonus component still holds that assets explain the amount of bonus positively and significant. The amount of sales is for the period after the credit crisis in all regressions positively explaining CEO compensation. Therefore I can conclude that firm size does explains CEO compensation positively, but for the period after the credit crisis the amount of assets is negatively correlated with CEOs basis salary.

As salaries are concerned, on average industry *Finance and Insurance* is hit the most. The average total compensation for this industry dropped from above $13 million in 2007 to almost $8 million in 2009 and grew up to $10 million in 2011. According to the regression results, two industries pay their CEOs after the bankruptcy of Lehman Brothers more salary and bonus compared to the industry Finance and Insurance, namely *Manufacturing* (31-33) and *Real Estate, Rental and Leasing* (53). The coefficients of both dummy variables, with basis level industry 52, are significantly positive. This trend is not supported by my graph where the mean CEO compensation level per industry is plotted over time. Also looking at the correlation matrix of the 6 largest represented industries in my sample, the outcome is that industries 31-33 and 53 are both highly correlated with industry 52. Hence, I would like to conclude that those two industries are the most affected by the bankruptcy of Lehman Brothers.

Although Cremers & Palia (2011) find a strong positive relationship between CEO tenure and his remuneration, my data shows a very weak and negative relation between tenure and executive remuneration. Also Johnston (2002) and Bulmash & Sah (2011) confirm the results of Cremers & Palia (2011), which are not in line with my findings. I did find a strong relationship between firm size and CEO compensation, which is in line with academic papers by Saks (2010), Zhou (2003), Kostiuk (1990) and Lau & Vos (2004). They all claim that firm size is the most important variable to explain CEO compensation. In contrast to that, I found a negative correlation between total assets and basis salary in the period after the credit crisis, which they did not take into their samples.

One of the limitations of my research is the survivorship bias. I have selected the 500 firms out of the S&P index per April 2013 and downloaded their historical data to do this research. This implies that firms that got bankrupt or are significantly downsized due to the crisis are excluded from my sample. Only the survivors of the S&P500 index and new added corporations are in my dataset, what causes this survivorship bias. The second limitation of my research is the low amount of data for the year 2012. Many corporations did not complete their annual reports for 2012 and the current economy is not really out of a recession. Therefore I took the fall of Lehman Brothers in 2008 as a benchmark and called this the absolute nadir of the recent credit crisis.

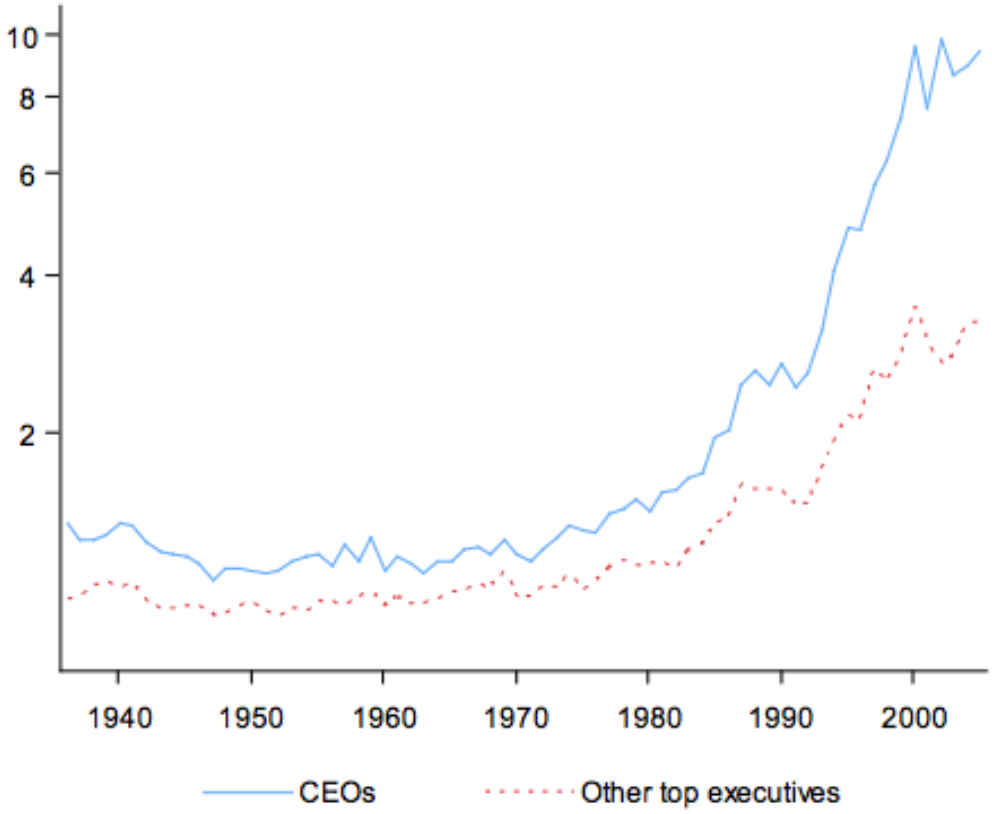
The rest of the thesis is organized as follows: The second chapter contains an extensive literature review of papers written by academics in this field. Hereby I have made a selection of the most relevant and recent papers that are published in professional literature. Chapter 3 is about my own dataset and describes the data collection and the regression equations. Chapter 4 contains descriptive statistics about my data and shows some graphs and tables. Furthermore, it contains the results of the regressions that are described in chapter 3. Finally, chapter 5 contains the conclusions of my research.

2. Literature review

2.1 Arise of executive compensation

There are many papers written about executive compensation. One of the reasons for that is the extreme upward trend of the amount of total compensation during the last decades. Frydman and Saks (2010) tested this upward trend and find that in the 30 years after World War II a quite constant increase of 0.8% per year is usual. However during the 70's and the *dot-com* bubble, executive compensation levels grow on average of more than 10% per year. Not just the amount of compensation was increasing, also the composition of the compensation package changed during that period. The part of incentive pay increased compared to the basis salary, what implies that the executives got a higher percentage of their total compensation as a bonus or as employee stock options (ESO). With this relative new kind of compensation, shareholders try to influence the decisions of the CEO and let him behave more like a shareholder with long-term incentives. Frydman and Jenter (2010) reported a similar paper about executive compensation (calculated as the sum of the salary, current bonuses, payout from long-term incentive plans and the Black-Scholes value of stock options grants) and created the graph of figure 1. All dollar values are adjusted for inflation calculated as 2000-dollars and reported as a logarithm in millions on the Y-axis. This graph shows that during the dot-com bubble in the late 90's CEO compensation grew massively and that other top executives get paid at a substantial lower level than the executives. The graph also shows the comparison between CEOs and other top executives. The ratio between them was quite stable around 1.4 prior to 1989, but has since then risen to almost 2.6 in the 00's.

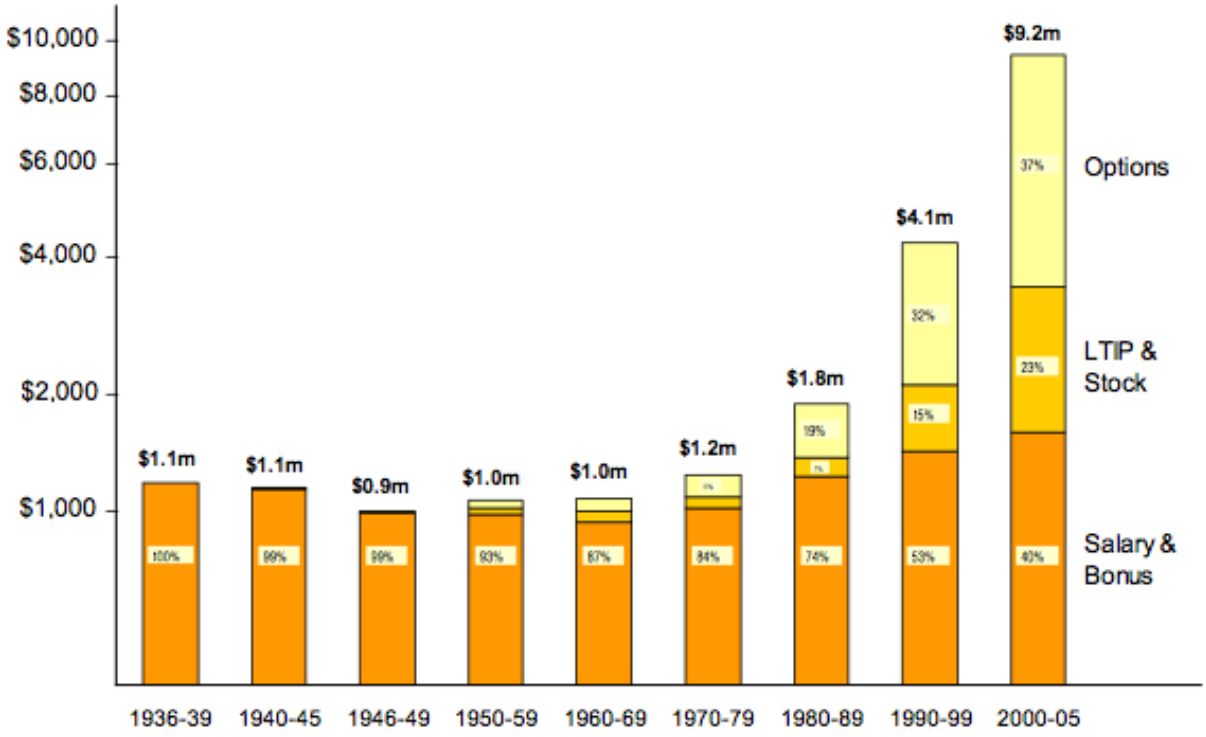
Graph 1: Compensation of CEOs and other top executives from 1936 to 2005.



