



PAY FOR PERFORMANCE AND CORPORATE GOVERNANCE AFTER FINANCIAL CRISIS OF 2007-2008.

Evidence from the U.S.

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Purpose of the study

The purpose of this paper is to study effects of the financial crisis of 2007-2008 and followed new legislation from point of views of i) corporate governance policies ii) a pay for performance relationship and iii) a link between these two issues. The first contribution is to offer empirical evidence about alleged changes of corporate governance policies. Secondly, this paper offers new evidence about the pay for performance relationship after the financial crisis of 2007-2008. Lastly, a third contribution is to offer new evidence about the alleged strong link between corporate governance policies and pay for performance relationship.

Data and methodology

Corporate governance data is taken from BoardEx database and company's performance and CEO's compensation data from Compustat database. To study changes of corporate governance policies, I use unpaired t-tests to average values of corporate governance variables and test if there are some significant differences between pre- and post-crisis data. To study the pay for performance relationship, I run regressions with different performance measurements and forms of compensation. Lastly, to study the link between these two issues, I evaluate significances of corporate governance variables in pay for performance regressions.

Findings

It seems that companies have taken slightly different corporate governance policies after the financial crisis of 2007-2008. On the one hand, some parts of corporate governance policies seem to have become more effective as there are larger number of non-CEO chair of boards and more female and outside members of board. On the other hand, other parts seem to have become less effective as the average size of board has increased and there are larger percentages of aged and related members of board. The strong link between corporate governance policies and pay for performance relationship seems to exist as more (less) effective corporate governance policies seem to be linked with smaller (larger) amount of explanatory power in pay for performance regressions. The pay for performance relationship has become stronger between ROA and CEO's total compensation but not between ROA and other forms of compensation or between a stock return and any form of compensation. One potential reason for unchanged level of pay for performance relationship with market-based performance measurement could be a trade-off between stronger pay for performance relationship and risk management, which is one focus area of new legislation.

Keywords Pay for performance, corporate governance, executive compensation, Financial crisis of 2007-2008

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Tutkimuksen tarkoitus

Tutkimuksen tarkoitus on selvittää miten vuosien 2007-2008 finanssikriisi ja sitä seurannut uusi lainsäädäntö on vaikuttanut i) yritysten hallinnointitapoihin ii) suoritusperusteiseen palkitsemiseen ja iii) näiden kahden asian väliseen riippuvuuteen. Tutkimuksen ensimmäinen kontribuutio on tarjota empiiristä evidenssiä väitetyistä hallinnointitapamuutoksista. Toiseksi, tämä tutkimus tarjoaa uusia tutkimustuloksia toimitusjohtajan suoritusperusteisesta palkitsemisesta eri mittareilla mitattuna. Lopuksi, tutkimuksen kolmas kontribuutio on tarjota uutta evidenssiä väitetyistä vahvasta linkistä hyvien hallinnointitapojen ja voimakkaamman suoritusperusteisen palkitsemisen välillä.

Lähdeaineisto ja tutkimusmenetelmät

Tutkimuksessa käytettävä hallinnointidata tulee BoardEx-tietokannasta ja yrityksen perustiedot ja toimitusjohtajan palkkiodatat Compustat-tietokannasta. Tutkiakseni hallinnointitapojen muutoksia, käytän kahden riippumattoman otoksen t-testejä hallinnointitapamuuttujiin ja arvioin, onko finanssikriisin jälkeen tapahtunut merkittäviä muutoksia. Tutkiakseni suoritusperusteista palkitsemista, ajan regressioita erilaisten menetys- ja palkkiomittareiden kanssa. Tutkiakseni hallinnointitapojen ja suoritusperusteisen palkitsemisen yhteyttä, arvioin hallinnointitapamuuttujien merkitsevyyttä regressioissani.

Tulokset

Tutkimuksen perusteella yritykset ovat ottaneet hieman erilaiset hallinnointitavat finanssikriisin jälkeen. Yhtäältä, jotkin osat vaikuttavat muuttuneen tehokkaimmiksi, sillä hallituksen puheenjohtajina on useammin joku muu kuin yrityksen toimitusjohtaja ja hallituksissa on enemmän naisia ja yrityksen ulkopuolisia jäseniä. Toisaalta, toiset osat vaikuttavat muuttuneen tehottomimmiksi, sillä hallituksen keskimääräinen koko on kasvanut ja hallituksissa on enemmän iäkkäitä henkilöitä ja yrityksen entisiä johtajia. Vahva linkki hallinnointitapojen ja suoritusperusteiden palkitsemisen voimakkuuden välillä näyttäisi olevan olemassa, sillä tehokkaampi (vähemmän tehokas) hallinnointitapa näyttäisi johtavan pienempään (suurempaan) selitysvoimaan erilaisissa suoritusperusteinen palkitseminen- malleissa. Yrityksen menestyksen ja toimitusjohtajan palkkion välinen suhde on tullut voimakkaammaksi oman pääoman tuottoasteen (ROA) ja toimitusjohtajan kokonaispalkkion välillä, mutta ei oman pääoman tuottoasteen ja muiden palkkiomuotojen välillä eikä osaketuoton ja minkään palkitsemismuodon välillä. Yksi mahdollinen syy suorituspohjaisen palkitsemisen muuttumattomaan voimakkuuteen markkinapohjaisella menestysmittarilla (osaketuotto) mitattuna voi olla valintatilanne uuden lainsäädännön korostaman tiukemman riskienhallinnan ja vahvemman suorituspohjaisen palkitsemisen välillä.

Avainsanat Suoritusperusteinen palkitseminen, hyvät hallinnointitavat, toimitusjohtajan palkitseminen, Finanssikriisi

Table of Contents

1. Introduction	1
2. Prior literature	6
2.1 The pay for performance: The relationship between CEO’s compensation and firm’s performance.....	7
2.2 Pay for performance relationship and corporate governance policies.....	8
2.3 Relevant legislation changes after the financial crisis in the U.S.	11
2.3.1 Recent developments from the corporate governance point of view	11
2.3.2 Recent developments from the pay for performance point of view	14
2.4 The research gap	16
2.5 Research questions and hypothesis	18
3. Methodology, data and variables	23
3.1 Methodology.....	23
3.2 Databases	24
3.3 Variables	25
3.3.2 Performance variables.....	27
3.3.3 Corporate Governance variables	28
3.3.4 Other control variables	31
3.3.5 Variables for robustness checks	34
3.4 Regression models	39
4. Results	40
4.1 T-values for differences of the corporate governance policies	40
4.2. Pre-crisis regressions	42
4.3 Post-crisis regressions.....	45
5. Robustness checks	50
5.1 The stock return as a performance measurement	50
5.2 Other robustness checks	53
5.2.1 Stock returns of longer periods	54
5.2.2 Models with alternative variables and discussion about limitations	61
6. Conclusion	68
Appendix	77
Appendix 1: Mathematical proof for the decreasing significance of the coefficient, given the decreasing variance of the variable	77
2. Industry groups.....	78

LIST OF TABLES

Table 1: Definitions of the variables	26
Table 2. Summary of prior findings regarding of corporate governance policies and theories behind my homogeneity expectations	31
Table 3. Descriptive statistics of the variables, the whole data sample (2006-2013)	35
Table 4: Descriptive statistics of the variables, the pre-crisis data sample (2006-2009)	36
Table 5: Descriptive statistics of the variables, the post-crisis data sample (2010-2013).	37
Table 6. Correlation table	38
Table 7: T-values for the differences of corporate governance policies	40
Table 8: Pay for performance regressions with ROA and pre-crisis data	43
Table 9: Pay for performance regressions with ROA and post-crisis data	45
Table 10: Summary of findings related to the second research question.....	48
Table 11: Pay for performance regressions with the one year's stock return and pre-crisis data	51
Table 12: Pay for performance regressions with the one year's stock return and post-crisis data	52
Table 13: Pay for performance regressions with three years' stock return and pre-crisis data	55
Table 14: Pay for performance regressions with three years' stock return and post-crisis data	56
Table 15: Pay for performance regressions with five years' stock return and pre-crisis data .	58
Table 16: Pay for performance regressions with five years' stock return and post-crisis data	59
Table 17: Summary of pay for performance results.....	60

LIST OF FIGURES

Figure 1. Summary of the alternative findings.....	5
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1. Introduction

A relationship between CEO's compensation and firm's performance has been an enormously popular research topic and empirical evidence about pay for performance, i.e. about a relationship between CEO's compensation and firm's performance, has been contradictory. Many kinds of issues have argued to explain these differences. For example, a structure of compensation package (e.g. Mehran 1995), social ties between directors and board members (e.g. Hwang and Kim 2009) and many kinds of industry-specific characteristics (e.g. Mayers and Smith 2010) have had significant effects in many papers. One of the most common explanation has been corporate governance policies (e.g. Core et al. 1999, Fahlenbrach 2009, Hwang and Kim 2009, Conyon and He 2011).

