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The determinants of CEO compensation in the largest public American firms from 2005 until 2011

Master Thesis

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"This is America. We don't disparage wealth. We don't begrudge anybody for achieving success. But what gets people upset – and rightfully so – are executives being rewarded for failure. Especially when those rewards are subsidized by U.S. taxpayers."

Barack Obama, USA President

1. Introduction

Carola Frydman and Dirk Jenter's (2010) *CEO Compensation* explore the latent meanings of the rapid rise of CEO pay over the past 30 years and the intense debate about the nature of the pay-setting process. This paper is a true inspiration and my best motivation to start working on this field. The compensation of executive officers has always been a hot spot for journalists and academic researchers over the last thirty years. The reason is the sharp increase in CEO compensation from the late 80's and then. Mercury news online press report is truly worthy of attention: "*Oracle boosts compensation of billionaire CEO Larry Ellison for last year by 24 percent. Ellison, the world's sixth-richest man, according to Forbes, received total compensation for the year ended May 31 of $96.2 million, almost all of it in stock options. That compared with 77.6 million in the prior year. His compensation rose during a period in which the company's shares fell 23 percent, underperforming the NASDAQ Composite Index. The board's executive compensation committee said that its long-standing approach has been to provide total compensation opportunities that are significantly above the average of its peer group, Apple and Cisco*" (Mercury News, 22/09/2012). In my opinion, what draws the attention of newspapers is the disproportionate pay of executives to the medium-sized salary of common employees. Nevertheless, what draw my attention are the determinants of such high payments to these powerful corporation leaders. In other words, I want to investigate under what specific aspects do executive compensation committees decide on the level of the remuneration package.

With this thesis I would like to examine what defines executive compensation in the three-year pre- and after Lehman Brothers collapse period, principally in the large corporations established in the United States of America. Attending Corporate Governance and Empirical Methods in Finance lectures in the University of Tilburg, I had the great opportunity to listen to Mr. Alberto Manconi and Mr. Oliver Spalt discussing not only how firm size and performance affect officer pay but also how luck could be an alternative scenario behind the executives story. Thus, these lectures provided me a strong stimulus to research this important scientific area. The scientific articles that the professors demonstrated in class motivated me to think more thoroughly around the economic and accounting elements that might exert influence on CEO compensation.

In this study I am going to analyze the effects of specific institutional economic measures on the designing of executive packages by the board of directors. I will give emphasis on the years that preceded and followed the financial and real estate crisis of 2008 in the States in order to have a clear insight into deterministic relationships created in recent years. For this purpose, the following main research question is formulated:

What determines the executive compensation in the American largest publicly held corporations in the pre- and post-crisis years, by means of specific firm and CEO parameters?

The literature surrounding the determinants of CEO compensation and more generally the theoretical and practical concepts of corporate governance is too rich to help me address my scientific question. The related bibliography and articles express relative relationship among firm size, performance and growth with the compensation that their executive officer receives. Moreover, there are important clues that CEO remuneration is affected by other factors, such as CEO tenure and ownership status. Jensen & Murphy (1990) find a positive relationship between firm performance and executive compensation, though not statistically significant. Obermatt (2012)[1], a financial-research company, argues that remuneration should be based on company performance even though the S&P 100 firms do not correlate CEO pay with either performance or size. Moreover, Gregg et al. (2010) confirm this asymmetric relationship between executive pay and performance. As far as the effect of firm size on CEO compensation is concerned, Frydman & Saks (2010) found a positive and statistically significant relationship among firm size and executive pay. Gabaix & Landier's (2008) report allows them to relay substantial information in a concise and attractive way relatively to the strong firm size effect on CEO remuneration, started from 1970 on a continuously upward trend. In addition, Kostiuk (1990), Zhou (2003) and Lau and Vos (2004) claim that the dominant factor on the remuneration of chief

[1] The Economist 2012, 'Executive pay and performance'

executive officers is firm size, regarding datasets and listed companies from totally different spots of the global economic system. Finally, according to Cremers & Palia (2011) there is strong correlation between the CEO tenure and his compensation. To exemplify, Warren Buffet, the master of investments, is very proud to be the second most long-serving CEO in US. He counts 42 years on the control of Berkshire Hathaway, earning half million per year according to Forbes. This has to tell something. The scientific studies of Hill & Phan (1991), Johnston (2002) and Bulmash & Sah (2011) are also cited facts that reinforce what Cremers & Palia (2011) are saying. Nevertheless, these topics are to be discussed in detail in chapter 2.

Relatively to the scope of my work I intend to elaborate on a sample of over 400 organizations, a representative selection of market players that disclose real evidence of the compensation packages that offer and of their accounting metrics. In order to reach to conclusive answers to my research question, I aim to form some hypotheses that will reflect the influence of the firm characteristics on CEO pay. The four sub-hypotheses are:

1. *The firm size is positively related to CEO compensation*
2. *There is weak relation among firm performance and CEO compensation*
3. *The tenure of the CEO influences positively his remuneration level*
4. *Compensation benchmarking practices influence CEO pay dynamically.*

In this thesis, through these clear and concise hypotheses I will try to explore what factors define the executive officers income in the major American corporations. My personal goals are not to confirm the existing literature but to set rigorous standards of scientific accuracy and reach a comprehensive conclusion, worthy of my expectations. To attain these goals, I will first examine the recent literature related to executive compensation and then I am going to perform empirical analysis on data coming from accredited databases. Personally, my research matters in the way that financial world is incessantly intrigued by the recent articles relevant to the huge amounts of money that managers earn in the States at the expense of the shareholders.

This empirical work is consisting of two specific sections. Shortly after this introduction, chapter 2 is dedicated to detailed presentation of the current state of literature that surrounds the fields of corporate governance and executive pay. Then, chapter 3 comes to give the empirical part of this work, elaborating on the data, the methodology, the hypothesis testing and the direct outcomes of statistical processing. The last section, chapter 4, contains the conclusion reached under this analysis.

2. Literature

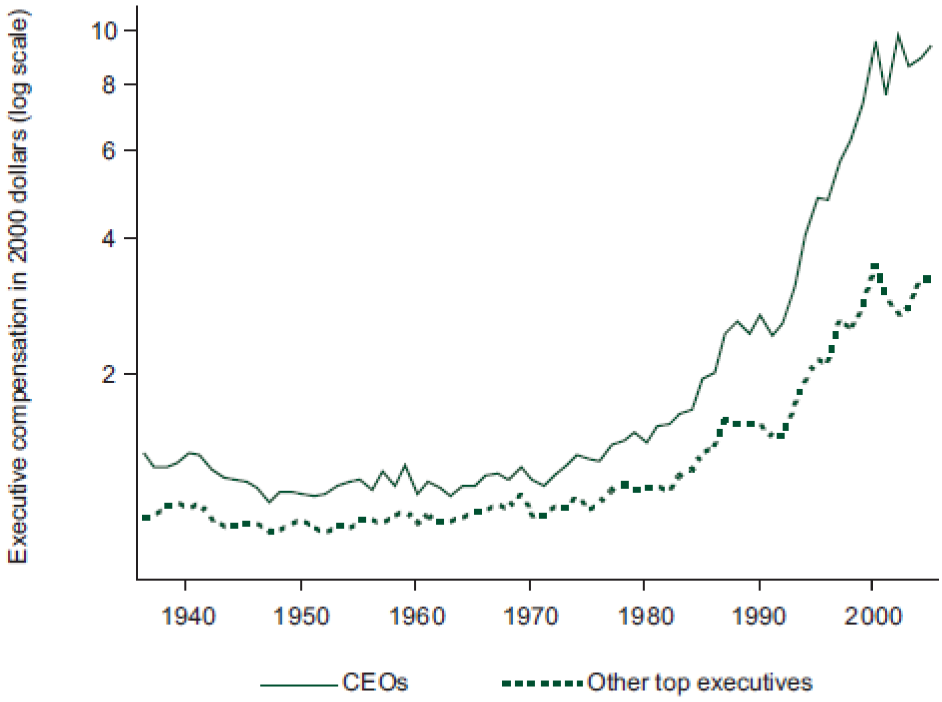
2.1. Trends in CEO compensation

Given the increasing interest that the academic literature shows around the topic of executive compensation, it is acceptable that since 1970 the level of executive pay has exhibited a solid upward trend. Frydman (2008) claims that this phenomenon can be explained by two categories of theories. First, compensation is the competitive product of labor and product markets. Globalized economy is transforming markets into a very dynamic field where powerful companies are more and more in need of ambitious and smart managers. Second, executive pay is constrained. Whether remuneration is high or normal, it is dependent to each institution's corporate governance. This "machine" sets the long term goals and is the main coordinator of the managerial behavior.

Empirically, this upward trend has been tested by lots of economists. Frydman and Saks (2010) think that due to the disastrous effects of World War II there was a substantial decline –from $0.9 million to $0.75 million– in the real value of pay during 1936-1945. In the following 30 years, compensation was rising at a modest rate of 0.8% per year. However, during the 70's and then, the level of pay was rising at a much faster rate and within the "dot-com" bubble analysts were recording an average growth rate of more than 10% per year. The composition of the managerial compensation was also changing, namely employee stock options (ESO) plans and other types of incentive pay were growing shares of total compensation. In 2010 again, Frydman & Jenter report a J-shaped pattern in executive compensation over the period 1936-2005 (See Figure 1). During World War II and in the late 1940's there was a sharp decline in the real value of top executive pay. From the early 50's until the mid 70's there was an average 0.8% increase per year. From 1970 and then, this percentage dramatically rose up to 10% per year. Figure 2 is also showing that during the past 30 years the CEO pay grew more rapidly than the average top executives' pay.

As far as I am concerned, the main reason for this boost is the technological improvement that the largest firms in the United States achieved throughout this period. The firms increased their productivity and started to intensify their exports. As

Figure 1: Median compensation of CEOs and other top officers, 1936-2005



Source: Frydman & Jenter (2010)

a result, they realized huge profits and the top management had a lot of well-established reasons to ask for higher pay packages. According to Gabaix & Landier (2008), the six-fold increase in CEO remuneration between 1980 and 2003 can be attributed to the six-fold increase in market capitalization of large U.S. companies that period. The firm size plays an important role here. Moreover, a five times increase in stock market valuations resulted not only in a CEO productivity increase but also in an equilibrium CEO pay increase of the same magnitude. Alternatively, it seems to them logical that the increased amounts of money that the managers started to earn were a consequence of competitive strategies among firms that were active on the same industry sectors. Nevertheless, this is a signal of poor corporate governance methods that finally benefited those who were sitting on the top chairs.

Following the recent news, the 'Wall Street Journal / Hay Group CEO Compensation Study' for 2011 observes that after a 2010 in which total compensation grew at a double-digit rate, 2011 showed modest increases. Despite realizing higher profitability, organizations were more conservative and acted for the sake of shareholders who saw no substantial increases at their dividend profits. At this point I have to underline that in response to this constant increase of the CEO compensation, in April 2007, the U.S. House of Representatives passed the “Say on Pay” bill which requires corporations to allow shareholders to approve or disapprove a company’s executive compensation plan. First of all firms, Aflac held on May 5, 2008 the first shareholder vote on executive pay in the United States (Ross, Westerfield & Jaffe 2010, p.1).