Source: Frydman & Jenter (2010).

Another important trend that is shown in that same paper is the change in composition of the compensation package. The main graph of Frydman and Jenter (2010) is shown below in figure 2. From 1936 until the 1950s, CEO remuneration consisted mainly out of salary and bonus. Since the 80's, the components Long Term Incentive Payments (LTIP), stocks and stock options play a more important role. These LTIP are bonus plans based on the performance of several years, again with payments in either cash or stocks. Also noticeable from the graph is that the amount of basis salary plus bonus is almost constant over the past 70 years. Only the options and LTIP amounts increased massively.

Graph 2: Composition of CEO remuneration from 1936 – 2005.



Source: Frydman & Jenter (2010).

The trend in CEO compensation as mentioned above has to do with the agency problem and moral hazard. Shareholders try to let the executives behave in the favor of shareholders by giving them options and stocks, so executives will behave themselves more as a shareholder then just an employee of the firm. More about this theory will be described in paragraph two.

2.2 Bonuses and incentive pay

In small and non-listed firms, the manager is in many cases also on of the shareholders simultaneously. This implies that the manager of the firm behaves like a shareholder and probably insists on long-term targets. In large companies like listed corporations, the managers are not the shareholders or have a very small fraction of the shares. Shareholders, the principals, just invest their money and delegate the daily decisions to the executives, who are the agents. Next to that, there exists information asymmetry. A problem is arising here. The agents do not have to make decisions in the interest of the principal because of conflicting targets, information and goals. Generally, executives just want to get their salary and reach their targets to get bonuses and shareholders want to see an increasing share price. In practice executives

focus on investment projects that suite best for getting their bonus on the short-run instead of selecting investment projects that pay off high profits over the long run. This mismatch is called the *agency problem* and arises in all firms where management and ownership is separated. Targets for bonuses are set such that the agents run the corporation in the interests of the principle (Eisenhardt, 1989). So the gap between the incentives of the shareholders and executives is partially closed due to the set targets to receive a bonus (Jensen and Meckling, 1976; Smith and Stulz, 1985).

In the 80s, 90s and 00s, the bonuses for executives have focused the executives more on the short-run than on the long-run decisions and pay-offs. This of course because the executives just want to reach their personal target to get wealthy. This was concluded by the Financial Stability Board (2009) in their report about short-run profits and executive bonuses, which lead to a thread for the worldwide financial markets. Echoing this, the US government changed some regulations for executives' remuneration. The so-called *pay-for-performance* compensation should consist for a larger fraction out of non-cash payments, like shares or derivative contracts. In 2010, the Committee of European Banking Supervisors did almost the same and obliged that 50% of the total compensation package should consist of non-cash compensation. Both financial institutions took this decision to force the CEOs to act more like a shareholder and therefore run the corporation with a better risk-return-tradeoff.

In their famous paper, Jensen and Meckling (1976) describe the two sides from which we can see the agency problem. First, the principal (shareholders) can take some profound actions against the CEO if its dealings are about to damage the corporation's profile. These actions are called *agency costs*. Both parties suffer from these extra costs and in addition there will be a gap between the executives decisions and shareholders wealth optimization. The second angle is about the positive aspects of the agency theory. By monitoring and controlling the executives, the principal could set financial restrictions and organizational rules to the executive's decisions. These extra costs of monitoring are beard by the shareholders. On top of that, there exists a residual wealth loss when the executive is not able to achieve the maximum wealth for the principal.

Because of the above-mentioned structure, executives try to minimize bad news to the markets until they have secured their desirable bonus payments. If the private use of company aircrafts, which is the most costly en frequently disclosed managerial fringe benefit, is first disclosed to shareholders, company stock prices drop by around 1.1%. But more important: "*... this value loss does not fully anticipate the future poor performance of such companies. Regression analysis indicates that firms permitting CEO aircraft use under-perform market benchmarks by about 400 basis points per year, a severe shortfall that cannot be explained simply by the costs of the resources consumed.*", is concluded by Yermack (2006).

Gregg et al. (2010) argue that remuneration should be based on firms' performance, even through large corporations do not correlate executive compensation with performance or size. Bonuses are necessary due to the agency theory, which argues that top managers act in their own interests at the expense of the shareholders' interests (Berle and Means, 1932). The majority of the shareholders care about wealth optimization via the stock price, while the executive is able to do whatever he wants. Therefore many CEOs of the large cap funds do get bonuses on top of their basis salary to close the gap between the shareholders and executives different incentives. Hence, if the CEO optimizes shareholders' value he will be rewarded with, in some case huge, cash- or option bonuses (John, Mehran and Qian, 2009).

Most rational people agree that the CEOs of the S&P500 corporations earn a lot of money, but these executives itself are not always satisfied with it. Because the amount of the remuneration is publicly known, they try to *leapfrog*. This implies that the executives try to climb on the ladder to become the best-paid executive compared to their peers. Once this goal is reached, the *ratchet effect* plays a role, which implies they try not to fall down of their top position. Diprete, Eirich and Pittinsky (2009) created in their paper annual rankings on the amount of remuneration and show that this changes over time dramatically. They conclude "*... it is apparent in each of the charts that leapfrogging had a considerable effect on change in mean total compensation.*" They also show that the amount of total compensation of individual executives is more stable over the years than the salary / bonus component, because bonuses are earned every year while incentive payments on the long run were not awarded on a yearly basis.

Some argue that the incentive problems are "… one of the most fundamental causes of the credit crisis" (Blinder, 2009). Fahlenbrach and Stulz (2010) did a research about CEO remuneration in the banking industry in the US and concluded that the conflict of interest cannot be blamed for the credit crisis. They also conclude that banks with CEOs whose incentives are better in line with those of the shareholders performed worse than CEOs whose incentives differ from its shareholders. In addition to that, they find that there is no significant difference in performance between banks that granted the bonus in cash or in options. Consequently, the CEOs that got paid in options suffered large wealth losses due to the decreasing stock prices.

According to the described different incentives and bonuses, I would expect a significant relation between stock returns and the amount of bonus received by the CEO. One of my hypotheses in this paper is that the amount of the executives' bonus depends on the stock return in that particular year and eventually on the lagged stock return of the year before. This would imply that the executive is rewarded by a bonus on top of his basis salary if the stock outperforms its benchmark in that particular year.

3. Empirical Research

3.1 Methodology

In order to answer my main research question and hypotheses as presented in the introduction, I have constructed an empirical research based on a selection of important theories, which test similar things in the broad field of executive compensation. The main goal is to test whether there are any changes in executive compensation for the largest publically held firms in the U.S. since the fall of Lehman Brothers. This will be done by several hypothesis and regression analysis:

1. The bonuses and other incentive payments of a CEO depend on the performance of the firm.
2. The size of the firm and the tenure of the CEO both still have a positive influence on its compensation.
3. There are major changes since the fall of Lehman Brothers for executive compensation in the financial market and also in other industries.

The first one is to test the pay-for-performance theory since the recent credit crisis. Hereby I am testing the relationship between the executive's compensation package and the performance of that specific firm for the years 2009 and later by OLS regressions. The goal is to test whether this theory still holds after the bankruptcy of Lehman Brothers in September 2008. The literature review of chapter 2 contains an extensive description of the pay-for-performance theory for the period before the recent crisis. The second hypothesis is tested by some regressions using different variables for size, compensation and controlling for tenure. By running these regressions I am testing if firm size and executives tenure are still variables that explain the amount of salary, bonuses and other incentive payments to the CEO for the period as from 2009. The third set of regressions is to test if executive compensation changes since 2009 for financial firms and other firms, due to the bankruptcy of Lehman Brothers.