After the financial crisis of 2007-2008, corporate governance policies have got a huge amount of publicity, there have been new legislations related to it and according to some researches (e.g. Murphy 2012, Kaplan 2013), companies have improved their corporate governance policies as boards have become more powerful and independent. Furthermore, goals of new legislations seem to be quite consistent with academic evidence about effective corporate governance policies¹. However, the prior literature from the past few decades (e.g. Core et al. 1999, Hwang and Kim 2009 and Conyon and He 2011) has shown that corporate governance policies have stayed an important factor behind differences of pay for performance relationship, regardless of new legislations and other changes. Therefore, the current situation offers an interesting opportunity to study corporate governance policies, the pay for performance relationship and the link between these two issues, especially given the financial crisis of 2007-2008 and its consequences, most importantly followed new legislations. Based on all that, the first research question of this paper is the following:

Research question 1: "Have U.S. companies taken more effective corporate governance policies after the year 2009?"

Based on a majority of prior literature, which has argued that corporate governance policies have stayed an important factor behind differences of companies' operational performance and

¹ This means that goals and purposes of new legislations are often consistent with academic findings. For example, many academic studies have shown that an independence of board is an important issue for power of boards and the primary objective of Sarbanes-Oxley Act (2002) was to increase the boards' independence.

effectivity of compensation policies² (e.g. Core et al. 1999, Gompers et al. 2003, Farber 2005, Ozkan 2007, Firth et al. 2007, Larcker et al. 2007, Hwang and Kim 2009, Conyon and He 2011, De Angelis and Grinstein 2011 and Schultz 2013), I expect that corporate governance policies have stayed relatively similar pre- and post-crisis of 2007-2008. However, given that some papers (e.g. Murphy 2012 and Kaplan 2013) have argued without comprehensive empirical evidence that companies have taken more effective corporate governance policies, this is an interesting opportunity to study this issue. Based on the prior literature, my first hypothesis is the following:

Hypothesis 1: “U.S. companies have not taken more effective corporate governance policies after the year 2009”

A second interesting research topic is the link between corporate governance policies and pay for performance relationship. Many papers (e.g. Core et al. 1999, Gompers et al. 2003, Farber 2005, and Larcker et al. 2007) have found that companies with more effective corporate governance policies tend to have better operational performance. Moreover, regulators’ objectives seem to be consistent with academic findings regarding of principles of effective corporate governance policies, so one could expect that companies have taken more homogenous corporate governance policies. If this would be the case as e.g. Murphy (2012) and Kaplan (2013) have claimed, there would be an interesting opportunity to find new evidence from the link between corporate governance policies and pay for performance relationship. More closely, if the corporate governance policies would have become more homogenous, these variables could have smaller amount of explanatory power in pay for performance regression models. This is because when a variable has a smaller variance (i.e. tighter distribution), the coefficient has a higher variance, which leads to the smaller p-value i.e. smaller significance of that coefficient (e.g. Stock and Watson 2007).

Based on prior findings about corporate governance policies and pay for performance relationship, there are many kinds of interesting findings related to this strong link. Furthermore, to my best knowledge, there seems to be no comprehensive study that examines how some shock (in this case, the financial of 2007-2008 and its consequences e.g. new legislations) effects to the alleged strong link between corporate governance policies and the pay for performance: Is the link still as strong as before the financial crisis of 2007-2008 and

² In this paper, an effective compensation policies mean that CEO’s interests are consistent with the shareholders’ interests

its consequences? How the alleged improvements of corporate governance policies have affected to this link? Based on all these, the second research question of this paper is the following:

Research question 2: “Do corporate governance variables have a smaller amount of explanatory power in pay for performance regression models after the year 2009?”

Given the prior literature, which has shown that corporate governance policies have stayed an important factor behind differences of companies’ operational performance and effectivity of compensation policies, I expect that corporate governance policies can still partially explain differences of pay for performance relationship. However, if Murphy (201) and Kaplan (2013) would be correct and companies would have improved corporate governance policies, there would be an interesting opportunity to find more information about the strong link between corporate governance policies and pay for performance relationship. Based on all these, the second hypothesis of this paper is the following:

Hypothesis 2: “Corporate governance variables do not have a smaller amount of explanatory power in pay for performance regression models after the year 2009”

A third interesting research topic is a level of pay for performance relationship, as a prior literature has argued that companies with less effective corporate governance policies tend to have i) lower operational performance (e.g. Core et al. 1999, Gompers et al. 2003, Farber 2005, Larcker et al. 2007) and ii) less effective compensation policies (e.g. Ozkan 2007, Firth et al. 2007, De Angelis and Grinstein 2011 and Schultz 2013). In fact, Core et al. (1999), Hwang and Kim (2009), Fahlenbrach (2009) and Conyon and He (2011) have argued that companies with weaker corporate governance policies (i.e. weaker and less effective boards) tend to have quite poor pay for performance relationship.

Based on that, it is interesting to study what changes, if any, there have been in the pay for performance relationship after the financial crisis of 2007-2008 and its consequences. If the corporate governance policies have become more effective, as e.g. Murphy (2012) and Kaplan (2013) have argued, the pay for performance relationship should be stronger, based on prior literature. This is because for example, Core et al. (1999), Hwang and Kim (2009), Fahlenbrach (2009) and Conyon and He (2011) have highlighted importance of corporate governance policies behind stronger pay for performance relationship. In other words, they have argued that quite often, companies with less effective corporate governance policies tend to have

weaker pay for performance relationship. However, the recent changes of corporate governance policies are only alleged, given that the prior literature (e.g. Murphy 2012 and Kaplan 2013) have not offered comprehensive empirical evidence. Therefore, the current situation offers an interesting opportunity to study the level of pay for performance relationship. Interestingly, there is no paper, which offers empirical evidence about this important issue with appropriate control variables after the financial crisis of 2007-2008 and its consequences, so the third research question of this paper is the following:

Research question 3: “Is a level of pay for performance relationship stronger after the year 2009?”

Given prior literature, which has found that corporate governance policies have stayed an important factor behind differences of companies’ operational performance and effectivity of compensation policies and because there is no empirical evidence about improved corporate governance policies, there is no supportive arguments for stronger pay for performance relationship after the financial crisis of 2007-2008. However, given that some papers (Murphy 2012 and Kaplan 2013) have argued that companies have improved their corporate governance policies, this is an interesting opportunity to study this issue. Therefore, the third hypothesis of this paper is the following:

Hypothesis 3: “A level of pay for performance relationship is not stronger after the year 2009”

The first contribution of this paper is to offer empirical evidence about corporate governance policies after the financial crisis of 2007-2008 and its consequences (the first research question): Does the empirical evidence of this paper offer supporting evidence for researches (e.g. Murphy 2012, Kaplan 2013), who have argued that companies have taken more effective corporate governance policies after the financial crisis of 2007-2008 and its consequences? Does it seem that new legislations have achieved their goals, for example more independent boards?

The second contribution of this paper is to offer new evidence about the pay for performance relationship (the third research questions): Is the pay for performance relationship stronger after the financial crisis of 2007-2008 and its consequences? Has the large amount of public discussions, new regulations etc. pressured boards to monitor compensation more closely?

The third contribution of this paper is to offer some new evidence about the alleged strong link between these two issues. More closely, my purpose is to offer some evidence about the

potential changes of the level of pay for performance relationship, given the alleged changes of corporate governance policies. If one (in this case corporate governance policies) has changed in some way, what has happened to the other one (in this case the pay for performance relationship)? Is the relationship between these two still as strong (the second research question)? These kinds of questions can be answered (to a certain extent, of course) based on my three research questions.