2.2. The agency problem

Within the theoretical frameworks of corporate governance there is one crucial topic that describes the relationship between managers and owners of a company: the Agency Theory. Even though in small companies the owners seem to be managers simultaneously, in large institutions, probably in listed ones, the agents who control the firm operations are separated from the shareholders who invest their money into the firm. Being the principal of the company, the shareholders delegate day-to-day decision-making in the company to the directors, who are the agents. A problem is arising here. Agents do not necessarily make decisions in the best interests of the principal because the individual goals conflict. The company managers set as their primary goal to pursue their own personal ambitions, such as high bonuses. On the other hand, shareholders aim to maximize their wealth. Consequently, in practice managers focus on company investments that provide high short-run profits because their remuneration is dependent on that variable. These actions however, are happening at the expense of the maximization of the shareholders’ wealth which is achieved by long-term projects (Solomon 2010, p. 9).

In order to alleviate these discrepancies, firm owners link some performance incentives to the executives’ compensation packages. Under the optimal contracting view, the board of directors tries to provide cost-effectively such incentives to the managers. Bebchuk and Fried (2003) argue that the same executives play an important role in re-nominating directors to the board. Hence, the directors usually have an incentive to favor the executives with ambitious compensation plans. As a result, in companies where there is separation among ownership and control, the power of the managers affects the levels of the money that they earn. Executive compensation is not only an instrument to analyze the agency theory but also a component of the problem itself. Nonetheless, the shareholders are not staying for a long time inactive. In order to monitor the CEO performance, the shareholders can elect non-executive directors on the board, gaining some power on the decision-making process. Another solution could possibly be the establishment of compensation committees. Members of these committees determine the terms of executive remuneration with respect to firm performance. Alternatively, large shareholders can also raise their voice and take part in the strategic decisions (Hope, 1999, p. 207).

In their classical paper, Jensen and Meckling (1976) investigate the main angles from which we have to see the agency problem. First, the principal will take serious actions against any possible managerial dealings that are about to harm the company profile. These actions can be described by the term *agency costs*. Both sides will suffer monitoring and bonding costs and in addition there will be some divergence between the managerial decisions and the welfare of the shareholders. Second, the authors look deep inside the positive aspects of the agency theory and try to identify who bears these costs. By monitoring, the principal supervise the performance of the manager and additionally set financial restrictions and organizational rules to her actions. Finally, apart from the bonding costs that are incorporated to the executives' part and the monitoring ones that have to be borne by the shareholders, there is a residual loss or wealth loss when the manager cannot achieve the maximization of the principal welfare.

According to me, managers who are over-confident and selfish tend to create such kinds of agency problems inside the firms. Seeking always for more and more perquisites to enrich their already prosperous lifestyles, managers of large firms conflict with the principal due to their flamboyant behavior. Yermack's work (2006) leads to some important conclusions that illustrate perfectly my point. Associating more than 30% of Fortune 500 CEO perks consumption with the company performance, he found that when shareholders read for the first time the announcement of personal aircraft use by CEOs, the company stock prices drop by about 1.1%. There is also strong relationship between personal jet use and CEO's golfing activity. However, the most crucial finding of this research is that firms disclose greater rates of bad news to shareholders after perk behavior news have emerged. Therefore, in terms of strategic management, executives minimize the bad news flowing to the markets until they have secured access to desirable comforts.

2.3. Efficient Market Hypothesis

The concept that an efficient market is a market in which prices fully reflect all available information at any given time belongs to Eugene Fama, the American famous economist who introduced his theory in 1970 in his classical paper. In this market and under the assumption of the full availability of information, firms can make decisions that are compatible with the production-investment process and investors can choose among the securities that represent the ownership of firm's activities (Fama, 1970). Fama performed adjustments of security prices to three relevant information subsets to test his model: weak, semi-strong and strong.

The weak form states that all new information is immediately and fully reflected by a new price movement. We cannot predict current or future movements of the prices by looking back at old news that has pushed the stock price up or down. As a result, there is no "random walk" across the share prices and investors should not use recent trends in stock prices in order to realize abnormal returns. Furthermore, the semi-strong form assumes that share prices adjust immediately to new information as it becomes publicly available. The key point here is that common investors cannot outperform the stock market whereas insiders who own private information can easily earn abnormal profits. In terms of semi-strong form, most of the tests that studied the behavior of stocks after relative announcements were event studies. Finally, the strong form concentrates to all relevant information, whether publicly available or privately held. This form approaches very much the reality where inside traders realize huge profits and stock markets operate inefficiently due to this privately held information (Barnes 2009, p. 45-47).

Efficient Market Hypothesis has also generated two valuable implications in the financial world. First, technical analysis is used by researchers who try to find predictable patterns in stock prices. To be successful, they connect the response of stock prices to fundamental supply-and-demand factors. Chartists use several empirical tools to conduct their analyses: relative strength, resistance or support levels and uncovering of profitable trading rules. Second, fundamental analysis uses earnings, dividend policies, future interest rate provisions and risk evaluation of the firm to determine proper stock prices. Fundamental analysts study past earnings and examine balance sheets. Nevertheless, efficient market hypothesis disapproves this style of analysis on the basis that only few analysts are able to have a unique insight in corporate schemes (Bodie et al., 2011, p. 376-380).

After Fama's publication a lot of critique emerged on how markets quickly embody new information. Kothari (2001) admits that whether security markets are informationally efficient is of great importance to all market participants because security prices determine the allocation of wealth among firms and investors. Empirically, Ito & Sugiyama (2009) add that the degree of market inefficiency varies through time without trend. In the States for instance, while the stock exchange was very efficient at the beginning of this century, it is quite inefficient during this after-crisis period. Doyle & Chen (2012) advise that market inefficiency is multi-dimensional according to the benchmark indicator used. That is, while there is global integration to some degree relatively to the financial markets, there is still sufficient local variety that has to be examined.

2.4. Optimal contracting theory vs. managerial power theory

According to this theory, boards of directors are assumed to design pay-for-performance contracts so as to align the interests of managers with those of the shareholders. The optimal contract balances the provision of incentives against exposing risk-averse managers to too much volatility in their pay (Frydman & Jenter 2010). Iman Anabtawi (2005) explains in detail this specific theoretical framework of optimal contracting theory. Shareholders (principal) rely on their managers (agents) to operate publicly held corporations, but they end up facing the agent problem. As mentioned above (sector 2.2), there is conflict of interest between the principal and the agents because the latter pursue private goals rather than maximizing the principal's wealth. In order to alleviate these discrepancies, boards form optimal contracts that maximize shareholder value. The author proposes the optimal contracting theory be yielding important implications for designing executive contracts. First, as the pay-performance sensitivity increases, the alignment of interests between executives and shareholders increases. Second, the measure of executive performance should be as informative as possible about managerial behavior. Third, the options exercise price should not be reset if the stock price falls below it. This is the general theoretical framework surrounding the optimal contracting theory.

In 2004, Lucian Bebchuk and Jesse Fried publish their book "Pay without performance" and express their vigorous opposition to the optimal contracting theory. As they say, even though it is a neat and reassuring model, it fails to reflect the realities of executive compensation. The key point for the authors is the managerial power perspective on executive compensation. Executives have substantial influence on their pay and this limits the usefulness of the model. They also impact the board of directors and this means that powerful CEOs get higher salaries and bonuses. From Bebchuk and Fried's (2004) point of view, there are *outrage costs* included in an arrangement. That is, when the compensation package favors the managers, the extent to which directors and managers bear economic and social costs depends on the outsiders' views. If an arrangement is proved to be outrageous, shareholders exert pressure on directors and managers are about to see their reputation harmed. On top of that, not only the outsiders' perception but also the outrage costs explain the term "*camouflage*". The authors use that term so as to describe how the designers of the compensation packages are incentivized to hide and legitimate the level and the performance insensitivity of executive compensation. But these actions are advantageous to CEOs. When they are camouflaged, CEOs operate at the expense of the shareholders, are demotivated to produce work and trap firm performance in a vicious circle (Bebchuk & Fried, 2004, p. 2-6).

Thomas & Wells (2011) confirm the contradiction among the two schools of thought: Optimal Contracting and Board Capture. Optimal Contracting advocates contend that the existing executive compensation system functions right and shareholders need not to change much to ensure that they get their money's worth. In contrast, Board Capture theorists believe that CEOs dominate the board of directors and set their own salaries and bonuses. Apparently, Bebchuk & Fried belong to the second stream. Moreover, Dechow (2006) also provides evidence relative to the utility of optimal contracting theory. She thinks that asymmetric contracts are contradicting optimal contracts as they are exposing CEOs to more downside risk and less upside benefit. An illustration of an asymmetric contract could be:

- Bonus is 5% of increases in firm value (unrealized gain)
- Bonus is 10% of decreases in firm value (unrealized loss)

These contract models are dissimilar enough to the conventional executive arrangements. Thus, the author offers the alternatives of bonus contracts, which provide executives with limited upside and more downside risk and equity contracts which give CEOs limited downside and more upside risk. In this way, total executive compensation will be sensitive to both upward and downward movements of value. In summary, we can conclude that the Optimal Contracting theory has been thoroughly criticized by the scientific community. This criticism stems from the impotence of this traditional model to capture the real interactions between officers and directors, which are normally reflected to the executive contracts.

2.5. Compensation benchmarking theory

Except the two dominating theories (shareholder value and managerial power) which try to interpret executive compensation trends, a new theory is emerging from the recent work of some theorists who believe that there is a benchmarking process that pushes compensation up. DiPrete et al. (2010) analyze thoroughly the concept of compensation benchmarking. They think that complex and dynamic managerial peer groups produce a process by which governance failures in firms propagate through the ranking system increase in executive pay. The authors demonstrate that a small number of Chief Executive Officers have regularly been leapfrogging their compensation ratings by moving to the right tail of the benchmark distribution and realize abnormal rises in their remuneration, regardless of their performance and job mobility. Based on leapfrogging, peer CEOs claim higher salaries and bonuses and ratchet the rent extractions up year by year. DiPrete et al. (2010) is believed to be a major breakthrough in the research of executive compensation.

A similar study by Bisjak et al. (2008) proves the significant impact of benchmarking on CEO compensation. They argue that it is controversial for directors to compare compensation level among peer groups in order to determine the pay structure. On the one hand, compensation increases irrespectively of who exactly is the top manager and what is the firm performance but on the other hand classification exposes boards to provide competitive cash packages to executives. Their empirical research produced that 96 out of 100 American firms, randomly selected, used the benchmarking model in 1997. An extra interesting finding is that CEOs whose pay is below their counterparts' median receive $1.3 million higher increases in total pay per year than their above-median peers do. This is a clear proof of leapfrogging and by behaving in this way CEOs achieve to place themselves on the above-median group. Bisjak et al. underline that leapfrogging is noticed at short-serving CEOs whose firm either performs well or is active in tight markets. Finally, they disapprove the pay-for-luck phenomenon and find that "*leapfroggers*" are more likely to face higher rates of turnover.

Reviewing the relative literature, the intuition behind compensation benchmarking theory is more or less presented with the same pattern. In Faulkender & Yang (2010) the researchers find that the compensation level at a possible peer institution is statistically significant in defining its likelihood of being chosen as a compensation peer after controlling for some firm characteristics. They attribute this feature not only to entrenchment but also to the fact that a high compensation in more complex firms might be an equilibrium result in a well-functioning labor market. The article of Hayes & Schaefer (2009) is also noteworthy. They present the "*Lake Wobegon*" effect[2] as a possible reason for the surge in CEO pay. Economically, this effect captures the phenomenon that occurs when no firm admits to having a below-average paid CEO and eventually no firm allows its CEO pay package to lag market expectations. Based on asymmetric information, managerial rents and corporate myopia, the authors confirm the existence of the effect and confirm the upward ratcheting of firms in an attempt to deceive market for their firm value.

All in all, compensation rating theory can give feasible explanations to the CEO compensation theoretical framework. In my opinion, the perspectives that benchmarking theorists cover so as to deal with the rapid rise of CEO compensation in recent years, are pioneering and potentially more plausible than that of the classic theorists.

