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CEO COMPENSATION AND PAY-FOR-PERFORMANCE SENSITIVITY

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**Abstract**

This thesis determines the state of recent developments in CEO compensation in the spirit of corresponding literature. Besides the literature review, empirical study provides further evidence on CEO pay-for-performance sensitivities in the US listed companies during 2007-2011 and containing Compustat Execucomp data of more than 33,000 CEOs from more than 3,000 companies. I build the regression similar to methods in a groundbreaking paper from Jensen and Murphy (1990a) and expecting positive and significant relationship between the change in CEO total compensation and shareholder wealth. My estimate of the pay-for-performance relation for chief executive officers indicates CEO wealth changes by $4.93 per $1,000 change in shareholder wealth. Role of the value of CEO stock holdings plays the most important role determining pay-for-performance sensitivity a $4.7 change in CEO wealth per 1,000 change in shareholder wealth. I also report CEO total mean compensation during 2007-2011 is $5,968,000 a year. The mean value of option awards have declined by 18% and median stockholdings have increased during the same period by 130%. Relatively high value of pay-for-performance sensitivity and CEO stockholdings may help other shareholders to solve the differing interests of their and CEOs. Besides stock rewards, other compensation methods are needed to minimize the effect of systematic risk. Relative performance evaluation RPE, could be used together with equity-based incentives but they are not widely used in US listed companies. However, further research is needed to determine how equity-based compensation affects on CEOs excessive risk taking.

**Keywords**

Executive compensation, CEO compensation, pay-for-performance sensitivity

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1 INTRODUCTION

1.1 Background of the thesis

The chief executive officer (CEO) compensation of US corporations has been researched comprehensively for last two decades. Unlike in many other western countries, US firms are required to disclose an extensive amount of CEO compensation data, which has enabled a numerous research in the US. Also corporate governance and executive compensation have become popular subjects of media due to several accounting frauds (Enron, WorldCom, AOL) and rapidly increased CEO compensation. Shareholders of these firms have lost billions of dollars and the scandals are said to be related to weak corporate governance and equity-based incentive systems like stock options.

Hall and Liebman (1998: 686) show that mean direct CEO compensation increased by 209% in real terms between 1980-1994. As the total average compensation for executives of the largest US companies declined both in 2008 and 2009, it is suggested that the trend might be turning in 2011. “Amid growing concern about executive retention, most US companies remain focused on shareholder perceptions and the alignment between executive pay and business performance in the economic recovery” (Towers Watson 2010). Frydman and Jenter (2010: 1) suggest that the high CEO pay can be seen as the result of executive’s ability to set their own pay and extract rents from the firms they manage or CEO pay can be viewed as the efficient outcome of an optimal labor market in which competition for managerial talent exists.

Most research between executive compensation and firm performance has been firmly rooted in agency theory: compensation plans are designed to align interests of self-interested and risk-averse executives with those of shareholders (Jensen and Murphy 1990a: 25). The differing interests between shareholders and executives are not a recent finding. Already Adam Smith (1776) suggests: "Being the managers of
other people’s money (rather than their own) it cannot be expected that they should watch over it with the same anxious vigilance”. CEO pay-for-firm-performance is measured by using two main approaches: the Jensen-Murphy fractional ownership statistic and equity-at-stake statistic and which type of metrics should be used depends on what type of actions CEO is willing to make. Also a third incentive measure, the elasticity of CEO wealth to performance, is used in some contexts (Frydman and Jenter 2010: 10-11.)

1.2 Literature overview

In this subchapter, I will go through the most relevant literature discussed later in chapters 2 and 3. They are presented here in chronological order, as it will help understand how the first classical literature created more research on ownership and control structure and finally leading us to compensation. It is critical to understand how principal-agent problem is connected to executive compensation. As the theoretical framework was created, it also led to numerous empirical research around incentives and pay-for-performance.

“The Modern Corporation And Private Property” written by Berle and Means (1932) is the fundamental introduction to the internal organization of the corporation in modern society. Their most enduring theme is that in the modern world those who legally have ownership over companies have been separated from their control. They also pointed out that the structure of the corporate law in the US during 1930s caused the separation as shareholders elected corporate directors who actually control all the company activities. This book has emerged growing research on agent-principal problem and it’s been cited on most of the popular research articles during past decades. Jensen and Meckling (1976) is also one of the classics and most cited articles in the field of accounting and finance. They presented whole new concept “agency theory” which is still in major use in many studies in finance, corporate governance and organization theory. The agency theory presented by Jensen and Meckling (1976) is linked to agency costs in the organizations as commonly known. However, the article also presents many other interesting aspects of the theory and
ownership of the firm. Even being classical and highly respected article, some have criticized it for its narrow and fairly negative view of the relationships between owners and managers.

The modern history of executive compensation research began in the early 1980s and helped in acceptance of agency theory. The pioneering work is done by Jensen and Meckling (1976), Mirrlees (1974, 1976), Holmström (1979) and Fama (1980). Holmström (1979) proposed a model that has later become a standard formulation for the principal-agent relation. In his article, he makes a clear tradeoff between risk and incentives in the moral hazard problem and also investigates the informational value of signals. Mirrlees (1974, 1976) was among the first researchers to treat the manager-stockholder conflict with mathematics. In his model, the shareholder’s problem is to design an optimal contract for manager to increase stock value. This problem has become a classic in the agent-principal discussions. Fama (1980) also presented insights of the agency problems and theory of the firm. He criticizes Alchian and Demsetz (1972) and Jensen and Meckling (1976) as viewing the firm as a set of contracts among factors of production rather than seeing it as a team whose members act from self-interest but realize that their destinies are depend in the competition between other teams. Grossman and Hart (1980) presented in their classical paper that there is a “free-rider” problem in the organizations. If each of the company’s existing shareholders holds a small amount of equity, there’s no risk of a takeover.

Information asymmetry, adverse selection and moral hazard are all tied close to principal-agent models and will be discussed more fundamentally in later chapters. Akerlof (1970) presented a classic paper on adverse selection and brought informational issues at the forefront of economic theory. He sees signaling and screening as two primary solutions to this problem. Stiglitz (1975) pioneered the theory of screening. By screening, the party without information can induce the other party to reveal their information. Since the seminal contributions of Akerlof and Stiglitz, the comprehensive effects of information asymmetry have been studied in numerous contexts. Optimal contracting theories are closely related to asymmetric
information. Contract theory studies shed light on how economic actors can construct contractual agreements in the presence of asymmetric information. Hart and Holmström (1987) provide early survey on the contracting literature and they argue that contracts provide the foundation for a large part of economic analysis.

History of corporate governance goes back to Berle and Means (1932) as they pondered on the changing role of the modern corporation in society. Some decades after that Fama and Jensen (1980) established principal-agent problem as a way to understand corporate governance. They analyzed the survival of organizations in which decision makers do not bear a major share of the wealth effects of their decisions. Through controlling the implied agency separation of decision and risk bearing functions survive in the organizations. Shleifer and Vishny (1997) have later made a comprehensive survey of corporate governance. They show that legal protection of investors is one essential element of corporate governance. However, there are huge differences between countries how legal protection has been set. Corporate governance has been popular topic in 2000s after Enron and WorldCom collapsed and there might be need for more open system by which corporations are directed and controlled.

Starting with the 1980s, the following decades saw a dramatic rise in executive pay. There has been lot of discussion what has been driving the executive pay up so dramatically compared to the pay of an average worker. Have companies failed to align the interest of the shareholders with those of managers? Frydman and Jenter (2010) suggest that both managerial power and competitive market forces are important determinants of CEO pay, but they are not alone consistent with the available evidence. Murphy (1999) has made one of the most comprehensive analysis of executive compensation and summarizes executive compensation practices vary with company size and the level of pay is higher in the US than in other countries. However, the stock option compensation has been adapted also outside the US as US companies routinely export pay practices to executives of foreign subsidiaries and putting pressure on local competitors. His analysis also shows that the executive pay increased rapidly after broadly introduced stock
options. As stock options were seen as great incentives where executives can earn when increasing the market value of the company, it has been the main reason for the executive pay growth during past decades.

One of the most inspiring articles related to this thesis is Jensen and Murphy (1990b). They showed a CEO wealth change of $3.25 for every $1,000 change in shareholder wealth. That is aligned with their hypothesis that public and private political forces impose constraints that reduce the pay-for-performance sensitivity. Both pay-for-performance and the level of CEO pay have been decreasing since 1930s and are consistent with their hypothesis. Jensen and Murphy (1990b) created a boom in the research of pay-for-performance and there have been several results for and against their results. One of the most remarkable pay-for-performance researches after Jensen and Murphy (1990a) is Hall and Liebmann (1998): “Are CEOs Really Paid Like Bureaucrats?”. They question the earlier study by showing differing results: a $6.00 increase in executive wealth for $1,000 increase in firm value. The difference is explained mainly by different time period in each study. As 1980s was the beginning of stock options broader use and higher growth in executive pay, it will make Hall and Liebmann’s result bigger. Another explanation for higher pay-for-performance sensitivity is that Hall and Liebmann (1998) used size-adjusted firm values. There are huge differences between firm sizes in the sample and it may cause diminishing pay-for-performance over time.

As stock options have played the most important role increasing the executive compensation over time and they are the most important component addressing pay-for-performance sensitivity together with stock holdings, it is good to go through the most essential literature around executive stock options. Yermack (1995) tests whether stock options can reduce agency costs carried by corporations. However, he finds no evidence for stock option awards to have strong association with the main predictions of compensation theory. Murphy (1999) also presents relevant information about stock option compensation and its incentive implications. Even stock options provide a direct link between executive compensation and share price
appreciation there are some problems concerning pay-for-performance sensitivity such as difference between share appreciation and total shareholder returns.

Relative performance evaluation, RPE, is based on an idea that an individual should not be held responsible for risks and factors beyond the control of the individual. Sometimes it may be hard to apply RPE for executives because it may be hard to find another executives to compare with. Usually, executives in other companies in the same industry are used as a base for relative performance evaluation. Aggraval and Samwick (1999a, 1999b) test cross-sectional predictions of a relative performance evaluation model but find no evidence. There is also inconsistency RPE in practice in more competitive industries. Rajgopal et. al (2006) suggest based on their empirical study that RPE is not actually common used in practice by compensation committees. Garvey and Milbourn (2003) suggests based on his empirical research that executives who face remarkably high costs of removing excessive systematic risk prefer RPE.

Factors determining executive pay could be categorized in several different ways. Mehran (1995) divided factors into six different topics: CEO characteristics, stock performance, accounting-based performance, capital structure, investments and board structure and monitoring. In chapter 3, I will present more detailed empirical research results of each topic. Rose (1994), Murphy (1986), Grinstein Hribar (2003), Johnson et al. (1997) show the effects of CEO characteristics on pay. More talented and experienced CEOs are paid better than less experienced and less experienced CEOs have higher pay-for-performance sensitivity. The relation between stock performance and executive pay is not clear. Demsetz and Lehn (1985) found no empirical evidence op positive correlation between ownership correlation and profit rate. However, Jensen and Murphy (1990a, 1990b) and Hall and Liebmann (1997) showed a positive relationship between stock performance and executive pay. Accounting-based performance is also used for executive compensation. Antle and Smith (1986) show that accounting returns have more impact on salary and bonus than do stock returns. Berger et al. (1997), Mehran (1992) examined firm capital structure and CEO pay and they document that managers with low performance-
sensitive compensation choose lower leverage. Executive’s stock ownership and cash compensation is related to investment-based determinant of executive compensation (Lewellen et al. (1987), Mehran (1995) and Himmelberg et al. 1999). Finally, the relation between board structure and executive pay is seen as follows: the more outside board members the less equity-based compensation (Core and Guay 1999).

1.3 Objectives of the thesis

1.3.1 Motivation for the study and research question

There has been discussion about CEO pay already in the 1990 when Jensen and Murphy (1990a: 1) argued that America pays its most important leaders like bureaucrats which is based on their finding (Jensen and Murphy 1990b: 260) indicating CEOs receiving on average $3.25 for every $1,000 raise in shareholder wealth. They also argue that it leads into situation where many CEOs act rather bureaucrats than value-maximizing entrepreneurs whose interests are aligned with those of shareholders. Hall and Liebman (1998: 654) present contrary evidence on CEO compensation and by taking into account the revaluation of CEO stock and stock option holdings, they suggest CEO compensation is highly correlated with firm performance.

