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The effects of CEO Remuneration, Managerial Stock Ownership and Board Independence on Firm Performance

An Empirical Analysis of the U.S. Market

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Preface and Acknowledgements

This is my master thesis *'The effects of CEO Remuneration, Managerial Stock Ownership and Board Independence on Firm Performance'*. It is a research in the field of Corporate Governance. This thesis is written to graduate within the Erasmus School of Economics, Erasmus University Rotterdam for the Master Specialization Financial Economics.

The end result of this thesis would have not been established without the aid of my thesis supervisor Y. Zhu. For this, I would like to thank Y. Zhu for his time and availability, his feedback and provided guidance on the progress of my thesis.

Abstract

This thesis has studied the potential effects of CEO remuneration, managerial ownership and board independence on firm performance, measured by Tobin's Q, I conduct an empirical analysis on the effects of these corporate governance mechanisms, using a sample of 162 US firms publicly listed on either the NASDAQ or NYSE index over a time period of 12 years (2003-2014). I provide empirical evidence that there is no significant relation between firm performance and CEO remuneration. Finding no pay-for-performance relation lends no support to the rationale of the agency theory. Instead, these empirical results entail the ability of CEOs to use their pay to extract 'rents' from the corporation, favoring the managerial power theory. Furthermore, I find a significant non-linear relationship between managerial ownership and firm performance, which is in line with the agency approach. Lastly, I found a significant positive relation between the number of outsiders on the board and firm performance. Increasing the percentage of outsiders by 10%, roughly increases firm performance by 0.865%. This suggests that independent board members are effectively reducing agency costs and asymmetric information in this sample, thereby positively affecting firm performance.

Keywords:

Corporate Governance, CEO Remuneration, Managerial Stock Ownership, Board Independence, Firm Performance, Agency Theory

JEL Classification codes:

G30, G32, G34, G35, M12

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I. Introduction

In recent years, growing activism within a company by institutional shareholders in particular is observed. During the financial crisis, the concerns of these shareholders were rising. They felt like their financial interests were hardly taken into consideration, causing conflicts between management and the shareholders (Goodijk, 1998). One of the key problems associated with corporate governance is the conflict of interest between shareholders and managers. The solution is to use certain approaches to align the interest of the shareholders with those of the management of the company and to assure the investors that they get a return on their investment. In other words, corporate governance is generally regarded as a set of complementary mechanisms that brings the activities and decisions of managers in alignment with the interests of shareholders. (Anson et al., 2004). Different corporate governance mechanisms and their particular effects is interesting to study, as previous studies have shown that there is still no uniform conclusion on the effects of several corporate governance mechanisms and their effects. The study of Mak & Kusnadi (2005) examines the effects on firm performance by several corporate governance mechanisms. One of the mechanisms they study is the size of the board. They find an inverse relation between board size and firm performance. Furthermore, they find that the implications of these mechanisms apply to numerous countries, each having distinctive corporate governance systems (Mak & Kusnadi, 2005). This suggests that one size of corporate governance does not fit all.

Lately, the debate regarding the remuneration structure of the CEOs of listed companies has sparked up. Often the rewards are considered disproportionate and even unacceptable, on the grounds that the rewards of CEOs have skyrocketed in recent years in comparison to the rewards of the lower functions in a corporation. According to David & Mishel (2014), the payment of U.S. CEOs continues to rise, while the salary of the average laborer stagnates (Davis & Mishel, 2014). This obviously causes a great deal of controversy, especially in the economically weak times prevailing for several years. One of the corporate governance mechanisms this thesis examines is CEO compensation. It captures the effects of this compensation on firm performance, measured by Tobin's Q. The choice of the remuneration contract, which provides the remuneration of managers, is another key component of the corporation's governance structure. Besides the level of rewards, the decision concerning the form of rewards and the incentives of the executives may be of great importance. One would suggest that a higher compensated CEO works harder to improve the firm performance of the company. However, the study of Michaud & Gai (2009) shows that CEO compensation has no significant effect on firm performance and impeaches the suggestion that higher compensation leads to higher firm performance (Michaud & Gai, 2009).

The ownership structure of equity plays an imperative role within the corporate governance structure of a company. The ownership structure deals with the amount of shares held by internal managers ('internal share ownership'). It is often assumed that a larger amount of equity owned by executives incentivizes them to undertake activities that maximizes the shareholders' value (Jensen & Meckling, 1976). Furthermore, a higher equity stake may induce the risk-taking behavior of managers and as a result affects the firm performance. Wright et al. (1996) show that higher level of stock ownership by managers reduces the growth-oriented risk taking behavior and affects the growth opportunities, incorporated in the Tobin's Q (Wright et al., 1996).

Along with CEO compensation and equity ownership, the board composition of a firm can influence the performance as well. The number of outside directors[1] can have a significant effect on performance or the compensation structure. A more independent board can have superior monitoring capabilities in comparison to a captured board. The monitoring results of a captured board can lack credibility. According to Denis & McConnel (2003), the capabilities of monitoring by a captured board are compromised by observed loyalties or friendly connections to the management (Denis & McConnel, 2003). Looking at board independence as a mechanism, Erkens et al. (2012) show that a board with a more independent structure suffers lower firm performance, while Francis et al. (2012) finds no significant relation between board structure and firm performance. According to Jensen & Meckling (1976), independent boards may be more likely to react to the pressure of shareholders in periods of financial distress (Jensen & Meckling, 1976). The enhanced reactions independent board may have on this pressure can induce firms to obtain a more shortsighted myopic view to focus on short-term profits rather than focusing on long-term investing. This myopic view increases the risk taking behavior of managers, causing larger losses in the long-run (Erkens, Hung, & Matos, 2012).

While the effects of these corporate governance mechanisms have been studied to some extent, this thesis provides extensive research by looking at the effects of managerial stock ownership, board structure and CEO compensation in a more recent period. What makes this research unique, is the fact that it aims to gather the effects of multiple corporate governance mechanisms in a single work. This thesis examines the effects of managerial stock ownership, board independence and CEO compensation on firm performance, measured by Tobin's Q, based on the following research question: *'What are the effects of CEO compensation, managerial stock ownership and board independence on firm performance for US firms publicly listed on the NASDAQ/NYSE indices for the period 2003-2014?'*

[1] Independent directors are directors on the board with no direct affiliation with the company.

While there has been a plethora of previous research on the effects of compensation, stock ownership and board independence on firm performance, I try to complement the existing literature by examining the outcomes of these mechanisms in a single work using a relatively recent timeframe, which has not been done thoroughly. In this way, I examine if these effects are in line with previous literature over time. Examining these effects in a single multiple linear regression model has not been done in existing literature. Furthermore, I use a relatively unique sample of firms listed on the NASDAQ/NYSE index, instead of a sample consisting solely of firms listed on the NASDAQ or NYSE. The sample is a unique composition of both the indices. Furthermore, I use a wide range of performance measures, to test the structural validity between the studies corporate governance mechanisms and firm performance. For example, the usage of the Return Index as a performance measure has not been done thoroughly in the existing literature.

This study uses a sample of 162 US companies publicly listed on either the NASDAQ- or NYSE index. The time frame is 12 years from 2003 to 2014. There are 1944 observations in total. I use a multiple linear regression, with CEO remuneration, managerial ownership and board independence as the independent variables. Furthermore, I include several observed firm characteristics (i.e. control variables), year-fixed effects (to control for time-varying factors) and firm-fixed effects (to control for unobserved firm characteristics and unobserved heterogeneity). The main empirical findings suggest there is no significant pay-for-performance relation, contradicting the rationale of the agency theory. Furthermore, I find a significant non-linear relationship between managerial ownership and performance. Lastly, I find a positive relation between the number of outsiders on the board and firm performance, which perhaps provides useful insight about the positive effects of a good governance structure on firm performance.

The remainder of the paper is structured as follows: Section 2 outlines a theoretical framework in order to answer the research question, by using literature research and previous findings. I describe the agency theory and the possible agency costs that arise with CEO compensation and equity ownership and the theory of 'managerial power' when a CEO becomes entrenched. Furthermore, I describe the optimal contracting approach, which states that the agency conflicts between shareholders and executives are mitigated by providing the desired incentives for executives using the 'optimal contract'. Section 3 characterizes the data and methodology used of the empirical research and the respective empirical restrictions imposed. In section 4, the acquired data is subjected to empirical testing in order to answer the research question. Lastly, section 5 concludes and I briefly discuss limitations to the research and possible future research.

2. Theoretical Framework

This section outlines the theoretical framework and the ideas and implications I base this research upon. I describe the overall purpose of Corporate Governance and how this is realized in the U.S. Furthermore, I describe several theories that are utilized as a vital mechanism to explain the remuneration contracts, such as the agency theory, optimal contract theory and the managerial power theory. Furthermore, I examine earlier findings on the effects of the several corporate governance mechanisms on firm performance, in order to develop my hypotheses later on.

2.1 Corporate Governance

The aforementioned definition of Corporate Governance is that it is generally regarded as a set of complementary mechanisms that brings the activities and decisions of managers in alignment with the interests of stakeholders and to assure that the investor obtain a return on their investment (Anson et al., 2004). Shareholders and other stakeholders are dependent on the decisions and performances of the executives. It can occur that the interests of the managers and shareholders are not properly aligned, which implies that the managers do not always act in the best interests of the shareholders and other stakeholders. A separation between 'ownership' (the shareholders) and 'control' (the management) can lead to an inefficient contract (Hart, 1995). In order to align the interests of the owners and the executives, one would suggest the rewards of the managers to solely be a function of the corporation's performance. However, this exposes the managers to additional idiosyncratic risk as the earnings of a company can be negative in one year, while the executive puts in effort to maximize firm value. Furthermore, a typical listed company has a lot of small owners/shareholders that have little to no power to correct the management directly. In this way, these owners cannot interfere with the daily monitoring, thus a separation of ownership and control is a fact. Therefore, when separation of ownership and control exists, good Corporate Governance is essential to ensure the interest of management and shareholders are aligned.

Hart (1995) suggests that Corporate Governance is irrelevant when there is no presence of agency conflicts. When there are no agency conflicts present in a company, each individual can maximize his own utility. Effort that is put in is paid back in the gratification of the individual, thus making Corporate Governance irrelevant. Additionally, since there are no disagreements between principal and agent in this case, a governance structure is not required (Hart, 1995). When there are agency conflicts and transaction costs, a corporate governance structure becomes imperative. Transaction costs ensure that not all Corporate Governance problems are dealt with through an optimal performance-related remuneration contract, as the transaction costs make these contracts incomplete (Hart, 1995).

2.2 Corporate Governance in the U.S.

Regarding the Corporate Governance in the U.S., there is an Anglo-American Corporate Governance system. This system particularly takes the widely dispersed shareholders' base into account. The board of directors in the U.S. mainly has to protect the interests of the shareholders as a clear fiduciary duty, whereas in other countries weight is given to the interests of other stakeholders as well (Denis & McConnel, 2003). As stated by Denis & McConnel (2003), the conflicts of interest between management and shareholders mingled with the inability to perfectly monitor the management and write perfect contracts will reduce the firm value, ceteris paribus. The U.S. board has delegated responsibility to the CEO for the daily management. Furthermore, it is responsible to the shareholders for the overall strategy and governance of the corporation (Denis & McConnel, 2003).

The corporate scandal of Enron indirectly led to widely public interest of enhanced strict corporate governance regulation in 2002. Enron made huge losses, but creatively kept the losses from the books, by shadowy structures with various subsidiaries (Fox, 2002). After official investigation by the Security and Exchange Commission (SEC), it became clear that the profits had significantly been exaggerated for several years. In reality, Enron were $20 billion dollars in debt (Fox, 2002). The SEC announced that the Corporate Governance rules should be tightened to prevent such scandals in the future. As a result, they introduced the Sarbanes-Oxley Act (SOX) in 2003. The overall intention of the SOX legislation is to improve the accuracy and transparency of the information provided to the board and shareholders (Denis & McConnel, 2003). SOX attempts to achieve this by establishing more outsiders and financial experts on the board. All publicly listed companies on the NASDAQ/NYSE must have a majority of independent directors on the board. Furthermore, the audit committee consists entirely of independent directors. However, specific legislation regarding the separation of chairman and CEO is absent. A board votes about the executive pay. A conflict of interests arises when the CEO is the chairman, the so called CEO duality. In this case, the CEO would vote about his own executive pay in that case. This reduces the effectiveness of the board (Mohr, 2012). In the Netherlands, according to the Code-Tabaksblat, it is prohibited for a CEO to be the chairman in a limited liability company to ensure the objectivity of the board and a balance of power between executive- and non-executive directors.