2.6. Elements of executive compensation

The executive compensation can contain a lot of elements depending most times on the corporate governance of the firm and the undersigned contract among the top executive and the Board of Directors. In many cases, the firm culture and the block holders' philosophy play a significant role in the definition of the remuneration package. These elements vary a lot and each has its own individual effect on the final amount of money that the CEO's bank account will realize. For financial analysts, the main components of a compensation package are: salary, bonus, stock-based forms of compensation and pensions.

[2]In Lake Wobegon, a fictional town in Minnesota, US it is said that all men are strong, all women are good looking and all children are above average. The "Lake Wobegon" effect depicts the natural human tendency to overestimate one's abilities (Grazell, 2012).

2.6.1. Salary

Salary is the fixed contractual amount of compensation that does not explicitly vary with performance (Balsam, 2002, p. 35). In other words, it is the fixed compensation that the manager earns no matter he accomplishes or not the predefined goals. Base salaries were appearing an upward trend in the past, especially in the United States. In recent years though, companies are giving emphasis on the pay-for-performance model. That is, the executive should give his best in order to maximize his earnings. In this way, firms limit high salaries in order to decrease the risk aversion of managers and to send the right signals to the shareholders and employees. Companies should discourage CEOs from viewing a salary increase as part of their year-end report card and from overemphasizing the salary importance (Kay & Van Putten, 2007, p. 154-155).

2.6.2. Bonus

Bonus is a form of compensation that is conditioned upon individual, group or corporate performance. For most executives, it is based on group performance. The performance conditions can be implicit or explicit, objective or subjective and even financial or nonfinancial. Bonuses can also be based upon one or many factors and upon short- or long-term measures (Balsam, 2002, p.36). According to Jensen & Murphy (2010), on average CEOs earn around 50% of their base pay in the form of bonuses and these do not make compensation fluctuate.

The design of bonus provides executives with value even when their performance is not particularly good. In some cases the firms take objective measures and bonus is tied to whether the executive meets a budget or is awarded when profits exceed those of the preceding year or when the institutional pension fund investments get appreciated. However, it is hard to understand whether the shareholders' value has increased, even though managers have reached these goals. In those cases bonus plans do not reward performance. On the other hand, many companies base their bonus plans on subjective measures, i.e. strategic decisions or effective leadership. In this case, the board of directors judges if it is fair for the bonus to be awarded because observers cannot precisely answer weather the executive has met his goals. To sum up, both objective and subjective measures need to be taken so that a strong relationship between bonus and performance to be established (Bebchuk & Fried, 2004, p. 124-127).

2.6.3. Stock options

Stock options allow the manager to purchase one or more shares of stock at a fixed exercise price over a fixed period of time. These options are in-the-money when the share price is higher than the exercise price. The value of the stock options rises as the share price increases, but it can also expire worthless if the share price declines (Balsam, 2002, p.37). In the early 90's, the massive rise in stock option awards led to criticism in the US popular media and prompted requirements by government agencies for greater disclosure of executive compensation data (Yermack, 1995). This was the era when top managers started to earn huge amounts of money and common shareholders were probably upset about the luck of their investments.

Sanders & Hambrick (2007) state that at their peak, in 2001, stock options accounted for over 50 percent of the pay of CEOs of major US firms and in 2005 were still the biggest component of CEO compensation, accounting for 41 percent. But why do companies award their managers stock options? The answer is that firms want to alleviate the principal-agency problem and try to motivate executives to maximize the shareholders value. Managers become less risk-averse and are obliged to take risky decisions that will affect the firm's stock future. Problems of shirking are also ameliorated since the CEO payoffs are aligned with shareholders payoffs. According to Sanders & Hambrick (2007) again, stock options help overcome the problem of shortsightedness, that is the underinvestment in the future. Indeed, CEOs have no incentive to undertake projects that will benefit only their successors, even if those might improve the firm value. Stock options are solving this problem by making the CEOs eligible to participate in the future gains of the company's share price.

Nevertheless, there are clues that stock options may create problems in corporate governance. First, the CEO might avoid increasing dividends in favor of using the cash to increase the share price. Second, the firm tends to pick a business strategy of higher risk, as the CEO has to take on riskier projects. Third, if the stock price falls below the share price, CEO turns demotivated. Finally, CEO may manipulate earnings and maximize profits in one target period to make the share price more favorable for exercising options. This manipulation can reduce earnings and stock price after the target period (Kim & Nofsinger, 2007, p.16).

2.6.4. Stock grants

Stock grants are shares that are given by the company to the executives. They have no exercise price but they have value when the share price is positive. They can be restricted or unrestricted. A restriction could be the period of time that the manager has worked for the company (Balsam, 2002, p.38). Clementi et al. (2006) support that security grants are proper in organizations where there is limited enforcement of contracts and firms cannot commit to follow up on promises of cash compensation. Stock grants can then operate as commitment devices, as it is harder for firms to break the promise on payments to shareholders than on cash payments to employees.

2.6.5. Other stock-based forms of compensation

Apart from stock options and stock grants, there are other stock-based instruments such as stock appreciation rights, phantom stock and equity units. Stock appreciation rights are the right to receive the increase in the value of a specified number of shares of common stock over a defined period of time. In fact, they are stock options with the exception that the corporation pays the executive, in cash or common stock, the excess of the current market price of the shares over the aggregate exercise price. Therefore, the executive is capable of realizing the benefits of a stock option without having to purchase the stock. Moreover, phantom stocks are units that act like common stock but they do not constitute claims for ownership of the corporation. They entitle executives to receive the increase in common stock prices and any dividends declared. Equity units enable CEOs to purchase common stock at its book value and resell the stock to the corporation at their book value at a later date (Balsam, 2002, p. 39).

2.6.6. Pensions

This is a form of deferred compensation, whereby after retirement from the corporation, the CEO receives a series of payments that are defined by the pension plan (Balsam, 2002, p. 39).

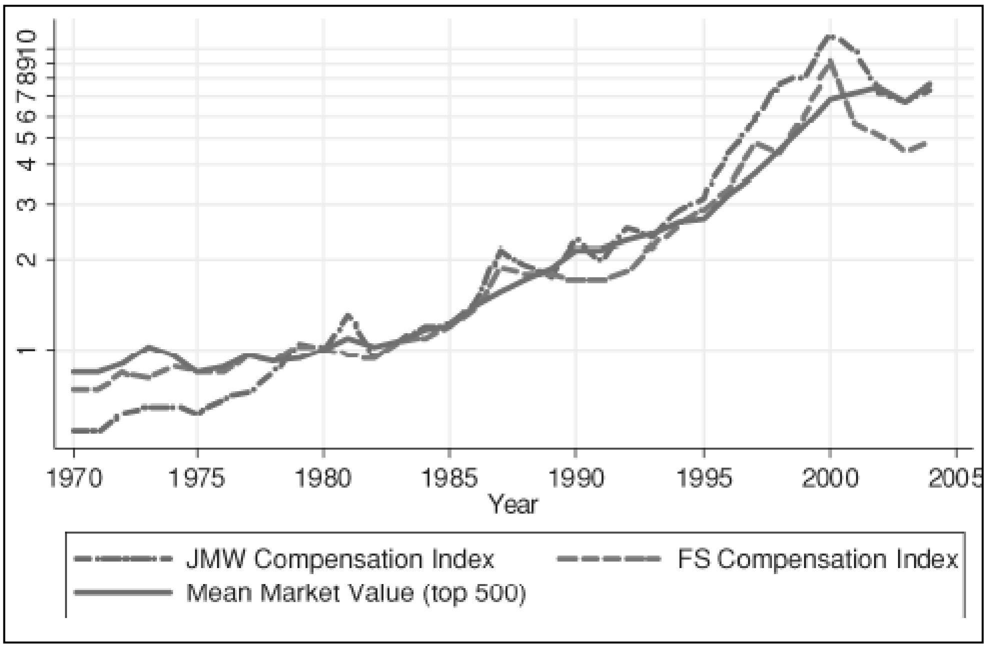
2.7. The impact of firm size on pay

A lot of researchers have thoroughly elaborated on how the size of the institution affects the remuneration of the top management. Frydman & Saks (2010) studied the relationship between firm size and executive pay. After decomposing the correlation of compensation and firm size, they suggest that firm size has a positive and significant effect on compensation over the sample period of 1936-2005. They support that in contrast to the 1950's and the 1960's, now this relationship is much stronger. In particular, from 1936 until 1975 the aggregate firm size explains only 2% of the variation in pay, while in the second half of the sample the corresponding percentage is 34%. The authors give two possible explanations for the increasing intense of this relationship. First, the level of pay is currently tied to simultaneous fluctuations in firm size while it responded more to lagged firm size in the past. Second, the proxy for firm size has been changing over time. These results are consistent with Conyon & Murphy (2000), who provide evidence that the median pay for companies with 1997 sales in excess of £1,500 million is £3,552,000, much higher than the £686,000 median pay for institutions with sales below £200 million (US data).

Gabaix & Landier (2008) confirm the study of Frydman & Saks (2010). They assert that the best proxy for firm size and the one with the highest predictive power is the market capitalization. Figure 2 explains the rise in managers' pay. The indices are normalized to be equal to 1 in 1980. Up until 2003 the size of firms has been increased in real terms by a factor of 6. Ceteris paribus, the model of Gabaix & Landier predicts that CEO compensation should increase by 500%. The results that stem from cross-country regressions are also impressive. The variation in typical firm size explains about 50% of the variance in CEO compensation across countries.

Two decades ago, in the early 90's, Kostiuk (1990) studied the impact of firm size on CEO income. He divided his sample chronologically in three segments from 1934 and then and found that elasticity of size on pay is similar across firms – even when comparing US firms to UK ones – and remarkably stable over time. He also concludes that firm size is certainly the dominant factor in setting the compensation level even though firms are strongly idiosyncratic. Examining 755 Canadian firms over the period 1991-1995, Zhou (2003) estimates firm-size elasticity of CEO pay. She reports that for every 10 per cent increase in the firm sales (i.e. proxy for size), the cash compensation paid to CEO executives increases by 2.5 per cent. When controlling for size, the author documents a 15 to 25 per cent greater sales elasticity of executive compensation for large firms than that for small firms. On the other side of Pacific Ocean, Lau & Vos (2004) illustrate a CEO compensation – firm size elasticity of 0.39. That is, for every percentage increases in the firm's total assets, the average CEO compensation increases by 0.39. These results are applied to 104 New Zealand listed companies between 1998 and 2002 and prove a positive and robust relationship between CEO payments and firm size.

Figure 2: Executive compensation and market capitalization of the Top 500 firms



Source: Gabaix & Landier (2008)

Other analysts analyzed deeper this topic and others found different results Schaefer (1998) analyzes the relationship between firm size and the extent to which managerial compensation depends on the wealth of the firm's shareholders. He measures size by either market capitalization or assets and compensation by executive salary plus bonus or change in CEO-pay-related-wealth across many years. After estimating his econometric model, Schaefer determined that pay-performance sensitivity appears to be inversely related to the square root of firm size. In addition to Schaefer, Cichello (2005) uses as proxies of firm size either total assets, number of employees or annual sales. He shows that firm size has a larger impact on the pay-performance sensitivity than the variability of returns has. It is also imperative for the researcher to control for the firm size when using dollar returns as the measure of the firm performance.