Frydman and Jenter (2010: 34) show CEO compensation structure in S&P 500 firms has changed radically between 1992 and 2008. The relative weight of base salary of the total compensation has diminished from 42% to 17% and, at the same time, the total compensation has increased from $2.3M to $6.1M. This indicates increased amounts of bonuses, stock and stock option holdings. This points out a question, is the CEO compensation at the realistic level? Growing stock option use in compensation combined with several accounting frauds during the turn of millennium have made the academics to join the common public in thinking of CEO compensation going too far. Hall and Murphy (2003: 1-2) criticized firms granting too many options to too many people and claimed stock options encouraging
executives to an excessive risk taking, which mitigates problems with executive risk aversion. Agency theory creates a theoretical framework around the CEO compensation and not many studies are available using a different approach.

The past academic research leaves us with many unanswered questions. What has agency theory to say about executive compensation? What is the optimal compensation structure for CEO? How total compensation should really be measured? How does the CEO compensation affect on the firm performance? In this thesis, I will try to shed light on some of these questions about CEO compensation. This thesis examines how CEO pay is related to firm performance in the US firms by using executive compensation data from COMPUSTAT ExecuComp on S&P 500 firms. Approaching this subject in the spirit of agency theory and corporate governance principles I try to determine how individuals inside an organization behave and how arising agency problems are solved through compensation and incentives. Hypothesis is built to test how different compensation structures: base salary + bonuses, stock options or stock ownership affect on firm performance.

1.3.2 Structure of the thesis

The structure of the thesis is laid out as follows: the second and third chapters will present a literature review of theoretical issues in executive compensation. The second chapter presents the main theoretical aspect rooted in corporate governance, CEO compensation, agency theory and separation of ownership and control. In the third chapter I will present some empirical literature and researchers’ findings on CEO compensation, pay-for-performance sensitivity and determinants of executive compensation. I will have to limit the theories and empirical findings I present to such issues that are relevant to my topic and are about to help understanding later empirical results. That’s why the literature review may not comprehensively answer all the questions emerged earlier. Chapter four presents the hypotheses, which I will build based on earlier empirical models and theories used in literature. By referring earlier studies, I will try to form extensive hypotheses to test empirically pay-for-performance sensitivities in S&P 500 firms. In fifth chapter I will present the data
used for the thesis and show the limitations that may have affected the later empirical results. In addition, I will provide some descriptive statistics on CEO compensation in S&P 500 firms. Chapter six presents the empirical models on CEO pay-for-performance sensitivity and CEO equity-based compensation and firm size. Chapter seven concludes the empirical results and finally chapter eight gives a short abstract of the work and also some ideas for further research in future are provided.
2 CORPORATE GOVERNANCE AND AGENCY THEORY

In this chapter I will go through the most essential literature related to my research topic. As my research topic is firmly rooted in agency theory, it will play an important role in whole work in accordance with corporate governance. In the next chapter I will present some empirical research on CEO compensation.

Agency theory has been researched intensively among academics within last two decades. However, the first notion was presented notably earlier by Berle and Means (1932):

“The separation of ownership from control produces a condition where the interest of owner and of ultimate manager may, and often do, diverge, and where many of the checks which formerly operated to limit the use of power disappear.”

Berle and Means (1932) presented how corporate structures create a need for corporate governance. Companies were becoming so large that the ownership and control was separated. Jensen and Meckling (1976) incorporate different theories of property rights, agency and finance to develop a theory of ownership structure for the firm. They determine agency relationship as “a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent”. Organizations are thought as the artificial construct under the law allowing some of them treated as individuals, also called legal fictions, which serve as a nexus for contracting relationships among individuals. The private corporation can be seen as one form of the legal fiction serving as a nexus for contracting relationships and which is characterized by divisible residual claims on the assets and cash flows. Those can be sold without a permission of other contracting individuals.
**Table 1. Agency Theory Overview**

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<th>Key idea</th>
<th>Principal-agent relationships should reflect efficient organization of information and risk-bearing costs</th>
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<td>Unit of analysis</td>
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<td>Information asymmetry between principal and agent</td>
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<td>Information assumption</td>
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<td>Contracting problems</td>
<td>Agency (moral hazard and adverse selection)</td>
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<td>Risk sharing</td>
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<td>Problem domain</td>
<td>Relationships in which the principal and agent have partly differing goals and risk preferences (e.g. compensation, regulation, leadership, impression management, whistle-blowing, vertical integration, transfer pricing)</td>
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(Eisenhardt 1989: 59).

### 2.1 Separation of ownership and control

Modern corporations are typically formed so that ownership and control is separated. Historically, firms have grown rapidly due to the economic growth and globalization and entrepreneurs with single management and ownership have become rare. Especially in situations where individuals have become common shareholders thousands of them being principals, it is just impossible for them to make any daily decisions. Agents are needed to operate daily business and they are chosen by board to act as supervisors of the firm. Much of the literature on the function and role of modern firm is based on the assumption of widely dispersed ownership and control (Jensen and Meckling 1976, Grossman and Hart 1980). Fama (1980: 289) underlines
separation of security ownership and control being as an efficient form of economic organization within the set of contracts perspective. Firms face competition in the markets, which forces the evolution of tools to effectively monitor and evaluate the performance of entire team and its individuals.

Management can be considered being type of labor with special role around everything that is related to decision-making. Risk bearing and ownership of capital form the joint functions that are prepackaged and sold to investors. Overall, the firm is seen as set of contracts covering the ways inputs are joined to create outputs and how the receipts from outputs are shared among inputs. This “nexus of contracts” perspective sees ownership of the firm as an irrelevant concept. The first step towards understanding this approach is that control over a firm’s decisions is not necessarily the task of security owners (Fama 1980: 290.)

Instead of using multilateral contracts among all input’s owners a set of bilateral contracts facilitates the efficient organization in team production. The contract terms form a base for entity called a firm especially for team organizing purposes. The team production of an efficient organization can be affected through contractual structure (Alchian and Demsetz 1972: 794.) Fama and Jensen (1983) are concerned with the survival of organizations where agents make important decisions without bearing a substantial wealth effect including open corporations, large professional partnerships, financial mutual and nonprofits. What they call separation of residual risk bearing from decision management is the separation of ownership and control is seen complex in the organizations in the sense that valuable information specific for decision making is diffused through many agents inside the organization. Separating decision management and control results control of the agency problems of diffused decision systems. The form of organization that is able to deliver the output demanded by customers at the lowest price and covering the costs at the same time, will survive. Their analysis produces two complementary hypotheses:

1. Separation of residual risk bearing from decision management leads to decision systems that separate decision management from decision control
2. Combination of decision management and decision control in a few agents leads to residual claims that are largely restricted to these agents

La Porta et al. (1999) present that in most countries, large public companies are generally not widely held and have some controlling shareholders who are able to designate and monitor corporate executives. Controlling shareholders have financial incentives to not expropriate the minority outside investors. Such financial incentives are usually either cash flow or equity ownership by controlling shareholder.

2.2 Agency costs

If the both directions of contract are utility maximizers, risk for diverging interests between principal and agent exists. These diverging interests may also be related in any indirect situations with cooperation effort but no clear principal-agent dichotomy. Principal may limit these divergences from his interests by establishing appropriate incentives for agent. From a principal’s viewpoint, it is impossible to establish such incentives and design appropriate monitoring with zero costs. Also, principal may set incentives to make sure agent doesn’t take certain actions that would harm principal and if he does, principal will be compensated. In general, it is impossible to guarantee that agent will completely serve principal’s interests with zero costs. These costs are called agency costs. "Agency costs are as real as any other costs." Agency costs are defined as the sum of: the monitoring expenditures by the principal, the bonding expenditures by the agent and the residual loss. The residual loss equals the dollar equivalent of reduction in welfare experienced by the principal due to differing interests in agent’s decision making compared to principal’s objectives (Jensen and Meckling 1976: 5-6.)

Jensen and Meckling (1976: 10-12) form their study primarily based on agency costs of equity and debt. If an entrepreneur owns his firm wholly, he will make operating decisions that satisfy his interests completely. These decisions involve pecuniary and non-pecuniary aspects (the physical appointments of the office, the attractiveness of
the office staff etc.) The optimal mix of these pecuniary and non-pecuniary benefits is achieved when the marginal utility derived from an additional dollar of expenditure is equal for each non-pecuniary item and equal to the marginal utility derived from an additional dollar of wealth. If the entrepreneur sells equity claims on the corporation, which share proportionately in the profits of the firm and have limited liability, agency costs come to exist through diverging interests between the entrepreneur and outside shareholders. As the fractional equity ownership of owner-manager falls, his fractional claims on outcome reduce causing increasing demand of company perquisites.

If the agency costs generated by the existence of outside owners are positive it will pay the shareholder to sell out to an owner-manager who is able to avoid these costs. The owner-manager may use his personal wealth and issuance of limited liability debt claims to repurchase firm stock from other stockholders. In general, this type of single-owner company doesn’t suffer the agency costs caused by outside equity held by other stockowners. However, there must be some reasons driving the diffused ownership of equity claims in corporations that are prevalent as an organizational form. Why no such corporations exist with single-owners and high leverage? The incentive effects are associated with highly leveraged firms, the monitoring costs of these incentive effects engender and bankruptcy costs. In addition, potential creditors are not willing to borrow huge amount of capital to firms with a weak equity capital invested by owner-manager (Jensen and Meckling 1976: 40-41.)

2.3 Different perspectives on agency theory

Holmström (1979: 74) defines moral hazard as an arising issue when individuals engage in risk sharing under conditions such that their privately taken actions affect the probability distribution of outcome. Much of the economic literature on moral hazard is related to concerns raised by agency problem (Ross 1973: 134). The source of moral hazard is information asymmetry among individuals, which cannot be perfectly observed. Underlying problem could be solved through monitoring and using its results in contracts. However, complete monitoring is either impossible or
extremely costly to execute. Similar theories are provided by Harris and Raviv (1976), who address the context of imperfect information for improving contracts that are based on payoff alone. Any additional information about agent’s actions, no matter is it imperfect or not, may enhance the welfare of both agent and principal (Stiglitz 1975). Adverse selection can be considered as an aspect of agency theory where agent’s and principal’s interests conflict and asymmetric information exist between both parties (Akerlof 1970: 493). Especially, when trading partners confront asymmetrical information they experience uncertainty before striking a deal with each other, which is about to jeopardize the efficient exchange relationship (Dahlstrom and Ingram 2003: 767). Greenwald and Stiglitz (1990: 164) describe asymmetric information affecting both the internal organization of firms and its external relations with capital, labor and capital markets that form a base for foundations of the new theory of the firm.

Murphy (1999: 25-26) provides the essential literature outline on pioneering work of optimal contracting such as Mirrlees (1974, 1976), Holmström (1979) and Grossman and Hart (1983). Typically in so-called hidden action model, the CEO is assumed to take actions, a, to produce stochastic shareholder value, x(a). For CEOs efforts, compensation, w(x,z), and utility, u(w,a), is received, where z is a vector of other observable measures in the contract. Also, the CEO’s utility function and the production function are common knowledge to both shareholders and the CEO, but only he or she observes the actions taken. Shareholders know exactly what type of actions they want the CEO to take but cannot directly monitor his or her actions. The optimal contract, w(x,z), maximizes the risk-neutral shareholders’ objective, x-w, subject to an incentive compatibility constraint (the CEO maximizes u(w,a) by choosing proper actions) and a participation constraint (the expected utility of the contract must exceed the CEO’s reservation utility).

The traditional principal-agent models pose a fundamental conception of the correlation of an optimal contract and a statistical inference problem, where the payouts actually depend on the likelihood that the desired actions were truly taken. Underlying assumption of the informativeness principle introduced by Holmström
(1979) suggest that payouts are based on stock-based measures, x. This variable is not just about granting shareholders more wealth but, above all, realizations of x provide information useful in determining the actions the CEO took. Aforementioned formulation also makes clear role for additional performance measures (e.g. accounting returns) in the CEO’s incentive contract. Non-stock based measures are useful in assessing the attractiveness of the CEO’s actions from shareholder’s perspective. In situations where these other measures constitute a sufficient statistic for the CEO’s actions, stock-based measures are not needed at all (Murphy 1999: 26.)