The study of Linck, Netter and Yang (2008) shows that post-SOX the boards are significantly larger and more independent. Furthermore, there is an increase in the cost of directors and overall director salary pay, especially amongst smaller firms. Besides that, the separation of CEO and chairman has doubled post-SOX, though less than a third of all the corporations in the sample has separated these functions overall (Linck, Netter, & Yang, 2009).

Post-SOX also significantly influenced the remunerations of the CEOs. Chhaochharia and Grinstein (2006) investigated the board structure within U.S. companies pre-SOX regulation and post-SOX, respectively. Their results show that the monitoring of the board has significantly increased post-SOX regulation, while the CEO remuneration has significantly reduced after controlling for unobservable firm- and time-varying effects (Chhaochharia & Grinstein, 2006).

2.3 Agency theory

The majority of empirical studies on CEO remuneration and management equity ownership utilizes the agency theory as a vital mechanism in explaining the remuneration contracts and equity ownership. Berle & Means (1932) were the first to observe that the separation of ownership and control leads to agency problems in large publicly listed companies, as the managers pursue different interests than those of the owners (Berle & Means, 1932). Berle & Means (1932) laid the foundation of the traditional agency theory. After the 'Irrelevance Proposition' by Modigliani and Miller in the late fifties, the agency theory was first introduced by Jensen and Meckling (1976). They argue that managers do not always act in the best interests of the shareholders, when both the parties are maximizing their own utility, leading to agency costs and thus a decline in enterprise value (Jensen & Meckling, 1976). This theory states that the contract between equity holder (the principal) and manager (agent) leads to the manager serving the interests of the principal, reducing the principal-agent problem.

Hendrikse (1998) defines the principal-agent problem in further detail. The problem consists of two ingredients: a) Conflict of interests and b) information asymmetry. The principal observes the results of the decisions of the agent, but the actual efforts are not observable. Activities of the agent are therefore difficult to observe; hence the principal loses control over the agent. The result of a particular performance by the agent may be the result of other factors than the effort of the agent (Hendrikse, 1998). Therefore, it is impossible to depend the rewards of the agents solely on the actual performance. As a result, there is information asymmetry, as the agent has superior information available relative to the principal. For example, the agent knows more about specific circumstances within the company underlying the final results (Hendrikse, 1998).

Examining information asymmetry, I divide it into *ex-ante* information asymmetry and *ex-post* information asymmetry. The *ex-ante* information asymmetry arises prior to the setup of the contract between principal and agent. This implies that one of the parties conceals information about characteristics, leading to adverse selection. This problem is addressed first by Akerlof (1970), using 'lemons' (bad cars) as an example. If the buyer cannot distinguish good and bad cars, they are only willing to pay the average price. In this case, the sellers of the good cars do not receive a fair price and

eventually pull out the market, leaving only the 'lemons' (Akerlof, 1970). This also holds between principal and agent. It is difficult for the employer (principal) to distinguish motivated- and unmotivated employees (agents). Akerlof (1970) provides two solutions to deal with the adverse selection problem: Screening and signaling. By signaling your features and thus providing the principal with additional information, it resolves the information asymmetry. One example is the need for particular education credentials to apply for a job. In this way, the ability level of the employee is signaled to the employer implying that the 'more-informed' agent moves first. The other solution is screening, where the 'less-informed' principal induces the agent to disclose additional information and thus the 'less-informed' principal moves first. The principal may offer a certain wage to the agent in an attempt to screen the agent, by providing large bonuses to attract agents who are willing to put in a lot of effort (Akerlof, 1970).

Contrary to *ex-ante* information asymmetry, *ex-post* information asymmetry occurs after the initial contract between principal and agent is set up. The agent performs a non-controllable hidden action after signing the contract: moral hazard. Furthermore, the information between principal and agent might be symmetric prior to the contract, but after the contract the agent knows more about a specific important variable compared to the principal. For example, only the manager knows whether or not a specific strategy is viable in certain market conditions if the principal is not informed. This is *ex-post* information asymmetry. Better monitoring of the managers can reduce the *ex-post* information asymmetry and increase the ability of following the manager's actions. However, it is impossible to perfectly monitor all the actions of the managers. As a result, this can lead to behavior of the manager which is sub-optimal from the principal's perspective. Some examples of sub-optimal behavior by managers are entrenchment and 'empire building'.

When a manager becomes entrenched, it is costly to replace the manager. The study of Shleifer & Vishny (1989) showed that when it is costly for the shareholders to replace the manager, the probability of being replaced is reduced. In order to become entrenched and thus costly to replace, the manager makes manager-specific investments. By making these investments, the entrenched manager obtains relatively higher wages and increases the flexibility of determining the corporate strategy to his own volition (Shleifer & Vishny, 1989). Furthermore, the study of Morck et al. (1988) showed that large stakes of management ownership decreases the value of the firm, due to entrenchment. Several mechanisms that facilitate more control by management will have a negative effect on firm value, for high equity stakes by management. An example is the enhanced control of voting rights by managers (Morck et al, 1988). Additionally, the study of Cronqvist et al. (2009) found that the entrenchment of managers affect worker's pay. Entrenched CEOs pay their workers more and

the study shows that managerial ownership and (weak) corporate governance can affect the compensation of employees (Cronqvist, Heyman, Nilsson, & Svaleryd, 2009) .

Another example of sub-optimal behavior by the manager is 'empire building'. This phenomenon is letting the company grow beyond the optimal magnitude of the firm. It is closely related to the 'Free Cash-Flow' hypothesis from Jensen (1986). He states that manager tend to overinvest when there are large free cash-flows present. Managers are more likely to invest in negative investment opportunities, to increase the amount of assets and thus building the 'empire', which is highly sub-optimal for the shareholder. From their perspective, it is optimal to pay out the free cash-flows as dividend or solely invest in opportunities which enhances the shareholder value (Jensen, 1986).

To ensure that the agent acts on behalf of the principal and to alleviate the information asymmetry, they can draw up an optimal contract that provides the required incentives to the agent. In this way, the remuneration of the agent is dependent on the firm performance. In the next section, I elaborate on this optimal contract theory in the following paragraph.

2.4 Optimal contract theory

Until recently, multiple remuneration studies used the optimal contract theory as the most dominant literature. The remuneration system in the large listed companies is designed to reduce the agency conflicts between shareholder and manager. An effective reward system provides additional value to the firm by providing the desired performance-incentives to the managers through the optimal contract. According to the principal-agent theory, in absence of complete information on the activities and behavior of the executives, it is essential for the shareholders to relate the remuneration of the CEO to the firm performance. This provides the appropriate incentives to the executives and results in optimal decisions by the CEO (Holmstrom, 1979). However, the remuneration contract cannot solely depend on the firm performance, as there are other factors (besides the influence of the CEO) that influence the firm performance. The remuneration contract relying on performance leads to additional idiosyncratic risks, as he is exposed to various types of additional corporate risks. Murphy (1998) constructs a model of a trade-off between the amount of incentives provided and the allocation of the aforementioned risk. He shows that the pay-for-performance sensitivity (*b)* is a follows:

$$b = 1/(1 + r * \sigma^2 * c(e)') \quad (1)$$

With r as the risk-aversion of the manager, σ^2 as the uncertainty and $c(e)'$ the first derivative of the costs of effort of the manager (Murphy, 1998). Equation (1) indicates that the optimal pay-performance relationship ($b=1$) is realized, when:

1) The manager is risk-neutral ($r=0$);
2) The output is obtained with certainty ($\sigma^2=0$).

Furthermore, Equation (1) suggests that the pay-for-performance sensitivity (b) is lower, when (Mur99):

1) Managers are more risk-averse ($r>0$);
2) The uncontrollable noise of the company increases ($\partial b/\partial \sigma^2<0$).

This implies that there is a trade-off between providing higher performance incentives and the risk-aversion of the manager. When the manager is more risk averse ($r>0$), a small portion of the optimal contract is variable (smaller b) and thus a larger portion of the contract fixed (Murphy, 1998).

As briefly mentioned before, according to the Agency theory the level of CEO rewards depends on the extent to which the CEO manages to achieve the optimization of the shareholders' value. As a result, the CEO is rewarded when the stock price goes up. This way of rewarding can be perceived as unfair at times. A CEO can reliably fulfill his function of maximizing shareholders' value, while the share price still falls due to an exogenous shock (e.g. global financial crisis). Garvey and Milbourn (2006) found an asymmetric distribution of CEO remuneration. If the industry does well, the CEO is rewarded and thus compensation rises. However, when the industry underperforms, the CEO remuneration hardly reacts to that. They are rewarded for good luck, but not punished for bad luck (Garvey & Milbourn, 2006).

To summarize the 'optimal contract theory', the optimal contract ensures that managers maximize their performance and act on behalf of the shareholders. This is achieved using performance-related incentives, while taking the consequences for the risk-averse manager into account. The next paragraph contemplates the CEO remuneration from another perspective, namely the 'managerial power theory'.

2.5 Managerial power theory

The most recent alternative theory to executive compensation is introduced by Bebchuk, Fried and Walker (2002), called the 'managerial power theory' or the 'rent extraction theory'. This theory also implies agency problems between managers and shareholders. However, the theory considers the

remuneration contracts as a part of the agency problems itself, not as a tool to align the interests (Bebchuk, Fried, & Walker, 2002). The managerial power theory implies that CEOs are capable to influence the rewards at the expense of the shareholders, especially when a CEO becomes more entrenched. When a CEO becomes more entrenched, its ability to raise its own merits increases. Rewards are no longer entirely determined objectively and independently. The CEO receives a level of remuneration beyond what is optimal from the shareholders' perspective. Consequently, it is possible to achieve high excessive financial benefits ('rents') through higher rewards, which are sub-optimal under the 'optimal contract theory' (Bebchuk, Fried, & Walker, 2002).

Bertrand and Mullainathan (2001) conducted research into the possibility of CEOs to determine their own reward. A distinction is made between the 'optimal contract theory' and the 'managerial power theory' in their research. In their study, 'luck' is a perceivable shock to performance beyond the control of the CEO. They conclude that CEOs receive relatively as much pay for luck as general pay for performance. This is consistent with the managerial power theory. Furthermore, a weak governed firm pay their CEO relatively more for 'luck', as weak governance increases the probability of a CEO becoming entrenched (Bertrand & Mullainathan, 2001). The managerial power of a CEO depends to a large extent on the ownership structure within a company. The more shares the CEO owns, the more influence the CEO has on the board composition. The board composition is a proxy for CEO power. The study shows that a higher percentage of independent directors decreases the pay for luck and thus the managerial power. Lastly, the managerial power decreases when outsiders own large amount of shares, e.g. blockholders (Bertrand & Mullainathan, 2001).

2.6 Stewardship theory

Contrary to the agency theory, the stewardship theory implies there is a congruence of interests between principal and agent, rather than a conflict of interests. The managers are regarded as valuable stewards, whose interests are aligned with the owners. The corporate behavior of the manager yields more utility than the individual self-centered behavior (Davis, Schoorman, & Donaldson, 1997). The theory implies that the stewards strive for the optimal firm value. From the principal's point of view, no additional motivation for the manager is needed in that case. As the behavior of the steward is consistent with goals of the organization, the principal can trust him and additional monitoring is not necessary. Monitoring, a feature of the principal-agency theory, can undermine the collective behavior of the steward and actually decrease the motivation of the agent (Davis, Schoorman, & Donaldson, 1997).

The principal-agency theory assumes that managers are motivated by extrinsic rewards, such as the aforementioned optimal remunerations. These optimal remunerations stimulate the agent to act in the best interests of the principal. On the other hand, the stewardship theory assumes a more intrinsically motivated steward (van Slyke, 2006). The rewards to stimulate the managers are intrinsic, such as the ability to give a meaning to the society or promotion opportunities within the company. Through these intrinsic rewards, managers are motivated to act in the interests of the company. Furthermore, stewards identify themselves with the company and in turn will show cooperative- and altruistic behavior (van Slyke, 2006).

According to the stewardship theory, the organizational structure helps the manager to formulate and implement the plans to achieve a higher corporate value. For instance, the autonomy of the manager should be extended purposefully (Davis, Schoorman, & Donaldson, 1997). Davis et al. (1997) argue that this situation is achieved earlier when the CEO is the chairman of the board. Higher authority and discretion are now assigned to a single person, which clarifies who bears the responsibility for particular issues. The structure of CEO duality is considered dysfunctional within the agency theory. The stewardship theory focuses on organizational structures that facilitate and empower rather than focusing on monitoring and controlling.