Furthermore, Baker & Hall (2004) are analyzing how the strength of the managerial incentives relates to the firm size. Their crucial estimations are that CEO incentives are more or less constant or decline slightly as firm size increases and that CEO marginal products rise significantly with firm size. The fast growth of executive pay was the main subject of Bebchuk & Grinstein's (2005) scientific paper. The writers argue that between 1993 and 2003 there was a noticeable increase in the scale of the firms. That is verifiable by the 40%, 30% and 51% inflation-adjusted increase in the average sales of the S&P 500, Mid-Cap 400 and Small-Cap 600 firms respectively, from 1993 to 2001. During the same period, the incidence of new economy firms with higher compensation has increased. After controlling for firm size and performance, the scientists indicate that the levels of the CEO compensation increased by 96 percent between 1993 and 2003 and the ones of the top-five executives increased by 76 percent. Both studies confirm the positive relationship between the size of the organization and the top executive's pay package.

2.8. The impact of firm performance on pay

The importance of the relationship between firm performance and CEO compensation has been well documented in the corporate governance literature. Summarizing the literature written from 1970 until 1996 relatively to pay-performance relationship, Hope (1999) notes that there is significant absence of a systematic link between pay and performance in the UK. The author is also providing the standard approach for investigating this relationship econometrically:

$$\boxed{\text{Compensation} = b_0 + b_1\text{Performance} + \text{other variables} + u_i}$$

where b_1 coefficient reflects the pay-performance sensitivity. The higher $b_{1,}$ the more sensitive is executive compensation to corporate performance (Hope, 1999, p. 215-216).

Brick et al. (2012) define pay-performance sensitivity as the instrument that measures the impact of a change in equity value on the manager's wealth. According to Jensen & Murphy (1990) high pay-performance sensitivity means that CEOs have closely aligned their interests with those of the shareholders. In their study, they find a positive relationship between cash compensation and firm performance, though not statistically significant. The coefficients in their study indicate that a CEO receives an average pay increase of $31,700 in years when shareholders earn a zero return and receives on average an additional 1.35 cent for each $1,000 increase in shareholder wealth. However, the authors express their disappointment at the low pay-for-performance sensitivity of CEO pay (Barkema & Gomez-Mejia, 1998). Conyon & Murphy (2000) use the pay-performance sensitivity as a measure of effective CEO ownership. They report average and median pay-performance sensitivities for US CEOs be 4.18% and 1.48% respectively, way higher than the average (2.33%) and the median (0.25%) sensitivities for UK CEOs. It is worth to refer that when controlling for risk, investment opportunities and human capital, they find that the age variable is significant indicating a monotonical increase in pay for performance after 52 years.

In addition to its own powerful framework, the connection between the managerial remuneration and firm performance is also affecting and is affected by other aspects of the corporate governance inside the organizations. Mishra et al. (2000) provide evidence that pay-performance sensitivity is positively correlated to the future firm performance. Barkema & Gomez-Mejia (1998) argue that firm performance could be a consequence of CEO pay, depending on whether or not CEOs are differentially rewarded according to the amount of discretion they enjoy. Furthermore, the work of Cunat & Guadelupe (2005) is based on a large scale of quoted and non-quoted UK firms using a quasi-natural experiment as the source for increased compensation. They illustrate that companies that are more exposed to foreign competition increase the slope of their performance-related pay contracts more than sectors that are relatively shielded from it. In other words, CEOs exposed to strong competition, are performing better and are earning higher compensation packages.

In this literature section, it is imperative that I refer to the very straightforward article of Bertrand & Mullainathan (2001). On the whole, they investigate the cases in which CEOs are not rewarded for performance but for luck. They state that shareholders will not reward CEOs for observable luck, that is, changes in firm performance that are beyond the CEO’s control. In order to test their hypothesis, they use three measures of luck. These luck factors are large movements in oil prices, changes in industry-specific exchange rates and overall economic fortune of a sector. They report that CEO pay is positively related to luck – or, “*CEO pay is as sensitive to a lucky dollar as to a general dollar*”. They measure performance either as changes in accounting returns or as stock market returns. Their results are also consistent both with the skimming and with the contracting view. Poorly-governed firms allow CEOs to gain effective control of the pay-setting process itself. On the contrary, in well-governed firms CEO pay is used by shareholders to give a solution to the agency problem.

Furthermore, Obermatt (2012), a company that conducts financial researches in US reports that the S&P 100 institutions do not connect CEO remuneration with either performance or market capitalization. Measuring performance against a peer group, analysts calculated that between 2008 and 2010, Occidental Petroleum's CEO earned almost eight times his "deserved pay". Hence, they suggest firms base executive remuneration on earnings growth and stock return. On top of that, having examined 415 UK companies from 1994 until 2006, Gregg et al. (2010) find little evidence of an upward trend in pay-performance sensitivities. In their study, they declare an asymmetric relationship, namely pay-performance elasticities are high when stock returns are high whereas they are low when stock prices plummet. This means that firms do not link properly the executive pay with their stock performance. They reward executives for exceptional performance but they do not blame officers for exceptional under-performance.

2.9. The impact of CEO tenure on her pay

Before going further to what has been written relatively to how the tenure of a CEO impacts her remuneration package, my personal feeling is that it is very reasonable for someone who owns a management position to realize higher income the longer they stay in the same spot. This is justified by continuous improvement in experience, development of wider network connections and deeper personal engagement within the organization.

To begin with, Hill & Phan (1991) explain why tenure is such significant. They think that CEOs exert more and more influence on the Board of Directors as their tenure increases. This substantial influence might stem from the fact that new board members are nominated by managers for their future benefit. Another possible factor might be the control over firms' internal information systems that CEOs gain year by year. Therefore, smart managers start influencing the board composition in order to achieve higher compensation packages afterwards. In their study, the collected data concern the period between 1977 and 1988 with 104 firms to constitute the sample. One of their main findings is that positive pay-performance sensitivity weakens the longer the tenure. Their hypothesis that a long-serving officer positively impacts the pay-size relationship is also supported by the empirical analysis. Testing the relationship between CEO pay and risk, the authors found that the longer the tenure, the stronger the pay-risk relationship. Additionally, Becker (2006) concludes that tenure may have a positive effect on managerial incentive strength.

Exploring more the literature, one can discover the very informative work on this topic belonging to Cremers & Palia (2011). The authors examine how CEO pay varies over a CEO's tenure. They use a large dataset from 1992-2007 and they test four possible hypotheses: entrenchment, learning, career concerns and dynamic contracting. First, the longer the tenure, the more likely the CEO is entrenched. Thus, entrenchment has a positive effect on pay. Second, shareholders and directors learn about CEO abilities over time by following firm performance. Hence, executive pay level increases with experience as stakeholders efficiently update their learning. Finally, under both the career concern and the dynamic contracting hypothesis CEO pay-performance sensitivity is positively correlated with tenure. Their dataset consists of approximately 2,200 firms and 3,200 different chief executive officers and their proxy for tenure is the number of years during which the CEO has been making decisions by her top office. In general, Cremers & Palia report a positive relationship between tenure and pay under their hypotheses but for different reasons. Under the entrenchment hypothesis, the explanation is the CEO extreme power, while under the learning and dynamic contracting higher levels of pay are required to compensate risk averse CEOs for receiving a higher incentive contract.

Johnston (2002) performs empirical investigation in tenure, internal promotion and executive compensation. Dividing executive remuneration by tenure, the author demonstrates that CEO pay rises with tenure. The initial year of job tenure raises executive pay by 4% and this relationship peaks at about 14 years. Bulmash & Sah (2011) compare the relationship of tenure and managerial compensation before and after the Sarbanes-Oxley Act. To test this, they shaped two groups of observations: 1993-2002 and 2003-2010. Convincingly, they state that tenure is significantly and positively related to basic compensation, total compensation and total payout both before and after the Sarbanes-Oxley Act. According to the scientists, this could indicate that as required by Sarbanes-Oxley Act, CEO responsibility increased after 2002 and with greater tenure they could receive higher compensation.

3. Empirical Research

3.1 Methodology Design

In order to test my hypotheses presented in the first chapter and give a proper answer to my main research question, I conducted an empirical research based on replication of important academic papers which test similar scientific questions as mine but in different financial markets and for different financial data. For refreshment purposes, I remind that I will try to test what factors determine the compensation of Chief Executive Officers (CEOs) in large American companies and what relationships can be extracted. The data used in this thesis are coming from the US and cover the period from 2005-2011. I chose the US financial market because it is more transparent due to strict disclosure laws and is comprised of the major global public-held companies across all industry sectors. Eventually, data are easily accessible and a proper sample can be constructed. In general terms, they are absolutely consisting of financial observations per firm, per year, resulting in a representative cross-sectional time series dataset. I selected the time framework in a way that I can draw results for a period that extends from 3 years before 2008 crisis and 3 years afterwards, namely 2005-2011. Personally, I expect results to be more robust by looking into an economy's ups and downs. Main variables used in the research are presented in Table I.

3.1.1 The impact of performance on compensation

To begin with, I firstly test the pay-performance relationship. Duffhues & Kabir (2008) tested this relationship in companies listed in the Dutch stock exchange market. Their techniques are really concise and to the point, thus I decided to use them so as to estimate the impact of performance on compensation relatively to my data. I will test the relationship between pay and performance using this econometric model:

$$\boxed{Comp_{it} = \alpha_0 + a_1 Perf_{it} + \alpha_2 Size_{it} + \alpha_3 Lev_{it} + \gamma_j + \delta_{it} + \varepsilon_{it} \quad (1)}$$

I am running Ordinary Least Squares (OLS) regressions. The dependent variable is either cash compensation (CASH_COMP) or total compensation (TDC1) of the Chief Executive Officer (see Table I). The main independent variable here is performance and I use several proxies to capture its impact on pay. First, two pure accounting measures are perceived as good indicators of performance: return on assets (ROA) and return on sales (ROS), which are earnings before interest and taxes (EBIT) divided by total assets (AT) and total sales (SALES) respectively. Second, I use annual holding period returns (AHPR) to proxy for market performance. I constructed AHPR using the formula:

$$AHPR_{it}=\frac{P_{it}+DIV_{it}-P_{i,t-1}}{P_{i,t-1}}$$

where P is the annual close price of the i company’s stock for each fiscal year and DIV is the ex-date dividend per share for each fiscal year. Holding period returns are used because they capture any income added to the shareholders wealth. The third measure of performance combines accounting and market values and is known in the literature as Tobin’s q. I formed Tobin’s Q according to Duffhues & Kabir (2008):

$$Q = \frac{MCAP + DEBT}{AT}$$

where MCAP is market capitalization and DEBT is total debt in current liabilities. Because the pay-performance relationship includes high levels of endogeneity I also include a group of control variables. Eventually, I control not only for market capitalization as a proxy for firm size but also for leverage. According to Duffhues & Kabir (2008) size is positively correlated with compensation and leverage can be either a negative impact on pay in terms of monitoring or a positive one in terms of firm risk. In my model, industry and time dummy variables are included so that fixed effects to be captured. I classified the firms according to the Global Industry Classification Standard (GICS). A detailed description is presented in Table II. The last term of the regression model is the idiosyncratic error term. Tracking my second hypothesis, I expect that the performance estimated coefficients are positive but not statistically significant, especially those that proxy for the market measures of performance.

After performing several Hausman tests in order to decide whether I use fixed or random effects, I end up using fixed effects model for cash compensation and random

Table II
The GICS taxonomy

Code	Industry sector
10	Energy
15	Materials
20	Industrials
25	Consumer Discretionary
30	Consumer Staples
35	Health Care
40	Financials
45	Information Technology
50	Telecommunication Services
55	Utilitites

This table describes the industry taxonomy of the companies according to Global Industry Classification Standard. I present the code and the industry sector. Sources: Wikipedia, Compustat

effects model for total compensation. The regressions are referring to contemporaneous and lagged relationship among the dependent and the independent variables.