The traditional principal-agent model enables to use some important and practical conceptions useful in understanding existing contracts and, naturally, in designing new ones. Particularly the models describe the nexus between risk and incentives provided by the simple agency model (Gibbons 1997). Let’s say that firm value is given by \( x = e + \varepsilon \), where \( e \) is denoted as executive effort, and \( \varepsilon \) is normally distributed uncontrollable noise, \( \varepsilon \approx N(0,\sigma^2) \). In addition, managerial contracts take the simple linear form \( w(x) = s + bx \), where \( s \) is denoted as a fixed salary and \( b \) as pay-performance sensitivity. Assuming that the CEO has exponential utility, \( U(x) = -e^{r(W-c(e))} \), where \( r \) is the executive’s absolute risk aversion and \( c(e) \) is the convex disutility of effort. Hence, the optimal sharing rate is given by:

\[
\begin{align*}
    b &= \frac{1}{1+\sigma^2 e}
\end{align*}
\]

Equation (1) implies that the optimal pay-performance sensitivity will equal \( b = 1 \) when output is certain (\( \sigma^2 = 0 \)) or CEOs are risk neutral (\( r = 0 \)) (Murphy 1999: 26-27.)

In addition to pay-for-performance sensitivities, relative performance evaluation (RPE) is used for evaluation of executive performance and contracts. Holmström (1982: 45) describes relative performance evaluation as a way of using information about state uncertainty efficiently. Economic theory provides a rationale for relative
performance evaluation particularly based on risk sharing (Gibbons and Murphy 1991: 1). However, relative performance evaluation is valuable if and only if agents face some common uncertainties. Competition among agents is a consequence of efficient information usage but it doesn’t have any intrinsic value. Especially with a large reference group of agents, the cost of uncertainty rising from common sources can be eliminated through relative performance measures (Holmström 1982: 45.) RPE not only provides benefits but also entails costs for the society when there exist source of common uncertainties and risks. Overall, the RPE is expected to be a common feature used for implicit CEO compensation and dismissal contracts as the benefits for filtering out common uncertainties is high. At the same time, costs of measuring the performance of other firms seem to be relatively low as well as probability for shirking and sabotage among co-workers (Gibbons and Murphy 1991: 1, 31.)

The problem of providing incentives to agents and employees is thus far more complicated as it is implied in standard principal-agent models. The performance measures used as a base of rewards may reflect highly disparate elements of performance into a single number and exclude those elements that are relevant to the true firm performance. How can the agent be motivated to serve the society when only a highly incomplete set of performance measures and complex set of potential responses from the agent exist? Incentive problems must be employed as en bloc, where one cannot make reliable conclusions about right measure of the incentives for an activity just reviewing of that activity alone. Also the range of instruments for controlling the CEO’s performance is wider than only determining the pay-for-performance (Holmström and Milgrom 1990: 223.)

2.4 Optimal contracting, managerial power or competitive pay?

It is critical to determine how managerial compensation is actually negotiated or set by different stakeholders. Managerial power reflects to agent’s ability to set his or her own pay and, in fact, it is closely connected to agency problem itself. Optimal contracting is, for one, seen as the dominant study of executive compensation trying
to improve drawbacks welling from agency theory. Extensive literature on optimal contracting is presented e.g. by Murphy (1999) and Core at al. (2003). As some studies has revealed, features of CEO pay arrangements may reflect rent-seeking instead of efficient provision incentives (e.g., Blanchard et al. (1994), Yermack (1997) and Bertrand and Mullainathan (2001)). Managerial power hypothesis has shed light into relatively high executive pay that has not been fully explained by optimal contracting theory. Copeland and Weston (2004) present six main features to take into account when designing compensation plans:

1. The plan should be able to monitor and consequently based on objective criteria that is easily observable and difficult to manipulate

2. The plan should prevent excessive perquisites to executives and prevent shirking

3. The plan should base on long-term objectives and be aligned with shareholders’ interests

4. The plan should align the risks of executives to ones of shareholders but take into account that shareholders are able to diversify underlying risk

5. Management compensation should be tied to changes in the shareholder wealth and if possible, management’s contribution to shareholder wealth

6. The tax efficiency of the plans should be compared and the efficiency should determine the choice between these two identical plans

Determining whether the contracts are set optimally to attend moral hazard between shareholders and CEO is quite complex. The optimal contracting theory recognizes the fact that managers suffer from agency problem and do not automatically
maximize the firm value (Bebchuk and Fried 2003: 2). The optimal incentive strength is depended on unobservable parameters, such as the marginal product of CEO effort, the CEO’s risk aversion, the CEO’s cost of effort and the CEO’s outside wealth (Frydman and Jenter 2010: 12.) Jensen and Murphy (1990a: 227) argue that pay-for-performance sensitivity is too low to be consistent with formal agency theory: “we believe that our results are inconsistent with the implications of formal agency models of optimal contracting”. In the basic principal-agent model, the optimal level of incentives decline concurrently with the cost of managerial effort, the noise-to-signal ratio and the executive’s risk aversion. Himmelberg et al. (1999: 381) present that a large fraction of the cross-sectional variation in managerial compensation could be explained by unobserved firm heterogeneity such as a proxy for the noise in the outcome measure.

Shleifer and Vishny (1997: 741) define a complete contract that specifies what the manager does in all states of the world, and how the profits are allocated. However, the future contingencies are hard to predict and complete contracts are technologically impracticable. Because these kinds of problems arising in designing complete contracts, the manager and the financier have to allocate residual control rights (the rights to make decisions in circumstances where future events are not predictable through the contract) (Grossman and Hart 1986: 716). As Fama and Jensen (1983: 322) point out, separation of residual risk bearing from decision management leads to decision systems that separate decision management from decision control. Differing interests between manager and financier, mentioned earlier, is unraveled by incentive contracts that can take a variety of forms: share ownership, stock options and a threat of dismissal if income is low (Jensen and Meckling 1976).

As Jensen and Murphy (1990b: 139-142) argue that most managers are paid like bureaucrats, they emphasize the matter of pay-for-performance sensitivity on the CEO pay. Considering more aggressive pay-for-performance systems would, at the same time, decline the pay of poor managers and boost the pay of well performing ones. A combination of three basic policies would create appropriate monetary
incentives in designing value-maximizing contracts for CEOs: 1) boards may require CEOs becoming substantial shareholders; 2) salaries, bonuses and stock options can be structured to be aligned with both superior or poor performance; and 3) the threat of dismissal due to poor performance can be made very real for CEOs. However, the reality of the CEO compensation is at variance with these principles.

It is justifiable to question the optimal contracting in determining adequately compensation practices and give space for theories suggesting executives setting their own pay. Bebchuk and Fried (2003: 4) raise outrage costs and constraints as a building block of managerial power hypothesis. The tightness of constraints managers and directors confront depends partially on the amount of outrage they face in the society after disclosing the proposal. There is existing evidence on the designing compensation contracts being highly depended on outsiders’ reactions (Johnson et al. (1997). Frydman and Jenter (2010: 16) suggest that managerial power hypothesis is supported through their proclivity to hide certain part of the compensation disclosed. Bertrand and Mullainathan (2001: 901) point out an interesting viewpoint based on simple models of contracting theory concerning CEO compensation. They argue shareholders not paying CEOs for observable luck (changes in firm performance that are beyond his or her control). So-called “spring loading” is one of the most convincing evidence behind managerial power hypothesis. Existing empirical evidence shows that CEOs receive stock options in advance of good news and have remarkable effect on their wealth (Yermack 1997: 32).

A potential criticism on managerial power hypothesis shows that the theory itself cannot explain the continuous increase in CEO compensation since 1970. In addition, most of the existing evidence on corporate governance trends shows that it actually has strengthened since 1970 (Frydman and Jenter 2010: 17). Kaplan (2008: 2) points out that it is hard to imagine the increase in CEO pay not driving by the market forces. However, according to Bebchuk et al. (2002: 38) managers will prefer such compensation structures that enable extracting rents to be camouflaged as optimal contracting and to be sure, it can sometimes be undetectable from outside observers.
Camouflage is successful as long as it prevents rent extraction from being easily identifiable to outside observers. The role of compensation consultant can be seen either useful or they also might play a role in camouflaging rent.

2.5 Controlling CEO’s actions and governance mechanisms

I limit my study in agency problem between CEO and shareholders and I won’t touch the differing interests between directors and shareholders. As went over earlier in this chapter, optimal contracting is a way to align agent’s interest with those of principals’ and managers are paid for performance. However, optimal contracting does not itself guarantee a solution for agency problem and on this account also monitoring is needed alongside decent corporate governance. Merchant and Van der Stede (2007) define corporate governance as referring to the sets of mechanisms and processes that help to ensure firms being managed so that it brings more value for shareholders while at the same time fulfilling the responsibilities to other stakeholders. According to (Huson et al. (2001: 2265) shareholders rely on both external and internal monitoring mechanisms to help solving the agency problem arising the differing interest of agent and principal. Boards of directors and blockholders are important internal monitoring mechanisms and the takeover market is seen as a major outside monitoring mechanism. Hermalin and Weisbach (1998: 3) build a model based on CEO compensation and corporate governance that has an empirical support: 1) a poor-performing CEO is more likely to be replaced than one performing well; 2) when the board is more independent, CEO turnover is more sensitive to performance; 3) due to poor firm performance the probability of using independent outside directors raises; 4) board independence declines as CEO tenure increases; and 5) accounting measures of performance should predict CEO turnover better than stock-price performance.

Corporate governance mechanisms have remarkable effect on firm performance and behavior. Cornett et al. (2008: 359) divide governance mechanisms into variables that are seen in different contexts to have an effect on firm. Variables and effects are presented in Table 2.
Table 2. Corporate Governance Mechanisms

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect on CEO’s actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional ownership</td>
<td>Larger institutional ownership enables better monitoring, focus more on firm performance</td>
</tr>
<tr>
<td>CEO stock and/or option ownership</td>
<td>CEO stock and option ownership improves incentives for value-maximizing behavior but may also enhance earnings management</td>
</tr>
<tr>
<td>Percent of outside directors</td>
<td>Higher number of outside directors is related to improved monitoring and control</td>
</tr>
<tr>
<td>CEO/chair duality</td>
<td>Duality may impede effective monitoring and cause earnings management</td>
</tr>
<tr>
<td>Board size</td>
<td>Smaller boards are more effective in monitoring CEO’s actions</td>
</tr>
<tr>
<td>Age and tenure of CEO</td>
<td>Experience in years is positively associated with CEO’s effectiveness to run the firm</td>
</tr>
</tbody>
</table>

(Cornett et al. (2008: 369-360)).

2.6 Incentive effects of CEO pay structure

Although the practices and structures of CEO compensation are wide-ranging and vary between different industries and companies, most executive pay packages contain four basic elements: a base salary, an annual bonus tied to accounting performance, stock options, and long-term incentive plans including restricted stock plans and multi-year accounting-based performance plans. In addition, executives take part in employee benefit plans and also receive some special benefits e.g. life insurance and supplemental executive retirement plans (SERPs) (Murphy 1999: 5). Other important forms of CEO pay that have received less attention among researchers are perquisites, pensions and severance pay (Frydman and Jenter 2010: 5). From 1936 to the 1950s, CEO compensation was structured mainly by using base salaries and annual bonuses. Bonuses are typically non-discretionary, tied to one or more annual accounting measures, and paid in cash or firm stocks. In the 1960s, cash payments from long-term incentive plans, based on multi-year performance started to fall to CEO compensation. Perhaps the most notable change in CEO compensation
took place in early 1980s, when stock option compensation started. The purpose of stock option compensation is to tie remuneration directly to the share prices and compensate managers who increase shareholder value. During the 1980s and especially in the 1990s, stock options became the largest component of executive pay. However, after stock market decline in 2000-2001, stock options lost some of their luster and made way to restricted stock grants (Frydman and Jenter 2010: 4-5).