2.7 CEO remuneration components

As briefly mentioned earlier, by linking a part of the remuneration of the executive to a performance measure that contributes to the objective of the company, the conflict of interest is mitigated and the executive tries to maximize the shareholder value. In the literature, creating shareholder value is regarded as a benchmark for the firm performance. Below, I elaborate on several CEO remuneration components used to align the interest with short- and long-term incentives.

2.7.1. Base salary

The base salary is the fixed component of the remuneration plan. This salary is often revised annually (depending on market conditions) or remains fixed for several years. If the base salary is revised periodically, it results in a salary that remains competitive compared to other companies in a specific sector, the so called ‘competitive benchmarking’ of the salary (Jensen & Murphy, 1990). CEOs receive the base salary regardless of the efforts exerted and the firm performance. As mentioned before, a more risk-averse CEO prefers a higher fixed base salary and a lower variable component *b* (See *Paragraph 2.4*).

2.7.2 Annual bonuses

The annual bonus is a reward for the performance over a predetermined period, usually one year. Bonuses can be based on individual performance, 'business units' performance or the firm performance. Frequently, the bonuses depend on the firm's profits, which the CEO does not always affect. The purpose of the annual bonuses is to motivate the CEO to generate short-term shareholder value, so called short-term incentives.

A typical bonus scheme distributes no bonuses if the CEO has not reached a certain threshold. The threshold is the minimum performance a CEO must achieve, in order to receive a bonus. When the threshold is realized, the target bonus is granted to the CEO. Additionally, there is a limit associated to the bonus that can be granted. This bonus cap aims to reduce the opportunistic behavior of the CEO, as CEOs could be incentivized to achieve the highest bonus by manipulating the accounting numbers (Healy, 1985).

The use of accounting numbers in bonus plans is controllable and understandable, but two main drawbacks underlie this performance measure. Firstly, managers are able to manipulate accounting numbers by recording revenues earlier ('Earnings management') and shifting costs into the future, to reach the short-term threshold. Furthermore, the use of accounting numbers in bonus plans can lead to a short-sighted 'myopic' view and thus destroy long-term shareholder value, e.g. the CEO is cutting back on the Research and Development expenses as this decreases the short-term profits (Healy, 1985).

2.7.3 Long-term incentive plans

Contrary to the short-term annual bonus plan, the stock- and option plans are long-term performance-related remunerations. The most famous option remuneration to CEOs is a stock option. With these stock options, the CEO has the right to buy the shares[2] of a company for a specific exercise price over a certain period. The advantage of option plans is motivating CEOs to remain active at the company. Therefore, certain conditions underlie these option plans, such as the 'vesting period'. During this period, it is not allowed to exercise these option in order to retain the CEO.

Additionally, the long-term incentives can be in the form of shares. Often, the CEO has the right to utilize a part of their regular annual bonus to acquire ordinary shares of the company. Remuneration in shares incentivizes the CEO to focus more on long-term orientation, as the CEO will benefit from positive developments in the share price. Therefore, a set of rules is attached to the share

[2] The right to buy the shares refers to a call option.

plan, such as the obligation not to sell the shares during an initial two- or three- year period or when a certain predetermined performance is met. This conditional share plan is known as 'Restricted stock'. The advantage is that, compared to cash-based compensation, it is not necessary for the company to pay out additional free cash flows to the CEO. A disadvantage of share plans is that the increased equity ownership by a CEO can increase the risk-averse behavior, as the CEO endeavors to avoid the risk of declining share prices. As a result, the CEO tends to reject riskier projects which, in fact, yield high returns in the future. This phenomenon is called the underinvestment problem.

Khaksari et al. (2009) studied the optimal ratio between cash- and equity compensation. They concluded that the optimal wealth-maximizing mix of compensation consists of 60% cash, 30% equity and 10% alternative types of remuneration. This is not in line with the suggestion that it is optimal to reward CEOs more in shares and options, in order to align the interests of the CEO and shareholder (Khaksari, Mehran, & Tehranian, 2009).

2.8 Relation between CEO compensation and firm performance

Regarding the CEO compensation, I make a distinction between cash-, equity- and total compensation and their respective relationship with firm performance. The computation of each of these compensation components are further discussed in Section 3.2. With regard to cash-based compensation, the pay-for-performance argument would suggest that higher paid CEOs put more effort on increasing the performance of the company. Murphy (1998) found this positive relation between cash compensation and firm performance.

H1a: *There is a positive relation between cash-based compensation and firm performance.*

As discussed earlier, equity-based compensation is an incentive for managers to maximize the wealth of the shareholders. When equity-based compensation is relatively high, management acts more in the shareholders' interests. The agency theory predicted that a CEO makes more value-enhancing decisions, when its remuneration is performance-related. This suggests that higher equity-based compensation will have a positive effect on firm performance, ceteris paribus. Brander & Poitevin (1992) argue that equity-based compensation enhances the risk-taking behavior of managers, because their sensitivity to the stock volatility increases and therefore the expected returns (Brander & Poitevin, 1992). However, Cooper et al. (2009) finds evidence for a negative relation between firm performance and incentive compensation. Cooper et al. (2009) stated that higher equity-based compensation amplifies the CEOs (over)confidence and that investors are overreacting towards firms

with relatively high CEO compensation (Cooper, Gulen, & Rau, 2009). Overall, I expect a significant positive relation between equity-based compensation and firm performance. If this positive relation does not hold, the relationship can either be zero or negative. If the relation is zero, an increase in the equity-based compensation does not affect firm performance. This would suggest that the CEO is already providing maximum effort and at their maximum capacity and that an increase in compensation does not improve firm performance. If the relation is negative, an increase in equity-based compensation leads to lower firm performance, consistent with Cooper et al. (2009).

H1b: *There is a positive relation between equity-based compensation and firm performance.*

To attract high quality CEOs, a firm is willing to pay relatively more for it in general. Since high quality CEOs are expected to provide more effort in generating higher firm value, I expect a significant positive relation between firm performance and the total compensation of the CEO.

H1c: *There is a positive relation between total compensation of the CEO and firm performance.*

2.9 Relation between managerial stock ownership and firm performance

Fostering the amount of internal shares held by the managers is a corporate governance mechanism to reduce the separation of ownership and control. This motivates the managers to act in the interests of the shareholders and thus reduces the agency costs, ceteris paribus. Looking at the relation between managerial ownership and firm performance, the amount of equity ownership can induce the risk-taking behavior of managers and as a result affect firm performance. Wright et al. (1996) show that a higher level of stock ownership by managers reduces the growth-oriented risk taking behavior and affects the growth opportunities, incorporated in the Tobin's Q (Wright et al., 1996). According to Morck et al. (1988), a non-monotonic relationship exists between managerial ownership and Tobin's Q, as Q first rises, then declines and then rises again slightly when the amount of ownership increases. At high amounts of ownership, the manager is completely entrenched and only the incentive effect remains, which explain the rise again after high amounts of ownership (Morck et al., 1988).

The positive relation between Q and managerial stock ownership is in line with the 'convergence-of-interest' hypothesis by Morck et al. (1988). It states that deviating from value-maximizing behavior becomes costlier for the managers when their equity stake rises. According to the convergence-of-interest hypothesis, managers are less likely to utilize corporate assets for their own benefits rather than for the shareholders (Morck et al., 1988).

A negative relationship between managerial ownership and Q is in line with the entrenchment hypothesis. This hypothesis suggests that the corporate governance mechanisms and market discipline become inefficient for large shareholding managers. With larger stakes, the incentive to maximize value mitigates and the manager can become entrenched by the increased voting power and attachment to the firm for example. An entrenched manager is more likely to utilize the corporate assets for their own benefits, e.g. empire building (Morck et al, 1988).

Mehran (1995) also finds evidence for the convergence of interest hypothesis, as Mehran finds a positive relation between the percentage of shares held by the managers and firm performance. Mehran (1995) concludes that the form rather than the amount of compensation matters to motivate managers to enhance shareholder value (Mehran, 1995). However, van Praag (2005) criticizes the results of Mehran in its literature review on this subject. According to van Praag (2005), the research of Mehran does not take the possible endogeneity of the percentage of shares held by management into account or the unobserved heterogeneity among firms that can probably cause the relationship between managerial ownership and firm performance. For example, stimulating value-maximizing behavior of the management may lead to more ownership of shares and better performance (Praag, 2005). In this study, I include fixed effects in the regression to control for the unobserved heterogeneity addressed by van Praag. Overall, I expect a non-linear relationship between Q and the percentage of shares held by management, consistent with Morck et al. (1988).

H2: *There is a non-linear relation between managerial stock ownership and firm performance.*

Briefly looking at the relationship between stock ownership and cash- and option remuneration, Ryan and Wiggins (2001) found a significant negative relation between internal stock ownership and option remuneration, while they found no relation between the cash remuneration and stock ownership of managers. From this perspective, internal share ownership is a substitute for the 'incentive' pay, as there is less performance-related remuneration necessary if the CEO is already motivated to create shareholder value with higher stock ownership (Ryan & Wiggins, 2001). The shares held by managers incentivizes the manager to invest in value-generating projects (e.g. NPV >0), which have a positive impact on the share price. Managers will be less inclined to utilize free cash-flows for activities serving the self-interest, such as the aforementioned 'empire building'. In this way, the manager acts in the interests of the shareholders in general.

2.10 Relation between board independence and firm performance

The culture within a company is formed by character of the employees. A healthy corporate culture can ensure that people put in additional time and energy into their efforts, which gives the company a head start relative to the competition. A board brings value to a company, if the board consists of a combination of experience, talent and background. Due to the unique characteristics of the individuals, the board members complement each other in solving problems and making decisions. Therefore, it is important that the supervisory board and shareholders select a proper composition of board members, which complement each other well and delivers value to the company. One of the highlighted characteristics of board members in this research is whether the board member is an outside director.

An outside director is a director who had no prior affiliation with the company. A board with a relatively high percentage of outside directors is considered an independent board. A key reason for the appointment of outsiders on the board are the monitoring role they can fulfill. They can monitor the decision making of the CEO and management, to ensure the decisions are aligned with the interests of the shareholders. Consequently, appointing outsiders seems like a logical solution to mitigate the agency problem. However, the empirical proof of a positive relation between firm performance and the amount of outsiders is questionable. Rosenstein and Wyatt (1990) find a positive relationship, while Francis et al. (2012) find no significant relation. During the financial crisis, they find no relationship between the percentage of outside directors and firm performance. Vance and Stanley (1964) describe a negative relation between the amount of outsiders and various performance measures. Similarly, more recent studies like Agrawal and Knoeber (1996) find a negative relationship between the percentage of independent directors and Tobin's Q, while Arosa, Itturale and Maseda (2010) find a positive relationship between firm performance and the proportion of independent members on the board. However, it is important to note that they found this significant positive relation only for the family firms ran by the first generation, the second generation they found no relation (Arosa, Iturralde, & Maseda, 2010). The paper of Bulan, Sanyal and Yan (2009) not only shows a positive effect of outsiders on firm performance, but also concludes that it increases the productivity of the firm, measured by total factor productivity. While there still seems to be no conclusive consensus about the effects of non-affiliated board members on firm performance, I expect a positive relation between the two, mainly due to the enhanced monitoring capabilities of independent board members. This positive effect can occur particularly in the examined time frame, since the financial crisis takes place in this period. In these times of financial distress, severe monitoring is valuable, as it disciplines the managers.

H3*: There is a positive relation between the percentage of outsiders and firm performance.*

3. Research design

3.1 Data collection

The empirical research focuses on companies that collectively contain several restrictions. These restrictions are imposed in terms of the empirical research and the possibility to collect the relevant data. The amount of data found will be limited by these restrictions and provides a smaller sample. According to the restrictions imposed in terms of the empirical research, a company must:

I. Be an American company listed on either the NASDAQ- or NYSE index. This is the distinctive character of the empirical research.

II. Have data available from 2003-2014. In this way, inactive companies or companies that went bankrupt during this time period are excluded.

The data collection also has an impact on the restrictions and thus the obtained data. During the selection, the company must be listed on either the NASDAQ- or NYSE index and reflected in the WRDS' CompuStat Database as well as the EXECUCOMP Database and must have financial- and balance sheet data available. I acquire the balance sheet data for the listed firms from the CompuStat Database, using Ticker Symbol as the identifier. Data regarding executive compensation I collect from the EXECUCOMP Database. Board specific information I obtain from DataStream, to gather the relevant data on the percentage of outside directors on the board to capture the board independence. Furthermore, I obtain the board size from DataStream to use it as a control variable (further discussed in Section 3.2). The respective datasets are merged into a single dataset. In this way, the data can easily be processed into statistical programs like STATA.