3.1.2. The impact of firm size on compensation

The second stage of this analysis includes the test of the size-compensation relationship. I am following the scientific paper of Zhou (2003) as a reference because it was very informative and straightforward to me when I first read it. In order that I replicate this article and reach to valuable results I have to add several new variables to my original dataset. These are return on equity (ROE) which is net income divided by shareholders equity and a dummy variable for the firms whose sales are above the sample median (LARGE). My estimated model is similar to Zhou (2003) and aims to shed some light on my first sub hypothesis:

$$\boxed{LN\_CASH\_COMP_{it} = \beta_0 + \beta_1 \ln Size_{it} + \beta_2 Perf_{it} \qquad (2)}$$

The natural logarithm of sales (LN_SALES) and total assets (LN_AT) are used as proxies for firm size and accordingly I will extrapolate sales and assets elasticities. Return on assets (ROA), annual holding period return (AHPR) and return on equity (ROE) are used as proxies for firm performance and further for control variables of size. Some remarks about the coefficients: β_0 is the constant intercept, β_1 is the elasticity of CEO cash compensation to firm size and $\beta 2$ is the pay-performance semi-elasticity (Zhou, 2003). I have to add here that in order to regress firm size on CEO cash compensation and make the distinction between large and small firms, I constructed a dummy variable named LARGE. LARGE is 1 if the average sales of the firm are above the sample median and 0 otherwise. The median of the average sales of the 489 US companies listed on the S&P500 between 2005 and 2011 is $7287.957 million. I will estimate my model using Ordinary Least Squares (OLS).

3.1.3 The impact of CEO tenure on her compensation

To test the third sub hypothesis respectively to the impact of CEO tenure on his pay, I partly use the methodology of Cremers & Palia (2011). In general, I extract results from three specifications in which I use tenure, accounting and firm characteristics. The one-line illustration of my econometric model is:

$$\boxed{LN\_TDC1 = \gamma_0 + \gamma_1 TENURE_{it} + \gamma_2 LN\_AGE + \gamma_3 Size_{it} + \gamma_4 Accounting_{it} + \gamma_j + \delta_{it} \quad (3)}$$

where the dependent variable is the natural logarithm of total compensation, TENURE is the main independent variable and represents several variables proxing for CEO tenure, LN_AGE is the control variable of CEOs age (ln), Size contains the natural logarithms of market capitalization (and its quadratic form) and that of sales (LN_MCAP, LN_MCAP2 and LN_SALES) and finally I use return on assets (ROA), property, plant and equipment to assets ratio (PPE) and capital expenditures to assets ratio (CAPX) as accounting performance control variables (See Table I for more details). In all specifications I use time dummy variables for each year from 2005 until 2011 and firm fixed effects in order to capture unobserved heterogeneity at a firm level. The t-statistics comprise of robust standard errors clustered for 465 firms.

In this model I added some new variables, whose existence is critical to well-established interpretations. First, I generated the TENURE variable by subtracting the year when the executive became CEO from the fiscal year. Second, I created five dummy variables which indicate each of the five first years of the CEO being on the top chair. Third, manager's age was available from the Execucomp database and finally I extracted capital expenditures and PPE from Compustat and then I divided them by total assets (AT) in order to get the ratios needed. The number of observations slightly decreased because of some mismatches in the datasets, but nothing to worry about.

3.1.4 The impact of compensation benchmarking

In the final part of this empirical analysis, I will challenge the topic discussed in 2.5 part of this thesis, namely compensation benchmarking theory. The way that I approached this problem that corresponds to my fourth sub hypothesis is similar to Bisjak et al. (2008). I tried to replicate their paper with success even though my observations were way less than theirs. By and large, the concept was to form peer compensation groups and then to regress the yearly difference of total compensation on some firm variables and some variables which proxied for the peer groups.

I implemented Ordinary Least Squares (OLS) on three different specification of the below model:

$$\text{Total Compensation}=\delta_0+\delta_1\text{Accounting}+\delta_2\text{Tenure}+\delta_3\text{Peers}+u_\varepsilon \quad (4)$$

As measure of total compensation I used the yearly absolute change in the total compensation (TDC1) of the CEO. Total compensation values were winsorized at the 0.01 level controlling for high skewness of compensation data (Bisjak et al. 2008). Thus, the main dependent variable in (4) is the yearly difference in the winsorized total compensation (DTDC1). As accounting and firm measures and of course as independent variables I use the logarithm of sales for the prior fiscal year (LOG_LAG_SALES), the yearly change in sales (DSALES), the yearly change in net income (DNI) and the yearly change in firm market value (DMV). All variables concern the 2004-2011 period.

To control for CEO tenure I use the variable TENURE as it was formatted in the previous part. The noteworthy fact here is that in this analysis I demanded observation with at least 2 years of CEO tenure. According to Bisjak et al. (2008) this ensures that I do not take into consideration pay increases of managers that appointed as CEOs during the fiscal year and thus received money only for part of the year.

The next step required the construction of the peer groups. I constructed my peer groups for every fiscal year and within each industry sector according to the GICS classification presented in Table II. To divide my firms in each group I first calculated the median of the annual holding period returns and the lagged total compensation median for each group. Then, I computed the relative performance (REL_PERF) of each firm as the annual holding period return (AHPR) minus the median return of each group. A negative relative performance indicates that the firm underperformed their peers at the specific fiscal year. Subtracting the lagged winsorized total compensation of the CEO from the median total compensation of the peer group, I calculated the distance from peer group median (DISTANCE). A positive distance means that the CEO total compensation is situated in the low part of the group. For every positive value I created a dummy variable (LOWCOMP) which equals to 1 and 0 otherwise. In this model, replicating Bisjak et al. (2008), I also created two variables in order to test whether relative pay or relative performance matters more for determining total compensation: the cumulative distribution function of distance (CDF_DISTANCE) and relative performance (CDF_REL_PERF).

3.2 Data Structuring

Until 1992, US companies reported executive compensation as part of accounts payable under compensation plans. This was rather a description than the true accounting book values of the actual earnings that top executives were realizing in fact. However, as Desmond et al. (2005) report, in October 1992 the Securities and Exchange Commission (SEC) state authority obliged public companies to provide more detailed statements and filings comprising remuneration information for the CEO and the four most highly compensated executive officers other than the CEO. This event enabled Standard & Poor’s analysts to register SEC compensation items and construct ExecuComp, a database exclusively for executive compensation. In this thesis, ExecuComp is the main source of executive data.

All of my data are for the period from 2005-2011. My proxy for the largest public held firms in US is the S&P500 index which consists of the 500 top publicly traded American institutions. The composition of the index is not fixed. Stocks attached to the index must comply with specific rules in order to maintain their position. As a result, during these 8 years a few companies were excluded from the index due to either mergers and acquisitions activity or serious decrease in their trading volume. However, they were got substituted by other ones and the index was always composed of 500 companies. As it is out of the scope of this research what companies are exactly included in the S&P500 index every moment, I decided to opt for the 500 companies that were being traded in mid-October 2012.

First of all, I would like to underline that the empirical analysis was conducted using STATA, edition 12, which is one of the most complete statistical programs. For all parts of my analysis, I downloaded compensation data from Execucomp and firm data from Compustat[3]. The queries were based on the ticker[4] of each company and were adjusted to produce data from 2004 until 2012 as a control for individual fiscal years and for later calculation of annual holding period returns of 2005 and other difference and percentage variables. The outputs of the two queries produced two datasets and each of them was treated separately until their merge. After the downloading I checked for missing values of data. Observations of years when firms were still unlisted or firm-years with missing accounting data and CEOs with undisclosed data were excluded from the sample. Finally, I managed to form a sample of 489 firms, 777 CEOs and 3269 firm-year observations. In my opinion, it is a concrete dataset with representative contents, able to give robust results on the whole.

3.3 Results

3.3.1 Descriptive statistics

I first illustrate some descriptive statistics of my sample. Needless to say that it is very important for the reader to have a first insight on the sample. Table III demonstrates summary statistics of CEO compensation for the sample of US public listed institutions on the S&P500. It refers to fiscal years from 2005 until 2011 and there are two panels relatively to the two types of compensation, cash either total. I observe that the average CEO cash remuneration in 2005 is $3.175 million with a respective median of $2.549 million. After that year, I detect a sharp decrease of about 40% in average terms and more than 50% in median terms for cash compensation. The average cash CEO compensation for the 7 past recent years was $1.810 million with a median of $1.115 million.

As far as the total CEO compensation is concerned, numbers are ranging more or less around $10 million. The median value shows that 50% of CEO-year observations are higher than $7.76 million. Consequently, median numbers confirm that large public firms in the US provide their CEOs with satisfactorily high pay packages. The

[3] Available via personal account in Wharton Research Data Services (WRDS) website

[4] Ticker: Unique non-numerical code of publicly traded stocks

Table III
CEO compensation in the largest public traded US firms

	Mean	Median	Standard deviation	Obs.
Panel A: Cash Compensation				
2005	3175	2549	3187	435
2006	1891	1100	3035	442
2007	1648	1000	3227	469
2008	1666	1041	4940	476
2009	1389	1037	1595	481
2010	1514	1095	1828	484
2011	1525	1084	2072	482
2005-2011	1810	1115	3072	3269
Panel B: Total Compensation				
2005	9522	6397	9242	435
2006	10311	7682	10540	442
2007	10171	7672	9619	469
2008	10105	7354	11327	476
2009	8640	7019	6795	481
2010	10362	8572	8048	484
2011	10937	8944	9367	482
2005-2011	10010	7760	9379	3269

This table shows summary statistics of compensation paid to Chief Executive Officers of 489 US firms listed on the S&P500. Panel A presents statistics for cash compensation whereas Panel B presents those for total compensation. Values are expressed in thousands of dollars.

gap between total and cash CEO compensation is huge probably due to market-based compensation such as stock options and long-term payment plans. It is impressive that for the same firms and the same years cash represents only 18% of the total compensation in average terms and 14% in median terms.

Table IV illustrates summary statistics for the main variables used in the empirical research. Panel A contains the four proxies for firm performance while Panel B presents basic accounting measures that operate as proxies and further as control variables within the regression model. Again the total number of observations is exactly the same with that one in previous Table III, showing perfect match between CEO data and firm characteristics. The average large public held organization in the States realizes positive return on assets and sales of 11.3% and 17.3% correspondingly. On the whole, stocks attached to S&P500 show a positive average annual holding period return of 10.1% and a median Tobin's q ratio of 1.044. The same table suggests that the average large firm in US has total assets of $49 billion,

Table IV
Main variables summary statistics

	Mean	Median	Standard deviation	Obs.
Panel A: Performance measures				
ROA	0.113	0.099	0.086	3,269
ROS	0.173	0.157	0.224	3,269
AHPR	0.101	0.071	0.57	3,269
Q	1.412	1.044	1.322	3,269
Panel B: Accounting measures				
AT	49,274	11,323	177,314	3,269
SALES	17,768	7,389	34,897	3,269
MCAP	23,027	10,439	39,892	3,269
LEV	0.036	0.015	0.057	3,269

This table presents summary statistics of performance and accounting measures for a sample of 3,269 firm-year observations in the US. ROA is return on assets, ROS is return on sales, AHPR is annual holding period return, Q is Tobin's q and LEV is leverage. Sales, total assets (AT) and market capitalization (MCAP) are in million dollars.

total sales of $17 billion and market value of equity of $23 billion. The debt ratio is quite low at a median 1.5%.