The selected data consists out of the 500 largest publicly held firms in the United States over the period 2004 – 2012. I chose the U.S. market because it is more transparent due to strict publication laws and it contains corporations that are globally active in all industry sectors. On top of that, the required data is in most cases easily

accessible via the library of my university what leads to a proper dataset. I have selected the data for the period 2004 – 2012 to have four years of data ex ante and post the year 2008, what is seen as the absolute nadir of the recent credit crisis and contained the big news that the large bank Lehman Brothers got bankrupt.

Data files containing information about executives and their compensation are downloaded from the Execucomp database, which is part of the Wharton Research Data Services (WRDS) database. Annual accounting data on firm level is available in the Compustat database, which is also provided by WRDS. Next to that, stock returns, corrected for stock splits and dividends, are downloaded from the Thomson Reuters DataStream database. A list of all downloaded and created variables and its definitions is attached in table 3 in the appendix.

3.2 Regression analysis

To start with the regression analysis, I am testing the relationship between firm performance and executive's pay. Hereby is partly made use of the technique of Duffhues and Kabir (2008) of which the results are described in chapter two, but I make the distinction between basis salary and the bonus component, added more control variables and make use of data before and after the crisis. This set of regressions contains of data for CEO's per firm. The Ordinary Least Squares (OLS) regression that is ran is constructed as follows:

$$Compensation_{it} = \alpha_0 + \alpha_1 Performance_{it} + \alpha_2 Size_{it} + \alpha_3 Leverage_{it} + \alpha_4 Tenure_{it} + \alpha_5 Age_{it} + \alpha_6 Gender_{it} + \lambda j + \delta_t + \varepsilon_{it} .$$

The dependent variable $Compensation_{it}$ is the amount of compensation paid to the CEO for firm i in year t. All variables are expressed as the natural logarithm to adjust for the non-normality of compensation and to deal with outliers. Because the total remuneration package consists of many different components, I have decided to measure "Compensation" with two different variables: LN_Salary and LN_Bonus, to test for different outcomes. The variable LN_Salary is the natural logarithmic amount of basis salary and LN_Bonus is the natural logarithmic value of the optional bonus. For completeness, table one contains a detailed description of all the variables.

The explanatory variables, performance, size and leverage, are also measured in different ways. The variable performance should be the most important and is therefore measured by three different variables: return on assets (ROA), return on sales (ROS) and return on stock (RET). So ROA and ROS are accounting based and RET is based on capital market performance. I expect compensation to be higher for well-performing corporations, so the α_1 coefficient should be positive, for all three standards. For ROA, ROS and RET are also the one-year lagged variables added to the regressions to check whether the basis salary or the other compensation variables are significantly related to previous year's performance measures.

As control variables many measurements of firm size and leverage are added to the OLS regression. It is usually accepted and shown to expect executives of large firms to receive relatively higher compensation than executives of smaller firms (Zhou 2000). Size is measured by the natural logarithm of the book value of total assets and the total amount of sales. The variable *market leverage* is calculated as the ratio of total debt to total debt + market equity. The reason for this is that debt holders may closely monitor the activities and remuneration packages of the executives, and hereby this would reduce the incentive of excess compensation. To control for executive characteristics, variables controlling for its tenure, age and gender are added to the regression. To capture industry- and time fixed effects the terms λ_j and δ_t are added to the regression. Industries are defined on a basis of the first two digits of their SIC codes. For completeness, table 8 in the appendix contains a list of industries. Finally, ε_{it} is added to the regression as an idiosyncratic error term. These sets of regressions will be done for two separate periods, 2004-2007 and 2008-2011 to check whether pay for performance theory holds for both periods.

In addition to the above described regression analysis, I am also going to test this relationship by the change in compensation and the change in performance. This is done to test whether the mutual changes in performance and compensation are related, while controlling for the same variables as before. This will be tested by the following regression equation:

$$\Delta Compensation_{it} = \alpha_0 + \alpha_1 \Delta Performance_{it} + \alpha_2 Size_{it} + \alpha_3 Leverage_{it} + \alpha_4 Tenure_{it} + \alpha_5 Age_{it} + \alpha_6 Gender_{it} + \lambda j + \delta_t + \varepsilon_{it} .$$

My expectation is that the basis salary in year t is not related to firm performance in year t, but it is related to firm performance of year t-1. LN_Bonus is expected to be statistically significant related to firm performance of year t. The results and interpretations of these regressions are shown in paragraph 4.2. Furthermore, I expect that executive's tenure has a strong significant correlation with its compensation, and even after the credit crisis it has become more important. I would expect firms not to trust on their size, performance or other factors only, but more on the skills of its executive, which normally increases by tenure. Therefore I think tenure has significant and positive explanatory power. In addition to that, age would also have a positive correlation with compensation and I expect that male and female CEOs will get remunerated equally, based on previous research by Bugeja et al. (2001).

3.3 Changes in executive compensating for other markets

The researches as described before do not make any distinction between the different industries represented in my data, but controlled for industry fixed effects. In this part I am going to test whether the fall of Lehman Brothers, which was a huge player in the banking sector, also effects executive compensation in other industries and by how much. I expect that the fall off Lehman Brothers and the credit crisis on itself does influence the situation at other corporations, especially those who are active in the financial services. First, some descriptive statistics about the different industries will be reported. Then, I will run a regression analysis with dummy variables for each industry. The different industries are based on the first 2 digits of the NAISC and are described in table 8 in the appendix. The regression equitation that will be run is as follows:

$$Compensation_{it} = \alpha_0 + \alpha_1 Performance_{it} + \alpha_2 Size_{it} + \alpha_3 Leverage_{it} + \alpha_4 Tenure_{it} + \alpha_5 Age_{it} + \alpha_6 Gender_{it} + \alpha_5 Industry_{it} + \delta_t + \varepsilon_{it} .$$

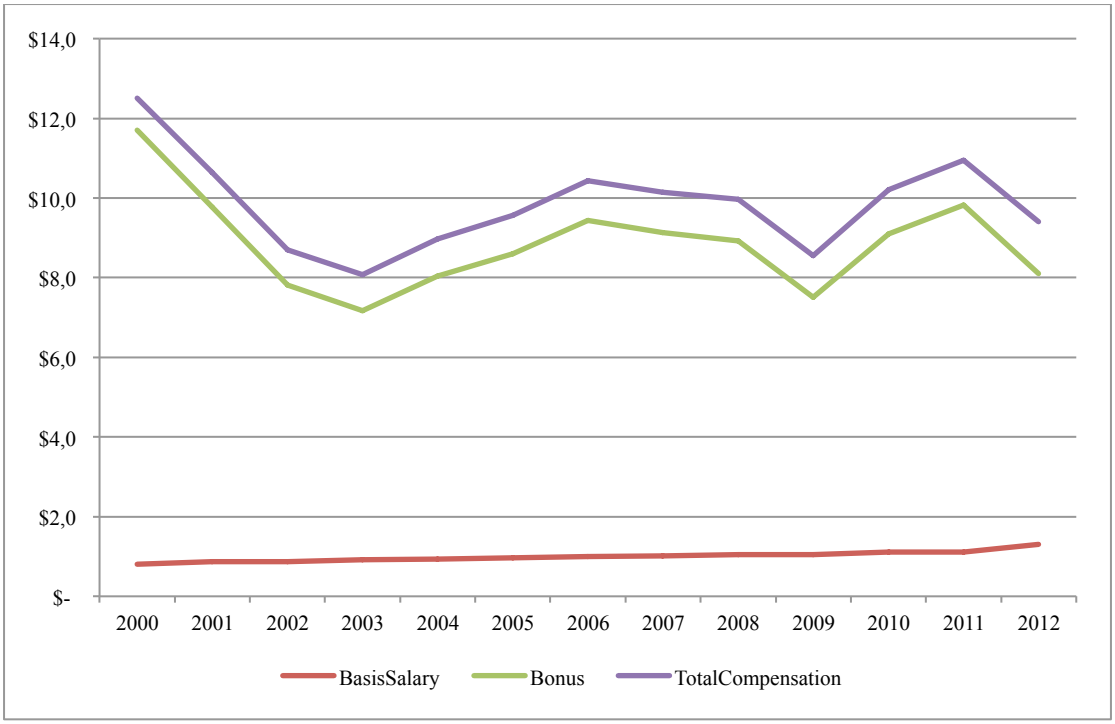
To measure compensation is made use of the LN_TotalCompensation variable, because I would like to test the changes between industries on a level of total compensation. Performance, size, leverage and CEO characteristics are measured by the same variables as before. The variable capturing industry will contain of dummy variables with basis level NAICS code 52, which was Lehman Brother's industry code.

I expect for industry 52, Finance and Insurance, the impact to be the largest. This because Lehman Brothers was a huge player within this industries and other players would be more reluctant and reticent with their executives compensation. I also expect the strong related industry 53 (Real Estate, Rental and Leasing) to be influenced much by the bankruptcy of Lehman Brothers and the whole credit crisis on itself.