Financial institutions (SIC 6000-6300) are not included in the sample. These institutions are subjected to company-specific accounting rules and are regulated. Furthermore, the time period of this study contains the financial crisis. The financial institutions are regulated heavily during this period and can bias the overall results, hence they are excluded from the sample. After all constraints have been imposed, a sample size of 162 companies remain, totaling 1944 observations over the years 2003-2014.

3.2 Description of variables[3]

Tobin's Q (Q)

In this research, I use Tobin's Q as a performance measure and thus the dependent variable, consistent with Morck et al. (1988). They suggest that the Tobin's Q reflects the increased value of various intangible assets, like corporate governance for example. Since I study the effects of corporate governance mechanisms, the incorporated increased value of these intangible assets reflected in the

[3] How the variables are denoted in the regressions are indicated in the parentheses.

Tobin's Q make it a representative performance measure. Calculating the market value of debt is not possible, so I use an approximation of the Tobin's Q. Bowman (1980) found a significant cross-sectional correlation between the book- and market value of debt and implied that the difference between the two is negligible. Therefore, I assume the market- and book value of debt equal in this empirical research and I calculate it as follows (Bowman, 1980):

$$\text{Tobin's Q} = \frac{\text{MV Equity} + \text{Debt in Current Liabilities} + \text{LT Debt}}{\text{Total Assets}} \quad (2)$$

This can be interpreted as the total market value of equity and debt over the total book value of assets.

Return Index (RI)

The Return Index is a proxy used to calculate the Total Shareholder's Return, which displays the theoretical growth of the shares over a specified period and the dividends are assumed to be re-invested. The base year of this index is 1980 and is set to an arbitrary level of 100. The (cumulative) yearly Return Index (RI) is calculated as follows:

$$\text{RI}_t = \left(\frac{\text{RI}_t - \text{RI}_{1980}}{\text{RI}_{1980}}\right) \quad (3)$$

Return on Assets (ROA) and Return on Equity (ROE)

While the Tobin's Q is a prospective (forward-looking) measure, the Return on Assets and Return on Equity are retrospective (backward-looking) measures. Furthermore, the Tobin's Q is a market measure, while ROA and ROE are accounting measures. Due to the significant differences in these firm performance measures, I use these prospective accounting measures as a robustness check, to test the robustness of the relationship between the firm performance measures and the relevant corporate governance mechanisms. ROA and ROE are calculated as follows:

$$\text{ROA} = \text{Net Income/Total Assets} \quad (4)$$

$$\text{ROE} = \text{Net Income/Total Equity} \quad (5)$$

CEO compensation (CEOcomp)

As mentioned earlier, I make a distinction between cash-, equity- and total compensation and their respective relationship with firm performance. I calculate cash-compensation (CashComp) by enumerating the total received salary and annual bonuses. Total compensation (TotalComp) is computed from Exucucomp (TDC1) and is the summation of total cash-compensation, total value of

stock option grants (using Black and Scholes valuation), the total value of restricted stocks granted and the Long-Term Incentive Payouts. I calculate the equity-based compensation (EquityComp) as total compensation minus total cash-compensation. What is left is the value of stock option grants plus restricted stock option grants plus Long-Term Incentive Payouts (LTIP). In short:

$$\text{Cash compensation} = \text{Total Annual Salary} + \text{Annual Bonuses} \quad (6)$$

$$\text{Total compensation} = \text{Cash Compensation} + \text{Value (Restricited) Option Grants} + \text{LTIP} \quad (7)$$

$$\text{Equity Based Compensation} = \text{Value (Restricited) Option Grants} + \text{LTIP} \quad (8)$$

The value of the options is determined using the Black and Scholes method. This method shows a reasonable estimate of the actual value of the options, based on the current share- and exercise price, maturity, dividend yield, interest rate and volatility (Black & Scholes, 1973). According to Duffhues et al. (2003), the model of Black and Scholes is sub-optimal for valuing employee stock options. An employee stock option features different properties than standard financial stock-exchange options. The Black and Scholes method does not take the potential positive effects on options by managers (increasing the share price) into account. Furthermore, factors mitigating the option value such as the lack of tradability are also not taken into account (Duffhues, et al., 2003). This shows that the Black and Scholes value should be regarded as a minimum rather than a maximum value. Despite the drawbacks, Duffhues et al. (2003) classify the Black and Scholes method as the most acceptable basis for valuing options.

In my regression model (described in Section 3.5) I take the CEO compensation one year prior to *t*. Lagging the remuneration by one year is for the identification of a causal relationship, instead of finding a mere correlation. Furthermore, Cooper et al. (2009) provides a reason why CEO remuneration in year *t* may not be incorporated immediately into firm performance in year *t*. The remuneration contract can have both observable- and unobservable proportions of firm performance (Cooper, Gulen, & Rau, 2009). If future (observable) firm performance measures correlate with the unobservable part of the remuneration contract, then the variation of CEO remuneration in year *t* that is not defined by the discrepancies of the observable firm performance measures in year *t* should therefore predict the variation of observable firm performance measures in year *t+1* (Cooper, Gulen, & Rau, 2009). Furthermore, the effect of the CEO decision making usually takes up to one year to have a significant effect on performance.

Managerial stock ownership (ManOwn)

Kim & Lu (2011) argue that the total number- and composition of insiders affect the within-firm variation of total insider ownership over time and thus may have little or nothing to do with ownership itself. Using total insider ownership might result in finding no effect of ownership, as the coefficient of ownership in the firm fixed effect regression is derived from the within-firm variation in ownership (Kim & Lu, 2011). They argue to use CEO ownership or the ownership of the top five executives as the ownership measure, considering these ownership measures do not contain such confounding effects as total insider ownership and are free from the bias towards finding no effect of ownership (Kim & Lu, 2011). The inability to find an effect of total insider ownership is more due to alterations in the number- and composition of insiders, than the low within-firm variation of the ownership measure (Kim & Lu, 2011). Therefore, I sum the percentage of shares owned by the top five executives to measure managerial stock ownership. Since I expect a non-linear relationship between ownership and firm performance (Hypothesis 2), I also add the ownership measure squared and the ownership measure cubed to the OLS regression.

Board independence (BoardIndep)

As mentioned earlier, a relatively higher percentage of outside directors indicates a more independent board. The percentage of outside directors is calculated as the number of outside directors over the total number of directors in the board. Board independence is one of the corporate governance mechanisms I study and thus an independent variable in the regression. I expect a negative coefficient in the OLS regression.

3.2.1 Control variables

In this thesis I include several control variables, explained below. I include these control variables, as they most likely affect the dependent variable, Tobin's Q, directly and to control for firm characteristics. Without these control variables, the coefficients of the independent variables might fall or rise endogenously. This endogeneity effect can lead to parameter estimates which are inconsistent and biased (Robert & Whited, 2012). Furthermore, it prevents an erroneous representation of the relationship between the relevant variables. Instead of occurring in the error term, the control variables are now directly affecting the dependent variable in the regression and thus procure more reliable consistent parameter estimates (Robert & Whited, 2012).

Board size (BoardSize)

Haleblian and Finkelstein (1993) argue that a larger board enhances firm performance, as more expertise is available to make sophisticated decisions. However, there are disadvantages with a

larger board. Well known is the fact that larger groups tend to be less effective, as it is harder to coordinate and thus solve problems. These negative effects can outweigh the positive effects of a larger board and thus have a negative impact on Tobin's Q. In addition, a smaller board reduces the free-riding by directors. Earlier findings seem to indicate that a smaller board is preferred for a company. Yermack (1996) finds a negative relationship between board size and Tobin's Q.

Firm size (FirmSize)

Firm size might influence the performance directly. If the firm is growing, it is usually a good indicator that the firm is performing well. To account for this effect on firm performance, I include it as a control in the regression and firm size is calculated as the log of total assets. Furthermore, Mertens et al. (2007) shown a strong positive relationship between the remuneration of CEOs and the size of the firm. To test for this, I include an interaction term between the size of the firm and the CEO pay and I expect a positive coefficient of the interaction term.

Growth opportunities (GrowthOpp)

As mentioned earlier, Tobin's Q can capture the value added by management of intangible assets and, according to Yermack (1996), it can capture the value of future investment opportunities. To control for this, I add growth opportunities as a control and it is calculated as the capital expenditures over total assets.

Furthermore, growth opportunities can affect CEO pay. Firms with high growth opportunities generate value from future investments. Managers of these companies are difficult to monitor, as the outcomes of the investment decisions are uncertain and only visible in the long term. These companies can have substantial agency problems. According to Ryan and Wiggins (2001), companies with high growth opportunities should provide more long term performance-based awards to motivate the managers in creating sustainable shareholder value.

Leverage (Leverage)

I construct this variable as the book value of total long-term debt over the book value of total assets. It is a proxy that represents the impact of long-term debt and shows how much is borrowed for operating activities. Prior research has shown that leverage has a significant impact on firm performance. According to Jensen and Meckling (1976), a higher leverage ratio reduces the free cash-flow problem and thus agency costs. In turn, this has a positive impact on the firm performance (Jensen & Meckling, 1976). According to Coles et al. (2006), there is a strong positive relationship between leverage and the remuneration of the CEO. High leverage affects the remuneration of the

CEO, as a higher leverage ratio is an incentive to enhance earnings manipulation and it increases firm risk and therefore requires higher executive compensation (Coles, Daniel, & Naveen, 2006).

Age CEO (AgeCEO)

I include the age of the CEO as a control, as it relates to the CEO ownership and the risk tolerance (Kim & Lu, 2011). The risk tolerance affects the growth opportunities and Tobin's Q. Furthermore, the age of a CEO influences the magnitude of the CEO remuneration. A plethora of research concluded that, on average, an older CEO receives higher remuneration in comparison to a younger CEO.

3.3 Summary statistics

This paragraph discusses the descriptive statistics regarding the data set used in my research. The applied variables such as the dependent variable Tobin's Q, independent variables such as CEO remuneration, managerial stock ownership and board independence, financial- and accounting measures and the relevant control variables are analyzed using descriptive statistics. ROE and ROA had some extreme spurious outliers. To deal with them, I winsorize them at the 1%- and 99% level. This flattens the influence of extreme values and reduces the probability of generating erroneous results.

The descriptive statistics of the variables applied in this thesis during the period 2003-2014 are presented in Table 1. Panel A shows the descriptive statistics pre-log normal transformation. The table shows the number of observations, the mean, the standard deviation, the minimum and maximum. Furthermore, I calculated the skewness- and kurtosis coefficient for each variable, not reported. If the skewness is zero and the excess kurtosis is zero (i.e. the kurtosis is 3), the variable is assumed to be normally distributed. With regard to Tobin's Q, the maximum value is 10.97 and the minimum value 0.13 with an average Tobin's Q of 1.71. A Tobin's Q of less than one indicates that it is not sensible to invest in such goods i.e. resources (assets), as the market value is less than the replacement value. If the ratio is greater than one, investing in such capital does add value and investing in the relevant company seems wisely (Tobin, 1969).

During the relevant time period, a CEO from a company listed on NASDAQ/NYSE index earned $5,086,800 on average in year *t.* The standard deviation of $5,727,920 reflects the high variance in CEO compensation. The company Lubys Inc reported the minimum total compensation of $101,000 in the fiscal year 2003, while the maximum compensation was $48,168,360 reported by the Danaher Corporation in the fiscal year 2003. The average compensation in cash is $1,156,440 and the

average equity compensation in dollar value is $3,930,630. This confirms the trend of the increase in compensation in the form of equity relative to cash compensation to CEOs. The average age of a CEO is about 57. In terms of the other performance measures, like ROA, ROE and RI, they show huge discrepancies. ROA, ROE and RI have an average of 5%, 9% and 4614, respectively. The minimum ROA has a value of -43% and the maximum value is 27%. The minimum Return on Equity is -209%, the maximum is 95% with a standard deviation of 31%.

Looking at share ownership, the average managerial stock ownership is 4.63%. The highest percentage of shares owned by the managers is 54.11%. Regarding the board characteristics, the average board size is around 10, while the average percentage of outsiders on the board is 31% with a standard deviation of 39%. The biggest board size is 26, while the highest percentage of outsiders is 93%. This implies that every board has at least 1 insider on the board. Furthermore, the average firm size is $6,300,790,000 with a minimum of $5,049,000 and the maximum firm size of $172,384,000,000 is Microsoft in 2014. Lastly, the average growth opportunities and leverage ratio are 0.04 and 0.18, respectively.