A figure 1 below presents eight alternative results (cases a-h) that I could get based on my three hypotheses i.e. all hypothesis will be rejected or not rejected, 1 of 3 will be rejected (could be 1, 2 or 3), or 2 of 3 will be rejected (could be 1&2, 1&3 or 2&3). These eight alternative results would offer some interesting information about corporate governance policies, the pay for performance relationship and the link between these two issues in the U.S. after the financial crisis of 2007-2008. A comprehensive description about these different cases and my interpretations can be found from the chapter 2.4.

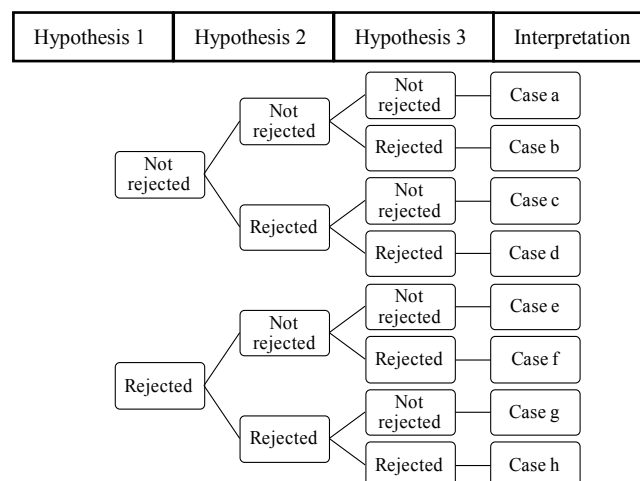


Figure 1. Summary of alternative findings.

This figure summarizes my hypotheses and key research ideas of this paper. A prior literature has argued that corporate governance policies are an important factor behind stronger pay for performance relationship and offered some evidence about the link between these two issues. Therefore, given current discussions about effectivity of corporate governance policies, new legislations and some articles about improved corporate governance policies (e.g. Murphy 2012 and Kaplan 2013), this is an interesting opportunity to study these issues after changed environment. In this paper, I study i) the alleged changes of corporate governance policies (hypothesis 1), ii) the level of pay for performance (hypothesis 3) and iii) the link between these two issues (hypothesis 2).

To analyze these three hypotheses, I use corporate governance data from BoardEx, firm's performance and CEO's compensation data from Compustat and run six different linear multiple regression models. I study differences between the period before the crisis and

followed new legislations (2006-2009) and the period after the crisis and followed new legislations (2010-2013). To answer to the first research question, I compare average values of corporate governance variables (e.g. average size of the board) pre- and post-crisis and evaluate if there are some significant differences by calculating unpaired sample t-values for the hypothesis that two means are equal. To answer to the second research question, I analyze statistical and economic significance of corporate governance variables in pay for performance regression models and evaluate if there are some significance differences between the pre- and post-crisis data.

To answer to the third research question, I analyze statistical and economic significance of my performance variables in pay for performance regression models and evaluate if there are some significant differences between the pre- and post-crisis data. I follow a prior literature, especially famous paper by Core et al. (1999), and use many control variables related to CEO's and firm's characteristics. I evaluate overall quality of my models by using adjusted r-squared and by analyzing the significance of variables in my models. I follow prior literature and use the return on assets (ROA) my main performance measurement. In addition, I make a robustness checks by using alternative variables, such as another performance measurement, a stock return.

In the next chapter, I present a literature review from this area and theories behind my research questions and hypotheses. In the third chapter, I explain the reasoning behind my methodology and describe the data and variables. The chapter four includes my results and chapter five robustness checks and discussion about findings and limitations. The last chapter concludes.

2. Prior literature

In this chapter, I present prior findings about pay for performance relationships and importance of corporate governance policies behind a stronger pay for performance relationship. In addition, I present recent developments of corporate governance related legislations in the U.S. and explain why these new regulations are interesting from point of views of i) corporate governance policies and ii) the pay for performance relationship. Lastly, I present theories behind my research questions and hypotheses and explain what kinds of evidence I could get.

2.1 The pay for performance: The relationship between CEO's compensation and firm's performance

The relationship between CEO's compensation and firm's performance has been an enormously popular research topic. There exist quite a strong consensus regarding of the agency problem theory and the general idea that managements should be compensated based on their company's performance (e.g. Jensen & Meckling 1976) but the empirical evidence regarding of the relationship between CEO's compensation and firm's performance (i.e. pay for performance) has been contradictory. For example, Conyon and He (2009) have found that there exists a significant relationship between level of CEO's total compensation and firm's performance but Banker et al. (2012) have argued the opposite, a negative relationship between these two issues. More closely, Banker et al. (2012) have argued that companies, which pay higher compensation to the CEOs, have negative short-term abnormal returns.

Interestingly, a level of observed pay for performance relationship has varied enormously depending on models and variables. For example, Jensen and Murphy (1990) have found that a pay for performance elasticity is 0.325 %, i.e. when shareholders' wealth increases 1000 dollars, the CEO compensation increases 3.25 dollars. More recently, many researches have argued that this elasticity is significantly stronger. For example, Hall and Liebman (1998) have argued that the pay for performance elasticity is about 1.3%, Aggarwal, and Samwick (1999) that it is much larger, 14.52%. With a more recent data, the same researches (Aggarwal and Samwick 2003) made a very strong statement and claimed that the pay for performance elasticity for the CEO can be as high as from 42% to 58% in some cases. Very contractive results have presented by Duffhues and Kabir (2008), who have argued that the pay for performance relationship can be even negative (i.e. when shareholders' wealth increase, CEO's compensation decreases). Lastly, Ozkan (2007) has used a more recent data and found that the pay for performance elasticity is about 1 % in the U.S.

Given that a range for pay for performance elasticity has varied from negative values to almost 60 %, discussions about appropriate level of CEO's compensation have been active for decades. For example, Murphy (1986) has argued that executive compensations encourage managers to put in their best effort and because of this, large compensation packages do not necessarily be a problem. However, Holmström (1979) has argued that lack of information can decrease quality of contracts. Therefore, it seems that appropriate structure of compensation policies is one key issue to consider. For example, Mehran (1995) has argued that if a structure of

compensation package is a good enough, high compensations are not problematic because these packages are good way to align interest of the CEO with shareholders. For example, Bebchuk and Fried (2004) have presented the opposite view and argued that CEO's compensation packages fail too often because boards are not powerful and independent enough. However, Gabaix and Landier (2006) have criticized Bebchuk and Fried (2004) and argued that between 1980 and 2003 the most significant reason for a huge increase of average CEO's compensation was a huge increase in market capitalization of large U.S. companies. To summarize this discussion, there is no consensus about appropriate level of compensation policies. Moreover, there is a disagreement about if compensation policies are appropriate ways to mitigate agency problem or if there is too large amount of managerial power for that being possible.

In addition to the level of compensation, another active topic of discussions has been about reasons behind differences of pay for performance elasticity. As the elasticity tends to vary largely depending on the data and models, many papers have tried to explain what factors could partially explain these differences. For example, Mehran (1995) has argued that a structure of compensation package is a very important issue, and Hwang and Kim (2009) that social ties between directors and board members can have an explanatory power in pay for performance regressions. Many papers, which have often focused on some industry, have argued that there exist different kinds of industry specific characteristics that can partially explain the differences in pay for performance relationship (e.g. Mayers and Smith 2010). In addition, e.g. Lubatkin et al. (2005) have argued that cultural differences can have significant effects because for example, the traditional agency theory does not fit very well in the Nordic countries and that should be considered. Even though there are large amount of theories that tries to explain differences of pay for performance relationship, probably one of the most common explanation has been corporate governance policies.

2.2 Pay for performance relationship and corporate governance policies

Based on many papers (e.g. Core et al. 1999, Hwang and Kim 2009, Fahlenbrach 2009, Conyon and He 2011), one of the most significant factors behind differences of pay for performance relationship has been corporate governance policies. These papers have offered further evidence that this happens because of two reasons. First, companies with more effective corporate governance policies tend to have more effective compensation policies for the CEO (e.g. Ozkan 2007, Firth et al. 2007, De Angelis and Grinstein 2011, Schultz 2013) and second, their operational performance tends to be better (e.g. Core et al. 1999, Gompers et al. 2003,

Farber 2005, Larcker et al. 2007). In fact, Cornett et al. (2007) have argued that effective corporate governance policies may be even more important factor for a strong link between CEO's compensation and firm's performance than existence of incentive based compensation, which many researches have argued to be a key thing (e.g. Mehran 1995).