4. Results

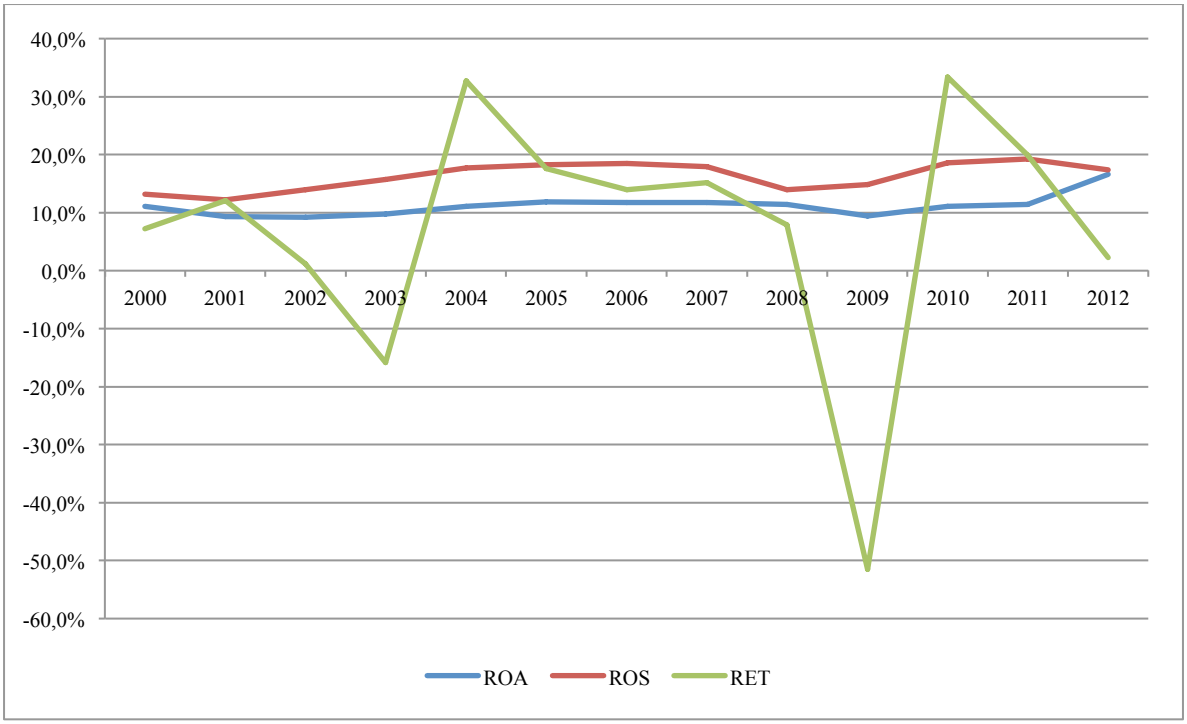
4.1 Descriptive analysis

Before running any regression analysis, I am going to describe my constructed dataset by some descriptive statistics. Graph 3 below shows the means of CEO compensation (all in millions of US Dollars) over time for the period 2000 – 2012. The number of observations lays around 460 per year, except for 2012 where the number of observations is only around 25. The red line represents the basis salary and grows quite constant over time by around 3% per year. On the other hand the green line, which represents the total amount of optional bonus, shows more fluctuations over time. It contains cash- and non-cash bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), and long-term incentive payouts. It shows a sharp downward trend up to $7.2 million in 2003, after which it raises again up to $9.4 million in 2006. Then, I notice a sharp decline to $7.5 million in 2009, just after the fall of Lehman Brothers and the nadir of the credit crisis. The purple line represents the amount of total compensation, which consists out of basis salary plus the optional bonus. Because the basis salary is quite constant, the purple line moves quite constant, but above, the green line. The maximum mean of total compensation lies in 2000 and is around $12.5 million per year. Its minimum, just above $8 million, is reached in 2003. So both maximum and minimum values are reached before the credit crisis, but the years around 2008 show a sharp decrease for executive compensation.



Graph 3: Mean CEO compensation (in millions of US Dollars) over time.

Other important variables for my research are firms performance, captured by ROA, ROS and RET. Graph 4 below shows these performances over time for the period 2000 – 2012. The blue line represents the return on assets and fluctuates for the whole period around 10%. The return on assets, which is represented by the red line, lies above the ROA and fluctuates around 15%. Both lines show in 2008 and 2009 a decrease, the year that Lehman Brother got bankrupt. In the years 2010 and further, the returns climb back to their normal levels. Although ROA and ROS do not fluctuate that much, the return on the stock market is more volatile with outliers of +33% and -52%. It is represented by the green line and shows 2 peeks and 2 falls. The first drop is observed in 2001, 2002 and 2003, what can be seen as the beginning of the financial crisis. The second, and much larger, decrease is in 2009 and shows an average stock return of -52%. The fall of Lehman Brothers, which was in September 2008, seems to influence the whole financial market with highly negative returns on stock markets in the upcoming year.



Graph 4: Mean firms performance over time.

Table 1 below presents very brief my used variables and shows the number of observations, mean, median, standard deviation, minimum and maximum per variable. The numbers reported for *assets total* and *sales* are in billions of US Dollars and the numbers for CEO compensation are in millions of US Dollars. The mean age of a CEO of one of the 500 largest corporations is almost 56, and the minimum and maximum ages are 36 and 84. The average tenure in my sample is just above 6, and the maximum tenured CEO is 48 years in office. Of the in total 5,428 observations, 98% of the CEOs are male. The gigantic amounts of total assets and sales fluctuate extreme around its mean and their interval is extremely broad. On top of that, there are some extreme outliers that influence my data. Therefore I decide to take their natural logarithmic values for the upcoming regressions.

	#of obs.	Mean	StdDev.	Median	Min	Max
BasisSalary	5,428	$ 1.0	$ 0.5	$ 1.0	$ 0	$ 8.1
Bonus	5,415	$ 8.9	$ 13.7	$ 6.1	$ 0	$ 60.0
TotalCompensation	5,414	$ 9.9	$ 13.8	$ 7.1	$ 0	$ 60.0
ROA	5,415	10.8%	8.9%	9.6%	-109.2%	85.8%
ROS	5,397	16.3%	24.5%	14.8%	-1000.6%	86.4%
RET	5,263	7.7%	41.3%	11.0%	-100%	+332.1%
Age	5,283	55.96	6.69	56	36	84
Tenure	5,236	6.22	6.29	4	0	48
Male_dummy	5,428	0.98	0.14	1	0	1

Assets Total	5,424	$ 43.3	$ 153.8	$ 10.1	$ 0.8	$ 2,265.8
Sales	5,406	$ 16.0	$ 31.1	$ 6.6	$ 0.7	$ 444.9
LN_AT	5,424	9.33	1.45	9.22	4.41	14.63
LN_Sales	5,406	8.84	1.26	8.80	4.28	13.01

Table 1: Descriptive statistics executive characteristics and firm size.

Table 2 below shows the correlation matrix of the used variables for my research. It shows that all three variables of compensation are highly correlated with *LN_AT* and *LN_Sales*, which are two variables measuring for firm size. It also shows that ROA, ROS and RET are mutually highly correlated measures for firm performance but they are not strong correlated with *Bonus* or *TotalCompensation*. It also shows that tenure has a low correlation with all compensation variables, what implies that the number of years in office is not that important to explain CEO compensation. Also age, which is of course highly correlated with tenure, is only highly correlated with the amount of basis salary and not at all with the optional bonus.

	Basis	**Bonus**	**Total**	**ROA**	**ROS**	**RET**	**Age**	**Tenure**	**LN_AT**	**LN_Sales**
BasisSalary	1	0.1836	0.2206	0.0029	0.0157	-0.0162	0.1873	0.0317	0.3761	0.4441
Bonus	0.1836	1	0.9993	-0.0058	0.0357	0.0597	0.0479	0.0265	0.2325	0.2357
TotComp	0.2206	0.9993	1	-0.0057	0.0360	0.0586	0.0548	0.0275	0.2452	0.2509
ROA	0.0029	-0.0058	-0.0057	1	0.3371	0.2368	-0.0068	0.0393	-0.3515	-0.0520
ROS	0.0157	0.0357	0.0360	0.3371	1	0.1468	0.0249	0.0407	0.0744	-0.0528
RET	-0.0162	0.0597	0.0586	0.2368	0.1468	1	0.0011	0.0379	-0.0968	-0.0528
Age	0.1873	0.0479	0.0548	-0.0068	0.0249	0.0011	1	0.4224	0.1292	0.1135
Tenure	0.0317	0.0265	0.0275	0.0393	0.0407	0.0379	0.4224	1	-0.0473	-0.0526
LN_AT	0.3761	0.2325	0.2452	-0.3510	0.0744	-0.0968	0.1292	-0.0473	1	0.7758
LN_Sales	0.4441	0.2357	0.2509	-0.0520	-0.0860	-0.0528	0.1135	-0.0526	0.7758	1