Table 1

Descriptive Statistics

The table shows the descriptive statistics for firms listed on the NASDAQ and NYSE for the period 2003-2014. Panel A shows the mean, standard deviation and other statistics for the data prior to the lognormal transformation, while Panel B shows the mean, standard deviation and other statistics for the data post-lognormal transformation. All the accounting- and market based variables are based on fiscal year t. Q is the market value of equity plus the book value of debt over the book value of assets. RI is the Return Index, whereby the calculation is specified in Section 3.2 and the basis year is 1980. ROA is net income divided by total assets, while ROE is the net income over total ordinary equity. TotalComp is the summation of total cash-compensation, total value of stock option grants (using Black and Scholes valuation), the total value of restricted stocks granted and the Long-Term Incentive Payouts. CashComp includes annual salary and bonuses, while EquityComp is TotalComp minus CashComp. ManOwn is the percentage of shares owned by top five executives. FirmSize is the total assets, GrowthOpp the capital expenditures over total assets and leverage the long-term debt over total assets.

Panel A: Pre-Lognormal Transformation

Variable	N	Mean	Std. Dev.	Min	Max
Q	1944	1.71	1.23	0.13	10.97
RI	1764	4614	7731	2	51782
ROA (%)	1944	0.05	0.09	-0.43	0.27
ROE (%)	1944	0.09	0.31	-2.09	0.95
CashComp ($1,000)	1944	1156.44	1032.60	1.00	13125.80
EquityComp ($1,000)	1932	3930.63	5299.74	1.00	45116.65
TotalComp ($1,000)	1932	5086.80	5727.92	101.00	48168.36
ManOwn	1944	4.63%	7.95%	0.00%	54.11%
BoardIndep (%)	1944	31.03	38.40	0.00	92.94
FirmSize ($1,000,000)	1944	6300.79	15506.03	5.049	172384.00
GrowthOpp (%)	1944	0.04	0.05	0.00	0.34
Leverage (%)	1944	0.18	0.17	0.00	0.85
AgeCEO	1942	57	8	36	87
BoardSize	1944	9.96	2.30	5.00	26.00

Panel B: Post-Lognormal Transformation

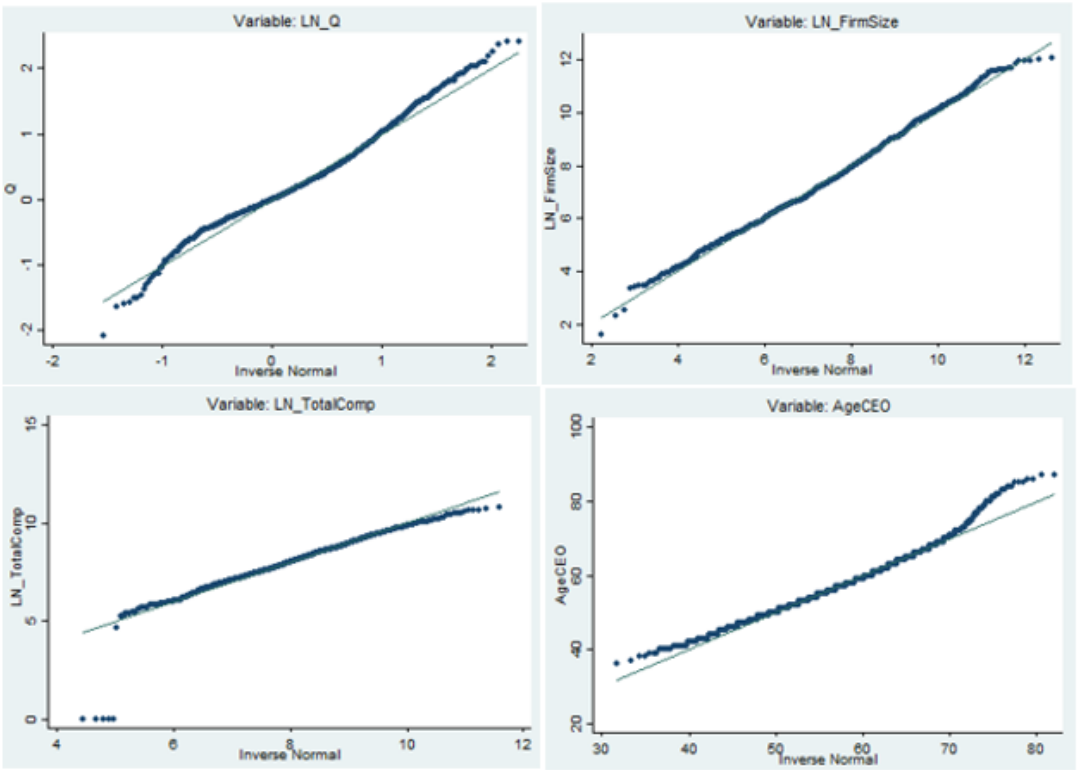
Variable	N	Mean	Std. Dev.	Min	Max
LN_Q	1944	0.36	0.57	-2.07	2.40
LN_RI	1764	7.07	1.96	0.76	10.85
LN_ROA	1944	0.04	0.10	-0.57	0.24
LN_ROE	1917	0.09	0.25	-3.42	0.67
LN_CashComp	1944	6.83	0.65	0.00	9.48
LN_EquityComp	1932	7.20	2.00	0.00	10.72
LN_TotalComp	1932	8.05	1.00	4.62	10.78
LN_ManOwn	1944	0.04	0.07	0.00	0.43
LN_BoardIndep	1944	0.23	0.28	0.00	0.66
LN_FirmSize	1944	7.46	1.59	1.62	12.06
LN_GrowthOpp	1944	0.04	0.04	0.00	0.29
LN_Leverage	1944	0.16	0.14	0.00	0.62
LN_AgeCEO	1942	4.03	0.13	3.58	4.47
LN_BoardSize	1944	2.29	0.83	1.61	3.26

Since none of the variables comply with the assumption of a normal distribution, I attempt to normalize the distribution of the variables more by performing a logarithmic (LN) transformation on the variables. Based upon the skewness and kurtosis of the variables (not reported) and the QQ-plots in Graph 1, I assess whether the variable complies with the normal distribution assumption now. For the sake of brevity, I include four QQ-plots in Graph 1, the remainder of the plots are not reported in the thesis. In the OLS regression I do not utilize the logarithmic transformation of ROA, ROE, ManOwn, BoardIndep, GrowthOpp, Leverage and AgeCEO as the QQ-plots showed no normal distribution post log-normal transformation and therefore a log-normal transformation is unnecessary.

Graph 1

QQ-Plots

QQ-Plots shown for certain variables used in the thesis. For the sake of brevity not all QQ-plots are shown. If the QQ-plot shows a normal distribution, the LN-transformation of the variable is kept, otherwise the variable pre-log normal transformation is used in the OLS regression.



The regression results are based upon the assumption that the error term is normally distributed, i.e. the value of the standardized residuals are normally distributed. Using Graph 2, I can visually assess whether the distribution of the standardized residuals is normal. As shown in Panel A of Graph 2, the curve of the normal distribution is almost identical to the distribution of the residuals and thus the error term ε is normally distributed. Another assumption is the homogeneity of variance or homoscedasticity. In linear regression models, homoscedasticity means that the variance of the residuals is independent of the independent variable. With the aid of a scatterplot, whereby the

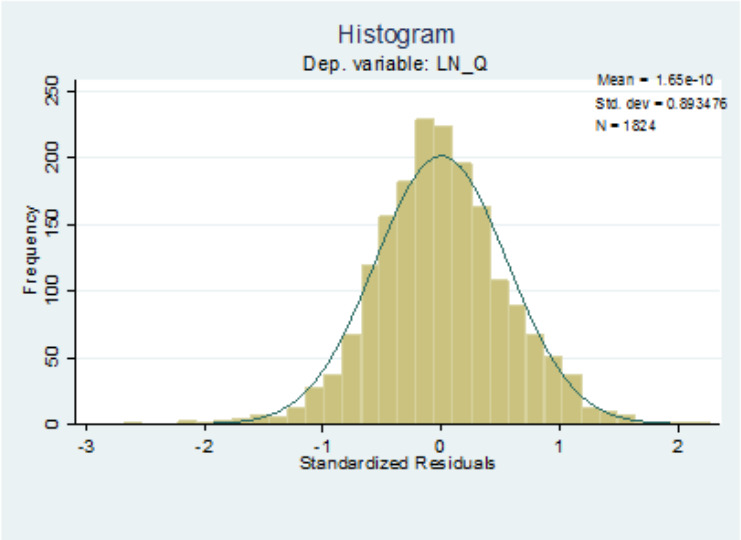
standardized residuals are located on the Y-axis and the standardized predicted values on the X-axis, I can visually judge whether there is homoscedasticity. The points in this plot will be divided randomly, without a clear pattern. Panel B of Graph 2 shows no clear pattern in the plot and thus there is homoscedasticity.

Graph 2

Testing the linear regression assumptions

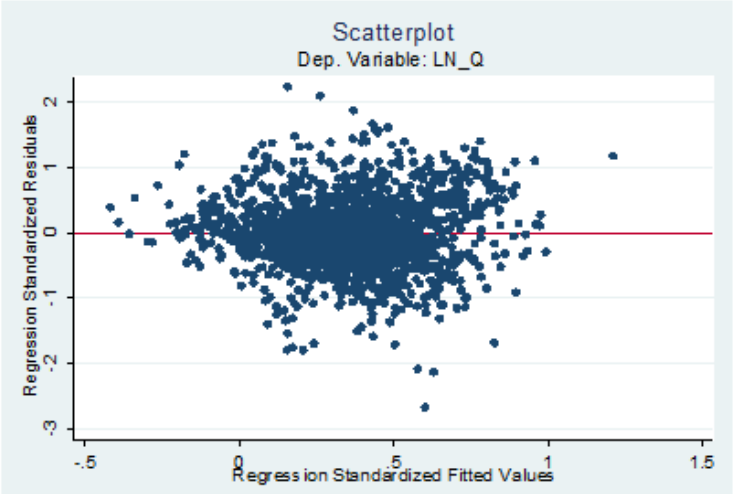
Panel A: Histogram of Standardized Residuals

The histogram shows the distribution of the standardized residuals. The distribution has a mean of 1.65e-10, a standard deviation of 0.893 and and N is 1824. The X-axis reflects the standardized residuals, while the Y-axis shows the frequency.



Panel B: Scatterplot to assess homoscedasticity

This is the scatterplot to visually assess the homogeneity of variance. The X-axis reflects the Regression Standardized Fitted Values, while the Y-axis shows the Regression Standardized Residuals. The dependent variable is LN_Q.



3.4 Pearson' correlation matrix

Table 2 on page 34 presents the Pearson correlation matrix for the variables which are included in the sample. The Pearson's correlation coefficient expresses the strength of a linear relationship between two variables in a numerical value. The correlation coefficient always has a value between -1 and 1, where 1 (-1) implies a perfect positive (negative) correlation. In addition, on the basis of this matrix I can obtain a first impression of potential multicollinearity. There is multicollinearity when independent variables have such a strong correlation that this has a disproportionate impact on the regression model, whereby these variables are mutually reinforcing. O'Brien (2007) & Marquaridt (1970) use VIF-values greater than 10 as a guideline for severe multicollinearity.

The correlation matrix shows that several variables correlate significantly with each other. The matrix shows that firm size is positively correlated with the three CEO remuneration components. This suggests that a bigger firm provides higher remuneration. RI and ROE are also positively related, which seems intuitive, as both these performance measures increase when the share price increases. Leverage is negatively correlated with all the performance measures, except return on equity. Board independence is positively correlated with the performance measures, which suggests that a more independent board enhances firm performance. Board size and board independence approach a perfect positive correlation and thus could indicate potential multicollinearity.

To test the coherence of independent variables, I examine potential multicollinearity on the basis of the variance inflation factor (VIF). As mentioned before, a VIF greater than 10 indicates severe multicollinearity. With multicollinearity, two or more explanatory variables are strongly correlated in the linear regression model and at least one of the variables can be predicted on the basis of the model. Panel A of Table 3 on page 35 shows the VIF-values of the independent- and control variables. As Table 3 shows, there seems to be severe multicollinearity between the size of the board and board independence. I therefore exclude board size from the regression in order to deal with multicollinearity and run the VIF-test again. Panel B of Table 3 shows that the highest VIF-value is now 2.61 with a mean VIF of 1.51. This indicates no presence of severe multicollinearity and thus all the independent- and control variables are included in the regression model, except for board size.

Table 2

Pearson' correlation matrix

This table shows the Pearson' correlation matrix for the respective variables used throughout the thesis. Each coefficient expresses the linear relationship between two variables. A relative strong positive (negative) relationship is denoted by a high positive (negative) Pearson correlation coefficient.