Furthermore, researches seems to have quite consistent views about effective corporate governance policies and according to them, there should be certain characteristics of the board structure (relatively small size of board, non-CEO chair of board, independence etc.) and board members (not too busy nor too old directors etc.). Interestingly, many papers have argued that if corporate governance policies are less effective, CEO's compensation is less sensitive for performance of the company, i.e. the pay for performance relationship is weaker (e.g. Core et al. 1999, Hwang and Kim 2009, Fahlenbrach 2009, Conyon and He 2011).

Probably the most cited paper of this area is done by Core et al. (1999), who found that firms with less effective corporate governance policies face larger agency problems and that these companies tend to have both lower stock returns (indicating smaller performance) and higher CEO's compensation. Obviously, these companies have smaller pay for performance relationship and according to this paper, there are many significant corporate governance variables, which can partially explain a variation in pay for performance relationship. These variables can be divided into two categories, a structure of board (small size, non-CEO chair of board, independence) and the characteristics of board members, (not too busy or too old directors). Core et al. (1999) found that their eight corporate governance variables were all able to partially explain differences in pay for performance relationship (i.e. explain some parts of combination of high compensation and bad or average performance).

After Core et al. (1999), many researchers have found similar kinds of results. Larcker et al. (2007) have found that corporate governance structures are related to firms' future operating performance and excess stock returns. Conyon and He (2009) have argued that firms with more independent board have stronger pay for performance relationship both in China and in the U.S. Fahlenbrach (2009) has found that corporate governance policies can mitigate agency problem and increase pay for performance sensitivity. Hwang and Kim (2009) have found that many corporate governance variables are significant factors behind differences of pay for performance relationship even though other significant factors (like for example other directors' compensation) exist. To summarize, these papers argue that corporate governance policies affect to pay for performance relationship and quite often, also to performance of the

company.

Furthermore, after famous paper by Core et al. (1999), there have been some inclusions to effective corporate governance policies. Probably the most important finding is related to a gender diversity of board of directors. Even though it is not clear if a larger percentage of female members of board has a significant impact to effectivity of board, some researchers and politics have argued that boardroom gender diversity could have many positive consequences. For example, Adams and Ferreira (2009) have argued that gender diversity may lead to higher attendance rate of board meetings. Furthermore, Harriet Harman (UK labor party member) has argued that female members can have an important role in risk management. In here famous line, she has stated that the financial crisis of 2007-2008 would have been significantly smaller if the Lehman Brothers had been “Lehman Sisters” (Morris 2009). In addition, Michel Barnier (EU commissioner) has said that female members can help board to obtain more group thinking, which could help to prevent large crisis (Treanor 2011). Based on these kinds of findings and arguments, a percentage of the female members should be considered in corporate governance analysis.

As the previous examples show, the discussion about importance of corporate governance policies has been relatively active for decades. Given this, one may wonder how it is possible that there have been so many large accounting scandals in the U.S. (e.g. Enron 2001, World com 2002, American Insurance group 2005). According to many researches, ineffective legislations have been a very important factor behind both the accounting scandals and more recent crisis, the financial crisis of 2007-2008. For example, Sun et al. (2011) have argued that new legislations after the accounting scandals, such as the Public Company Accounting Reform and the Investor Protection Act of 2002, were not effective enough and a failure of corporate governance policies, especially a failure of risk management, was a very significant factor behind the financial crisis of 2007-2008. However, other researches have argued that legislation can have many kinds of positive effects. For example, Chhaochharia and Grinstein (2009) have argued that new legislations after the accounting scandals had a positive effect to CEO’s compensation because interests between shareholders and management were better aligned.

Based on these contractive findings about effectivity of new legislation, one could think that a structure of legislation is a highly important issue because legislation should have not only appropriate goals but also appropriate ways to seek these goals. For example, Adams and Ferreira (2007) have offered supportive evidence for this view and highlighted that

inappropriate disclosure practices are one issue that can prevent legislations to achieve its objectives. However, there might be challenges that are even more important because inappropriate legislations might have even the opposite than desired effect. For example, Adams and Ferreira (2007) have warned that larger amount of legislation might get board members to think that they do not have to understand every risk included in some deal, because legislation takes cares of that.

Similar kinds of challenges can be found from an internal corporate governance policies³ point of view. For example, Bebchuk and Fried (2003) have argued that CEO's compensation packages can be a part of the agency problem because boards may have more incentives to favor CEO than the shareholders. Later (2010) Bebchuk and Fried have found another problem and argued that the CEO can try to manipulate compensation package measures (e.g. ROA or stock return). To summarize this discussion, both internal and external corporate governance policies are important for stronger pay for performance relationship, but both also include many kinds of challenges.

2.3 Relevant legislation changes after the financial crisis in the U.S.

After the financial crisis of 2007-2008, there have been large number of new legislations related to corporate governance. Even though I do not expect any significant changes to corporate governance policies, there are some arguments and theories about why there could be some changes and why this is an interesting opportunity to get more information about corporate governance policies and pay for performance relationship. First, I present some findings and theories about why one could assume that companies would have improved their corporate governance policies after the financial crisis of 2007-2008. After that, I present some theories about why those changes may have had some effects to pay for performance relationship as well.

2.3.1 Recent developments from the corporate governance point of view

After the financial crisis of 2007-2008, there have been active discussions about appropriate legislation, effective corporate governance policies and importance of these issues. In addition to many academic articles, Sun et al. (2011) and Bainbridge (2016) have published

³ Legislation is a significant external factor but companies have a large amount of internal policies to consider, such as the size of the boards, committees etc.

comprehensive books and the OECD (2009) has made a comprehensive report about the corporate governance policies pre-crisis, during the crisis and post-crisis. Many kinds of findings have presented in these sources, both for and against new legislations.

For example, Sun et al. (2011) have argued that quite often, shareholders are not able to monitor managers well enough and regulation may help to mitigate this problem, especially in the financial sector. Interestingly, they have argued that new legislations have both challenges and opportunities. On the one hand, they are a bit pessimist about successfulness of these kinds of legislation because they tend to be relatively costly (e.g. they have claimed that the cumulative costs of Sarbanes-Oxley Act 2002 to U.S. economy have been 1.4 billion dollars) and because of a lack of appropriate level of resources. The latter means that supervisors may not have enough financial resources and human capital to monitor all companies, so they should be concentrating on the financial sector. However, on the other hand, they admit that regulations were one important issue that helped boards to be more effective monitors during the financial crisis of 2007-2008 in Japan.

Regardless of many kinds of critics, there has been a large amount of new legislations, which set rules for example to the maximum pay levels and deductibility, severance agreements and claw backs. The most important recent legislations are the Emergency Economic Stabilization Act (EESA, 2008), the Obama (2009), the American Reinvestment and Recovery Act (ARRA, 2009) and the Dodd–Frank Wall Street Reform and Consumer Protection Act (2010, commonly referred as the Dodd-Frank act). The first three contains mostly compensation restrictions and the last one includes some corporate governance rules (Murphy 2012). Given that the interests of this paper are the alleged changes of corporate governance policies, not the law changes itself, I do not focus on comprehensive description about the new laws. Instead, I present some examples, which support the view that new legislation could have some important effects to corporate governance policies.

Among the new legislations, the Dodd-Frank act probably has got the largest amount of space in the public discussion and even though it is mostly focused on the financial sector, it includes some parts, which can be very significant issues for effective corporate governance policies of all companies. Probably the most important things are so-called say on pay votes, which means that all public companies must obtain annual, non-binding advisory shareholders votes on the top executive pay. Not surprisingly, there have been discussions about effectivity of this kind of voting system. On the one hand, Bebchuk (2007) has argued that say on pay votes leads to

more effective compensation policies because they help boards to overcome psychological barriers to negotiate with CEO on behalf of the shareholders. On the other hand, e.g. Kaplan (2007) and Bainbridge (2008) have claimed that say on pay votes will lead to less effective compensation policies because directors will appeal to ill-informed shareholders and take less responsibility. Because of that, they have argued that boards should ignore the say on pay votes.