Table 2: Correlation matrix

4.2 Relationship between executive's remuneration and performance

4.2.1 Before the fall of Lehman Brothers

Table 4 presents multivariate regression results for the relationship between executive compensation in the period 2000-2007, which is the period before the fall of Lehman Brothers, and firms' performance. Table 3 in the appendix shows the specified definitions and calculations of the variables. The number of observations varies over the 6 different regressions from 2,660 to 3,057, which is enough to draw some conclusions about the results. Besides 9 different variables for compensation, I have added control variables such as LN_AT, LN_Sales, Market_Leverage and some CEO characteristics to the regressions. The fifth column is constructed on a different way

than the previous regressions. The dependent variable is ΔLN_Bonus, which is the change in LN_Bonus for the past year. The explanatory variables for firm performance are also constructed as the one-year-change of ROA, ROS and RET. Also industry- and year fixed-effects have been added to the regression, but are omitted in the table for the sake of brevity. The absolute t-statistic is reported in parenthesis and ***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

	LN_Basis	**LN_Basis**	**LN_Bonus**	**LN_Bonus**	**ΔLN_Bonus**
Constant	4.557*** (10.41)	4.593*** (10.74)	4.027*** (9.06)	4.150*** (9.18)	0.354 (0.78)
ROA	1.724*** (3.39)	0.250 (0.37)	1.013** (1.90)	2.331*** (3.14)	
ROAl1		1.490*** (3.05)		-1.456*** (2.64)	
ΔROA					1.697*** (3.05)
ROS	-0.436* (1.61)	-0.446* (1.53)	-0.361 (1.20)	-0.443* (1.36)	
ROSl1		-0.004 (0.35)		-0.008 (0.52)	
ΔROS					-0.028** (1.94)
RET	-0.003 (0.04)	0.052 (0.74)	0.322*** (4.83)	0.320*** (4.20)	
RETl1		-0.057 (0.94)		0.190*** (2.93)	
ΔRET					0.138*** (3.03)
LN_AT	0.122** (2.21)	0.116** (2.07)	0.423*** (4.82)	0.451*** (7.31)	0.005 (0.10)
LN_Sales	0.056 (1.04)	0.044 (0.80)	0.082* (1.42)	0.044 (0.73)	-0.010 (0.23)
Leverage	0.683*** (4.36)	0.644*** (4.07)	-0.734*** (4.61)	-0.693*** (4.14)	-0.101 (0.62)
Tenure	-0.008** (1.96)	-0.012*** (3.19)	-0.007** (1.65)	-0.006* (1.33)	-0.002 (0.59)
Age	0.121*** (3.42)	0.016*** (4.43)	-0.001 (0.22)	-0.003 (0.80)	-0.004 (1.08)
Male	-0.267* (1.43)	-0.226* (1.25)	-0.152 (0.79)	-0.093 (0.48)	0.060 (0.30)
Adj. R^2	0.0765	0.0796	0.227	0.2320	0.0033
F-stat.	7.78	6.90	25.11	21.71	1.25
# of obs.	3,031	2,665	3,037	2,674	2,660

Table 4: Regression results CEO compensation before fall of Lehman Brothers.

The first two columns of table 4 show the regression results between the amount of basis salary and firms performance for the period before 2008. In the first columns, I have added the non-lagged variables for ROA, ROS and RET. In the second column I

have also added the one-year lagged variables. The coefficients do not show a clear relationship between the amount of basis salary and firm performance, which is in line with expectations. The return on assets seems to influence the amount of basis salary positively, while the return on sales seems to influence it negatively. The coefficients for the return on stock are both very close to zero and the sign is not consistent. In terms of interpretation, ceteris paribus, a 1% increase in return on assets would lead to a 1.7% increase in basis salary, based on the first column. Although this might look a huge impact, the adjusted R^2 is 7.7%, which is very low. This means that about 7.7% of the variance of the natural logarithm of the basis salary is explained by firm performance, having controlled for firm size, leverage and CEO characteristics.

The third and fourth columns of table 4 show the relationship between the natural logarithm of the optional bonus compensation and firm performance, controlling for firm size, leverage and CEO characteristics. The coefficients for ROA are both positively significant, but its lagged variable seems to have a negative impact on the bonus. The three variables for the return on sales are negative, but not significant. This implies that the return on sales does not explain the amount of bonus paid to the executive; just this was also the case for the amount of basis salary. The return on the stock market does influence the amount of the bonus; in both regressions these coefficients are positive and highly significant. The R^2 is in the third and fourth regression both around 23%, which implies that 23% of the variance of the bonus is explained by this regression. This percentage is much more than for the regressions of the first and second column. In terms of interpretation, a 1% increase in the stock return would result in a 0.3% increase in bonus compensation, in case of ceteris paribus.

The last column of table 4 shows the relationship between the change in the natural logarithm of the optional bonus and the change in firm performance, controlling for firm size, leverage and CEO characteristics. It shows that ΔROA is positively and highly significantly related to the increase of ΔLN_Bonus. Also the increase in the stock return is on the same way related with the change in the bonus component. This implies that an increase in ΔROA by 1 causes an increase of 1.697 at ΔLN_Bonus. Although this might look consistent, the R^2 of this regression is very low by 0.33%.

What important is to focus on are the control variables, particular in the first four regressions. The natural logarithms for the total amounts of assets and sales, which measure for the size of the corporation, do not result in the same outcomes. LN_AT is in all 4 regressions positively significant with coefficients around 0.1 for basis salary and 0.4 for bonus compensation. This implies that the amount of assets, which is an accounting number and does nothing to do with how these assets are used, is positively related to CEO compensation. Because both variables are reported as natural logarithm, the interpretation is as follows: If the amount of total assets increases by 1%, ceteris paribus, the amount of bonus paid to its executive will be increased by 0.45% (in case of regression 4). The variable controlling for the total amount of sales is just in 1 regression significant, but the coefficients are consistent; in most regressions they are around 0.05. Leverage does show a clear pattern; in the regressions explaining the basis salary it has a significant coefficient of -0.6, which implies that high-levered firms do pay lower salaries than low-levered firms, ceteris paribus. The control variables for CEO characteristics show that tenure is negatively related to CEO compensation, although the coefficients are very close to zero, they are significant. Hereby I do not discover any differences between basis salary and bonus, but the economic significance is quite close to zero. On the other hand, the age of a CEO is positively related to his basis salary, but does not influence his bonus compensation. Also the gender does not explain that much of its compensation, all coefficients are negative, but the economic interpretation is that low that it is negligible. This might be due to the fact that 98% of the CEOs in my sample are male.

4.2.2 After the fall of Lehman Brothers

Table 5 below presents multivariate regression results for the relationship between executive compensation in the period 2008-2012, which is the period after the fall of Lehman Brothers, and firms' performance. The number of observations varies from 1,859 to 1,880, which is enough to draw some conclusions about the results. Besides 6 different variables for compensation, I have added control variables such as LN_AT, LN_Sales, Market_Leverage and some CEO characteristics to the regressions. Also industry- and year fixed-effects have been added to the regression, but are omitted in the table for the sake of brevity. The absolute t-statistic is reported in parenthesis and ***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

	LN_Basis	**LN_Basis**	**LN_Bonus**	**LN_Bonus**	**ΔLN_Bonus**
Constant	6.392*** (10.36)	6.270*** (10.28)	6.488*** (15.52)	6.468*** (15.41)	0.533 (1.22)
ROA	-2.470*** (4.96)	-1.888*** (2.67)	0.060 (0.18)	0.420 (0.86)	
ROAl1		-1.710*** (9.24)		-0.782** (1.70)	
ΔROA					0.296 (0.65)
ROS	1.206*** (10.01)	1.103*** (9.24)	0.209*** (2.56)	0.178** (2.17)	
ROSl1		1.101*** (8.81)		0.241*** (2.80)	
ΔROS					0.162*** (2.50)
RET	0.309*** (3.23)	0.151* (1.51)	0.319*** (4.92)	0.315*** (4.56)	
RETl1		0.142* (1.48)		0.198*** (2.98)	
ΔRET					0.202*** (4.56)
LN_AT	-0.219*** (3.66)	-0.340*** (5.61)	0.109*** (2.68)	0.078** (1.87)	-0.002 (0.06)
LN_Sales	0.186*** (3.23)	0.307*** (5.25)	0.208*** (5.32)	0.236*** (5.87)	-0.016 (0.40)
Leverage	0.752*** (3.62)	0.872*** (4.18)	-0.476*** (3.39)	-0.414*** (2.89)	-0.224* (1.63)
Tenure	-0.043*** (7.52)	-0.043*** (7.68)	0.001 (0.26)	0.000 (0.06)	0.002 (0.37)
Age	0.026*** (4.67)	0.026*** (4.80)	-0.008** (2.13)	-0.008** (2.00)	-0.006* (1.49)
Male	-0.120 (0.64)	-0.095 (0.50)	-0.0126 (0.10)	-0.034 (0.26)	0.027 (0.20)
Adj. R^2	0.0925	0.1304	0.2108	0.2164	0.0361
F-stat.	6.62	8.53	15.76	14.89	3.05
# of obs.	1,877	1,859	1,880	1,862	1,860

Table 5: Regression results CEO compensation after fall of Lehman Brothers.