	Q	ROE	ROA	RI	TotalComp	EquityComp	CashComp	ManOwn	BoardIndep	FirmSize	GrowthOpp	Leverage	AgeCEO	BoardSize
Q	1													
ROE	0.1442**	1												
ROA	0.3706**	0.6918**	1											
RI	0.0886**	0.2534**	0.3667**	1										
TotalComp	0.0457	0.1735**	0.1689**	0.2745**	1									
EquityComp	0.0479	0.117**	0.1081**	0.2091**	0.8474**	1								
CashComp	-0.0669**	0.1304**	0.1186**	0.1244**	0.6737**	0.3703**	1							
ManOwn	-0.062*	-0.0387	-0.0648**	-0.0339	-0.2693**	-0.219**	-0.2317**	1						
BoardIndep	0.0859**	0.1163**	0.15**	0.3424**	0.447**	0.3714**	0.2144**	-0.1853**	1					
FirmSize	-0.1137**	0.2213**	0.2158**	0.4736**	0.6228**	0.4647**	0.4274**	-0.2548**	0.6709**	1				
GrowthOpp	0.1115**	0.0576*	0.1302**	0.0616**	0.0389	0.0691**	-0.0016	-0.0282	0.0087	0.0718**	1			
Leverage	-0.2212**	-0.007	-0.1228**	-0.1178**	0.2736**	0.2088**	0.2217**	-0.1372**	0.1301**	0.3303**	0.0457*	1		
AgeCEO	-0.1317**	-0.0188	-0.0497**	0.0117	0.0373	0.0454	0.0227	0.2231**	0.0408*	-0.0109	-0.0276	-0.0311	1	
BoardSize	0.0666*	0.1205**	0.155**	0.3710**	0.4631**	0.3726**	0.2475**	-0.1899**	0.9513**	0.7214**	0.0012	0.1253**	0.0497*	1

** Correlation is significant at the 1% level. * Correlation is significant at the 5% level.

Table 3
Multicollinearity tests

Panel A: BoardSize included

Variable	VIF	Tolerance
BoardSize	12.40	0.081
BoardIndep	10.58	0.094
FirmSize	3.03	0.330
TotalComp	1.73	0.577
Leverage	1.18	0.844
ManOwn	1.16	0.861
AgeCEO	1.07	0.933
GrowthOpp	1.01	0.988
Mean VIF	*4.02*	

Panel B: BoardSize excluded

Variable	VIF	Tolerance
FirmSize	2.61	0.383
BoardIndep	1.86	0.538
TotalComp	1.73	0.578
Leverage	1.16	0.858
ManOwn	1.16	0.861
AgeCEO	1.07	0.936
GrowthOpp	1.01	0.990
Mean VIF	*1.51*	

3.5 Methodology

The research method in this thesis is quantitative and I include financial data on the performance of listed companies, remuneration of CEOs, managerial stock ownership, the percentage of outsiders on the board and the earlier mentioned control variables discussed in section 3.2 and 3.2.1. The research question and the relevant hypotheses should be made operational. This is done by translating the hypotheses into available accounting data. This accounting data is objective, allowing for an objective examination of the hypotheses.

Hypothesis 1a to 1c examine the possible relationship between CEO compensation and firm performance. This hypothesis is made operational by looking at Tobin's Q as the performance measure and cash-, equity- and total compensation as CEO compensation. The second hypothesis concerns the possible (non-linear) relationship between firm performance and the number of shares held by the top five executives. This is made operational by measuring the total percentage of shares held by the top five executives. The third hypothesis assumes a relationship between firm performance and the amount of independent directors. This is made operational by looking at the percentage of outside directors on the board and is determined by dividing the number of outside directors by total board size.

In the regression I include firm- and year fixed effects. The firm fixed effects are included to control for possible unobservable time-invariant firm characteristics that may affect the coefficients estimates of the (in)dependent variable(s) in the multiple linear regression. In this way, you perceive the unobserved heterogeneity as fixed. By controlling for the unobservable time-invariant firm characteristics, it mitigates the aforementioned endogeneity bias and generates more reliable unbiased coefficients.

Since the hypotheses are made operational, I now elaborate on the regression format used throughout this empirical research. I use the following general Ordinary Least Squares[4] regression with fixed effects, consistent with Himmelberg et al. (1999):

$$\text{Tobin}'\text{s } Q_{j,t} = \alpha + N_t + \gamma_j + \beta * U_{j,t} + Y_{j,t} + \varepsilon_t \quad (9)$$

Where subscripts j and t are firm and year, respectively. N_t stands for the year fixed effects and γ_j

[4] Ordinary Least Squares is a statistical method to calculate the unknown parameters in a regression model. This method identifies the regression line that minimizes the total distance between the predicted line and the actual data points (i.e. minimizes the residuals).

for the firm fixed effects. $U_{j,t}$ is a vector of independent variables and $Y_{j,t}$ a vector of the relevant control variables, discussed in section 3.2.1. The β-term is the slope and emphasizes the relationship between the dependent- and independent variable(s) in the OLS regression and ε is the residual error.

Since all the assumptions of a linear regression model have been addressed and these assumptions are fulfilled in the previous section, I can start outlining the multiple linear regression model. If I outline Eq. (9) further, by expressing the vectors $U_{j,t}$ and $Y_{j,t}$ in the regression, it looks as follows:

$$LN\_Q_{j,t} = \alpha + N_t + \gamma_j + \beta_1 * LN\_CEOcomp_{t-1} + \beta_2 * ManOwn_t + \beta_3 * (ManOwn_t)^2 + \beta_4 * (ManOwn_t)^3 + \beta_5 * BoardIndep_t + \beta_6 * LN\_FirmSize_t + \beta_7 * GrowthOpp_t + \beta_8 * Leverage_t + \beta_9 * AgeCEO_t + \varepsilon_t \quad (10)$$

Where subscripts j and t are firm and year, respectively. N_t stands for the year fixed effects and γ_j for the firm fixed effects. The β_i term is the slope coefficient and emphasizes the relationship between the dependent- and relevant independent variable in the OLS regression and ε is the residual error. The power functions of *ManOwn* are added to the multiple linear regression, to control for possible non-linearities between the relationship of managerial ownership and performance. Eq. (10) is a log-log model, if both the dependent- and independent variable(s) are log-transformed. The regression coefficients of the independent variables in this case can be interpreted as follows: If $CEOcomp_{t-1}$ changes by 1%, Q_t changes by β_1%.

Referring back to the hypotheses, regarding hypothesis 1a to 1c I expect a positive coefficient of β_1 ($\beta_1 > 0$). Hypothesis 2 suggests a nonlinear relationship between managerial stock ownership and firm performance and thus I expect a significant β_2 coefficient and either a significant β_3 / β_4 coefficient or both. Lastly, hypothesis 3 assumes a positive relation between the percentage of outsiders and firm performance. Therefore, I expect a positive coefficient of β_5 ($\beta_5 > 0$).

4. Empirical results

Now the data has been characterized, the methodology of the research elaborated and the respective hypotheses are compiled, the acquired data is subjected to empirical testing in this section. The thesis focuses on different governance mechanisms, which serve as an indirect way to mitigate the agency problem. These mechanisms include governance structures such as CEO remuneration, managerial stock ownership and a higher degree of independent directors on the board.

Table 4 shows the regression results with LN_Q as the dependent variable. All the variables are log-transformed. The multiple linear models with observed firm characteristics and fixed effects have a high F-statistic and adjusted R^2, with the highest explanatory power being 79.7%. This indicates a reliable linear regression model, whereby the within Q variation is largely explained by the explanatory variables. The adjusted R^2 is an adjustment to the normal R^2 to correct for sample size and the number of variables. Adjusted R^2 is a more sophisticated estimate of explanatory power, when multiple independent variables are modeled. The high F-static implies that the models explain a significant amount of the within variation of the dependent variable. This indicates that the height of firm performance can be explained by the governance structures such as CEO remuneration, managerial ownership and board independence and the chosen firm characteristics. In table 4, if I control for time-invariant unobserved heterogeneity, the signs of the coefficients do not change, merely the magnitude of the sign. This suggests that the observed firm characteristics correlate slightly with the unobserved firm characteristics.

Examining the control variables, they are highly significant in each column, the sign of the coefficient remains constant and the magnitude only changes slightly after controlling for the firm fixed effects and time-varying factors. Firm size has a negative relation, which seems counterintuitive at first. A growing firm usually is a good indicator if the firm is performing well. In this sample, a relatively smaller firm perhaps uses their resources more effectively and thus a smaller firm performs better. As Table 4 shows, growth opportunities significantly capture the future investment opportunities, while leverage negatively relates to Q. This implies that a higher leverage level increases the financial distress costs significantly, hence diminishing returns. This is consistent with the pecking order theory, explaining the inverse relationship between leverage ratios and firm profitability. Pecking order states that there is no well-defined optimal leverage ratio as an attempt to obtain the optimal capital structure. Rather, needs for additional external funds are driving changes in the leverage ratio (Myers, 2003).

Table 4

OLS Regression Results

This table produces the OLS regression results. The first column is uncontrolled for observed firm characteristics, unobserved heterogeneity and time-varying factors. Column 2 to 8 control for observed firm characteristics (i.e. control variables) and unobserved heterogeneity (i.e. firm- and year fixed effects). The dependent variable is the logarithm of Q. The calculations of the variables are defined in Section 3.2. The year- and fixed effects are included by dummies for each year and firm. Coefficients of the fixed effects are not included in the regression for the sake of brevity. The absolute values of the standard errors are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LN_Q	LN_Q	LN_Q	LN_Q	LN_Q	LN_Q	LN_Q	LN_Q
LN_lagCashComp		0.008				0.002		
		(0.017)				(0.021)		
LN_lagEquityComp			0.002				0.002	
			(0.005)				(0.005)	
LN_lagTotalComp				-0.009				-0.007
				(0.013)				(0.013)
ManOwn	2.794***				1.920***	2.121***	2.080***	2.043***
	(0.753)				(0.627)	(0.654)	(0.658)	(0.658)
ManOwn Squared	-9.450**				-7.121*	-7.885*	-7.692*	-7.497*
	(4.696)				(3.635)	(3.791)	(3.820)	(3.818)
ManOwn Cubed	8.942				8.292	8.986	8.677	8.391
	(7.834)				(6.028)	(6.238)	(6.283)	(6.279)
BoardIndep					0.084*	0.083*	0.089*	0.090*
					(0.033)	(0.035)	(0.035)	(0.035)
LN_FirmSize		-0.181***	-0.180***	-0.180***	-0.198***	-0.206***	-0.205***	-0.205***
		(0.020)	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)	(0.021)
GrowthOpp		1.296***	1.320***	1.325***	1.352***	1.290***	1.335***	1.339***
		(0.291)	(0.292)	(0.293)	(0.282)	(0.291)	(0.292)	(0.292)
Leverage		-0.402***	-0.394***	-0.394***	-0.422***	-0.403***	-0.397***	-0.397***
		(0.084)	(0.085)	(0.085)	(0.081)	(0.084)	(0.085)	(0.085)
AgeCEO		-0.142***	-0.143***	-0.143***	-0.129***	-0.135***	-0.136***	-0.136***
		(0.023)	(0.023)	(0.023)	(0.022)	(0.023)	(0.023)	(0.023)
LN_FirmSize*						0.00490	0.004	0.005
LN_Comp						(0.023)	(0.083)	(0.025)
Constant	0.415***	9.018***	9.110***	9.189***	10.082**	8.760***	8.806***	8.881***
	(0.018)	(1.219)	(0.493)	(0.460)	(1.375)	(1.217)	(1.217)	(1.219)
Year Fixed Effects	NO	YES	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	NO	YES	YES	YES	YES	YES	YES	YES
N	1944	1778	1767	1767	1942	1778	1767	1767
adj. R-sq	0.012	0.793	0.794	0.794	0.794	0.796	0.797	0.797
F	8.731***	38.150***	38.9492***	38.530***	37.672***	30.591***	30.863***	30.867***

(***),(**),(*) indicate statistical significance at the 1%,5%,10% level, respectively.

4.1 Effect of CEO compensation

Looking at the effect of CEO remuneration first, after controlling for unobserved firm characteristics, the relationship of all the respective remuneration components and Tobin's Q is insignificant and thus I find no relation between CEO remuneration and firm performance. The coefficients in the table are interpreted as follows: Looking at column 3, if equity compensation rises by 1%, the Tobin's Q increases by 0.002%. Failing to report a positive pay-performance relation lends no support to the rationale of the agency theory, which states that CEO pay aids to align the interest of management and shareholders and thus increase firm performance.