3.3.2 The impact of performance on compensation

In this section I apply the Duffhues & Kabir (2008) econometric model to test the pay-performance relationship. In the regressions instead of absolute values of total compensation (TDC1), cash compensation (CASH_COMP) and market capitalization (MCAP) I use their natural logarithms. I log transform these variables in order to confront with their skewness. Compensation, market capitalization and sales data are known to follow skewed distributions and it is of vital importance to statistically infer to their natural logarithms when it comes to deal with these variables. The cost of this transformation is that the interpretation of the coefficients is slightly less intuitive (Florin et. al, 2010).

After careful consideration about what type of regressions I will use in order to gauge results, I decided to favor the classical approach of longitudinal analysis: fixed or random effects? The main reasons are two: first, executive compensation data contain endogeneity factors in high level which are difficult to be recognized by Pooled OLS (POLS) and second[5], I have a large panel dataset wherein pooled OLS may not take into account unique factors that are different across firms. Duffhues &

[5] Special thanks to Mr. Kabir for his contribution

Kabir (2008) use a much smaller dataset and that allows pooled OLS to control for industry & time effects.

In order to decide which model – fixed or random effects – fits better to my data I perform the Hausman test. This test is based on the difference between the random effects and fixed effects estimates. The null hypothesis is that this difference is not systematic. A statistically significant difference shows evidence against random effects (Wooldridge, 2010, p. 328-329). Performing the Hausman test for ROA, ROS, AHPR and Q as independent variables and the natural logarithm of cash as dependent one separately, I always get a significant P-value close to zero. This induces the use of fixed effects model for cash compensation.

Table V presents the results from eight different regressions that capture the pay for performance relationship in the largest companies of US. In Panel A, I show the contemporaneous relationship. That is, regressions for the same firm, for the same CEO, for the same fiscal year. In each regression I use one performance metric each time. The number of firm-year observations is stable at 3,249. The adjusted R squared is generally moving between 46%-50%, showing that about 50% of the variance of the natural logarithm of cash compensation is explained by performance, having controlled for firm size and leverage. Eventually, I can claim that the constructed model has high degree of reliability. The results of the regressions show a positive and statistically significant relationship between firm performance and CEO cash compensation. Only for market performance this relationship is reversed and I notice a negative correlation. In terms of interpretation, holding all other constant, a one percent increase in return on assets (ROA) would result in a 1.09% increase in cash compensation. This is a result of the natural logarithm form of compensation. As far as the control variables are concerned, the proxy for firm size is always positive and significant whilst leverage has greater magnitude but less statistical significance than the natural logarithm of market capitalization. Comparing my results to those in Duffhues & Kabir (2008) I find different signs in coefficients. The results are similar relative to the control variables and the reliability of the model whereas the coefficients of the independent variables do vary. These discrepancies are probably due to differences in the length of datasets, the estimation methods and the nature of the market examined.

I am also testing the lagged relationship between firm performance and CEO compensation as proposed in Duffhues & Kabir (2008). The authors suggest that this

Table V
Regression results for cash compensation

	(1)	(2)	(3)	(4)
Panel A: Contemporaneous relationship				
Constant	4.181***	5.113***	3.187***	4.457***
	(11.41)	(14.34)	(8.636)	(11.48)
ROA	1.090***			
	(3.301)			
ROS		1.090***		
		(15.22)		
AHPR			-0.231***	
			(-9.275)	
Q				0.0712***
				(3.210)
LN_MCAP	0.297***	0.191***	0.420***	0.270***
	(7.481)	(5.006)	(10.67)	(6.336)
LEV	1.075**	0.974**	0.831*	1.106**
	(2.387)	(2.249)	(1.867)	(2.456)
Adj. R^2	0.46	0.50	0.47	0.46
F-statistic	29.41	105.1	55.16	29.21
No. of obs.	3,249	3,249	3,249	3,249

	(5)	(6)	(7)	(8)
Panel B: Lagged relationship				
Constant	4.239***	4.493***	4.556***	4.244***
	(12.33)	(13.84)	(13.16)	(12.33)
LAG_ROA	0.469			
	(1.624)			
LAG_ROS		0.988***		
		(16.90)		
LAG_AHPR			0.122***	
			(5.609)	
LAG_Q				3.66e-05
				(0.00196)
LN_MCAP	0.291***	0.253***	0.262***	0.296***
	(7.947)	(7.323)	(7.102)	(8.064)
LEV	0.361	0.160	0.424	0.399
	(0.847)	(0.400)	(1.004)	(0.938)
Adj. R^2	0.59	0.63	0.59	0.59
F-statistic	22.95	120.1	32.84	22.05
No. of obs.	2,751	2,751	2,751	2,751

This table shows the regression results where the estimation method is fixed effects. The dependent variable is the natural logarithm of cash compensation paid to the CEO. I measure firm performance by return on assets (ROA), return on sales (ROS), annual holding period return (AHPR) of the firm's stock and Tobin's Q (Q). Firm size (LN_MCAP) and leverage (LEV) operate as control variables. The absolute t-statistics are reported in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

kind of relationship might be a more indicative approximation of reality because the remuneration of the current year might be affected by former year's performance. In Table V, Panel B I present the regression results of this transformation. Return on assets and Tobin's q ratio are not statistically significant and, lagged return on sales has the same coefficient and stock returns now have a positive effect on CEO pay. The differences are dramatic and by adjusted R-squared I can say that this model is a bit more reliable than the first one. Firm size is again a deterministic control variable but leverage is insignificant even though it is still positive. I lose around 500 observations as a consequence of the lag transformation, namely the 2005 firm-year observations because data for 2004 are not included in the dataset.

On the whole, one can claim that cash compensation is definitely not negatively correlated to firm performance. Nevertheless, I will shape a concrete opinion about the pay-performance relationship after seeing the results about total compensation that follow immediately.

Turning to total compensation of the CEOs of the largest US companies from 2005-2011, I am now obliged to reshape my estimation technique. I performed the Hausman test to all relationships of the performance measures and total compensation, again having controlled for size and debt. The P-values were way higher than 0.10. In contrast to cash compensation, the difference in coefficients now is insignificant and as a result I decide to use the Random Effects – Generalized Least Squares (GLS) model for total compensation.

Table VI shows the outcomes of the regressions of firm performance on total compensation of the Chief Executive Officer. Panel A demonstrates the contemporaneous pay-performance relationship. The only statistically insignificant relationship that I observe from the results is that of return on assets (ROA) for both relationships. On top of that, ROA seems to have different sign across the two relative regressions. Return on Sales (ROS) has positive and statistically significant effect on CEO pay whilst market return (AHPR) is positive for contemporaneous but negative for lagged relationship. In other words, previous year's stock returns are negatively correlated to current year's CEO total earnings. Tobin's q ratio is significant only for the first case, with a negative impact on pay whereas firm size is a strong control variable, being always positive and statistically significant. Leverage has a positive impact but its insignificance cancels out its role for control. Moreover, my results for

Table VI
Regression results for total compensation

	(1)	(2)	(3)	(4)
Panel A: Contemporaneous relationship				
Constant	5.822***	5.928***	5.592***	5.553***
	(30.04)	(30.33)	(28.55)	(28.42)
ROA	0.192			
	(0.960)			
ROS		0.200***		
		(3.970)		
AHPR			-0.110***	
			(-6.361)	
Q				-0.0855***
				(-6.639)
LN_MCAP	0.324***	0.311***	0.352***	0.368***
	(15.63)	(14.99)	(17.03)	(17.45)
LEV	0.392	0.364	0.266	0.260
	(1.389)	(1.294)	(0.947)	(0.926)
R^2	0.153	0.152	0.158	0.175
No. of obs.	3,269	3,269	3,269	3,269

	(5)	(6)	(7)	(8)
Panel B: Lagged relationship				
Constant	6.040***	6.076***	6.161***	6.034***
	(30.05)	(30.30)	(30.59)	(30.17)
LAG_ROA	-0.266			
	(-1.339)			
LAG_ROS		0.280***		
		(5.850)		
LAG_AHPR			0.102***	
			(5.996)	
LAG_Q				-0.0200
				(-1.563)
LN_MCAP	0.309***	0.297***	0.292***	0.310***
	(14.56)	(14.04)	(13.73)	(14.64)
LEV	0.259	0.189	0.289	0.245
	(0.867)	(0.636)	(0.973)	(0.822)
R^2	0.150	0.147	0.153	0.155
No. of obs.	2,768	2,768	2,768	2,768

This table shows the regression results where the estimation method is random effects – generalized least squares model. The dependent variable is the natural logarithm of total compensation paid to the CEO. I measure firm performance by return on assets (ROA), return on sales (ROS), annual holding period return (AHPR) of the firm's stock and Tobin's Q (Q). Firm size (LN_MCAP) and leverage (LEV) operate as control variables. The absolute z-statistics are reported in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

total CEO remuneration in US are similar to the Dutch market as presented by Duffhues & Kabir (2008), Table 6.

3.3.3 The impact of firm size on compensation

According to my first sub hypothesis, I expect size to be positively correlated with CEO compensation with a strong relationship. As a result, I expect size coefficients to be positive and probably statistically significant. Table VII shows the results of the regressions. The model 2 is estimated under Ordinary Least Squares (OLS) and columns 1-3 illustrate the sales elasticity whereas assets elasticity is visible on the 3-6 columns. Both for sales and for assets the elasticities are moving closely in the range of 0.146 - 0.173, which is slightly lower than literature predicts[6], but not significantly different. Economically, for every 10 per cent increase in the firm sales, the cash compensation paid to the CEO of a company listed on the S&P500 raises by about 1.7% while for each 10 per cent increase in the firm total assets, the average CEO is expected to earn from 1.46% to 1.73% more. All coefficients for the two proxies of firm size across all the states are statistically significant. My general impression is that the theory that wants size to be a strong determinant of CEO compensation also holds in this case. The coefficients of rates of returns are not always statistically significant and in most of the cases are non positive figures, except the coefficient of ROA which was undeniably expected to show a positive relationship with the natural logarithm of total assets as it is defined endogenously by the latter. Annual holding period returns (AHPR) have a negative impact to the natural logarithm of CEO cash pay and this is consistent with Table V, Panel A findings on this thesis.

Table VIII is an illustration of the distinction between large and small companies of my sample. I would like to have a more dispersed dataset in terms of size on the grounds that now I only take into consideration the largest firms in US. Nevertheless, I have divided my sample into two categories depending on their average sales in a fair proportion of 50%-50%. The mean and median for small firms are \$3.587 and \$3.338 billion respectively, while the mean and median for large firms are \$31.378 and \$15.712 billion respectively.

[6] In Zhou (2003) this range is 0.24-0.25 and in Kostiuk (1990) the sales elasticity is about 0.23

Table VII
Firm size elasticity of CEO cash compensation: all firms

	Sales elasticity			Assets elasticity		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.552***	5.554***	5.622***	5.359***	5.696***	5.744***
	(41.12)	(42.47)	(43.22)	(36.43)	(46.18)	(46.91)
LN_SALES	0.171***	0.171***	0.166***			
	(11.69)	(11.71)	(11.46)			
LN_AT				0.173***	0.148***	0.146***
				(12.02)	(11.27)	(11.18)
ROA	0.00882			0.936***		
	(0.0429)			(4.172)		
ROE		-0.000277			0.000955	
		(-0.0546)			(0.188)	
AHPR			-0.220***			-0.228***
			(-7.218)			(-7.474)
LEV	1.208***	1.207***	1.140***	0.793**	0.818**	0.748**
	(3.849)	(3.859)	(3.673)	(2.475)	(2.546)	(2.347)
Adj. R^2	0.049	0.049	0.064	0.051	0.046	0.063
F-statistic	57.08	57.08	75.37	59.74	53.67	73.20
Num. of Obs.	3,249	3,249	3,249	3,249	3,249	3,249

This table shows the regression results where the estimation method is Ordinary Least Squares (OLS). The dependent variable is the natural logarithm of CEO cash compensation (LN_CASH_COMP). I measure firm size by the natural logarithm of sales (LN_SALES) or total assets (LN_AT). Return on assets (ROA), return on equity (ROE), annual holding period return (AHPR) and leverage (LEV) are used as control variables and proxy for firm performance. The t-statistics are presented in the parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% respectively.