The first two columns of table 5 show the regression results between the amount of basis salary and firms performance for the period after 2008. In the first columns, I have added the non-lagged variables for ROA, ROS and RET. In the second column I have also added the one-year lagged variables. All 3 coefficients for ROA are negative and significant at the 1%-level. For the return on sales, all the coefficients both positive and highly significant at the 1%-level, which looks contradictory. Also the return on the stock market seems to influence the basis salary in a positive direction. For all the three variables, I observe that its lagged variable is consistent with its non-lagged variable in terms of sign and significance. In terms of interpretations, ceteris paribus, a 1% increase in return on assets would lead to a 2.5% decrease in basis salary, based on the first regression. Although this might look

contradictory and a strong relationship, the adjusted R^2 is 9.3%, which is very low. This implies that only 9.3% of the variance of the natural logarithm of the basis salary is explained by ROA, having controlled for firm size, leverage and CEO characteristics. In the second regression the coefficients do have the same sign, but still the economic interpretation is quite low with a R^2 of 13%.

The third and fourth columns of table 5 show the relationship between the natural logarithm of the optional bonus compensation and firm performance, controlling for firm size, leverage and CEO characteristics. The coefficients for ROA are both not significant, although its lagged variable is negatively significant. For the return on sales, all three coefficients are positively and highly significant. This implies that the return on sales does influence the amount of optional bonus compensation on a positive direction. The same relation counts for RET, where also all three variables are highly significant and positive. The adjusted R^2 in the third and fourth regressions are both around 21%, which implies that 21% of the variance of the bonus is explained by these regression models. In terms of interpretation, a 1% increase in the stock return would result in a 0.3% increase in bonus compensation, in case of ceteris paribus.

The last column of table 5 shows the relationship between the change in the natural logarithm of the optional bonus and the change in firm performance, controlling for firm size, leverage and CEO characteristics. It shows that all three Δ-firm-performance variables do have a positive sign, and even two of them are significant at the 1%-level. This implies that if the change in RET is positive, this has a positive impact on the total amount of bonus paid to the executive. The same counts for the change in the return on sales. ΔROA is also positive, but statistically not significant. The adjusted R^2 of this regression is around 4%, which is very low.

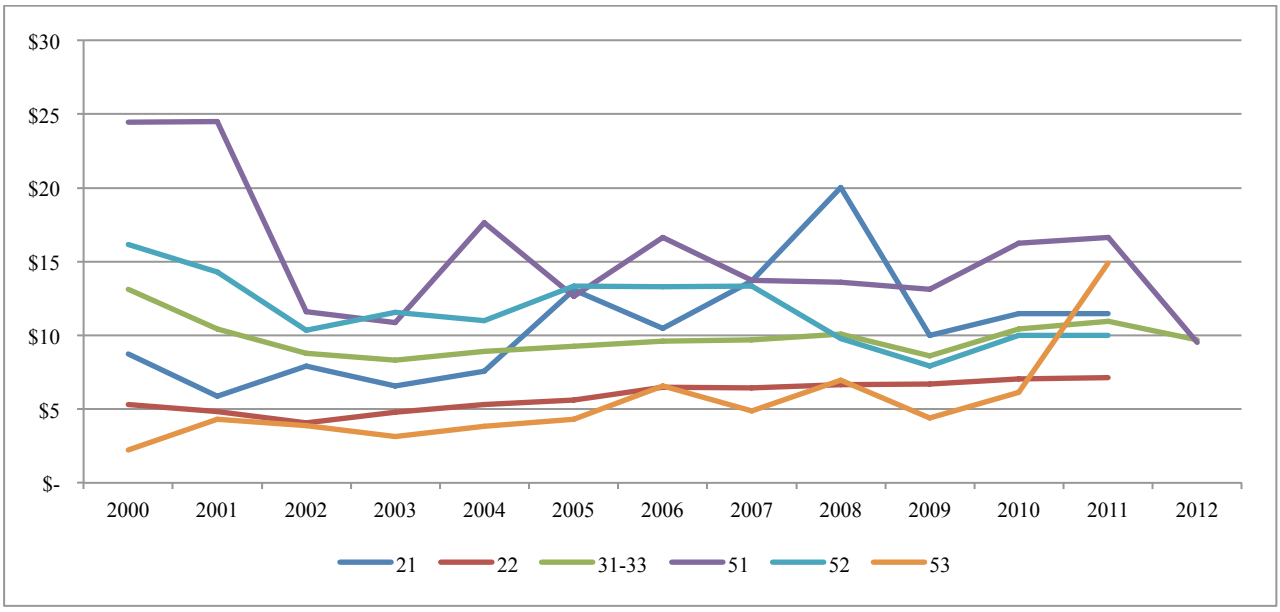
Focusing on the control variables, and especially in the first four columns, shows me some different outcomes. In all regressions I have controlled for two measures for firm size, LN_AT and LN_Sales. The total amount of assets of the firm is negatively and significantly related to the basis salary, but positively and significantly related to the optional bonus payment. This implies that firms with more assets pay lower basis salaries than firms with fewer assets, all else equal and on average. If the amount of

total assets increases by 1%, ceteris paribus, the amount of bonus paid to its executive will be increased by 0.1% (in case of regression 3). The control variable for leverage shows me that high-levered firms do pay more basis salary to their executives, but are less willing to pay huge bonuses. It may be concluded that firms that are higher levered than others are willing to pay more basis salaries in return for lower bonuses to be more certain about labor costs, compared to low-levered firms, all else equal and on average. The control variable for executives tenure shows me that is has a negative and significant coefficient for the basis salary and a very close to zero, but not significant, coefficient for the bonus compensation. This would imply that tenured CEOs get paid lower basis salaries over time while there are no consequences for their bonuses. Although age and tenure are highly correlated according to table 2, the coefficients for the first two regressions are contradictory. A high age does influence the basis salary in a positive way, although the economic interpretation is very small. The gender of the executive does not explain the basis or bonus compensation, according to these regressions. All the coefficients are statistically not significant.

4.3 The effect for other industries

As presented in graph 3 before, the amount of mean total compensation shows a decrease in 2008 and 2009, but after those years there is no significant change observable compared to the years before 2008. Graph 5 below shows the mean total compensation over time for the 6 largest industries in my sample. I have decided to report the largest 6 industries because those industries contain over the years of minimal 25 observations and it keeps the graph readable. The numbers reported on the y-axis are in millions of U.S. Dollars and show some proper changes between industries. On the first hand, the different averages between industry 51 and 22 are huge. The mean difference between those industries is at most more than $19 million in 2000. The light blue line, which stands for industry 52, shows a huge drop in 2008 and 2009. This is in line with my expectation that the bankruptcy of Lehman Brothers had much impact on CEO compensation for its competing firms in the same industry. Industry 53 shows some correlation with industry 52, and shows some drops in 2007 and 2009. On the other hand, industry 22, which stands for *Utility firms*, does not show any fluctuations around the years 2006-2011. Also industries 31-33 and 21 show major decreases in 2009, but start recovering their CEO compensation in 2010.

Because this is just some descriptive statistics about average compensation per industry, it is not allowed to draw any conclusions about this.



Graph 5: Executives total compensation for the 5 largest industries over time.

In table 6 below are the regression results reported where I have controlled for other factors, like firm size, performance, leverage and year fixed effects. In the first column is made use of the sample period 2000 – 2007 and the second column 2008 – 2012. For the first column counts that the coefficients for ROA, LN_AT, LN_Sales and M_Lev are all significant as expected and described in previous paragraphs. The adjusted R^2 of the first regression is around 17.8%, which is sufficient. For the second regression it is only 0.5%, which is very low. The coefficients for the different industry dummies are, ceteris paribus, the deviation compared to industry 52, which is omitted in the regressions. Many coefficients are not significant due to the low number of observations, as stated before. The 6 largest industries represented in my sample are 21, 22, 31-33, 51, 52 and 53. The coefficient of industry 22 increases after the fall of Lehman Brothers to 0.461 and is significant at the 1% level. This implies that CEOs of industry 21 firms get remunerated even more, compared to firms in the financial services. The data of industry 22 looses its significance after 2007, but is strongly significant before and shows a substantial lower remuneration behavior compared to industry 52. Also industries 31-33 and 51 show an opposite behavior, they pay to their CEOs more than before the fall of Lehman Brothers, compared to

industry 52. Industry 53 goes from a negative to a positive sign, but is statistically not significant.