Jensen and Murphy (1990b: 8) suggest that equity-based compensation is better incentive, than cash-based compensation, for managers to increase firm value. Given a certain level of compensation, managers should prefer fixed cash compensation over equity-based compensation because the latter is somehow tied to the firm’s stock return and may be beyond manager’s control (Mehran 1995: 165). Agrawal and Mandelker (1987: 824) define total manager compensation W, divided into three useful parts, as follows:

\[ W = W_s + W_h + W_o \]  

(2)

where \( W_s \) is his or her common stock and option holdings, \( W_h \) is his or her human capital, which equals the present value of the stream of future earnings from employment and \( W_o \) holding of other assets unrelated to firm. The stock and stock option holdings in the firm are valued in the capital markets, and their value is directly affected by the firm’s changes in a cash flow. Those changes in the cash flow may also have affect on the stream of the manager’s employment income and his or her human capital. Managerial incentive problems rise partly because of managers’ personal wealth considerations have influence on corporate investment and financing decisions. In the following paragraphs, I will go through the different forms of CEO pay presented by Murphy (1999) and other authors.
2.6.1 Base salary

Base salaries are usually determined by using competitive benchmarking, based primarily on general industry salary surveys those supplemented by detailed analyses of selected industry or market peers. The surveys typically adjust for firm size and it is measured using firm revenues or market capitalization especially in start-ups. Unexpectedly, executives devote substantial attention to determining the salary although salaries determine only a minor fraction of total compensation. The reasons for importance of salary compared to other forms of pay can be presented as follows: 1) base salaries are a key component of executive employment contract providing a guarantee of minimum increases in base salaries for the five following years, 2) since base salaries represent the fixed component in executive contracts, risk-averse managers will naturally prefer an increase in base salary to an increase in target bonus or variable compensation, and 3) most components of compensation are measured relative to base salary levels. In addition, target bonuses, defined benefit plans and severance arrangements are depended on salary levels (Murphy 1999: 9.) Baker et al. (1988) argue that base salary with annual bonuses based on individual performance is less efficient compared to profit-sharing, stock ownership and team-based bonuses.

2.6.2 Annual bonuses

Virtually every firm offers its top executives annual bonuses paid annually based on a single-year’s performance. However, most descriptions of executive bonus plans in literature are anecdotal, non-representative or picked up from voluntary disclosures in company proxy statements. In spite of substantial heterogeneity across firms and industries, executive bonus plans can be categorized into three basic components: performance measures, performance standards, and the structure of the pay-performance relation. According to the typical plan, no bonus is paid until a target performance is achieved (expressed usually as a percentage of performance standard) and a minimum bonus (usually expressed as a percentage of the target bonus) is paid at the target performance. Target bonuses are used to pay for achieving the
performance target and usually cap bonuses (a percentage or multiple of the target bonus) are paid. The range between the threshold and cap is called the incentive zone, indicating the increasing performance creating more incentives. Discretion in annual bonuses shows up in different ways. At times, board can exercise discretion by setting up an incentive pool among participating executives, however, this allocation doesn’t affect on overall pay but individual allocations. In addition, executives will have some portion of their annual bonus based on their individual performance. This individual performance often includes performance related to some pre-determined strategic milestones and the weight on individual performance rarely exceeds about 25% of the total executive’s bonus (Murphy 1999: 10-11.)

Murphy (1999: 11) shows that less than 50% of companies use a single performance measure, usually two or more of measures are used at the same time. However, in most cases multiple measures are additive can be treated as separate plans. In other cases, the measures are multiplicative (in which the pay on one performance measure might increase or decrease depending on the realization of another measure) or matrix of performance measures. Both financial and non-financial performance measures are used and, in overall, almost all firms use some kind of accounting measures. The most common financial measures used in companies are measures derived from accounting profit. Non-financial measure of individual performance is for one a common way to determine how individual has performed. Other common non-financial measures are customer satisfaction, operational and strategic objectives and measures of plant safety.

As discussed earlier, the primary determinant of annual bonuses is accounting profits. Accounting data is easily verifiable and understood among agents and principals and it is relatively useful in assessing the annual performance of managers. However, two main problems are identified with all accounting-based measures. First, accounting numbers are inherently based on past events and short-term, managers may focus on increasing current accounting profits and reject long-term investments e.g. R&D that affect on future profits. Second, accounting numbers are easily manipulated by managers (earnings management) through discretionary
adjustments in accruals or by shifting earnings across periods. Performance standards are typically based on budgets and past-year performance and often allow for some board-level discretion. Standards based on budgets and past-year performances are prone to the problem caused by employees’ influence over the standard-setting process.

2.6.3 Stock options

Stock options are such contracts, where the holder has right to buy a share of stock at pre-specified strike price for a pre-specified term. Executive options usually become exercisable over time, e.g. 25% might become exercisable in each of the following for years. The special feature of executive options compared to regular options is that these options are not tradable and given up if the executive leaves firm before vesting. Designing executive stock option plans is versatile as there are full of possibilities. Exercise prices could be indexed to the industry or market, options could be rejected unless desired performance level is not achieved. However, there is only little cross-sectional variation in option granting practices: most options expire in ten years and are granted with exercise prices equal to the “fair market value” on date of grant (Murphy 1999: 15.)
Table 3. Median options as percent of pay for CEOs 1992-2000

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>S&amp;P 500 Financial</th>
<th>Smaller Firms</th>
<th>New Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>19.2%</td>
<td>18.5%</td>
<td>35.0%</td>
</tr>
<tr>
<td>1993</td>
<td>20.6%</td>
<td>19.4%</td>
<td>36.4%</td>
</tr>
<tr>
<td>1994</td>
<td>30.1%</td>
<td>22.7%</td>
<td>37.5%</td>
</tr>
<tr>
<td>1995</td>
<td>22.0%</td>
<td>20.3%</td>
<td>36.8%</td>
</tr>
<tr>
<td>1996</td>
<td>30.7%</td>
<td>26.0%</td>
<td>42.1%</td>
</tr>
<tr>
<td>1997</td>
<td>35.9%</td>
<td>28.6%</td>
<td>49.4%</td>
</tr>
<tr>
<td>1998</td>
<td>42.8%</td>
<td>32.6%</td>
<td>48.7%</td>
</tr>
<tr>
<td>1999</td>
<td>49.3%</td>
<td>35.7%</td>
<td>55.5%</td>
</tr>
<tr>
<td>2000</td>
<td>49.3%</td>
<td>35.7%</td>
<td>54.3%</td>
</tr>
</tbody>
</table>

Note: Data from S&P’s ExecuComp database. Stock options are valued at the grant-date using ExecuComp’s modified Black-Scholes methodology. (Murphy 2002: 849).

Table 3 illustrates that increased stock option grants in CEO compensation is not limited to S&P 500 industrials from 1992 through 2000. Total compensation is not included in the table but primarily increasing stock option grants drives the large pay increases in three different categories of companies (Murphy 2002: 847–848.) The largest increase in option grant as percent of total CEO pay has occurred in S&P 500 Financial industry. In 1992, only 19.2% of CEO’s total compensation consisted of option grants and in 2000 the stake was 49.3%. New Economy industry has adopted option grants in CEO compensation notably earlier; the share was 35.0% already in 1992 and has increased again up to 54.3% in 2000.

Stock options have efficient incentive effect as they provide a direct link between managerial rewards and share-price appreciation. The payout from exercising options increases dollar for dollar with increases in stock price. However, the incentives from
Stock options do not follow incentives on stock ownership. Stock options are only affected by stock price, not total shareholder returns including dividends. Stock option holders have incentives to avoid dividends and to favor share repurchases. Second, as the stock options go hand in hand with stock price movements, executives with options have incentives to engage in riskier investments. Options lose incentive value when stock price falls below the exercise price. This “loss of incentives” is a common justification for option re-pricing due to share-price decline (Murphy 1999: 17.)

The incentive from a single option is dependent on the slope of the executive-value line, V/P, defining how the certainty-equivalent value changes with an incremental change in the stock price. The slope of the Black-Scholes line is greater than the slope of the executive-value line for undiversified executives. For example, when stock price and exercise values equal at $30, the slope of the Black-Scholes function is 0.86 ($0.86 per $1 change in price), but the slope of the executive-value line is only 0.64 for an executive with 50% his or her wealth in company’s stock. Deciding exercise price, X, is very critical when the board is granting options to executives. Increasing the exercise price, the incentive of each option granted reduces but also reduces the company’s cost of granting any options. The company could either grant a few options at a low exercise price or more options at a higher exercise price. We assume that company’s stock price is $30 and that the board has decided to award the executive $500,000 in options. The company could award the executive 16,667 shares of restricted stock (options with zero exercise price). Alternatively, the company could award 30,200 at-the-money options with a Black-Scholes value of $16.55 each or 50,500 premium options with an exercise price of $60 with a Black-Scholes value of $9.90 each. Solving the exercise price, X, that maximizes incentives, nV/P, the total costs of options fixed to k, follows

\[
\text{MAX (X) = nV/P, subject to nC = k }
\] (3)

The incentive-maximizing exercise price, X, will be dependent on the usual arguments in the Black-Scholes function and will also be dependent on other factors
that affect nV/P, such being degree of risk aversion, wealth, previously owned stock, and the numbers of options to be granted (Hall and Murphy 1999: 7–8.)

2.6.4 Other forms of compensation

Restricted stocks are minor but still important form of compensation. The restricted stock grants are “restricted” in the sense that they are forfeited under several conditions. One important aspect supporting restricted stocks is favorable tax treatment. The forfeiture possibility allows favorable tax treatment, as executives don’t pay taxes on the shares until the restrictions become void. Also the cost is amortized over the vesting period, and recorded as the grant-date stock price even if prices have increased since the grant. Many companies also offer long-term incentive plans LTIPs in addition to bonus plans. They are typically based on rolling-average three- or five-year cumulative performance. In addition to company-wide retirement programs, top executives usually participate in supplemental executive retirement plans SERPs. SERPs are non-qualified for tax purposes and may include benefits based on years served or variable benefits based on inflation or company performance. SERPs are difficult to disclose, as it’s about discounting the future payments for a long period and not requisite information is available in proxy statements. This has led some observers to call SERPs the ultimate form of “stealth compensation” (Murphy 1999: 22–23.)
3 EMPIRICAL RESEARCH ON CEO COMPENSATION

Ciscel and Carroll (1980) presented early the empirical relation between firm performance and executive compensation. Executives are paid for increasing profits through cost control or sales. Researchers argue whether executives are paid for firm sales or accounting profits. Sales growth is considered the dominant determinant of executive incentives and compensation. Ciscel and Carroll (1980) also point out that three econometric problems multicollinearity, heteroscedasticity and simultaneous equation bias may have affected on the results of earlier studies. I will omit the earliest empirical findings and concentrate on more recent findings from last three decades. In this section, I will go through the important relation between executive pay and stock and accounting performance. Later on, I will review the empirical findings on determinants of executive compensation.

3.1 Executive pay and stock price movements

Basically, there are two different forms of empirical studies on the relation of executive pay and firm performance (shareholder value). The first form is about defining the shape of the relation, the second as for defines the sensitivity of executive compensation and wealth to changes in shareholder wealth. Usually these pay-for-performance sensitivities are documented in a dollar change in shareholder wealth on executive compensation. In this chapter, I will briefly go through the most relevant empirical studies for both forms. Researchers opinions vary broadly as there is no consensus how different pay structures affect on firm performance.

3.1.1 Relation between executive compensation and firm performance

A number of studies have sought to evaluate empirically the relation between managerial share ownership and firm performance. However, the findings are not uniformly in agreement. Demsetz (1983) argues that there should be no relationship between ownership structure and firm-performance. Demsetz and Lehn (1985) found
no empirical evidence on linear relationship between profit rate and ownership by large shareholders. The structure of corporate ownership varies systemically in ways that are consistent with value maximization. Fama and Jensen (1985: 312) point out that the common stock residual claims in open organizations are unrestricted, as stockholders are not required to have any other role in the organization and their residual claims are freely alienable. Due to the unrestricted nature of the residual claims in open organization, there is almost complete separation between decision management and residual risk bearing. Even managers in open organization that own substantial shares of stock may decide to sell these shares. Mehran (1995) provides evidence of a positive relation between managerial equity ownership and firm performance. Thus compensation affects on executive’s incentives in ways that are measurable on corporate efficiency. Morck et. al (1988) find an evidence on non-monotonic relationship between ownership concentration and the market value of the firm. They argue that the relationship is positive for managerial ownership between 0 and 5%, negative between 5 and 25%, and positive thereafter above 25%.

Hermalin and Weisbach (1991) study 134 NYSE firms and use CEO stock holdings as managerial stock ownership. They find the relation to be positive for CEO stock ownership between 0 and 1%, negative between 1 and 5%, positive between 5 and 20%, and negative thereafter above 20%. McConnell and Servaes (1990) provide further evidence on Morck et. al (1988) and Demsetz and Lehn (1985) empirical studies on the relation between the distribution of equity ownership and corporate value. Specifically, they investigate the cross-sectional relation between Tobin’s Q and equity ownership for a sample of 1,173 firms in 1976 and for a sample of 1,093 firms in 1986. They find a significant curvilinear relation between Q and the fraction of shares owned by corporate insiders for both samples. The curve peaks around at 50% insider ownership, in 1976, the maximum is reached when insider ownership is 49.4%.