Finding no relation between CEO pay and firm performance suggests that CEO remuneration is utilized for other purposes besides a tool to align the interests, such as motivating and retaining the executives with the company and to create a long-term relationship between the company and the executives (Duffhues & Kabir, 2008). Furthermore, these results entail that a powerful CEO can control their own remuneration and is consistent with the aforementioned managerial power theory, which presupposes the ability of CEOs to use compensation in order to extract 'rents' from the corporation (Duffhues & Kabir, 2008). The interaction term between CEO remuneration and firm size shows no significant relation, implying that the relationship between CEO compensation and firm performance does not vary between firms with different sizes. This seems counterintuitive, as a bigger firm probably has more resources available to pay out more than a relatively small firm. However, the study of Baker and Hall (1998) schematically shows that the median of the pay-for-performance sensitivity is larger in relatively smaller companies. They estimated the elasticity of the marginal CEO product relative to firm size. Baker and Hall (1998) came to an elasticity of roughly 0.4, and they implied that CEO incentives are slightly decreasing if firm size increases (Baker & Hall, 1998). In short, after controlling for firm- and year fixed effects, I find no positive relation between firm performance and the three respective remuneration components. One implication is that the remuneration parts do not vary significantly over time and thus their effects are absorbed by the year fixed effects. Therefore, I reject hypothesis 1a, 1b and 1c; *There seems to be no relationship between firm performance in year t and cash-, equity- or total compensation prior to year t.*

4.2 Effect of managerial ownership

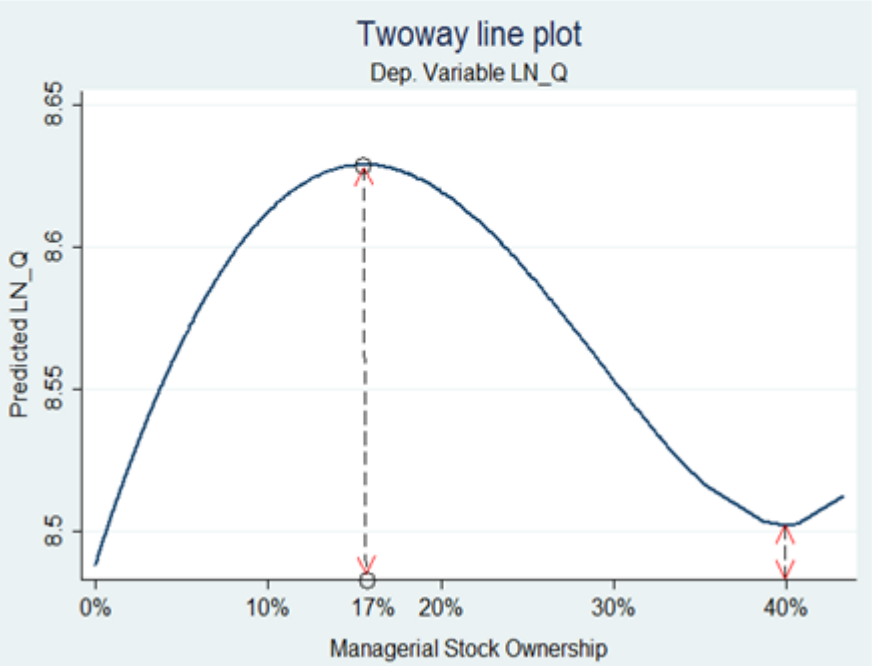
As Table 4 column (1) shows, managerial ownership significantly affects firm performance, without controlling for observed firm characteristics (i.e. the control variables) and the unobserved heterogeneity (i.e. the fixed effects). When controlling for the observed firm characteristics and unobserved heterogeneity, managerial ownership still significantly affects firm performance, measured by Tobin's Q. This suggests that managerial ownership is exogenous in my model. This implies that even after controlling for time-invariant (un)observed characteristics, which might affect both managerial ownership and Tobin's Q, the relation remains significant.

The statistical significant relationship between managerial ownership and firm performance is in line with the agency approach of Fahlenbrach & Stulz (2009) and Morck et al. (1988). This approach states that higher managerial equity stakes benefit the shareholders, as the incentives are more aligned (i.e. convergence of interest hypothesis). However, at larger stakes the manager can become entrenched and utilize corporate assets for their own personal benefits. As Graph 3 shows, I find a significant positive relationship between Q and ManOwn from 0% equity stake until about 17%. Higher stakes provide enhanced firm performance in this region. This is in line with the convergence of interest hypothesis. From 17% until 40% I find a negative relationship. This is consistent with the entrenchment hypothesis, whereby higher stakes have a negative effect on firm performance, measured by Tobin's Q. At equity stakes of 40% or higher, the manager becomes completely entrenched and according to Morck. et al (1988), at such high equity stakes, managerial ownership only remains as an incentive device and thus the relationship is now positive again (Morck et al., 1988). In short, the agency approach assumes a significant (non-linear) relationship between firm performance and managerial stock ownership, as the empirical results in Table 4 suggest.

Graph 3

Non-linear relationship between Q and ManOwn

This twoway line plot visualizes the (non)-linear relationship between the predict logarithm of Q and the percentage of shares owned by the top 5 executives. The X-axis shows the percentage of shares owned and the Y-Axis represents the LN_Q variable.



Contrary to the agency approach, there is the contracting approach led by Fahlenbrach and Stulz (2009) and Demsetz (1983). This approach states there is an optimal level of equity stakes that resolves the agency problems and thus changes in managerial stock ownership would be sub-optimal and not lead to better performance (Demsetz, 1983); (Fahlenbrach & Stulz, 2009). The determinants for the ownership structure are endogenous according to the contracting approach. Consequently, the contracting approach implies no relation between managerial equity stake and firm performance and suggests the significant relationship of the agency approach is erroneous, as the contracting approach implies that managerial ownership is endogenous due to unobserved heterogeneity (Fahlenbrach & Stulz, 2009) & (Himmelberg, Palia, & Hubbard, 1999). The aforementioned results of Himmelberg et al. (1999) support the contracting approach, as they found no significant relation between firm performance and managerial stock ownership after controlling for this unobserved heterogeneity. Considering I found a positive relationship between managerial ownership and firm performance, I reject the contracting approach and accept the agency approach, ceteris paribus. Furthermore, Graph 3 shows that the found relationship is non-linear and thus I accept hypothesis 2; *There is a non-linear relation between managerial stock ownership and firm performance.*

4.3 Effect of outside directors

Next, I examine the effect of the percentage of outsiders on the board as a governance mechanism. Column (5) to (8) of Table 4 indicate a statistically- and economically significant relationship between firm performance and board independence at the 1% significance level. As column (5) shows, a 1% increase in board independence leads to a 0.084% increase in Q, which is quite economically significant. Looking at column (8), a 10% increase in board independence (i.e. an increase from 10 non-affiliated board members to 11 outside directors) results in a 0.90% increase in Tobin's Q, ceteris paribus. On average, a 10% increase in board independence leads to a 0.0865% increase in Q. This implies that higher independence of the board reduces the agency costs and asymmetric information, resulting in higher firm performance. The positive relation found gives therefore useful insights about the effects of a solid corporate governance structure on corporate performance, as addressed by Schøler & Holm (2013). To conclude, after controlling for observed firm characteristics and the year- and fixed effects, I accept hypothesis 3: *There is a positive relation between the percentage of independent directors and firm performance.*

4.4 Robustness check

In order to test the structural validity between the studied corporate governance mechanisms and firm performance, I perform a robustness check by using different performance measures. First, I use a proxy for the total shareholder's return, i.e. Return Index, as an additional performance measure, since maximizing shareholder's return is in accordance with the interests of the shareholders. Secondly, I use return on equity and return on assets as supplementary performance measures. As mentioned before, the Tobin's Q is a forward-looking market measure, while ROA and ROE are backward-looking accounting measures. To test the robustness of the relationship between firm performance and the relevant corporate governance mechanisms, I use these different prospective accounting measures and the Return Index as dependent variable.

Table 5 shows the results with the Return Index as the dependent variable. The table shows some significant differences compared to the results with Q as performance measure. All the lagged CEO compensation components remain insignificant when firm- and year fixed effects are added to the regression. This is consistent with the efficient market hypothesis, which states that the market capitalizes on CEO incentive pay grants and processes this immediately into the stock price at the announcement date (Cooper, Gulen, & Rau, 2009). This results in no relation between the return index in year *t* (stock price is part of this index) and cash-, equity- or total compensation prior to year *t*, which is in line with the main findings of Table 4. Looking at the effect of managerial ownership, it becomes insignificant when controlling for the unobserved heterogeneity in column (5) to (8).

Table 5

Robustness Check with RI as Dependent Variable

This table produces the OLS regression results. The first column is uncontrolled for observed firm characteristics, unobserved heterogeneity and time-varying factors. Column 2 to 8 control for observed firm characteristics (i.e. control variables) and unobserved heterogeneity (i.e. firm- and year fixed effects). The dependent variable is the logarithm of RI. The calculations of the variables are defined in Section 3.2. The year- and fixed effects are included by dummies for each year and firm. Coefficients of the fixed effects are not included in the regression for the sake of brevity. The absolute values of the standard errors are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	LN_RI	LN_RI	LN_RI	LN_RI	LN_RI	LN_RI	LN_RI
LN_lagCashComp		0.239***			0.030		
		(0.085)			(0.051)		
LN_lagEquityComp			0.165			-0.019	
			(0.111)			(0.043)	
LN_lagTotalComp				0.110*			-0.031
				(0.060)			(0.036)
ManOwn	14.91***	4.672	5.029*	4.261	2.082	1.908	1.890
	(3.028)	(2.847)	(2.937)	(2.866)	(1.844)	(1.901)	(1.858)
ManOwn Squared	-106.9***	-53.29***	-57.05***	-50.95**	-14.02	-12.59	-12.58
	(21.54)	(19.75)	(21.07)	(19.92)	(11.50)	(12.18)	(11.61)
ManOwn Cubed	201.3***	103.2***	107.1**	101.0***	26.34	23.66	23.95
	(41.61)	(37.72)	(41.10)	(37.98)	(20.48)	(22.21)	(20.66)
BoardIndep		0.0538	0.107	0.092	0.099	0.111	0.100
		(0.148)	(0.149)	(0.148)	(0.091)	(0.092)	(0.091)
LN_FirmSize		0.676***	0.589***	0.668***	0.573***	0.561***	0.570***
		(0.041)	(0.062)	(0.043)	(0.054)	(0.062)	(0.055)
GrowthOpp		1.291	1.356	1.388	3.004***	2.996***	3.039***
		(0.942)	(0.947)	(0.944)	(0.755)	(0.772)	(0.762)
Leverage		-2.683***	-2.837***	-2.729***	-1.052***	-1.005***	-1.062***
		(0.252)	(0.257)	(0.253)	(0.208)	(0.215)	(0.211)
AgeCEO		0.002	0.001	0.000	-0.083	-0.082	-0.081
		(0.006)	(0.006)	(0.006)	(0.064)	(0.064)	(0.064)
Constant	7.219***	2.680***	1.113	2.173***	6.727**	8.319**	6.973**
	(0.067)	(0.499)	(0.753)	(0.504)	(3.362)	(4.059)	(3.367)
Year Fixed Effects	NO	NO	NO	NO	YES	YES	YES
Firm Fixed Effects	NO	NO	NO	NO	YES	YES	YES
N	1776	1623	1590	1614	1623	1590	1614
adj. R-sq	0.013	0.296	0.296	0.296	0.893	0.892	0.893
F	8.898***	69.18***	67.68***	68.85***	23.31***	22.39***	23.23***

(***),(**),(*) indicate statistical significance at the 1%,5%,10% level, respectively.

These results are consistent with Himmelberg et al. (1999) and the aforementioned contracting approach, which implied that there is no relationship between managerial ownership and firm performance, as managerial equity stakes are endogenous due to the unobserved heterogeneity (Himmelberg, Palia, & Hubbard, 1999). Furthermore, looking at the percentage of outsiders, Table 5 presents no significant relationship between the amount of non-affiliated members on the board and firm performance, measured by the return index. The effects of managerial ownership and board independence are contradicting the main results of Table 4, suggesting these findings are not robust to using return index as the performance measure.