	LN_Total	**LN_Total**
	2000 - 2007	2008 - 2012
Constant	4.727*** (21.71)	7.196*** (24.14)
ROA	1.138*** (3.71)	-0.370 (0.90)
LN_AT	0.196*** (4.46)	0.010 (0.10)
LN_Sales	0.242*** (5.63)	0.171*** (3.39)
M_Lev	-0.468*** (3.03)	-0.213* (1.17)
Industry11	-0.047 (0.14)	0.354 (0.81)
Industry21	0.220** (1.79)	0.461*** (3.15)
Industry22	-0.282*** (2.49)	0.044 (0.32)
Industry31_33	0.089 (0.94)	0.238** (2.03)
Industry42	-0.446** (2.22)	-0.190 (0.75)
Industry44_45	-0.437*** (3.18)	-0.108 (0.64)
Industry48_49	-1.481*** (9.41)	-0.418** (2.02)
Industry51	0.201** (1.79)	0.411*** (3.09)
Industry53	-0.107 (0.65)	0.142 (0.85)
Industry54	-0.057 (0.33)	0.310* (1.46)
Industry56	0.164 (0.82)	0.212 (0.09)
Industry61	-1.577*** (3.40)	-1.441*** (3.25)
Industry62	-0.480** (2.26)	0.494** (1.80)
Industry71	0.175 (0.38)	0.105 (0.17)
Industry72	0.354** (1.74)	0.517** (2.12)
Adj. R^2	0.1788	0.0464
F-stat.	28.24	4.94
# of obs.	3,379	1,947

Table 6: Regression results, separated per industry.

Those results as described above and shown in table 6 are also observable in graph 5. Although the graph does not control for firm size and performance, you can see that the light blue graph, which is the basis level dummy, has a sharp decrease in the years

2008 and 2009. The other lines, and especially industry 22, 31-33, 51, 53, do not move in the same direction of industry 52. To clarify this more, table 7 below shows the correlations between the 6 largest industries of my sample. Hereby is the correlation between industry 52 and the other industries the main topic. It is shown that industry 52 and 51 are strongly correlated with a correlation coefficient of 0.6 and industry 31-33 with 0.5. Industry 21, 22 and 53 are negatively correlated, which implies that a decrease in CEO compensation in industry 52 leads to an increase in CEO compensation for industries 21, 22 and 53. This is party also visible in graph 5.

	Ind21	**Ind22**	**Ind31-33**	**Ind51**	**Ind52**	**Ind53**
Ind21	1	0.6288	0.1039	-0.3337	-0.2397	0.3491
Ind22	0.6288	1	0.2045	-0.0802	-0.3591	0.6314
Ind31-33	0.1039	0.2045	1	0.7601	0.5312	0.1810
Ind51	-0.3337	-0.0802	0.7601	1	0.6083	-0.0586
Ind52	-0.2397	-0.3591	0.5312	0.6083	1	-0.3684
Ind53	0.3491	0.6314	0.1810	-0.0586	-0.3684	1

Table 7: Correlations between industries mean CEO compensation.

One thing that is really clear is that the average CEO of an industry 52-firm did get a more sober remuneration package since the fall of Lehman Brothers. Executive's salaries did drop massively in the years 2008 and 2009 for most industries, but it is not really clear if this is due to the fall of Lehman Brothers. What also could be the situation is that both, the bankruptcy of Lehman Brothers and the financial crisis generally, are influencing the shareholders to lower executives compensation.

5. Conclusion

In this conclusion, I would like to give in short the outcome of what is discussed and researched in this master thesis. Supported by lectures and scientific papers, I tried to explain the massively amounts of executive compensation. I selected my data on the S&P500 corporations for the period 2000 – 2012. These firms are chosen because they are required to disclose detailed annual reports and they are all listed, what means that stakeholders track them very closely. The period 2000 – 2012 is chosen because it captures a period including the credit crisis. The fall of Lehman Brothers in 2008, which I consider as the nadir of the crisis, is my benchmark for splitting the periods. 2000 – 2007 for ex ante crisis and 2008 – 2012 for ex post crisis. My hypotheses are related to the relation between executive's remuneration, including incentive payments, and firm performance, executive characteristics and changes for those variables between the two different periods. Finally, I am seeking for changes in CEO compensation within industries.

Before I ran any regressions, some descriptive results of my created sample were created. These graphs show that the bonus component of the total compensation package is much more than the basis salary. It also shows that the basis salary is crisis proof and does not fluctuate at all during the whole sample period. The amount of total compensation, which includes basis salary, cash bonuses, restricted stocks, stock options and derivatives, long incentive payouts and other income, does fluctuate and shows a sharp decrease in 2008 and 2009, the year that is seen as the nadir of the credit crisis. Variables capturing firms performance, like return on assets, return on sales and return on stock, are visualized amongst time and show some small fluctuation for ROA and ROS in the years 2008, 2009 and 2010. The average return on stock shows a massive decrease in 2008 and 2009 with average returns of -52%. I have also created a correlation matrix to show mutual correlations. It shows high correlations between basis salary, bonus and total compensation with firm size variables. It also shows very low correlations between firm performance and CEO compensation. This holds for all three metrics for compensation; basis salary, bonus and total compensation. This implies that CEO compensation is not strong related to

firm's performance but is strong related to firm size, according to the correlation matrix.

Starting the regressions, I have made the distinction between the two periods as described before. For the period before the fall of Lehman Brothers counts that the amount of basis salary can be explained by the ROA and ROS. In terms of interpretation, ceteris paribus, a 1% increase in return on assets would lead on average to a 1.7% increase in basis salary. This is as a result of the natural logarithm form of compensation. I also observed that firms with more assets do pay more basis salary to their CEO, on average 0.12% more basis salary per 1% more total assets, ceteris paribus. Leverage is influencing the amount of basis salary significantly positive by 0.7% per 1% increase in leverage. My regressions also show that the number of years in office does influence the basis salary negatively, although its impact is quite close to zero. On the other hand, age does influence the amount of basis salary positively. If the CEO gets one year older, his basis salary would on average increase by 12%, ceteris paribus. For the distinction between males and females counts that, on average, male CEOs get paid 27% less than female CEOs, ceteris paribus.

For the optional bonus payment for the period before the fall of Lehman Brothers counts that the return on assets does influence it positively; a 1% increase in ROA causes on average a 1% increase in bonus payments. Adding the lagged variable of ROA to the regression causes a 2.3% increase in bonus per 1% increase in ROA_t, but a 1.5% decrease in bonus per one increase in ROA_{t-1}. The variables controlling for the return on sales are not significantly explaining the bonus payment to the executive. Those variables controlling for the return on the stock market do, a 1% increase on the stock market causes a 0.3% increase in bonus payments. Adding the one-year-lagged variable of RET to the regression causes a positive relationship with an additional 0.2% increase in bonus payment per a 1% additional stock return in the previous year. For the bonus payment holds that leverage is negatively related, a 1% increase in the leverage ratio implies a 0.7% decrease in bonus payment, ceteris paribus and on average. Furthermore I did not discover any statistical significant relationship between the bonus paid to the executive and its tenure, age and gender.

In the last regression, where I regressed the change in firm performance on the change in the natural logarithm of bonus, resulted in somehow the same results. The changes in ROA and RET are positively related to the change in bonus. The impact for a change in ROA by 1% causes on average an increased change in the bonus payment of 1.7%, all else held constant. This supports my findings of before that firm performance, measured by ROA and RET, does positively influence bonus payments.

Going to the results for the period after the fall of Lehman Brothers, I did run the same OLS regression as before. For this period I find that the basis salary can be explained by firm performance measures like ROA, ROS and RET. The return on assets is negatively influencing the amount of basis salary; a 1% increase in ROA causes on average a 2.5% decrease in basis salary, ceteris paribus. This looks contradictory, because a good return on assets would mean that the firm uses its assets well and that it might be profitable. Although, a 1% increase in ROS or RET, causes on average and all else equal a 1.2% or 0.3% increase in basis salary paid to the CEO of that firm. This means that there exists a pay-for-performance relationship if performance is measured by ROS and RET, but for ROA implies it that this theory does not hold. The two variables controlling for firm size deliver me contradictory results. The amount of assets does negatively influence the basis salary by -0.2% per 1% increase in total assets, which is a very small economic relationship. A 1% increase in the total amount of sales is 0.2% increasing the basis salary, which is also a very weak relationship. Those interpretations are supported by the low R^2 of the regressions explaining basis salary: this model explains only 9.3% of the variance in basis salary. The coefficients for CEO characteristics like tenure, age and gender are not consistent. CEO tenure is negatively related to his basis salary, while age is positively related. The interpretations are a 1% increase in tenure will cause a 4.3% decrease in basis salary, while a 1% increase in age will cause on average a 2.6% increase in basis salary. The coefficient controlling for the gender of the CEO is statistically insignificant and therefore negligible.