Himmelberg et al. (1999) extend the empirical results presented by Demsetz and Lehn (1985) using panel data to show that managerial ownership is explained by key variables in ways consistent with the predictions of the principal-agent models. They
explain the large fraction in cross-sectional variation in managerial ownership by unobserved firm heterogeneity. Distinct from earlier research papers and Demsetz and Lehn (1985), they use panel data to test for the endogeneity of managerial ownership by linking ownership to performance, measured by Tobin’s Q. Controlling both for observed firm characteristics and firm fixed effects, it becomes hard to conclude that changes in firm managerial ownership affect performance. Cho’s (1998) ordinary least squares (OLS) regression results suggest that ownership structure affects investment, and therefore, corporate value. He extends studies of Morck et al. (1988) and McConnell and Servaes (1990) by exploring how ownership structure affects corporate value and testing whether it is appropriate to treat ownership structure as exogenous. The evidence indicates that corporate value affects ownership structure, but not vice versa. These findings raise a question in the results of studies that treat ownership structure as exogenous. It also casts doubt upon the frequent assumption that managerial compensation structures such as stock grants provide strong incentive effect to managers to take actions that maximize corporate value. In general, based on empirical findings, it seems that a relation between CEO ownership and shareholder value exists. However, the shape of the relation and causality is mainly unclear.

3.1.2 CEO pay-for-performance sensitivity

There have been largely studies on CEO pay-for-performance sensitivity, the sensitivity of CEO compensation to changes in shareholder value. Murphy (1985) documented a strong positive relationship between firm performance and executive compensation. Coughlan and Schmidt (1985) presented results that are consistent with the results of Murphy (1985). They regressed abnormal stock returns and changes in executive compensation. The most remarkable study on CEO pay-for-performance sensitivity is that of Jensen and Murphy (1990a). The purpose of their paper was to empirically estimate the magnitude of the incentives produced by performance-based bonuses, salary revisions, stock options and performance-based dismissal decisions. They define the pay-for-performance sensitivity, b, as the dollar change in the CEO’s wealth associated with a dollar change in the wealth of
shareholders. Following simple least squares regression is used to determine estimated coefficients:

\[ \Delta(\text{CEO Salary + Bonus})_t = a + b\Delta(\text{Shareholder Wealth})_t \quad (4) \]

Jensen and Murphy (1990a) argue that the relation between CEO wealth and shareholder wealth is weak. On average, a $1000 change in shareholder wealth increases CEO’s this year’s and next year’s wealth by 2 cents. Their upper-bound estimate of the average compensation-related wealth indicates that in small firms CEO’s wealth is more dependent on shareholders’ wealth than in large firms. When including equity-based compensation generated by CEO’s stockholdings, gives a total change in all CEO pay- and stock-related wealth of $3.25 per $1000 change in shareholder wealth. Their results are inconsistent with formal agency models of optimal contracting. The empirical relation between top executive pay and firm performance is positive and statistically significant, but still weak in such occupational group where incentive pay is expected to play an important role. Public and private political forces imposing constraints could explain weak pay-for-performance sensitivity.

Joskow and Rose (1994) examine how complex performance measures affect the estimated pay for performance relationship. In their analysis, they include both market and accounting returns as financial performance allowing pay for performance change over time and allowing the performance sensitivity to depend on how good or bad the firm’s financial performance has been. Their second objective is to explore the dynamic structure of pay for performance relationship. Their empirical analysis relies on data for 1009 CEOs in 678 firms between 1970 and 1990. The empirical results suggest that CEO compensation became significantly more sensitive to firm performance during the 1980s compared to the 1970s, even when the stock options are excluded. CEO compensation is influenced by both accounting profits and shareholder returns. Board of directors may treat each of these performance measures as a useful signal of executive performance. Past financial performance, in addition to present performance, has an important impact on current
CEO compensation. The data provide virtually no support for the general assumption that the board of directors fail to penalize poor performing CEOs.

Boschen and Smith (1995) present an extensive empirical analysis on pay-for-performance sensitivity. They argue that weak pay-for-performance sensitivities presented in earlier studies may suffer from short-term time horizons used in studies. Pay to performance should be tied over a long time period for more accurate results. In their data, they use remarkably long time period from 1948 to 1990 and observe a weak but positively significant relation between CEO pay and firm performance. Cumulative pay for performance is much higher, contemporaneous sensitivity of executive pay to a 10% change in real stock returns at 0.3%-0.5%. The cumulative sensitivity over ten years is at 3-5%.

Hall and Lieberman (1998) build a new 15-year panel data set of CEOs in the largest US firms focusing the broad measure of compensation that includes stock and stock options. They document that CEO compensation and the sensitivity of CEO compensation have grown dramatically from 1980 to 1994. The compensation of the median CEO increases by more than 50 % representing an increase in CEO wealth $1.8 million. In 1994, the median CEO pay increases by $5.25 for every $1000 increase in shareholder value. This is more than the empirical results presented by Jensen and Murphy (1990a), CEO pay increase being $3.25 for every $1000 increase in shareholder value. The difference in sensitivity could be explained by more complete stock options schemes used by Hall and Lieberman (1998) compared to the earlier studies.

In general, empirical results suggest that the relation between CEO pay and firm performance is positive. The magnitude of the relation varies and is dependent on the length of time horizon and whether stock ownership and stock options are included in total compensation or not. The relation is more explicit when time horizon is long and stock ownership and stock options are included in total compensation. Murphy (1999) points out that the primary advantage of the sensitivity approach is that sensitivities have a natural economic interpretation. The pay-for-performance
sensitivity measures the executive’s share of value creation. However, pay-for-performance elasticities have no corresponding agency-theoretic interpretation.

3.1.3 Relative performance evaluation RPE

It is common that workers are rewarded not for their performance but for their performance compared to related co-workers. Compensation is almost always affected by random factors beyond the worker’s control. These factors often affect the observed performances of other workers in the same division, firm or industry. In these cases, RPE can provide workers incentives by insulating the random factors. RPE can be undesirable in the lower levels of the organization due to the high cost and teamwork. However, RPE works better for executives who are running their tasks alone. Random factors such as stock and product markets are beyond executive’s control but it is easy to compare firms in the same industry. Rivals’ stock prices are available on daily basis for a small cost. Firms in the same industry are facing the same shocks on the stock and product markets (Gibbons and Murphy 1991.) Gibbons and Murphy (1991) based underlying results on their empirical findings that changes in CEO pay are positively and significantly related to firm performance, but negatively and significantly related to industry and market performance.

Aggrawal and Samwick (1999a) explicitly test cross-sectional predictions of a relative performance evaluation model and find no evidence. Aggrawal and Samwick (1999b) show that there is less RPE observed in more competitive industries and strategic interactions between firms may cause inconsistency RPE in practice. Rajgopal et. al (2006) suggest based on their empirical study that compensation committees do not practice RPE meaning they do not filter out market-wide or industry-wide performance from the CEO’s total compensation. They also find sensitivity of CEO compensation to market-wide and industry-wide performance higher for such CEOs how are enjoying greater press visibility and superior ROA during the prior three years. The results are consistent with perception that market-
wide shocks increase demand for CEO talent outside the firm. Firms may need to increase compensation levels to retain the most talented CEOs.

Garvey and Milbourn (2003) provide an empirical model with straightforward implications. Firms should provide less RPE as the costs of hedging executive’s own portfolio decrease. Also pay-for-performance sensitivity should be unaffected by systematic risk if either executive’s hedging or firm-offered RPE is costless. Younger and less wealthy executives demand their firms to provide insulation from market risks inherent in stock-based incentive compensation. Significant evidence is provided of relative performance evaluation for executives who face remarkably high costs of removing excessive systematic risk on their own account.

3.2 Determinants of executive pay

In this subchapter, I will shed light on factors that determine executive pay. Factors are divided into six different topics mainly based on a study disclosed by Mehran (1995). Determinants of executive pay may differ significantly between small and large firms and between different geographic areas. The determinants I use are peculiar to the large US listed firms and for my empirical analysis.

3.2.1 CEO characteristics

Rose (1994) shows that more diversified firms require more talented CEO, who is compensated higher as usual. CEOs of firms with two separate lines of business earn on average 10-12% more in salary and bonuses compared to similar but undiversified firms. In addition, the effect of diversification on compensation is as strong for first-year CEOs as for CEOs who have been on the job for three or more years. Taste for diversification may turn out to be costly for CEO as higher compensation is achieved through growing the core business. Murphy (1986) presents evidence on agency theory indicating that less experienced CEOs have higher pay-for-performance sensitivity in their early years, as the compensation level is also lower. There is
higher uncertainty about inexperienced CEO’s abilities and shareholders are willing to align the pay with performance. Murphy (1986) excludes all equity based compensation measures in the analysis that may lead to inaccurate results.

Grinstein and Hribar (2003) studied CEO pay on M&A success. Using a sample of 327 large M&A deals between 1993 and 1999, they find out that 39% of the acquiring firms rewarded their CEOs for the successful merger or acquisition deal. The compensation is mainly cash and bonuses. CEOs are receiving more compensation when the deals are larger and they exert more effort. However, the measures of effort and skill do not explain a significant amount of the variation in bonus. Some evidence is found on the correlation between deal size and managerial power, since more-powerful CEOs are likely to enter larger deals. Managerial power also explains much of the cross-sectional variation in bonuses. Johnson et al. (1997) find that CEOs in firms that receive negative media coverage of their compensation arrangements enjoyed relatively small pay increases between 1992-1994 and pay-for-performance sensitivity increased.

3.2.2 Stock performance

A common research trend in the relation of managerial compensation and shareholder value is the shape of the relation between firm performance and executive pay. The relation between managerial compensation and shareholder wealth is an empirical issue (Morck et al. 1988). Murphy (1999) points out there is no established methodology for measuring the intensity of the relation. Demsetz and Lehn (1985) found no empirical evidence on positive correlation between ownership correlation and profit rate. Demsetz (1983) and Fama and Jensen (1983) have pointed out offsetting costs of significant management ownership. They also recognized there are other factors above share ownership that affect manager behavior. The managerial labor market, the product market and the market for corporate control may still force manager toward value maximization. In contrast, a manager controlling a substantial stake of the firm’s equity may have enough voting power or influence to guarantee his employment with better salary. If the manager has no
claim on the firm’s cash flow, he may indulge his preferences for non-value-maximizing behavior.

Morck et al. (1988) presents this “entrenchment” hypothesis predicting that corporate assets can be less valuable when managed by a manager free from checks on his control. However, the predictions of “entrenchment” hypothesis are not clearcut. Entrenchment is not just a consequence of voting power but some managers with long tenure; even founders or personality can be entrenched with relatively small stakes of equity. Other managers in firms with a large outside shareholder may be only weakly attached to the job despite of high ownership. On-the-job consumption and shirking reflect the existence of positive monitoring cost. However, the statistics show managers holding significant stake of equity meaning ownership and control are not so separate as is often supposed (Demsetz 1983). Morck et al. (1988) empirically examine the reduced-form relationship between management ownership of the firm’s equity and the market valuation of its tangible assets. They document in a cross-section of 371 1980 Fortune 500 firms, Tobin’s Q rising as board ownership rises from 0% to 5%. Falling as ownership rises further to 25%, and then continues to rise slowly as board ownership rises beyond 25%. The findings indicate that increases of Tobin’s Q with ownership reflect the convergence of interests between managers and shareholders, while the decline reflects entrenchment of the management team.

Second trend in the relation of managerial compensation and shareholder value is the intensity of the relation between managerial compensation and shareholder value. Murphy (1985) is one of the pioneer researchers who document a strong positive relationship between firm performance and executive compensation. He uses time-series data containing CEO-specific information from 1964 to 1981. His findings indicate a 10% increase in shareholder value corresponding to a 2.1% average increase in executive compensation. However, Murphy (1985) shows a negative relation between firm performance and the value of executive option grants. Coughlan and Schmidt (1985) build their empirical test based on 597 CEO-years
from 1978 to 1980 and find a 10% increase in executive cash and bonuses corresponding to a 1.2-1.5% abnormal return in the same year.