Given that the Dodd-Frank act and the say on pay votes are relatively new legislations, there seems to be no empirical evidence about effectivity of these kinds of regulation in the U.S. However, similar kinds of regulations have already taken in the U.K. in 2002 and according to Ferri and Maber (2013), these votes have been an effective way to control compensation in the U.K. They found that the say on pay votes have been an effective monitoring mechanism, which helps shareholders to pressure boards to remote controversial compensation policies and increase pay for performance elasticity. This phenomenon was especially strong among firms that had excess CEO pay before the regulation. Initially, one might think that based on Ferri and Maber's (2013) paper, the say on pay votes could have an effect also in the U.S. However, pay levels in the U.S are significantly higher and the culture is different, so no straightforward conclusion cannot be made without a further analysis and this is an interesting opportunity to find new information.

In addition to a direct obligation, new legislation could affect also via public discussion. For example, Wu (2004) has found that the California Public Employees' Retirement System (CalPERS), which publicly named companies having poor corporate governance, had a significant effect to the corporate governance policies. Wu (2004) offered evidence that after named by CalPERS, companies with ineffective corporate governance policies were more likely to hire independent board members and have a stronger relation between CEO's dismissal and performance. Given that the new legislations after the financial crisis of 2007-2008 have caused a large amount of public discussion and corporate governance policies have got strong critics, it could be that these issued combined have caused similar kinds of indirect effects than CalPERS did. However, CalPERS and new legislations after the financial crisis (The Dodd-Frank etc.) are quite a different and no straightforward conclusions can be made without further evidence.

Given these kinds of potential direct (obligation) and indirect (e.g. a public pressure) effects of new legislations and quite consistent view about effective corporate governance policies, one could argue that companies have faced pressure to improve their corporate governance policies.

This is because both internal (shareholders have got more power) and external (public discussion because of the financial crisis of 2007-2008) monitoring have become stronger and one could expect that companies have taken (or forced to take) more effective corporate governance policies. For example, Kaplan (2013) and Murphy (2012) have argued that this is exactly what has happened and companies have improved their corporate governance policies, as boards are now more powerful and independent. However, there is no empirical evidence about improved corporate governance policies and many researches have doubted the effectivity of legislations (e.g. Kaplan 2007, Bainbridge 2008, Sun et al 2011). Based on all that, the first interest of this paper is to study if companies have taken more effective corporate governance policies, as e.g. Murphy (2012) and Kaplan (2013) have argued. The exact proxies for effective corporate governance policies are presented in the chapter 3 (corporate governance variables).

2.3.2 Recent developments from the pay for performance point of view

To my best knowledge, there is no recent empirical evidence about pay for performance relationship. This is particularly interesting because of new legislation and a large amount of public discussion, which may have had some effects to the pay for performance relationship. For example Stathopoulos et al. (2004) have found that the public discussion can moderate the compensation of the management to some extent and Murphy (2012) has argued that the political regulations are important factors behind compensation policies and because of that, political issues should be considered when one is analyzing the pay for performance relationship.

More closely, given that shareholder power may have increased due to say on pay votes and other new legislations, firm's compensation policies could have become more effective. Supportive evidence for this view have found by De Angelis and Grinstein (2011), who found that CEO compensation packages are less effective if shareholders have smaller amount of power. Ferri and Maber (2013) have offered supportive evidence for De Angelis and Grinstein (2011) and argued that new regulations may control compensation because of increased shareholder power. In addition, Ferri and Maber (2013) have found supportive evidence for Stathopoulos et al. (2004) and argued that public discussion may control compensation because companies want to avoid negative publicity, which they could get if people think that compensation policies are too generous. However, it is not clear if new legislations have been effective, so no straightforward conclusions can be made without a further evidence.

In addition to these kinds of empirical findings, there is a theoretical reason for why the recent legislations may offer an interesting opportunity to find new information about pay for performance relationship. Basically, it is the alleged strong statistical link between the corporate governance policies and the pay for performance relationship. First, some researchers (e.g. Murphy 2012, Kaplan 2013) have claimed (but not offered comprehensive empirical evidence) that companies have taken more effective corporate governance policies. Second, given that empirical evidence about effective corporate governance and goals of the legislations seems to be quite consistent (e.g. outsider members), one could expect more homogenous corporate governance policies (e.g. larger amount of boards with high portion of outside members). Third, this should mean tighter distributions for corporate governance variables, such as “percentage of outside board members”, because there should be a smaller amount of companies with ineffective corporate governance policies. Fourth, this should decrease explanatory power of these variables in pay for performance regressions because an independent variable can have a large amount of explanatory power in a regression model only if a variance of the variable (X_i) is relatively large (i.e. distribution is relatively wide)⁴.

Based on all that, significant corporate governance coefficients would indicate that either corporate governance policies are still relatively ineffective or that corporate governance policies are very crucial for the level of pay for performance relationship as even smaller differences in corporate governance policies are enough to explain differences in pay for performance regressions. Both results would be interesting evidence and answer of the first research question could offer some insight about which one seems to be a more appropriate interpretation. Based on that, it is possible to get some new evidence about the alleged strong link between corporate governance policies and the pay for performance relationship. Either this paper would offer some evidence against e.g. Murphy (2012) and Kaplan (2013) or supportive evidence for e.g. Core et al. (1999), Hwang and Kim (2009), Fahlenbrach (2009), Conyon and He (2011).

However, if coefficients of corporate governance variables are insignificant, this paper can offer results that are even more interesting. In that case, there would be two different situations, depending on the answer of the first research question. First, if corporate governance policies

⁴ This is because a smaller variance of independent variable (X_i) means a larger variance for coefficient of that variable (B_i), which means higher p-value for this variable. For a mathematical proof for this, see the appendix 1. More intuitively, when there is more variation in variable (X_i), there is larger amount of information that one can use to fit regression line (e.g. Stock and Watson 2007).

have not become more effective but coefficients of corporate governance variables are insignificant, this paper would offer some evidence against the alleged strong link between corporate governance policies and pay for performance relationship. Second, if corporate governance policies have become more effective and coefficients of corporate governance variables have become less significant, there is an interesting opportunity to get new information about the current level of pay for performance relationship. What factors can now explain differences? Is significance of other variables (e.g. size of the company or CEO's tenure) changed? Based on all this, the second interest of the paper is about significance of corporate governance variables in pay for performance regression models.

Given that the prior literature (e.g. Core et al. 1999, Hwang and Kim 2009, Fahlenbrach 2009 Conyon and He 2011) has argued that corporate governance policies can partially explain differences in pay for performance regressions, more effective corporate governance policies could mean stronger pay for performance relationship. Alternatively, this paper would offer some interesting evidence against the strong link between corporate governance policies and pay for performance relationship. Based on all that, it is interesting to study what has happened to pay for performance relationship after the financial crisis of 2007-2008. This is the third interest of this paper.

2.4 The research gap

Interestingly, there seems to be a very limited amount of evidence related to these three interest. To my best knowledge, this is the first paper that offers evidence about effects of changed environment (the financial crisis of 2007-2008) to the alleged strong link between corporate governance policies and pay for performance relationship. Moreover, there seems to be no empirical evidence about improvements of corporate governance policies after the financial crisis of 2007-2008, even though for example, Murphy (2012) and Kaplan (2013) have argued that boards are now more powerful.

Regarding of the pay for performance relationship, there are some papers that have offered some evidence after the financial crisis of 2007-2008 but I argue that those papers have some significant limitations and because of those, this paper can offer new, important and interesting evidence. To my best knowledge, two papers with similar kinds of pay for performance regressions have published after the financial crisis of 2007-2008 so next I argue, why this paper has significant contributions to the existing literature regardless of these two papers. I

start with Vemala et al. (2014), who have done CEO compensation research in the U.S. after financial crisis of 2007-2008. After that, I continue with Alexander and Sherif (2016) who have done similar kind of research in the U.K.

Vemala et al. (2014) have done CEO's compensation research in the U.S. after the financial crisis of 2007-2008, so one could argue that their findings could decrease contributions of my paper. However, I argue that there are several reasons for why this is not the case. First, they are not interested in changes of corporate governance policies (my first research question) or effects of corporate governance policies in pay for performance regressions (my second research question). Second, even though they are interested in CEO's compensation after the financial crisis of 2007-2008, I argue that their methodology and more specifically, choices of variables, are questionable.