Concerning about the bonus payment, which is about 85% of the total compensation, I find that firm performance measured by ROS and RET is positively related to the amount of bonus. Also adding the lagged variables comes to the following interpretations: A 1% increase in RET_t causes on average a 0.3% increase in

LN_Bonus_t. A 1% increase in RET_{t-1} causes on average a 0.2% increase in LN_Bonus_t. Also the return on sales shows on average the same pattern with interpretation percentages of 0.18% (ROS_t) and 0.24% (ROS_{t-1}), in case of ceteris paribus. The coefficients for ROA are not significantly explaining the amount of bonus in these regressions. In these regressions, firm size does explain the bonus payment significantly positive. A 1% increase in total assets causes a 0.1% increase in the bonus, while a 1% increase in total sales causes a 0.2% increase in the bonus paid to the CEO, all else equal. The variable controlling for the leverage of the firm does negatively influence the bonus payment; A 1% increase in the leverage ration causes a 0.5% decrease in bonus payments, while it positively influences the basis salary. This implies that high-levered firms do pay on average more basis salary and less optional incentive bonus payments, compared to low-levered firms. The remaining variables controlling for CEO characteristics are not significant or are that close to zero that they can be neglected. The R^2 of these regressions is above 21% what makes these results more reliable.

Also for this period after the fall of Lehman Brothers I have run the regression for the change in the bonus payments explaining by the change in firm performance. The results are consistent with previous regressions; An increase in the change of ROS or RET is causing a increase in change of the bonus payment. This supports my findings of before that firm performance, measured by ROS and RET, does positively influence bonus payments.

As salaries are concerned, on average industry *Finance and Insurance* is hit the most. This is the industry were Lehman Brothers belonged to before its bankruptcy. The average total compensation for this industry dropped from more than $13 million in 2007 to almost $8 million in 2009 and grew back up to $10 million in 2011. My data did not allow me to draw any conclusions about all different industries because of the very low number of firms of some industries. Therefore I was forced to take the 6 most represented industries of my sample into consideration. According to the regression results, two industries pay their CEOs after the bankruptcy of Lehman Brothers more salary and bonus compared to the industry Finance and Insurance, namely *Manufacturing* (31-33) and *Real Estate, Rental and Leasing* (53). The coefficients of both dummy variables, with basis level industry 52, are significantly

positive. This trend is not supported by my graph where the mean CEO compensation level per industry is plotted over time. Also looking at the correlation matrix of the 6 largest represented industries in the S&P500, the outcome is that *Manufacturing* and *Real Estate, Rental and Leasing* are both highly correlated with *Finance and Insurance*. Hence, those two industries are most affected by the credit crisis and the fall of Lehman Brothers.

Hypothesis 1 states that the bonus payment to the CEO depends on firm performance. I can conclude that the pay-for-performance theory holds for both periods, but that there are some changes since the recent credit crisis. My data shows me that before the fall of Lehman Brothers the return on assets and the return on the stock market are the two explanatory variables to explain the amount of bonus pad to the executive. For the period as from 2008, the data shows me that the return on sales looses its significance and that the return on sales becomes one of the two significant explanatory performance variables explaining the amount of bonus. Although stock returns were very volatile in my dataset, the coefficients are quite equal in both sub-samples. A 1% increase in the stock market leads on average to a 0.3% increase in bonus payments to its CEO, ceteris paribus. My data also shows me that the constant term in my regressions is for the period after 2008 higher than for the period before 2008. This does not mean that CEO compensation increased since the fall of Lehman Brothers, but that the interception with the y-axis has become higher. And, of course, all other variables are not kept constant, what resulted in an on average decrease of total compensation to CEOs.

Hypothesis 2 states that firm size and executive tenure are both positively related to CEO compensation. For tenure, this definitely does not hold. In all regressions, prior- and post-crisis, the coefficient of tenure is significantly negative or insignificantly very close to zero. This allows me to conclude that CEO tenure is not positively related to CEO compensation, not for his basis salary and not for his optional bonus. On the other hand firm size, which I measured by total assets and total sales, is significantly related to CEO compensation for the period before the crisis for the amount of total assets. This counts as well for the basis salary as the optional bonus. The amount of sales is statistically not significant related to CEO compensation, for the period before the crisis. After the credit crisis, the amount of total assets explains

the basis salary in a negative way. The more assets a firm has, the less basis salary it pays to its CEO, all else equal. For the bonus component still holds that assets explain the amount of bonus positively and significant. The amount of sales is for the period after the credit crisis in all regressions positively explaining CEO compensation. Therefore I can conclude that firm size does explains CEO compensation positively, but for the period after the credit crisis the amount of assets is negatively correlated with CEOs basis salary.

Hypothesis 3 states that there are major changes for CEO compensation since the fall of Lehman Brothers in the financial services industry and also for other industries. As salaries are concerned, on average industry *Finance and Insurance* is hit the most. This is also the industry where Lehman Brothers belonged to before its bankruptcy. The average total compensation for this industry dropped from above $13 million in 2007 to almost $8 million in 2009 and grew up to $10 million in 2011. My data did not allow me to draw some conclusions about all represented industries because of the very low number of firms active in some industries. Therefore I took the 6 most represented industries of my sample into consideration. According to the regression results, two industries pay their CEOs after the bankruptcy of Lehman Brothers more salary and bonus compared to the industry Finance and Insurance, namely *Manufacturing* (31-33) and *Real Estate, Rental and Leasing* (53). But if I take a look at the graph over time, this is not observable and the other industries do not tend to react that much on the changes in industry 52. Also looking at the correlation matrix of the 6 largest represented industries in my sample, the outcome is that industries 31-33 and 53 are both highly correlated with industry 52. Hence, those two industries are the most affected by the bankruptcy of Lehman Brothers.

6. Appendix

Variable	Description
Total Compensation	The US dollar value in thousands of cash compensation, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), and long-term incentive payouts. Source: Execucomp
BasisSalary	The US dollar value in thousands of the base salary (cash and non-cash) earned by the named executive officer during the fiscal year. Source: Execucomp
Bonus	The US dollar value in thousands of a bonus (cash and non-cash) earned by the named executive officer during the fiscal year. Source: Execucomp. Calculated as TotalCompensation – Basis Salary.
ROA	Return on assets. Calculated as EBIT over AT.
ΔROA	Change in ROA_t with ROA_{t-1} multiplied by 100.
ROS	Return on sales. Calculated as EBIT over SALES.
ΔROS	Change in ROS_t with ROS_{t-1} multiplied by 100.
EBIT	Earnings before interest and taxes. Source: Compustat
AT	Total Assets (book value). Source: Compustat
LN_AT	The natural logarithm of AT.
SALES	Gross sales reduced by cash discounts, trade discounts, returned sales and allowances for which credit is given to customers. Source: Compustat
LN_Sales	The natural logarithm of SALES.
Market_Leverage	Market leverage, calculated as total debt over total debt + market value of equity. Source: Lemmon, Roberts & Zender (2008)
TOTAL_DEBT	Short-term debt plus long-term debt. Source: Lemmon, Roberts & Zender (2008)
MARKET_EQUITY	Stock price times shares outstanding. Source: Lemmon, Roberts & Zender (2008)
LN_CASH_COMP	The natural logarithm of CASH_COMPENSATION
LN_TDC1	The natural logarithm of TDC1
NAICS_2digit	The first two digits of the NAICS per firm. Reflects the industry. Source: Execucomp
RET	Return on stock, calculated as the logarithmic ratio of $Price_t$ over $Price_{t-1}$. Source: Thomson Reuters Datastream
ΔRET	Change in RET_t with RET_{t-1} multiplied by 100.
TENURE	The tenure of the executive, calculated as the current year minus the year since he is the executive of the firm. Source: Execucomp
LN_TENURE	The natural logarithm of TENURE.
LN_TENURE2	LN_TENURE squared.
AGE	Executive's age at the end of fiscal year. Source: Execucomp
LN_AGE	Natural logarithm of AGE.
MALE	Dummy variable for the executive being a male (=1) or female (=0).
TENURE_t	Dummy variable for each of the first ten years of CEO tenure (t=1,…10). Source: Cremers & Palia (2011)
Industry52	Dummy variable for if the firm is active in industry 52.

Table 3: Description and calculations of the used variables.

NAICS_2digit	Industry description
11	Agriculture, Foresty, Fishing and Hunting
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate, Rental and Leasing
54	Professional, Scientific and Technical Services
55	Management of Companies and Enterprises
56	Administrative-, Support- and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment and Recreation
72	Accommodation and Food Services
81	Other Services
92	Public Administration

Table 8: Description of the industries.

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