The coefficients of the interaction term LARGEXSALES are positive in the first three columns but not statistically significant. This insignificance is also persistent for the total assets interaction term (LARGEXAT), which on the contrary is negative in all the cases. This overall insignificance of the interaction term prevents the researcher of gauging safe interpretations about the distinction between small and large firms. The most possible explanation would be that even though the median of large firms is five times the median of small firms, it seems that the two sub samples have not as much striking differences as I expected at the inception of the separation of the dataset.

Table VIII
Firm size elasticities of CEO cash pay: small vs. large firms

	Sales elasticity			Assets elasticity		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.291***	5.274***	5.268***	5.041***	5.567***	5.566***
	(17.20)	(17.22)	(17.29)	(17.28)	(23.77)	(23.97)
LARGE	-0.132	-0.116	-0.0849	0.434	0.298	0.279
	(-0.313)	(-0.276)	(-0.204)	(1.148)	(0.949)	(0.900)
LN_SALES	0.213***	0.213***	0.214***			
	(5.590)	(5.584)	(5.642)			
LN_AT				0.212***	0.164***	0.164***
				(6.763)	(6.063)	(6.130)
ROA	-0.151			0.904***		
	(-0.581)			(3.007)		
ROE		0.00115			0.00140	
		(0.148)			(0.180)	
AHPR			0.00703			0.00145
			(0.149)			(0.0309)
LARGEXSALES	0.00114	0.00132	0.00146			
	(0.0238)	(0.0277)	(0.0308)			
LARGEXAT				-0.0489	-0.0271	-0.0220
				(-1.283)	(-0.802)	(-0.660)
LARGEXROA	0.129			0.278		
	(0.301)			(0.584)		
LARGEXROE		-0.00201			-0.000834	
		(-0.195)			(-0.0811)	
LARGEXAHPR			-0.395***			-0.396***
			(-6.408)			(-6.434)
Adj. R^2	0.045	0.045	0.073	0.050	0.044	0.073
F-statistic	31.92	31.85	51.80	35.25	31.20	51.79
No. of obs.	3,249	3,249	3,249	3,249	3,249	3,249

This table shows the regression results where the estimation method is Ordinary Least Squares (OLS). The dependent variable is the natural logarithm of CEO cash compensation (LN_CASH_COMP). I measure firm size by the natural logarithm of sales (LN_SALES) or total assets (LN_AT). Return on assets (ROA), return on equity (ROE) and annual holding period return (AHPR) are used as control variables and proxy for firm performance. LARGE is a dummy variable for firms whose average sales are above the sample median. Multiplying LARGE by the five main variables above, I take the interaction terms LARGEX*variable*. The t-statistics are presented in the parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% respectively.

Table IX

Firm size elasticities across different industries

	Sales elasticity			Assets elasticity		
	ROA	ROE	AHPR	ROA	ROE	AHPR
Materials	0.159	0.16	0.162	0.172	0.166	0.168
	4.82	4.89	4.94	5.29	5.26	5.4
Industrials	0.318	0.341	0.343	0.34	0.332	0.332
	10.63	11.82	11.86	12.23	13.71	13.72
Financial Services	0.095	0.09	0.104	0.088	0.07	0.077
	2.22	2.21	2.67	2.31	2.16	2.53
IT	0.078	0.076	0.073	0.043	0.044	0.042
	1.5	1.44	1.39	0.76	0.79	0.75
Utilities	0.211	0.179	0.199	0.209	0.184	0.197
	4.16	3.61	4.07	4.68	4.28	4.57

This table shows the sales and assets elasticities across five different industries in the US. The method used is OLS across different industries, using the industry dummy variables. The dependent variable is the natural logarithm of cash compensation (LN_CASH_COMP). For the sales elasticities, the independent variable is the natural logarithm of sales (LN_SALES) while for the asset elasticities the independent variable is the natural logarithm of total assets (LN_AT). ROA, ROE and AHPR denote regressions with respect to return on assets, return on equity and annual holding period return respectively. Absolute t-statistics are also presented under the coefficients.

Finally, I hereby provide some interesting results about sales and asset elasticities between different industries. According to the classification of Table II, I ran some regressions of cash compensation on sales or assets so as to understand the range of these elasticities across different industry sectors. The results are given in the Table IX. By and large, the elasticities vary between 0.07 and 0.343. I exclude from this range the elasticities for the US Information Technology industry, wherein the coefficients are statistically insignificant. The elasticities for the companies which belong to the Financial Services are marginally significant to the levels of 7%-10%. These values are extremely high compared to the Industrial sector where I found elasticities above 0.3. A possible explanation would be that CEO compensation in financial firms is not so sensitive to sales but more to economic results (i.e. stock exchange) whereas companies that are active in Utilities or Materials do combine the CEO cash payment with annual total sales or assets. For the sake of intuition, the top manager of an industrial firm realizes 3.41% higher cash earnings when the firm sales surge at 10%, controlling for return on equity. This figure is enormously higher than the overall sensitivity of 0.18 estimated in Table VII for the overall US firms and demonstrates that not all firms determine the CEO remuneration with the same rules: industry matters!

3.3.4 The impact of CEO tenure on her compensation

In order to capture the basic determinants of top executives' compensation, I formatted four sub hypotheses at the introduction of this thesis. The third one supposes a positive relationship of long-serving CEOs with their pay earnings. In this part of this thesis I will examine this relationship. Is it holding for US largest companies from 2005-2011 or not? Answers are on Table XI. Before that, on Table X I present the correlation matrix for the variables related to tenure and age of CEO. I can say that between age and tenure there is not a significant linear relationship of about 35% while LN_TENURE and LN_TENURE2 (squared LN_TENURE) are strongly correlated. Therefore I only expect multicollinearity problems in the third specification where both variables are used in the regression.

Table X
Correlation Matrix

	LN_TENURE	LN_TENURE2	LN_AGE	AGE
LN_TENURE	100%			
LN_TENURE2	94%	100%		
LN_AGE	32%	36%	100%	
AGE	33%	38%	99.5%	100%

This table shows the correlation structure of the main tenure and age variables used in the regressions of compensation on tenure.

Table XI presents the regression results of the third part of my analysis. I do not report the results for time dummies for the sake of brevity. In column (1) I observe an increasing pattern to the five tenure dummy variables. The compensation of a CEO remaining for five years or more on the lead of the institution increases by 23% in the first five years. The coefficients are statistically significant for the first two years. A possible explanation is that my dataset covers a time span of seven years and CEO-firm observations with 1or 2 years value in tenure account for 29% of the whole dataset. This pattern is also observable in Cremers & Palia (2011) for the ten first years of tenure but with much stronger significance due to the fourfold number of observations relatively to my dataset. An important finding is that age is negatively correlated to total CEO remuneration while I would expect that the older the CEO the more he earns. One could testify that this reflects the necessity of highly traded firms to hire younger and talented CEOs who might probably demand lower rents. The control variables used in the model have very low statistical significance except return on assets which denotes that profitable companies tend to pay better their executives.

In columns (2) and (3) I exclude the tenure dummies and I insert the core tenure variables. Tenure is also positively correlated and statistically significant to total CEO compensation. A one year shift in tenure increases CEO compensation by 11.1%. When adding the quadratic term in order to capture nonlinearity, the coefficient of LN_TENURE is positive whilst the coefficient of LN_TENURE2 is negative. The nonlinear form seems to be an inverse U with a maximum of – 0.2 / [2*(-0.04210] = 2.375. This shows that tenure has a positive impact on total compensation until the $e^{2.375}$ = 10.75 year and a negative impact after that. Time dummies are not reported in final tables but they are statistically significant for all the years except 2008 and 2010.

On the whole, my findings are consistent with literature and especially with the partly replicated paper of Cremers and Palia (2011).Tenure determines the annual earnings of the CEO on total basis in a significant and intensive way.

3.3.5 The impact of compensation benchmarking

In the last part of this empirical analysis I analyze the influence of the compensation benchmarking practices on CEO remuneration from 2005 until 2011, for the top listed companies in US. Table XII demonstrates the results. Generally, the table casts light on how the relationship of CEO pay with peer groups affects pay changes after controlling for firm and individual factors. Each of three specifications contains different variables and gives its own different explanation to my fourth sub hypothesis.

In the first specification in Table XII, I focus my explanation based on the behavior of variable LOWCOMP. To remind, this is a dummy variable which equals to 1 when the CEO pay for the prior year is lower than her peer group median. A positive coefficient of LOWCOMP indicates that CEOs belonging to the lower half of their group anticipate higher changes in their earnings relatively to their above-median counterparts (Bisjak et al., 2008). Therefore, from the first specification, I conclude that below-median CEOs (in terms of prior year figures) will receive about $2.3 million more pay surges than CEOs who are on the high level of the peer group. The coefficient is strongly statistically significant.

Table XI
Tenure and CEO pay

	(1)	(2)	(3)
TENURE_1	-0.220***		
	(-4.065)		
TENURE_2	-0.127**		
	(-2.576)		
TENURE_3	-0.0674		
	(-1.498)		
TENURE_4	-0.0157		
	(-0.349)		
TENURE_5	0.0147		
	(0.386)		
LN_TENURE		0.111***	0.200***
		(4.133)	(4.200)
LN_TENURE2			-0.0421*
			(-1.939)
LN_AGE	-0.814**	-0.944***	-0.820**
	(-2.374)	(-2.645)	(-2.218)
LN_MCAP	-0.417	-0.458	-0.435
	(-0.971)	(-1.080)	(-1.018)
LN_MCAP2	0.0394	0.0414*	0.0404*
	(1.619)	(1.719)	(1.669)
ROA	0.509*	0.520*	0.496
	(1.664)	(1.681)	(1.605)
LN_SALES	0.102	0.0994	0.103
	(1.238)	(1.206)	(1.252)
CAPX	-0.972	-0.978	-0.964
	(-1.556)	(-1.542)	(-1.539)
PPE	-0.194	-0.201	-0.185
	(-0.550)	(-0.573)	(-0.524)
LEV	0.364	0.389	0.363
	(1.083)	(1.142)	(1.072)
No. of obs.	3,086	3,086	3,086
R^2	0.708	0.707	0.708

This table shows the impact of CEO tenure on her pay. The dependent variable is the natural logarithm of total compensation (LN_TDC1). The estimated models contain fiscal year and firm fixed effects. In parentheses, t-statistics are reported using robust standard errors clustered by firm. ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

As far as the second specification is concerned, the main variable that proxy for benchmarking theory is distance from the peer group median. The larger this measure, the greater the changes in pay if the compensation benchmarking theory persists (Bisjak et al. 2008). My results are consistent both with the above argument and with Bisjak et al. (2008). The coefficient is 0.32 with a strong statistical significance. This implies that a one standard deviation change in relative pay is associated with a $2.405 million increase in total compensation[7].