First, Vemala et al. (2014) did not use any proxy variables for board's independence, even though both regulators and researches seem to highlight importance of independent boards (e.g. Barnhart and Rosenstein 1998, Core et al. 1999, Ozkan 2011, Fahlenbrach 2009, Conyon and He 2011, Schultz 2013). Second, they did not include any control variable for CEO's stockholding (i.e. incentive control), even though this variable has been significant in many other papers (e.g. Core et al. 1999, Coombs et al. 2005, Ozkan 2007). Third, they used Tobin's q as a main performance measure, even though e.g. Core et al. (1999), Coombs et al. (2005), Canarella and Nourayi (2008), Duffhues and Kabir (2008) and Conyon and He (2011) have argued that accounting based ROA would be a more appropriate proxy and based on my best knowledge, it is also more common proxy in this research area. Fourth, they used less common proxies for some issues, for example the total assets instead of the sales used by Core et al. (1999), Coombs et al. (2005), Brick et al. (2006), Ozkan (2007), Conyon et al. (2011) etc. Fifth, they included an unemployment rate without an appropriate theory for this variable and the p-value for this variable differed from less than 1% to more than 40%, which indicate that this might not be an appropriate variable to the models. Based on all these, I argue that even though Vemala et al. (2014) got some interesting results, their paper does not decrease the contribution of this paper.

To my best knowledge, the most recent paper of this research area is done by Alexander and Sherif (2016), who studied effects of the financial crisis of 2007-2008. However, similarly to the Vemala et al. (2014), they were not interested in changes of corporate governance policies (my first research question) or effects of corporate governance policies in pay for performance

regressions (my second research question). Furthermore, they used data from the U.K., so I argue that the results with my data from the U.S. could give different results. This is because the overall level of CEO's compensation tends to be significantly larger in the U.S. (e.g. Conyon et al. 2011, Alexander and Serif 2016) and there have been more legislations in the U.S. after the financial crisis of 2007-2008, for example the say on pay votes were adopted in the U.S. in 2010 and in the U.K. in 2002. Moreover, similarly to Vemala et al. (2014), Alexander and Sherif (2016) did not use any proxy variables for board independence or CEO's stockholdings and they used slightly less common control variables (e.g. the total assets instead of the sales) and performance variable (the Tobin's q instead of the ROA). Based on these differences, I could get very different results and Alexander and Sheriff's (2016) paper does not decrease the contribution of my paper.

Given that the pay for performance relationship is a common research topic, there are some other papers, which have published after the financial crisis of 2007-2008. However, to my best knowledge, these two papers presented above have the most similar interest than mine. For example, Schultz et al. (2013) have done research related to this area but they have used data from 2000-2010 and their point of view is not the financial crisis of 2007-2008, so effects of the crisis do not appear in their paper, especially because the Dodd-Frank act was adopted in 2010.

To summarize, there seems to be no paper, which offer evidence related to my first or second research question. Furthermore, even though there seems to be two paper, which offer evidence related to my third research question, these papers have significant limitations. Based on these, I argue that there is a significant research gap and that this paper has significant contribution to the existing literature.

2.5 Research questions and hypothesis

In this chapter, I summarize my research questions and develop my hypotheses. Based on the prior findings and a research gap, there are three main interest of this paper:

- i) The alleged improvement of corporate governance policies in the U.S. after the financial crisis of 2007-2008 and its consequences (e.g. the new legislation),
- ii) The strong link between the corporate governance policies and pay for performance relationship (i.e. significance of corporate governance variables in pay for performance

regression models) after the financial crisis of 2007-2008 its consequences and

iii) The level of pay for performance relationship after the financial crisis of 2007-2008 its consequences.

To study these three issues, I have three research questions and three hypotheses. The first research question is about the changes of the corporate governance policies in the U.S. after the financial crisis of 2007-2008.

Research question 1: “Have U.S. companies taken more effective corporate governance policies after the year 2009?”

Based on the arguments presented in the previous chapter, most importantly the prior literature showing that there exist significant inefficiencies in corporate governance policies as they have stayed an important factor behind pay for performance relationship regardless of new legislations and other changes, my first hypothesis is the following:

Hypothesis 1: “U.S. companies have not taken more effective corporate governance policies after the year 2009”

The second research question is about importance of corporate governance variables in pay for performance regression models after the financial crisis of 2007-2008 and its consequences (i.e. about the strong link between corporate governance policies and pay for performance relationship).

Research question 2: “Do corporate governance variables have a smaller amount of explanatory power in pay for performance regression models after the year 2009?”

Based on the arguments presented in the previous chapter, most importantly the prior literature showing that corporate governance policies have stayed an important factor behind pay for performance relationship regardless of new legislations and other changes, my second hypothesis is the following:

Hypothesis 2: “Corporate governance variables do not have a smaller amount of explanatory power in pay for performance regression models after the year 2009”

The third research question is about the level of pay for performance relationship after the financial crisis of 2007-2008 and its consequences.

Research question 3: “Is a level of pay for performance relationship stronger after the year 2009?”

The third hypothesis is based on many papers’ findings regarding of importance of corporate governance variables in pay for performance regression models. For example, Core et al. (1999), Hwang and Kim (2009), Fahlenbrach (2009), Conyon and He (2011) have argued that more effective corporate governance policies tend to be linked to stronger pay for performance relationships. Moreover, given the prior literature showing that corporate governance policies have stayed an important factor behind pay for performance relationship regardless of new legislations and other changes, there is basically no reasons to expect any significant changes to the level of pay for performance relationship.

Hypothesis 3: “A level of pay for performance relationship is not stronger after the year 2009.”

The prior literature has argued that there exists a strong link between effective corporate governance policies (my first and second hypotheses are related to this) and stronger pay for performance relationship (my third hypothesis is related to this). However, the prior literature has not offered evidence about what would happen to one of these if the other one faces some significant change. Is the pay for performance relationship still quite weak? Can smaller differences in corporate governance policies still partially explain differences in pay for performance relationship? Have there really been some significant changes in corporate governance policies? These kinds of questions can be answered based on my three research questions, which study changes of corporate governance policies, the link between corporate governance policies and pay for performance relationship and potential changes in level of pay for performance relationship.

Given that my hypotheses are independent of each other’s’ (i.e. rejecting one does not affect to the others), there are eight potential situations, which all could offer some interesting evidence about the current corporate governance policies, the pay for performance relationship and the alleged strong relationship between these two after the financial crisis of 2007-2008. The figure 1 (see page 5) visualized the potential results and next I present comprehensive descriptions about what these situations (cases a-h) would mean and why they all would offer some interesting information, given findings of prior literature. My hypotheses, which are based on the prior literature, argue that the case a should be the most likely case.

Case a: Offers evidence that on average, U.S. companies have not taken more effective corporate governance policies. Furthermore, this case offers evidence that the strong link between corporate governance policies and pay for performance relationship still holds. Lastly, this case offers evidence that the pay for performance relationship is still weak. To summarize, this case offers evidence that nothing has changed regarding of corporate governance policies, the pay for performance relationship or the link between these two. This would be evidence against e.g. Murphy (2012) and Kaplan (2013).

Case b: Offers evidence that on average, U.S. companies have not taken more effective corporate governance policies. Secondly, this case offers supportive evidence for the strong link between corporate governance policies and pay for performance relationship. More interestingly, the pay for performance relationship has become stronger because of some other factors than more effective corporate governance policies.

Case c: Offers evidence that on average, U.S. companies have not taken more effective corporate governance policies. Interestingly, this case offers some evidence that the link between corporate governance policies and pay for performance relationship is not as strong as the prior literature has argued. This is because coefficients of corporate governance variables are not significant in pay for performance regressions. In addition, this case shows that the pay for performance relationship is still weak.

Case d: Offers evidence that on average, U.S. companies have not taken more effective corporate governance policies. Interestingly, this case offers some evidence that the link between corporate governance policies and pay for performance relationship is not as strong as the prior literature has argued. This is because coefficients of corporate governance variables are not significant in pay for performance regressions. In addition, this case shows that the pay for performance relationship has become stronger, even though companies have not taken more effective corporate governance policies.

Case e: Offers evidence that on average, U.S. companies have taken more effective corporate governance policies. However, as the corporate governance variables are still significant, there are a few different interpretations: i) there are still relatively large amount of companies, which have ineffective corporate governance policies or ii) corporate governance policies are very crucial for strong pay for performance relationship, as even smaller differences are enough to

partially explain differences in pay for performance relationship. Answer to the first research question offers some evidence that the second one is more likely explanation but it is difficult to say which one, or a combination of both is a more appropriate interpretation. However, this would offer some evidence against e.g. Murphy (2012) and Kaplan (2013) because it seems that companies have not taken more effective corporate governance policies. In addition, this result shows that the pay for performance relationship is still weak.