Next, I use the backward-looking accounting measures, i.e. ROA and ROE, as dependent variable(s) as an additional check for the structural validity between the governance mechanisms and performance. The OLS regression results are shown in Table 6. As can be seen, the relation between the lagged cash- and total compensation and firm performance, as measured by ROA and ROE, remain insignificant and thus the insignificant relation between lagged cash- and total compensation and firm performance is robust to using different performance measures. What is noticeable is the statistical significant negative relation found between both the accounting performance measures and the lagged equity compensation, albeit the coefficients are economically quite insignificant. This is not in line with the main findings of Table 4. As column (5) of Table 7 shows, if $EquityComp_{t-1}$ increases by 1%, the return on equity decreases by 0.064%. A reason for this negative relationship could be a shift in the risk-taking behavior of (risk-averse) CEOs. An increase in equity compensation, e.g. option grants, could result in the CEO willing to take more risk, as option grants limit the downside risk, causing a positive- or negative relationship between equity remuneration and future performance, depending on the "moneyness" of the option grants and the CEO risk aversion (Cooper, Gulen, & Rau, 2009). Subsequently, I find a significant (non-linear) relationship between managerial ownership and the accounting performance measures, after controlling for the unobserved heterogeneity by including firm- and year fixed effects. This finding complies with the main results of Table 4 and thus the agency approach. This suggests that the significant non-linear relation between managerial ownership and firm performance is robust to using alternate performance measures outside of the return index.

Table 6

Robustness Check with The Accounting Measures as Dependent Variable

This table produces the OLS regression results with the accounting measures as dependent variable. Column (1) to (3) present the results with Return on Assets as the dependent variable, while column (4) to (6) present the results with Return on Equity. All the columns control for the observed firm characteristics and add the firm- and year fixed effects. The calculations of the variables are defined in Section 3.2. The year- and fixed effects are included by dummies for each year and firm. Coefficients of the fixed effects are not included in the regression for the sake of brevity. The absolute values of the standard errors are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA	ROA	ROA	ROE	ROE	ROE
LN_lagCashComp	-0.005			0.044		
	(0.005)			(0.031)		
LN_lagEquityComp		-0.016***			-0.064***	
		(0.004)			(0.017)	
LN_lagTotalComp			-0.009			0.029
			(0.008)			(0.024)
ManOwn	0.497***	0.512***	0.504***	1.187*	1.451**	1.336**
	(0.165)	(0.164)	(0.164)	(0.687)	(0.673)	(0.670)
ManOwn Squared	-2.789***	-2.775***	-2.745***	-7.890**	-8.921**	-8.109**
	(0.956)	(0.960)	(0.952)	(3.986)	(3.940)	(3.895)
ManOwn Cubed	3.848**	3.790**	3.719**	10.595	12.709*	10.519
	(1.572)	(1.585)	(1.564)	(6.557)	(6.506)	(6.403)
BoardIndep	0.011	0.011	0.012*	0.050*	0.055*	0.054*
	(0.009)	(0.009)	(0.006)	(0.020)	(0.022)	(0.020)
LN_FirmSize	0.004	-0.005	0.003	-0.008	-0.042*	-0.008
	(0.005)	(0.006)	(0.005)	(0.022)	(0.024)	(0.021)
GrowthOpp	0.148**	0.142*	0.150**	-0.107	-0.132	-0.108
	(0.074)	(0.074)	(0.073)	(0.307)	(0.303)	(0.300)
Leverage	-0.078***	-0.091***	-0.089***	-0.256***	-0.388***	-0.345***
	(0.020)	(0.020)	(0.020)	(0.083)	(0.082)	(0.081)
AgeCEO	-0.012**	-0.012**	-0.012**	-0.027	-0.027	-0.028
	(0.006)	(0.006)	(0.006)	(0.024)	(0.024)	(0.024)
Constant	0.648**	0.554*	0.698**	1.710	1.155	1.760
	(0.307)	(0.305)	(0.304)	(1.282)	(1.252)	(1.243)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
N	1810	1774	1799	1810	1774	1799
adj. R-sq	0.495	0.509	0.503	0.273	0.293	0.285
F	6.007***	6.524***	6.318***	5.358***	5.720***	5.210***

(***),(**),(*) indicate statistical significance at the 1%,5%,10% level, respectively.

Looking at the board independence next, I find a significant positive relationship between the number of outsiders on the board and return on equity in column (4) to (6) with practically the same magnitude as the main results in Table 4. In column (4), a 10% increase in board independence (i.e. increasing the numbers of outsiders from 10 to 11), enhances the return on equity by 0.61%. Examining the results between the number of non-affiliated and return on assets is less clear-cut, as I only disclose a significant positive relation for column (3). In column 3, increasing the number of outsiders on the board from 10 to 11, increases the return on assets by 0.12%. Even though these magnitudes suggest a rather weak economic significance, the relationship remains positive nonetheless and thus the positive significant relation between a more independent board and performance is overall robust to using all the alternate firm performance measures aside from the return index.

Briefly look at the control variables. Leverage remains highly robust to alternating performance measures. Growth remains significantly positive when using ROA and the Return Index. The age of the CEO only has the same effects as the main results for ROA. Kim and Lu (2011) suggest a negative association between the age of the CEO and the risk tolerance of the CEO regarding the investment behavior and decision making (Kim & Lu, 2011). This negative association may in turn negatively affect firm performance, ceteris paribus.

Table 7 schematically shows the results of the hypotheses, to summarize whether they are rejected or not in this empirical research.

Table 7

Results of the hypotheses

Hypothesis	✓ = *accepted* ; ✗ = *rejected*
H1a: Cash compensation$_{t-1}$ ↑ → Firm Performance ↑	✗
H1b: Equity compensation$_{t-1}$ ↑ → Firm Performance ↑	✗
H1c: Total compensation$_{t-1}$ ↑ → Firm Performance ↑	✗
H2: Non-linear relation between *ManOwn* & Firm Performance	✓
H3: Percentage of outsiders ↑ → Firm Performance ↑	✓

5. Conclusion

This study looked at the effects of CEO pay, managerial stock ownership and board independence on firm performance, measured by Tobin's Q, for U.S. listed companies. The sample consists of 162 companies, totaling 1944 observations over the period 2003-2014. Through corporate governance theories and previous studies, an expected relationship between the governance mechanisms and firm performance was defined by constructing multiple hypotheses, which were then tested in order to answer the research question.

5.1 Answering the research question

This thesis was based upon the following research question: *'What are the effects of CEO compensation, managerial stock ownership and board independence on firm performance for US firms publicly listed on the NASDAQ/NYSE indices for the period 2003-2014?'*

To answer this research question I formulated three hypotheses, whereby hypothesis 1 had three sub-hypotheses. From the theoretical framework and earlier findings, I expected a positive relation between the CEO remuneration components and firm performance. The stewardship theory implies a congruence of interests between shareholder and manager and thus the manager strives for optimal firm value. The agency theory argues that rewards are used to influence the actions of the CEO in order to align the interests with the shareholders. The aim of the shareholders is to maximize total shareholder return, which corresponds to good firm performance. In this study, I used Tobin's Q as the main performance measure and several additional measures as a robustness check. The main OLS regression results found no significant relation between cash-, equity- or total compensation and firm performance, measured by Tobin's Q after controlling for time-varying factors and firm fixed effects. These results are robust to alternate performance measures aside from equity compensation, which had a negative relation with the accounting measures ROA and ROE. Failing to report a positive pay-for-performance relation contradicts the agency theory and suggests that CEO pay is utilized for other purposes rather than aligning the interests between CEO and shareholders, such as retaining the CEO with the company. Additionally, these results entail the ability of CEOs to use the remuneration components to extract 'rents' from the corporation (Duffhues & Kabir, 2008). These 'rent' extractions are in line with the aforementioned managerial power theory.

The second hypothesis focuses on the relationship between managerial stock ownership and performance. The agency approach assumes there is a significant (non-linear) relationship between managerial ownership and firm performance (Fahlenbrach & Stulz, 2009). Contrary to that, the contracting approach suggests this significant relationship is erroneous, as managerial ownership is endogenous due to unobserved heterogeneity (Himmelberg, Palia, & Hubbard, 1999). The main OLS

regression results reported a significant non-linear relationship between managerial ownership and firm performance after controlling for the unobserved heterogeneity and time-varying factors. Reporting a significant relationship lends support to the rationale of the agency approach. By visualizing this non-linear relationship, I report a positive relation between ownership and performance between equity stakes from 0% until about 17%, favoring the convergence of interest hypothesis. Equity stakes between 17% and 40% report a negative relationship, which is in line with the rationale of the entrenchment hypothesis. At higher stakes >40%, the manager becomes completely entrenched, leaving the stock ownership merely as an incentive device and thus the relationship becomes positive again. These findings are broadly in line with the findings of Morck et al. (1988), who likewise reported a non-linear relationship. The non-linear relationship is robust to using ROA and ROE as alternate performance measures.

Lastly, I examined the effect of independent directors on the board. Based upon my theoretical framework and earlier findings, I expected a positive relationship between the percentage of outside directors and firm performance, mainly due to the enhanced monitoring capabilities of non-affiliated members. The severe monitoring increases the discipline of the managers and in turn positively affects firm performance. Bulan et al. (2009) concluded that a more independent board enhances the productivity of the firm, besides having a positive effect on firm performance. Arosa et al. (2010) found a significant positive relation between performance and the proportion of independent directors for first generation family firms. After controlling for observed- and unobserved firm characteristics, the main results shown a significant positive relation between firm performance and the percentage of non-affiliated members. Roughly, a 10% increase in board independence results in a 0.865% increase in firm performance on average, measured by Q. This entails that an independent board effectively reduces agency costs (i.e. asymmetric information) and thus improves performance. This lends support to the rationale that a tight governance structure positively affects the performance. The positive relation between board independence and performance is robust to using return on equity as performance measure.

5.2 Limitations

Some limitations underlie this study. Regarding the executive compensation, I distinguished between cash-, equity- and total compensation. This included the monetary incentives and option grants et cetera. However, I did not include non-monetary incentives. Obtaining a company car is an example of a tangible non-monetary incentive, while intangible non-monetary incentives tend to promise a certain opportunity, such as promotion or more flexible work etcetera. However, these non-monetary variables are hard to quantify and hard to make operational, therefore difficult to empirically analyze.

The valuation of the options and long-term bonuses is based on the Black and Scholes valuation. Albeit this Black and Scholes model is widely accepted, the annual values disclosed in the annual report remain a rough estimation. The value of those options and long-term benefits can fluctuate substantially and thus impact the total remuneration of the CEO, possibly changing the data over the years and potentially bias the results of this study. Despite the legislation, the remuneration of the CEO is still not fully transparent and in some cases not properly reported by the respective firm.

Furthermore, the theory and earlier findings lack an unambiguous econometric model in order to deal with the possible endogeneity of the managerial ownership and firm performance. Even though I followed Van Praag (2005) and controlled for possible unobserved heterogeneity by including firm fixed effects, there is no consensus on the specific relationship between ownership and performance and the lack of an unambiguous design of the model could mislead even the most sophisticated researcher. In addition to that, Zhou (2001) concludes that adding fixed effects to the regression may result in finding no relation between ownership and performance, even if there exists a relation, as the within ownership variation from year to year tends to be rather small and therefore do not reflect extensive changes in managerial incentives that would lead to significant alterations in firm performance (Zhou, 2001).

The examined timeframe contains the global financial crisis, which took place in 2008-2009. The financial crisis is a rare idiosyncratic event and can have temporal or persistent effects on other contemporaneous unobservable factors, which in turn might influence the empirical findings. To partially solve this problem, I added year fixed effects as time-varying factors and firm fixed effects as unobservable firm characteristics.

5.3 Further research

Since I used the NYSE and NASDAQ indices to obtain the companies, my sample mainly consists of big (old) companies. Further research may incorporate younger and more fast growing firms. For these firms, the governance mechanisms like CEO remuneration, managerial stock ownership and board independence may play a more imperative role (Morck et al., 1988).

Further research could examine the impact of the respective governance mechanisms from multiple countries. Additionally, examining the effects on firm performance for various industry sectors by separating each sector can add to the degree of diversification from various industry sectors, adding value to the current findings. This allows for a bigger sample selection, which may ensue more findings to be significant. Examining multiple countries and their respective industry sectors ensures that the findings are more generalizable. Splitting up the sample in multiple industry sectors might give useful insights about the level of governance structure in each sector, where particular attention is paid to the level of CEO remuneration, the ownership structure within each sector and the effect of an independent board on performance.

Moreover, it is possible to further divide various forms of remuneration in future research. Future research can break down the remuneration into more components, by paying attention to pension benefits and the aforementioned non-monetary incentives for example. The hard part in this is to make the non-monetary incentives and the intangible remunerations operational for empirical research.

Regarding the board composition, future research could look at the board effectiveness of attracting non-affiliated members, besides the enhancement of firm performance. Interesting to study is whether the additional monitoring costs by hiring independent directors are outweighed by the increased board effectiveness for example. If this is not the case, one might argue to incur less monitoring costs that relate to the agency problems. Further research might complement the existing literature by addressing the cost effectiveness of the monitoring instruments (e.g. hiring outside directors).

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