Using the cumulative distribution function of relative performance (CDF_REL_PERF) and distance (CDF_DISTANCE), I check whether relative compensation or relative performance matters more for determining compensation. The larger these values, the better are the relative performance and relative pay (Bisjak et al. 2008). The coefficients are statistically significant and positive. Intuitively, moving from the 1st percentile to the 100th percentile of pay relative to the peer group median is associated with an increase of $6.49 million in total compensation. Compared to Bisjak et al. results, it is rather a high estimation but in this thesis I refer to the most traded firms in USA and that could possibly explain the intense volume of the estimation. The estimation for relative performance shows that on average, managerial pay increases by $1.4 million when moving from the 1st to the 100th percentile of the cumulative distribution function of relative performance.

All in all, the compensation benchmarking theory holds even in this sample. Peer pay groups by industry and fiscal year do affect the composition of CEO compensation. This challenging part of this thesis proves that in the best firms in US, boards rank their executives and official rankings such as Forbes may exert some pressure on the decisions of the Directors' Board, when it comes to the hot topic of determining the remuneration of CEO. Personally, I feel that executives who are below median try to extract higher rents in order to hit a better place in the rankings. So on and so forth, this causes competitiveness among managers, who want to see themselves standing at the top ratings while simultaneously firms pay higher amounts of money to appoint these first-class employees. Thus, in comparison with the classic managerial theorems, this impressive surge in CEO pay levels in the last 25 years might be attributed to benchmarking practices, and not surprisingly.

[7] Obtained by the Stata's extensive output regarding standardized coefficients.

Table XII
The effect of compensation benchmarking

	(1)	(2)	(3)
Constant	-3,892***	-6,012***	-8,802***
	(-3.725)	(-6.601)	(-8.132)
LOG_LAG_SALES	361.6***	774.9***	599.7***
	(3.372)	(7.741)	(5.803)
DSALES	0.0241	0.0284*	0.0428**
	(1.401)	(1.752)	(2.544)
DNI	0.116*	0.136**	-0.00489
	(1.807)	(2.248)	(-0.0857)
DMV	0.0242**	0.0221**	
	(2.344)	(2.269)	
TENURE	-6.616	22.03	-10.96
	(-0.336)	(1.186)	(-0.592)
LOWCOMP	2,372***		
	(9.223)		
DISTANCE		0.320***	
		(20.01)	
CDF_REL_PERF			1,441***
			(3.701)
CDF_DISTANCE			6,490***
			(14.78)
R^2	0.042	0.151	0.086
F-statistic	17.31	70.29	41.11
Observations	2,374	2,374	2,631

This table presents the regression results where the estimation model is OLS. The dependent variable is the yearly difference in total compensation (DTDC1) from 2005 until 2011. Only CEOs with at least two years of tenure are considered. In parentheses, t-statistics are given. ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

4. Conclusion

Reaching the end of the line, I would like to give a small synopsis of what discussed in this master thesis. Stimulated by different factors such as important lectures and scientific papers, I tried to give my explanation to the hot subject of CEO compensation. In order to answer to my main research question, I had to examine if some factors proposed by the literature determine the ways through which directors shape a compensation package. I focused my research in the S&P 500 firms from 2005 until 2011. The reason behind this decision is that US large firms are required to disclose detailed SEC filings and eventually, I could have reliable and thorough data to work on. My hypotheses are related to how firm performance, size, CEO tenure and compensation benchmarking practices might determine the annual earnings of the chief executive officer in recent years. The findings of this thesis can set an important contribution to the general field of Finance and Corporate Governance; it is a concentrated study on the behavior of large-cap firms around the pay-setting process and furthermore, it confirms the existence of the “ratcheting effect”, a concept for which few previous studies have shown intensive interest.

This study produced several empirical outcomes, enabling the researcher to approach the answer of the main research question. First, I studied the impact of firm performance on the CEO annual compensation, either cash or total. After performing several Hausman tests to see which model is more appropriate, I implemented fixed effects for cash and random effects for total compensation regressions. Measuring performance by accounting and market metrics, there is no clear pattern relatively to the coefficients behavior, preventing me from extracting confident results. Firm performance is positively related to cash compensation except the case for market performance which I observed a reversed relationship in contemporaneous terms. Referring to total compensation, I can only remark the positive influence of return on sales (ROS) on total pay and the different signs of annual holding period return in the alternative states of nature: positive for prior year and negative for current year. Having obtained these ambiguous results, I state that there is not a serious connection between firm performance and CEO remuneration in the large US firms; the statistical significance is weak and the regression coefficients are not providing me with safe interpretation.

On the second stage of this research, I dealt with the firm size – pay relationship. I found that the larger the company, the higher the cash CEO compensation. The elasticities that I got are 17% for sales and about 15% for total assets. In the analysis, I also include regressions which take into consideration an interaction term which distinguishes large from small firms. In that type of regressions, I notice small statistical significance of the interaction term while the sales and assets elasticities enhanced their position to about 21%. Finally for this part, I ran several regressions according to the GICS classification so as to see the elasticities range across different industries. Firms belonging to the Utilities, Industrials or Material sectors show greater elasticities than firms which comprise the Financial or Information Technology sides. Thus, the cash compensation of a CEO of an industrial firm is way too sensitive to size fluctuations than that of his counterpart who is on the lead of a financial firm. All in all, the conclusion derived by this part is that size matters for the pay composition and on a large scale across different industries.

Moreover, I examined the behavior of the earnings of long-serving executives. As I expected and as former literature assumes, tenure is positively correlated to managerial pay. To testify this, I use three different regression specifications. The results show that CEOs who stay for five years and more on the lead of their organization tend to earn higher amounts of money probably as a result of entrenchment and network connections. Excluding the tenure dummy variables, I illustrate that a one-year shift in tenure, increases the executive compensation by 11.1% in the large US companies.

Finally, the most challenging part of this thesis was inevitably the research on possible benchmarking methods used by the Boards of Directors. Constructing median peer groups with respect to industry and fiscal year, I found that CEOs who belong to the below-median part of their compensation peer group expect higher increases in their pay than their above-median counterparts. Besides that, measuring the distance from the median peer performance and median peer compensation, I report that for a one standard deviation change in relative pay, an average surge of $2.4 million is expected in total compensation. The results are quite robust when I include the cumulative distribution functions of these two relevance metrics.

To sum up, many of my findings are very consistent with previous academic literature. By and large, the empirical work that followed after the literature part shed much light on the initial hypotheses. My personal sense is that the main deterministic factors of executive compensation are covered, even though they are not the only ones. One could possibly examine the stock options and grants' contribution or even how the increasing firm risk is correlated to lower CEO remuneration. Of course, there were time constraints and some data limitations that prohibited me from exploring more all aspects of compensation nature. Nevertheless, thinking myself as a finance member, I expect scientists to elaborate more on the benchmarking practices that these firms employ in order to rate and pay their executives. This field is slightly unexplored and terms such as “Lake Wobegon effect” or “ratcheting” should motivate academics to investigate more this rich soil of knowledge and potential findings. At least, I consider my research a tiny stone on the total academic universe which expands continuously and tries to find justified solutions to ever-growing research questions.

5. Appendix

Table I
The Variables

Variable	Description
CASH_COMP	The sum of salary, bonus and all other cash payments. Source: Duffhues & Kabir (2008)
SALARY	The 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 dollar value in thousands of a bonus (cash and non-cash) earned by the named executive officer during the fiscal year. Source: Execucomp
ALLOTHTOT	The dollar value in thousands of all the cash payments. Source: Execucomp
TDC1	The 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
ROA	Return on assets. Calculated as EBIT divided by total assets. Source: Duffhues & Kabir (2008)
ROS	Return on sales. Calculated as EBIT divided by total sales. Source: Duffhues & Kabir (2008)
EBIT	Earnings before interest and taxes. Source: Compustat
AT	Total assets. Source: Compustat
SALES	Gross sales reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers, for each operating segment. Source: Compustat
AHPR	Annual holding period returns
P	Annual close stock price adjusted to fiscal year. Source: Compustat
DIV	Ex-date dividend per share adjusted to fiscal year. Source: Compustat
Q	Tobin's q ratio. Source: Duffhues & Kabir (2008)
MCAP	Market capitalization. Calculated as shares outstanding times annual stock price at the end of fiscal year.
DEBT	Total debt in current liabilities is the sum of total amount of short-term notes and the current portion of long-term debt. Source: Compustat
CSHO	Shares outstanding at the end of fiscal year excluding treasury shares and scrip. Source: Compustat
LEV	Leverage is total debt divided by total assets. Source: Duffhues & Kabir (2008)
ind_dumi	Industry dummy variables according to Global Industry Classification Standards
time_dumt	Time dummy variables for each year between 2005-2011
LN_CASH_COMP	The natural logarithm of cash compensation.
LN_TDC1	The natural logarithm of total compensation
LN_MCAP	The natural logarithm of market capitalization
LN_MCAP2	Square of the natural logarithm of market capitalization. Source: Cremers & Palia (2011)
LAG_ROA	Lagged return on assets for the previous year
LAG_ROS	Lagged return on sales for the previous year
LAG_AHPR	Lagged annual holding period return for the previous year
LAG_Q	Lagged Tobin's Q for the previous year

ROE	Return on equity. Calculated as net income divided by shareholders' equity.
LARGE	Dummy variable for firms with sales above the sample median. Source: Zhou (2003)
LN_SALES	The natural logarithm of sales
LN_AT	The natural logarithm of total assets
LARGEXSALES	Interaction term for large firms in size relatively to their natural logarithm of sales. Source: Zhou (2003)
LARGEXAT	Interaction term for large firms in size relatively to their natural logarithm of total assets. Source: Zhou (2003)
LARGEXROA	Interaction term for large firms in size relatively to their return on assets. Source: Zhou (2003)
LARGEXROE	Interaction term for large firms in size relatively to their return on equity. Source: Zhou (2003)
LARGEXAHPR	Interaction term for large firms in size relatively to their annual holding period return. Source: Zhou (2003)
TENURE_t	Dummy variable for each of the first five years of CEO tenure (t = 1,..,5). Source: Cremers & Palia (2011)
LN_TENURE	Natural logarithm of tenure. Source: Execucomp, Cremers & Palia (2011)
LN_TENURE2	Square of the natural logarithm of tenure. Source: Cremers & Palia (2011)
LN_AGE	Natural logarithm of CEO present age. Source: Execucomp, Cremers & Palia (2011)
CAPX	Capital expenditures to total assets ratio. Source: Execucomp, Cremers & Palia (2011)
PPE	Property, plant and equipment to total assets ratio. Source: Execucomp, Cremers & Palia (2011)
DTDC1	Yearly difference in winsorized total compensation at the 0.01 level for 2004-2011. Source: Bisjak et al. (2008)
LOG_LAG_SALES	The logarithm of prior year sales. Source: Bisjak et al. (2008)
DSALES	Yearly difference in sales for 2004-2011. Source: Bisjak et al. (2008), Compustat
DNI	Yearly difference in net income for 2004-2011. Source: Bisjak et al. (2008), Compustat
DMV	Yearly difference in market value for 2004-2011. Source: Bisjak et al. (2008), Compustat
REL_PERF	Firm annual holding period return minus group return median. Source: Bisjak et al. (2008)
DISTANCE	Peer group median total compensation minus CEO winsorized lagged total compensation. Source: Bisjak et al. (2008)
LOWCOMP	Dummy variable which is equal to one if the total CEO compensation of the prior year is below the peer group median: Bisjak et al. (2008)
CDF_REL_PERF	The cumulative distribution function of REL_PERF. Source: Bisjak et al. (2008)
CDF_DISTANCE	The cumulative distribution function of DISTANCE. Source: Bisjak et al. (2008)

This table describes the variables used in this empirical study. I present the description and the sources from which each variable is collected.

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