Case f: Offers evidence that on average, U.S. companies have taken more effective corporate governance policies. However, as the corporate governance variables are still significant, there are a few different interpretations: i) there are still relatively large amount of companies, which have ineffective corporate governance policies or ii) corporate governance policies are very crucial for strong pay for performance relationship, as even smaller differences are enough to partially explain differences in pay for performance relationship. Answer to the first research question offers some evidence that the second one is a more likely explanation but it is difficult to say which one, or a combination of both is the appropriate interpretation. However, this would offer some evidence against e.g. Murphy (2012) and Kaplan (2013) because it seems that companies have not taken more effective corporate governance policies. In addition, this result shows that the pay for performance relationship has improved.

Case g: Offers evidence that on average, U.S. companies have taken more effective corporate governance policies. More interestingly offers some evidence against the prior literature (e.g. Core et al. 1999, Hwang and Kim 2009, Fahlenbrach 2009, Conyon and He 2011), because even though companies have taken more effective corporate governance policies, the pay for performance relationship is still as weak as it has been in prior literature. To my knowledge, this would be the first paper, which showed that even though corporate governance policies have become more effective, the pay for performance relationship has not become stronger.

Case h: Offers evidence that on average, U.S. companies have taken more effective corporate governance policies. Support the findings of the prior literature (e.g. Core et al. 1999, Hwang and Kim 2009, Fahlenbrach 2009, Conyon and He 2011), regarding of the significant link between corporate governance policies and pay for performance relationship because the pay for performance relationship has improved with corporate governance policies. To my best knowledge, this would be the first paper, which showed that when corporate governance policies have become more effective, the pay for performance relationships has become

stronger.

As one can see from the cases above, this paper has a significant contribution to the existing literature because it offers some new evidence about corporate governance policies, the pay for performance relationship and the alleged link between these two issues.

3. Methodology, data and variables

In this chapter, I describe my methodology, variables and arguments behind them.

3.1 Methodology

To study the first research question, I use an unpaired sample t-test, which is a commonly used method to test if difference between two observations is statistically significant. This is a commonly accepted method for testing effects of some shock (in this case the financial crisis of 2007-2008) and no comprehensive argumentation is needed, as there are not many alternative methods for this kind of research question.

However, there are many potential ways to study the second and the third research questions and because the relationship between CEO's compensation and firm's performance has been an enormously popular research topic, many kinds of methods have used. However, I argue that both theory and prior literature support multiple linear regression models and more specifically, the Ordinary Least Square (OLS) fitting. First, based on my best knowledge, the OLS fitting is the most common research method in this area. Second, there are many theoretical benefits in the OLS because under the following assumptions, it is unbiased, consistent and effective (Stock and Watson 2007):

Assumption 1: $E(u_i | X_{1i} = x_1, \dots, X_{ki} = x_k) = 0$. More intuitively, a conditional distribution (meaning given all the X_i values) of error term u is zero. In my paper, this assumption means that one cannot estimate future returns (ROA or stock return) based on error terms of pay for performance regressions. I have no reason to believe that this assumption would not hold because most papers of this research area have used similar kinds of models and databases than I do.

Assumptions 2: $(X_{1i}, \dots, X_{ki}, Y_i)$, $i = 1, \dots, n$, are independent and identically distributed (often shortened as i.i.d.). More intuitively, this assumption means that a collection process of observations is not biased. Because I collect my data by using simple random sampling (just

take all companies that are in both databases), this assumption holds automatically.

Assumption 3: $E(X_i^4) < \infty, \dots, E(X_i^4) < \infty, \dots, E(Y^4) < \infty$. More intuitively, this means that all independent (X_i) and dependent (Y_i) variables have finite four moments, i.e. large outliers are rare. I checked my data and I did not find any clear outliers.

Assumption 4: There is no perfect multicollinearity. More intuitively, no variable is an exact linear function of some other variable. I checked my data and there were no large correlations. The exact correlations are presented in the chapter 3.3.

Because these assumptions seem to hold and based on my best knowledge, the OLS is the most common approach for linear multiple regression fitting (both in this area of research and more generally in any research that use linear multiple regression models), I argue that the multiple linear regression with the OLS fitting is an appropriate way to answer my second and third research questions.

I run six different multiple regression models (three with pre-crisis data and three with post-crisis data) in Stata and use many control variables that I selected based on the prior literature. I evaluate my models based on adjusted r-squared and robustness checks. I use clustered standard errors to avoid problems related to the autocorrelation between observations from the same company.

3.2 Databases

I use corporate governance data from BoardEx, firm's performance and CEO's compensation data from Compustat and run six different linear multiple regression models and evaluate validity and reliability of my research by using different kinds of robustness checks (alternative models and variables). To maximize number of observations, I include all companies, which have information about all variables in the both databases. Following e.g. Core et al. (1999) and Fahlenbrach (2009), I drop companies that have some missing information because otherwise there might be some problems, such as a biased sample if missing of some data is not a random process. I use two different periods, pre-crisis (2006-2009) and post crisis (2009-2013) because this paper is interested in effects of the financial crisis of 2007-2008 and its consequences, such as new legislations.

3.3 Variables

In this chapter, I describe my variables, argue why I decided to use these variables and tell what kinds of coefficients I expect for each of the variables. Most of my variables and expectations are based on probably the most cited paper of this area, Core et al. (1999). I argue that this is an appropriate way to choose the variables because the second and the third interests of this paper are quite similar than the interests of the paper of Core et al. (1999) and because many other papers have used quite similar kinds of variables than I use. However, I add a percentage of female board members and make some small adjustment to some of the variables. Next, I define each variable and then explain the arguments behind them.

Table 1: Definitions of the variables

Variable	Definition
Total Compensation	Annual total compensation paid to CEO, as reported in annual report
Cash compensation	Sum of annual salary and bonus
Salary	Annual fixed compensation
ROA	Net income/loss divided by total assets
Size	Number of directors on board
Duality	1 if CEO is also the chair of the board, 0 otherwise
%Outsiders	Members of board of directors who are not employees of the company divided by total number of directors on board
%Aged	Members of board of directors who are older than 69 divided by total number of directors on board
Busy	1 if at least 50% of members of board of directors serve on three or more other boards, 0 otherwise
%Related	Members of board of directors who have been employees of the company but currently are not, divided by total number of directors on board
%Females	Members of board of directors who are female divided by total number of directors on board
Tenure	Number of years the CEO has been CEO
%CEO stocks	Stockholding of the CEO (%)
Sales	Annual revenue
D/A	Total debt divided by total assets
M/B	Market value of the company divided by total assets
Stock Return (%)	One/three/five year(s) total stock return, dividends re-invested
Total Assets (\$ thousands)	Total amount of assets owned by company (\$ thousands), as reported in balance sheet
%Busy	Members of board of directors who serve on three or more other boards, divided by total number of directors on board
CEO age	Age of CEO in years

This table presents definitions of the variables used in this paper.

3.3.1 Compensation variables

Even though one main interest of this paper is to study the pay for performance relationship between firm's performance and CEO's total compensation, it is important to separate different forms of compensation. This is because according to many papers (e.g. Mehran 1995, Banker et al. 2012), a structure of compensation can be an important factor behind pay for performance relationship and if one does not study different forms of compensation separately, one might not find all relevant information about the pay for performance relationship. For example, according to Banker et al. (2012), different forms of compensation may have contrary effects and one can get more accurate information about the pay for performance relationship by studying the different forms separately. Based on these kinds of findings, I follow a famous paper of this research area, Core et al. (1999), and I use three different forms of compensation, a total compensation, a cash compensation and a salary.

Total Compensation: The third research question of this paper is about if there is a stronger relationship between this variable and past performance of the company (i.e. ROA or a stock return) after the financial crisis of 2007-2008.

Cash Compensation: Following Core et al. (1999), I study cash compensation because then I can separate effects of i) equity-based compensation (i.e. total compensation minus the cash compensation) and ii) cash-based compensation.

Salary: Again, following Core et al. (1999), I use salary as one independent variable. This is because I want to study the pay for performance relationship of different kinds of compensation and salary represent a fixed annual compensation that has paid to the CEO.

3.3.2 Performance variables

To my best knowledge, the most common performance measurement in this research area is a return on assets (ROA), so I argue that the ROA is an appropriate proxy for performance of company. In addition, I make a robustness check by using market-based measurement of performance of the company, a stock return.