Jensen and Murphy (1990a) use 7,750 CEO-years observations from 1974 to 1986 and find that executive’s wealth varies with the value of the firm and stock ownership. CEOs in their sample hold about .25% of their firms’ common stock, including stock options and shares owned by relative family members. The value of the stock owned by the median CEO changes by $2.50 when the value of the firm changes by $1000. Gilson and Vetsuypens (1993) build their analysis based on a sample of 77 financially distressed firms from 1981 to 1987. They find that managers who retain their position through a debt restructuring often take a substantial cut in salary and bonus. Replacement CEOs as former firm employees earn a median 35% less than their predecessors. In contrast, the median outside replacement CEO earns 35% more than the manager he replaces. Gilson and Vetsuypens (1993) also present that compensation for the current management is often tied to short-term goals, such as the successful resolution of the firm’s bankruptcy or the value of the payoffs to creditors. Hall and Liebman (1997) use a data of 426 firms from 1980 to 1994 and report a $5.25 change in CEO pay for a $1,000 change in shareholder wealth. Their findings are pretty much consistent with Jensen and Murphy (1990a) and give strong evidence on the relation between pay and performance in current contracts.

3.2.3 Accounting-based performance

In addition to measuring CEO pay and stock performance, many studies also examine the relation between CEO pay and accounting based performance. Antle and Smith (1986) find that accounting returns have more impact on salary and bonus than do stock returns. They document a significant positive relationship between CEO compensation and firm return on assets (ROA). Mehran (1995) examines the relation of firm performance and executive compensation and ownership structure. Tobin’s Q and ROA are used as measures of firm performance. He finds firm performance to be positively related to the percentage of executive compensation that is equity-based. However, Mehran finds no relation between firm performance and
ownership structure. Himmelberg et al. (1998) document that operating income and the investment rate appear to have positive effects on ownership stakes.

Management buyouts (MBOs) and leveraged buyouts (LBOs) cause dramatic changes in ownership structure and incentives. Kaplan (1989) uses accounting variables as sales, operating income and net operating cash flow in in studying the impact of LBOs. He finds that operating income and sales grow at or below industry average before and immediately after a buyout. The outperformance occurs in the third year after the buyout compared to the industry. More outperformance occurs right after the buyout when used relative measures like operative income to assets or sales. Holthausen and Larcker (1996) report that the real value of sales increased 9.4% and operating profits by 45% from the LBO announcement to the reverse IPO date. A positive correlation between the fraction of equity held by the management and the gain in operating performance and shareholder value was also documented. Operating income and cash flow ratios show reverse LBOs outperform the industry before and after 4 years the IPO. This is consistent with powerful managerial incentives promoting efficient operations.

3.2.4 Capital structure

Much of the research have tried to find the relation between executive compensation and firm capital structure. Jensen and Meckling (1976) believe the existence of agency costs provide stronger reasons for arguing that the probability distribution of future cash flows is not separate from capital structure. Mehran (1992) investigates the relation between firm’s capital structure and executive incentive plan. He documents a positive relation between firm’s leverage ratio and executives’ compensation fraction in total incentive plans and equity stake owned by executives. Managers with low performance-sensitive compensation are more entrenched and choose lower leverage. Similar empirical results provide Berger et al. (1997) who find that leverage levels are positively related to CEO stock ownership and CEO stock option holdings. The results are consistent with decreases in entrenchment
leading to increases in leverage, and majority of the firms having less debt than optimal.

Agrawal and Mandelker (1987) investigate the relation between a manager’s security holdings and the firm’s financing decisions. The results reveal that top executives of firms that experience an increase in their leverage ratios, have a considerably large holdings of stocks and options of his firm. In the other words, the managers with low stockholdings are more likely to reduce leverage than those with large stockholdings indicating the interests of former are less aligned with those of shareholders. Overall, the evidence supports the hypothesis that executive security holdings tend to reduce agency problems between principal and agent with respect to the firm’s financing decision. Yermack (1995) finds no significant association between financial leverage and incentives from stock option awards. He also documents firms shift CEO compensation from cash salaries and bonuses toward stock options when facing liquidity problems. The ratio of stock option to cash compensation almost doubles in firms paying zero dividends.

3.2.5 Investments

Investments are also used as a reference in executive compensation. Usually investments provide cash flows in the long future so it may be difficult to valuate executive’s investment decisions. Agrawal and Mandelker (1987) examine the relationship between a manager’s holdings of common stock and options and the characteristics of the investment decisions made by the firm. Investments are divided into three different types: acquisitions by mergers, acquisitions by tender offers and divestitures by sell-offs. The total wealth, $W$, of an executive may be classified into three main types of assets: common stock and option holdings, $W_c$, human capital, $W_h$, and holdings of other assets unrelated to the firm, $W_o$. As manager’s employment income is aligned to firm value, an increase in the variance of returns on the firm’s total assets, $\sigma^2_V$, increases the variance and reduces the certainty equivalent of the stream of employment income. Executives are like to increase their human capital, $W_h$, and therefore have an incentive to reduce $\sigma^2_V$. Black and Scholes
option pricing model shows that the value of common stock increases when $\sigma^2_V$ goes up. Also the value of the executive’s common stock and stock option holdings, $W_s$, increases. The empirical results suggest that the common stock and options holdings of executives are larger in firms where the return variance increases upon an investment announcement. These findings are consistent with the hypothesis that a relationship between security holdings of executives and investment decisions of their firms exists.

Lewellen et al. (1987), Mehran (1995) and Himmelberg et al. (1999) examine the growth opportunities as an investment-based determinant of executive compensation. They report that executive’s stock ownership and cash compensation is related to Tobin’s Q and the nature of the relation vary by the nature of compensation. Lewellen et al. (1987) document that although the proportion of stock in the compensation package decreases with Beta, they found it increases with the variance of stock returns. Mehran (1995) argues that firms in which CEO compensation is relatively sensitive to firm performance tend to produce higher returns for shareholders than those firms with less sensitive executive compensation. Also Tobin’s Q and ROA are inversely related to the stake of CEO’s total compensation in cash. This relationship is valid even after controlling for the firm’s growth opportunities, asset in place, leverage ratio, business risk, and size. Himmelberg et al. (1999) report positive and significant correlation between CEO stock ownership and Tobin’s Q below 5% ownership and negative at higher stakes of ownership. They also document weak negative relationship between total equity ownership by top managers and R&D expenditures.

3.2.6 Board structure and monitoring

In terms of agency problem, more outside directors is said to have better control over firm’s executives. Mehran (1995) reports negative relationship between the percentage of total compensation in cash and the percentage of outside directors. In addition, firms with more outsiders on the board use more equity-based compensation. Beatty et al. (1995) argue that firms seek to address the differences in
incentive compensation contracts by increasing the level of monitoring for those firms in which top managers do not bear substantial incentive compensation risk. They also report that firms with managers having more equity-based incentives are more likely to have a larger percentage of outside directors on their boards, a major non-board member block holder and a separate CEO/board chairman position.

Yermack (1995) argues that firm size provides weak evidence of greater use of stock options by larger companies. This is result of boards having more difficulties monitoring managerial performance directly as firm size increases. In addition, exiting CEOs receive abnormally low levels of stock option grants suggesting that boards pay little long-term compensation to executives scheduled to leave the firm. Core and Guay (1999) find negative relationship between equity-based compensation and the level of regulation in the industry. As outside monitoring is higher in regulated industries, it is a substitute for high levels of equity-based compensation.

3.3 Research hypotheses

In this section I will look through the hypotheses I use in this empirical study. The hypotheses are based on previous studies and their predictions and empirical findings. As a more complete literature overview is presented earlier in this thesis, I will make straightforward approach on theories around hypothesis.

3.3.1 Pay-for-performance sensitivity

H1: The relationship between the change in CEO total compensation and shareholder wealth is positive and significant.

Most studies presented earlier have reported positive and significant relationship between the change in CEO total compensation and shareholder wealth. I expect findings substantially similar to these earlier studies. I will use data collected later
from 2007 to 2011 and it includes the financial crisis in 2008 when stock prices dropped dramatically. During 2010 and 2011 stock prices recovered from the bottom line close to their peak in 2007. I expect weak total compensation, shareholder wealth and less significant sensitivities for cash compensation during 2008 and 2009.
4 DESCRIPTION OF DATA

I collected the data to this empirical research using Compustat EXECUCOMP database. The data file contained annual data from 1992 until 2011, on the five top executives within a company. It contained more than 33,000 executives and 3,000 public companies in the U.S. I restrict my study between 2007 and 2011, as it will give more recent information about executive compensation. The sample contains 9,121 CEO-years and 2,769 different CEOs.

Table 4. Sample summary of CEO ages 2007-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean CEO age</td>
<td>54.5</td>
<td>54.8</td>
<td>55.1</td>
<td>55.6</td>
<td>56.0</td>
</tr>
<tr>
<td>Median CEO age</td>
<td>54</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Std Dev CEO age</td>
<td>6.8</td>
<td>6.7</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Min CEO age</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>Max CEO age</td>
<td>75</td>
<td>75</td>
<td>74</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>N</td>
<td>1995</td>
<td>1922</td>
<td>1859</td>
<td>1811</td>
<td>1314</td>
</tr>
</tbody>
</table>

Values are calculated excluding outliers, $p < 1\%$ and $p > 99\%$.

Table 4 shows that the average CEO in the sample is 55 years old. Even though the age range varies between 39 and 75, the standard deviation of CEO ages is only 6.6. This indicates CEOs in public firms being experienced and above middle age. The maximum CEO age indicates it is not rare CEOs continue their job even at the age over 70 years. The number of CEOs declines as moved from year 2007 to 2011. The coverage in Execucomp COMPUSTAT sample changes and is less comprehensive in the late years of analysis. Execucomp COMPUSTAT sample contains firms from S&P 500, S&P 400 and S&P 600 stock market indexes. Companies that have exited the lists during the period have not been emitted in the respect of survivorship bias.
4.1 CEO compensation data

CEO compensation data used in this research comes from Compustat EXECUCOMP database. Total compensation, base salary, bonuses, value of stock awards, value of option awards, non-equity incentives, other compensation, change in pension value and non-qualified deferred compensation earnings is reported for each CEO in certain year. I use TOTAL_SEC as a measure of total compensation. Option fair values available from EXECUCOMP are estimated using Black-Scholes option pricing model.

Table 5. CEO total compensation 2007-2011($1000)

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Total Compensation</td>
<td>5,959</td>
<td>5,616</td>
<td>5,272</td>
<td>6,165</td>
<td>6,829</td>
<td>5,968</td>
</tr>
<tr>
<td>Median Total Compensation</td>
<td>3,533</td>
<td>3,390</td>
<td>3,461</td>
<td>4,114</td>
<td>4,934</td>
<td>3,886</td>
</tr>
<tr>
<td>Std Dev Total Compensation</td>
<td>7,863</td>
<td>7,856</td>
<td>5,892</td>
<td>6,887</td>
<td>7,219</td>
<td>7,143</td>
</tr>
<tr>
<td>Min Total Compensation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max Total Compensation</td>
<td>137,941</td>
<td>116,963</td>
<td>73,650</td>
<td>87,051</td>
<td>137,167</td>
<td>110,554</td>
</tr>
<tr>
<td>N</td>
<td>2051</td>
<td>1969</td>
<td>1902</td>
<td>1848</td>
<td>1344</td>
<td>9114</td>
</tr>
</tbody>
</table>

Values are reported in 2011 dollar and adjusted for inflation using CPI.

I could not find necessary information to estimate option values at the exercise day so they are estimated at the end of the fiscal year. All money values are adjusted for inflation using the rates from the United States Bureau of Labor Statistics.

Table 5 presents the statistics for CEO total compensation (TOTAL_SEC) between 2007 and 2011. CEO total compensation (TOTAL_SEC) is composed of following: Salary, Bonus, Non-Equity Incentive Plan Compensation, Grant-Date Fair Value of Option Awards, Grant-Date Fair Value of Stock Awards, Deferred Compensation
Earnings Reported as Compensation, and Other Compensation. The mean total compensation of CEO is $5,968,000 and median $3,886,000. Total growth in Median CEO Total Compensation is 40% over the period. It is a little lower than the rates presented by Murphy (1999) for the period 1992-1996. There is a high gap between minimum and maximum values ($0 to $137,941,000). During the years 2008 and 2009, the effect of global financial crisis can be seen as lower total compensation for CEOs. However, rapid change upwards can be observed starting from 2010. Relatively high standard deviations indicate wide variations in CEO compensation across the firms.

Table 6. CEO compensation components 2007-2011($1000).

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary</td>
<td>Mean</td>
<td>785</td>
<td>787</td>
<td>808</td>
<td>826</td>
<td>858</td>
<td>812</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>731</td>
<td>744</td>
<td>756</td>
<td>773</td>
<td>800</td>
<td>760</td>
</tr>
<tr>
<td></td>
<td>Std Dev</td>
<td>431</td>
<td>419</td>
<td>443</td>
<td>457</td>
<td>447</td>
<td>439</td>
</tr>
<tr>
<td>Bonuses</td>
<td>Mean</td>
<td>326</td>
<td>287</td>
<td>204</td>
<td>247</td>
<td>231</td>
<td>259</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Std Dev</td>
<td>1,948</td>
<td>2,651</td>
<td>903</td>
<td>1,036</td>
<td>1,107</td>
<td>1,529</td>
</tr>
<tr>
<td>Value of Stock Awards</td>
<td>Mean</td>
<td>1,691</td>
<td>1,759</td>
<td>1,537</td>
<td>1,985</td>
<td>2,472</td>
<td>1,889</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>593</td>
<td>665</td>
<td>648</td>
<td>997</td>
<td>1,362</td>
<td>853</td>
</tr>
<tr>
<td></td>
<td>Std Dev</td>
<td>3,038</td>
<td>3,842</td>
<td>2,584</td>
<td>3,122</td>
<td>4,617</td>
<td>3,441</td>
</tr>
<tr>
<td>Value of Option Awards</td>
<td>Mean</td>
<td>1,354</td>
<td>1,314</td>
<td>1,083</td>
<td>1,076</td>
<td>1,143</td>
<td>1,194</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>404</td>
<td>329</td>
<td>282</td>
<td>301</td>
<td>332</td>
<td>330</td>
</tr>
<tr>
<td></td>
<td>Std Dev</td>
<td>3,023</td>
<td>3,578</td>
<td>2,715</td>
<td>2,516</td>
<td>2,269</td>
<td>2,820</td>
</tr>
<tr>
<td>Non-Equity</td>
<td>Mean</td>
<td>996</td>
<td>827</td>
<td>941</td>
<td>1,275</td>
<td>1,264</td>
<td>1,061</td>
</tr>
</tbody>
</table>
### Incentive Plans

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>311</th>
<th>420</th>
<th>754</th>
<th>774</th>
<th>536</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std Dev</td>
<td>1,749</td>
<td>1,661</td>
<td>1,576</td>
<td>2,287</td>
<td>1,815</td>
<td>1,818</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change in Pension Values</th>
<th>Mean</th>
<th>395</th>
<th>388</th>
<th>480</th>
<th>475</th>
<th>600</th>
<th>468</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Std Dev</td>
<td>1,090</td>
<td>1,121</td>
<td>1,332</td>
<td>1,249</td>
<td>1,347</td>
<td>1,228</td>
<td></td>
</tr>
</tbody>
</table>

### Other Compensation

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>77</th>
<th>71</th>
<th>62</th>
<th>62</th>
<th>77</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std Dev</td>
<td>3,104</td>
<td>915</td>
<td>640</td>
<td>1,176</td>
<td>800</td>
<td>1,327</td>
<td></td>
</tr>
</tbody>
</table>

Values are reported in 2011 dollar and adjusted for inflation using CPI.

Murphy (1999) reports CEO total compensation for the period 1992-1996 dividing the firms in 4 different industries: mining and manufacturing, financial services, utilities and other industries. The median total mean CEO compensation for all industries is $3,537,105 (adjusted for 2011 dollars). Murphy has used values with pre-2006 compensation disclosure requirements indicating that the numbers are not straight comparable with each other. However, my results show a 40% growth in total compensation for the 2007-2011 time period.

All the values used in Tables 5 and 6, were reported in the respect of SEC 2006 compensation disclosure requirements. In Table 6, Salary (SALARY) represents the dollar value of the base salary earned by the named CEO during the fiscal year, Bonuses (BONUS) represent the dollar value of a bonus earned by the named CEO during the fiscal year. Value of Stock Awards (STOCK_AWARDS) is value of stock-related awards that do not have option-like features. Valuation is based upon the value of shares that vested during the year as detailed in FAS123R. It discloses
the cost that was charged to the company (shareholders) for the year, as distinct from
the grant date fair value of the award. Value of Option Awards (OPTION_AWARDS) is value of option-related awards. Valuation is based upon the
value of options that vested during the year as detailed in FAS123R. It discloses the
cost that was charged to the company (shareholders) for the year, as distinct from the
grant date fair value of the award. Non-Equity Incentive Plans (NONEQ_INCENT) is value of amounts earned during the year pursuant to non-equity incentive plans. The amount is disclosed in the year that the performance criterion was satisfied and the compensation was earned. Change in Pension Values (PENSION_CHG) is composed of above-market or preferential earnings from deferred compensation plans and aggregate increase in actual value of defined benefit and actual pension plans during the year. Other compensation (OTHCOMP) represents other compensation received by the executive including perquisites and other personal benefits, termination or change-in-control payments, contributions to defined contribution plans (e.g. 401K plans), life insurance premiums, gross-ups and other tax reimbursements, discounted share purchases etc.

As shown in the Tables 5, 6 and Figure 1, the mean and median CEO compensation has increased (in 2011 constant dollars). Table 6 documents the main components of CEO compensation. There is a great deal of heterogeneity in pay practices across the firms and over time. The median CEO salary has grown 9% from 2007 to 2011. The development of base salary is relatively moderate indicating larger rises in other CEO compensation, as the total compensation has grown strongly. The standard deviation of salary has remained constant and there is no such a remarkable differences across the firms. The mean of Bonus payments has declined over the sample period by 30% and as the median is zero, it gives a sight of traditional bonuses are losing its popularity as compensation mechanism. The median of Stock Awards rises rapidly, 130%, during the time period. Instead, the median of Stock Option Awards declines 17%. It indicates more popularity to use stock awards on CEO compensation instead of stock option awards. The median of Non-Equity Incentive plans also grows remarkably by 84%. The mean of Change in Pension Values grows by 52% during the period and the median of Other Compensation has the same value both in 2007 and 2011.
Murphy (1999) reports average growth for CEO median salaries only 3.5% during 1992-1996, which is relatively small, compared to my result of 9% for 2007-2011. Bonuses in Murphy’s paper grow rapidly 69.5% as I reported a decline of 30%. The differences may originate from comparability issue as the disclosure policies have changed after 2006. Another explanation is that traditional bonuses are losing their attractiveness among directors and more equity-based and non-equity incentive plan compensation is used in recent years.
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As Figure 2 shows, the mean CEO compensation first declines in 2008-2009 and then rises above the value of 2007 in 2010-2011. I used mean values, as median variables had too many zero values to show complete level and composition of total CEO compensation. Option and Stock Awards cover over 50% of CEO total compensation in each year that indicates the relatively high importance of equity-based-compensation in total compensation. Non-Equity Incentive Plans hold also high portion of CEO total compensation. However, use of traditional cash bonuses has declined over the period. My results differ from the ones presented by Murphy (1999) using 1992-1996 time period. I report lower portion of base salary, bonuses and option awards but higher portion of stock awards and non-equity incentive plans during 2007-2011. There might be some bias in comparison as Murphy (1999) uses median values of compensation components and I ended up using mean values to show more complete data.
4.2 Stock options and common stock holdings

There are lots of different securities used for CEO compensation that have option-related features. They include stock options, stock appreciation rights, and other instruments with option-like features. As they all are classified as options in Execucomp data, I will call and treat all of these instruments as options. There are also different kinds of stock used for CEO compensation: restricted stock, restricted stock units, phantom stock, phantom stock units, common stock equivalent units and other stock-related instruments that do not have option-like features. Them as well, I will use a comprehensive classification of stock.

Stock Option Holdings (OPTIONS) is the sum of estimated value of in-the-money unexercised exercisable options and estimated value of in-the-money unexercised unexercisable options. Currently, ITM unexercised exercisable and unexercisable options represent the estimated aggregate value of ITM vested options at fiscal year end, calculated based on the difference between the exercise price of the options and the close price of the company’s primary issue of stock at year end. Stock Holdings (STOCK_UNVEST_VAL) represent the aggregate market value of restricted shares held by the executive as of fiscal year end.

As it shows Table 7, the median value of CEO stock option holdings peaked in 2007. It declined remarkably in 2008 but since that they have been increasing. In 2011, the value is still less than reported in 2007, meaning 45% decline over the sample period. The median stock option holdings for whole sample, $1,220,000, are almost one third of median annual compensation of CEO. Even earlier mentioned the decline of the CEO option holdings, they are still a potentially large source of income for CEOs. The median Stock Holdings has increased dramatically, even 130%, over the period. The median stock holdings for whole sample, $ 1,062,800, are 27% of median annual compensation of CEO. Together with stock option holdings, stock holdings play an important role in CEO’s wealth. They are almost two thirds of CEO’s annual compensation.
### Table 7. Value of CEO stock option and restricted stock holdings 2007-2011 ($1000)

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Option Holdings Mean</td>
<td>13,399</td>
<td>3,834</td>
<td>6,156</td>
<td>8,669</td>
<td>7,224</td>
</tr>
<tr>
<td>Median</td>
<td>1,989</td>
<td>45</td>
<td>1,139</td>
<td>1,842</td>
<td>1,085</td>
</tr>
<tr>
<td>Std Dev</td>
<td>37,751</td>
<td>13,587</td>
<td>15,325</td>
<td>28,554</td>
<td>16,965</td>
</tr>
<tr>
<td>Stock Holdings Mean</td>
<td>3,435</td>
<td>2,108</td>
<td>3,012</td>
<td>3,845</td>
<td>4,773</td>
</tr>
<tr>
<td>Median</td>
<td>727</td>
<td>511</td>
<td>954</td>
<td>1,449</td>
<td>1,673</td>
</tr>
<tr>
<td>Std Dev</td>
<td>9,961</td>
<td>5,901</td>
<td>6,973</td>
<td>8,760</td>
<td>27,710</td>
</tr>
</tbody>
</table>

Values are reported in 2011 dollar and adjusted for inflation using CPI.

In Table 8 are presented CEO stock holdings with and without stock options as a percentage of total shares outstanding. SHROWN_TOT_PCT is percentage of total shares outstanding held by the executive (if greater than 1%). SHROWN_EXCL_OPTS_PCT is percentage of total shares outstanding held by the executive, excluding options (if greater than 1%). The portion has declined over the period, no matter whether stock options are included or not. It could be due to nature of the dataset as the number of observations declines as moving from year 2007 to 2011. As I reported earlier the remarkable large rise in CEO stock awards, these findings are conflicting with the declined CEO stock ownership of total stock outstanding. However, there are other things beyond the stock awards that may have influence on these results.
### Table 8. CEO stock option and restricted stock portions 2007-2011(%)  

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CEO Stock Holdings % of Total Shares</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>5.4</td>
<td>5.1</td>
<td>3.0</td>
<td>2.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Median</td>
<td>2.3</td>
<td>2.3</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Std Dev</td>
<td>10.4</td>
<td>8.1</td>
<td>5.8</td>
<td>5.2</td>
<td>3.2</td>
</tr>
<tr>
<td>Min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>209</td>
<td>69.1</td>
<td>59.7</td>
<td>57.3</td>
<td>24</td>
</tr>
<tr>
<td>N</td>
<td>1040</td>
<td>939</td>
<td>924</td>
<td>903</td>
<td>621</td>
</tr>
<tr>
<td><strong>CEO Stock Holdings % of Total Shares Excluding Options</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.9</td>
<td>3.8</td>
<td>2.0</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Median</td>
<td>1.0</td>
<td>1.0</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Std Dev</td>
<td>8.1</td>
<td>7.8</td>
<td>5.5</td>
<td>4.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>87.6</td>
<td>61.2</td>
<td>54.8</td>
<td>54.5</td>
<td>23.6</td>
</tr>
<tr>
<td>N</td>
<td>1040</td>
<td>939</td>
<td>924</td>
<td>903</td>
<td>621</td>
</tr>
</tbody>
</table>

Values are reported in 2011 dollar and adjusted for inflation using CPI.

### 4.3 Firm size

I collected firm financials and stock price data using CRSP/Compustat Merged Database from 2007 to 2011. The data collected includes annual sales, number of shares outstanding, share price in the end of the fiscal year, return and dividends. I merged this data to the Compustat EXECUCOMP CEO compensation data by firm name and year.
Table 9 contains descriptive statistics of two firm size measures: annual sales and market value. The mean annual sales of the firms in the sample is 2.9 billion USD and median is lower at 0.28 billion USD. The mean market value of the firms in the sample is 3.3 billion USD and median is lower at 0.3 billion USD. The mean annual sales of the firms has increased by 34% but the mean market value is at the same level in 2007 and 2011.

Table 9. Firm Size Variables 2007-2011($1,000,000)

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Sales</td>
<td>Mean</td>
<td>2,990</td>
<td>3,038</td>
<td>2,917</td>
<td>3,237</td>
<td>4,006</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>266</td>
<td>276</td>
<td>289</td>
<td>347</td>
<td>430</td>
</tr>
<tr>
<td>Market Value</td>
<td>Mean</td>
<td>4,053</td>
<td>2,493</td>
<td>3,387</td>
<td>4,001</td>
<td>3,980</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>387</td>
<td>218</td>
<td>334</td>
<td>452</td>
<td>315</td>
</tr>
</tbody>
</table>

Values are reported in 2011 dollar and adjusted for inflation using CPI.
5 METHODOLOGY

In this thesis, I run an empirical test based on ordinary least squares (OLS) linear regression. Pay-for-performance regressions measure the relation between CEO compensation and firm stock performance.

\[(1.1)\, \Delta(\text{CEO Pay-Related Wealth}) = \text{Total Pay} + \Delta(\text{Value of Stock}) + \Delta(\text{Value of Stock Options}).\]

5.1 CEO pay-for-performance regression

I measure CEO pay-for-performance similar to Jensen and Murphy (1990a). I regress the changes in shareholder wealth with two different compensation proxies using ordinary least squares (OLS) method. The dependent variables used in regression are presented in Table 10.

<table>
<thead>
<tr>
<th>Compensation proxy</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary + bonus</td>
<td>Reported base salary and bonus</td>
</tr>
<tr>
<td>Total compensation</td>
<td>Salary + bonus + option grants + stock grants + non-equity incentive plan + change in pension value + other compensation</td>
</tr>
</tbody>
</table>

All money values are adjusted for 2011 dollar using CPI.

I will use annual first differences in market value in regression with annual first differences in compensation. The simple least-squares regressions are the following:

\[(1.2)\, \Delta(\text{CEO compensation})_t = a + b\Delta(\text{Shareholder Wealth})_t.\]
where, \( \Delta(\text{Shareholder Wealth}) \) is defined as the beginning-of-period market value multiplied by the inflation-adjusted rate of return on common stock. The change in shareholder wealth variable is defined as \( r_t V_{t-1} \), where \( r_t \) is the inflation-adjusted rate of return on common stock realized in fiscal year \( t \), and \( V_{t-1} \) is the firm value at the end of previous year (Jensen and Murphy 1990a).

I will also use lagged differences in shareholder wealth which allows current pay revisions to be based on past as well as current performance,

\[
(1.3) \quad \Delta(\text{CEO compensation})_t = a + b_1 \Delta(\text{Shareholder Wealth})_t + b_2 \Delta(\text{Shareholder Wealth})_{t-1}.
\]
6 RESULTS

Table 11 summarizes estimates of the relation between CEO cash and bonus compensation and shareholder wealth. The coefficient of change in shareholder wealth $b = 0.00207$ in column 1 is not statistically significant ($t=1.54$) indicating the relation between CEO cash compensation and firm performance is just suggestive. Column 2 of the table 10 reports coefficients based both current and past performance. The coefficients are negative and statistically significant.

Table 11. Estimates of pay-for-performance sensitivity.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Δ (Salary + Bonus) (1)</th>
<th>Δ (Salary + Bonus) (2)</th>
<th>Δ (Total Pay) (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-4.8</td>
<td>-120.0</td>
<td>163.8</td>
</tr>
<tr>
<td>Change in Shareholder Wealth</td>
<td>0.00207 (1.54)</td>
<td>-0.01324 (-6.06)</td>
<td>0.10195 (9.32)</td>
</tr>
<tr>
<td>Change in Shareholder Wealth t-1</td>
<td>--</td>
<td>-0.00658</td>
<td>0.04863</td>
</tr>
<tr>
<td>R²</td>
<td>0.0003</td>
<td>0.0053</td>
<td>0.0150</td>
</tr>
<tr>
<td>Pay-for-performance sensitivity,b</td>
<td>0.00207</td>
<td>-0.01982</td>
<td>0.15058</td>
</tr>
<tr>
<td>(F-statistic for “b”)</td>
<td>(2.36)</td>
<td>(21.95)</td>
<td>(49.82)</td>
</tr>
</tbody>
</table>

All money values are adjusted for 2011 dollar using CPI. The regression coefficients have been multiplied by 1000 for easier comparison.
Negative coefficient for year t-1 indicates that last year’s performance does not matter in this year’s pay. The sum of the coefficients $b = b_1 + b_2 = -0.01982$, is statistically significant ($F=21.95$), suggesting that CEO faces a loss of 2¢ for each $1,000 change in shareholder wealth.

Table 11, column 3 reports the relation between the change in CEO total pay and change in shareholder wealth based on Compustat Execucomp data. The sum of coefficients $b = b_1 + b_2 = 0.15058$ is statistically significant ($F=49.82$) indicating that total compensation changes by 15¢ for each $1,000 change in firm value. The intercept also shows that CEO receives $163,800 in years in which shareholders return is zero.

Table 12 summarizes estimates of the relation between the change in value of CEO stock option holdings and change in shareholder wealth. The coefficient of change in shareholder wealth $b_1 = 0.03248$ in column 1 is statistically significant ($t=3.92$) indicating that value of stock option holdings changes by 3¢ for each $1,000 change in firm value measured as current year’s performance. The coefficient for past year t-1 is $b_2 = 0.02995$ is also positive and statistically significant ($t=3.61$). Past year’s performance affects on current year’s stock option holdings of the CEO so that they change by 3¢ for each $1,000 change in firm value. The sum of the coefficients $b = b_1 + b_2 = 0.06243$ is also statistically significant ($F=12.95$) indicating total change by 6¢ for each $1,000.

Column 2 of table 12 presents the change in total pay added to the change in value of stock options related to firm performance. The value of intercept shows that CEOs earn $258,000 during the year when shareholders’ return is zero. The sum of coefficients $b = b_1 + b_2 = 0.20052$ is positive and statistically significant ($F=29.28$) indicating total change in CEO pay by 20¢ for each $1,000 change in firm value. These results are close to ones presented by Jensen and Murphy (1990a) who reported total change in CEO pay by 30¢ for each $1,000 change in firm value. However, the numbers cannot be fully compared as they have used different time period and data.
Table 12. Estimates of pay-for-performance sensitivity including value of stock options.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Δ (Value of Stock Options)</th>
<th>Δ (Total Pay) + Δ (Value of Stock Options)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>89</td>
<td>258</td>
</tr>
<tr>
<td>Change in Shareholder Wealth</td>
<td>0.03248</td>
<td>0.12611</td>
</tr>
<tr>
<td></td>
<td>(3.92)</td>
<td>(6.83)</td>
</tr>
<tr>
<td>Change in Shareholder Wealth t-1</td>
<td>0.02995</td>
<td>0.07441</td>
</tr>
<tr>
<td></td>
<td>(3.61)</td>
<td>(4.03)</td>
</tr>
<tr>
<td>R²</td>
<td>0.1313</td>
<td>0.0088</td>
</tr>
<tr>
<td>Pay-for-performance sensitivity, b</td>
<td>0.06243</td>
<td>0.20052</td>
</tr>
<tr>
<td></td>
<td>(12.95)</td>
<td>(29.28)</td>
</tr>
<tr>
<td>Sample Size</td>
<td>6,570</td>
<td>6,564</td>
</tr>
</tbody>
</table>

All money values are adjusted for 2011 dollar using CPI. The regression coefficients have been multiplied by 1000 for easier comparison.

CEO dismissal is the moment when they receive massive severance payments. That’s why these provisions should be taken into account when estimating the pay-for-performance sensitivity. Table 13 shows the median payment for CEO in case of dismissal and estimated pay-for-performance with -50% market return. The -50% return relative to market is based on the study by Jensen and Murphy (1990a), who used the same rate predicting the CEO dismissals. The median payment for CEO if dismissal occurs is $9,823,000 and estimated pay-for-performance b=0.03643. When CEO’s firm stock performance is 50% below market, CEO pay changes by 4¢ for each $1,000 change in shareholder wealth.
Table 13. Pay-for-performance sensitivity from CEO dismissals.

<table>
<thead>
<tr>
<th>Median Payment if CEO dismissal occurs (in 2011 constant $1,000)</th>
<th>Estimated pay-for-performance with -50% market return</th>
</tr>
</thead>
<tbody>
<tr>
<td>9,823</td>
<td>0.03643</td>
</tr>
</tbody>
</table>

All money values are adjusted for 2011 dollar using CPI. The regression coefficients have been multiplied by 1000 for easier comparison.

Median CEO stock ownership as percentage of shares outstanding, excluding stock options for the sample, is 0.47%. Thus, change in wealth related to stock ownership for CEO with median stockholdings is $4.7 per $1,000.

Table 14 presents my final estimate of the pay-for-performance sensitivity including salary and bonus, total compensation, change in the value of stock options, change in wealth due to dismissal and change in stock ownership – is $4.93 per $1,000 change in shareholder wealth. The result is relatively higher than $3.25 presented by Jensen and Murphy 1990a. The biggest difference is with change in stock ownership. Jensen and Murphy (1990a) reported median CEO stockholdings as 0.25% compared to 0.47% in my sample. Larger CEO stockholdings result higher estimated pay-for-performance sensitivity.
Table 14. Estimated pay-for-performance sensitivity.

<table>
<thead>
<tr>
<th>Predicted CEO-Wealth Change per $1,000 Change in Shareholder Wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Change in this year’s and next year’s salary and bonus</td>
</tr>
<tr>
<td>2. Total Compensation</td>
</tr>
<tr>
<td>3. Change in the Value of Stock Options</td>
</tr>
<tr>
<td>4. Change in Wealth Due to Dismissal</td>
</tr>
<tr>
<td>5. Change in Stock Ownership</td>
</tr>
<tr>
<td>6. Total Change in all Wealth</td>
</tr>
</tbody>
</table>
7 CONCLUSIONS

This empirical study provides further evidence on CEO pay-for-performance sensitivity using the latest Compustat Execucomp data for 2007-2011 time period. Several researchers have argued if CEOs are paid like bureaucrats. My answer is no, as a result of CEO stock and stock option holdings. I report change by $4.93 in CEO wealth per $1,000 change in shareholder wealth. On average, each $1,000 change in shareholder wealth results to a decrease in current and past year’s salary and bonus of about 2¢. The total compensation plus the discounted present value of the change in salary and bonus changes by about 15¢ per $1,000 change in shareholder wealth. Also the value of CEO’s option holdings plus the gains from exercising options changes by about 6.2¢ per $1,000 change in shareholder wealth. Pay-for-performance sensitivity in case of CEO dismissal is 3.6¢ per $1,000 change in shareholder wealth.

As mean stock ownership for all CEOs is 0.47%, the pay-for-performance sensitivity for CEO stock ownership changes by $4.7 per $1,000 change in shareholder wealth. Pay-for-performance sensitivities are driven primarily by stock options and stock ownership. Especially, the role of CEO stock ownership is very important when estimating the pay-for-performance sensitivities. In my results, the role of CEO stock ownership is more than 95% of total estimated pay-for-performance sensitivity. Also total compensation has grown in the U.S. during the 2007-2011 period and total mean CEO compensation for the period is $5,968,000 a year. The mean value of option awards has declined by 18% over the period which points out a question have option awards lost their shine as a compensation tool? Meanwhile, median CEO stockholdings have increased rapidly by 130%. The rise in popularity of common stock as a compensation tool leaves many question for the research in future.

Higher pay-for-performance sensitivity may ease the differing interests of agent and principal. However, new problems may arise when the company stock is not performing as expected. CEOs may suffer losses due to stock price decline creating temptations for abusing company’s resources. Stock ownership doesn’t reduce
systematic risk CEO faces with his or her portfolio. That’s why other compensation methods are needed like relative performance evaluation (RPE). In practice, RPE is not yet used widely among the public U.S. firms and is seen a good method only when the CEO is facing relatively high systematic risk in the portfolio.

Although the theoretical and empirical literature on executive compensation is fairly comprehensive, it is far from complete and leaves many issues for the future research. CEO pay levels are well documented in the U.S. but cannot give us all the answers. CEOs understand how their actions affect accounting performance but may not have the complete idea how to increase stock performance. Good stock performance during the general bull market guarantees high pay for the CEO but it’s hard to measure whether CEO’s actions have had effect on the performance or not. I would also like to see more empirical studies on how equity-based compensation affects on CEOs excessive risk taking and how the financial crisis in 2008 changed the compensation structure.
REFERENCES


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