Return on Asset (ROA): A large part of the literature, which has focused on realized (i.e. past) returns, has used ROA as a main performance measure. For example, Coombs et al. (2005), Conyon and He (2011) and Schultz et al. (2013) have found that the ROA is significant at one

percent level in similar kinds of regressions. In addition, Canarella and Nourayi (2008) have got five percent significance level. Based on the prior findings, I expect statistically and economically positive coefficient for this variable, even though Duffhues and Kabir (2008) have found very interesting results that the ROA is significantly negative at one percent level in similar kind of regression.

3.3.3 Corporate Governance variables

I use the following proxies for effective corporate governance policies. Most of these variables are taken from paper of Core et al. (1999) but I slightly modified some variables based on findings that are more recent. In addition, I add one new variable, a percentage of female members in board. I argue that these variables are appropriate proxies for effective corporate governance policies because they have well-developed theories behind them and they have been significant in many papers, which have studied pay for performance relationship. The first research question is about if there are some positive developments of corporate governance policies after the financial crisis of 2007-2008. The second research question is about if these variables have still as large amount of explanatory power in pay for performance regression models after the financial crisis of 2007-2008 as they had prior the crisis.

Board size (Size): According to many papers, larger boards tend to be less effective and tend to offer CEO's compensation packages that are less sensitive for firm's performance (e.g. Yermack 1996, Core et al. 1999). For example, Core et al. (1999), Ozkan (2007 and 2011), Conyon and He (2011) and Schultz et al. (2013) have found that a coefficient for board size is significantly positive at one percent level and Hwang and Kim (2009) that it is significantly positive at five percent level. Based on these kinds of evidence, I expect positive sign for the coefficient of this variable.

Dummy variable whether CEO is board chair (Duality): Many researches have argued that if CEO is also the chair of the board, there might be larger agency problems (e.g. Yermack 1996, Core et al. 1999). Supportive evidence for this theory have found for example by Core et al. (1999), Hartzell and Stark (2003,) Brick et al. (2006), Hwang and Kim (2009), Conyon and He (2011) and Schultz et al. (2013), who have found that the "CEO is the chairman"- dummy variable is significantly positive at one percent level. Based on these kinds of evidence, I expect positive sign for the coefficient of this variable.

Percentage of outside directors (%Outsider): According to many papers (e.g. Pfeffer 1981, Core et al. 1999), a significant percentage of board members should be outsiders. Otherwise, the board may not be independent enough because board members may be loyal to the managers and CEO may get more power. This could cause weaker pay for performance relationship and supportive evidence for this theory have found by Core et al. (1999), Ozkan (2007), Fahlenbrach (2009), Conyon and He (2011) and Schultz et al. (2013), who have found that the coefficient of this variable is significantly negative at one percent level. Based on these kinds of evidence, I expect negative sign for the coefficient of this variable.

Percentage of directors who are over age of 69 (%Aged): According to Core et al. (1999), board members may become less effective when they become older and because of this, the CEO may get more power. For example, Core et al. (1999) and Hwang and Kim (2009) decided to use the age of 69 years as an upper limit for effective board members and I follow their idea. Their findings support this theory as they found that the coefficient for this variable is significantly positive at five percent level.

However, this is the first variable that I slightly modified. Core et al. (1999) used a ratio aged outsider directors divided by all outsider directors but I argue that a ratio aged directors divided by all directors is a more appropriate proxy. This is because members who are both insiders and aged could be even less effective in comparison to i) aged outsider and ii) not-aged insiders. For example, Hwang and Kim (2009) have offered some supportive evidence for this theory because they used the same ratio than I do and found that it is more significant (significantly positive at one percent level) than the ratio used by Core et al. (1999). My databases do not offer similar kinds of data than Core et al. (1999) had so unfortunately, I cannot do a robustness check with their ratio. However, I argue that there are only a few insiders who are aged, so these two ratios are quite similar. Based on findings of Core et al. (1999) and Hwang and Kim (2009), I expect positive sign for the coefficient of this variable.

Dummy variable whether board is busy (Busy): According to Core et al. (1999), if board members are also members of many other boards, they may be less focused on individual companies and therefore be less effective controller of CEO. Following this paper, I use three other board membership (i.e. total amount of four) as a lower limit for busy board members. However, this is the second variable that I slightly modified, as I decided to use dummy variable instead of the percentage of busy members. I do this because Core et al. (1999) found that their variable tends to be insignificant and e.g. Ozdemir and Upneja (2012) that it is significant only

at ten percent level. Supportive evidence for my variable have found for example by Fich and Shivdasani (2006), who have found that the dummy variable tends to be more significant than the percentage of busy directors. Based on contradictory evidence, I expect positive sign for the coefficient of this variable but I cannot be sure if it is statistically significant. As a robustness check, I use the variable used by Core et al. (1999).

Percentage of outside directors who have a significant relationship with the company (%Related):

According to Core et al. (1999), board members who have a significant relationship with the company may be less independent and may give more power to the CEO. These relationships could be based on for example the following things: outside manager is appointed by CEO, outsider manager or his employer received payments from the company more than his or her board pay, inside director of the firm serves on the board of that outside director's firm. I follow this idea but modified the variables slightly because Core et al. (1999) used three variables but many of the coefficients of these variables were statistically insignificant in their models. I argue that these variables measure too much the same thing, social ties with the CEO, and this is the reasons for the insignificant coefficients. For example, Hwang and Kim (2009) have found some supportive evidence for my theory because they used one variable ("board independence") and found that it is significant at five percent level. Based on this finding, my theory, Core et al. (1999) findings and the fact that my database offers variable called "Outside director with past manager position in the company", I decided to use one variable. Based on all that, I expect positive sign for the coefficient of this variable.

Percentage of females (%Females): As described in the second chapter, there have been some arguments regarding of potential benefits of a gender diversity of boards (e.g. higher attendance rate of board meetings or better risk management) but given that these theories are relatively recent, there is not a large amount of empirical evidence about this. However, Brick et al. (2006) and Alexander and Sherif (2016) have found supportive evidence for these arguments because in their papers, the coefficient of gender diversity is significantly positive at one percent level. Based on these theories and findings, I expect positive coefficient for this variable.

To summarize, my second research question is about changes of these variables, which are proxies for more effective corporate governance policies. I do not expect any significant changes but based on the arguments presented in the previous chapter (public pressure, new legislations, and some papers), there could be some. If there have been some changes, corporate

governance policies should have become more homogenous and this should cause smaller significance for these variables, based on econometrics (see appendix 1). Next table summarizes this discussion about effective corporate governance policies and explains why more effective corporate governance policies would also mean more homogenous corporate governance policies.

Table 2. Summary of prior findings regarding of corporate governance policies and theories behind my homogeneity expectations

Variable	More effective policy means	Key argument for effectivity	Key argument for larger homogeneity expectation
Size	Smaller boards	Larger boards tend to be less effective monitors.	There should be a smaller number of companies with large boards.
Duality %	Smaller %	CEO may have more power if he or she is also the chair of the board.	There should be a smaller number of companies with CEO as the chair of the board.
Outsiders %	Larger %	Outside members are less likely to have social ties with the CEO.	There should be a smaller number of companies with significant percentage of inside members on board.
Aged %	Smaller %	Aged members tend to be less effective monitors.	There should be a smaller number of companies with significant percentage of aged members on board.
Busy boards %	Smaller %	Busy members tend to be less effective monitors.	There should be a smaller number of companies with busy boards.
Related %	Smaller %	Related members are more likely to have social ties with the CEO.	There should be a smaller number of companies with significant percentage of related members on board.
Females %	Larger %	Gender diversification may increase attendance rate and quality of risk management.	There should be a smaller number of companies with only male members on board.

This table summarizes prior findings about corporate governance policies from pay for performance relationship point of view. The first column has corporate governance variables defined in the table 1. The second column defines, what kinds of changes would indicate more effective corporate governance policies, based on the prior literature. The third column has key arguments behind statements presented in the second column. The last column explains why more effective corporate governance policies would also mean more homogenous corporate governance policies.

3.3.4 Other control variables

Not only the corporate governance variables but also other control variables have found to be significant factors behind differences in pay for performance relationship. Following many other papers, I control important CEO's and firm's characteristics. Lastly, I include industry-fixed and year-fixed effects to my models.

CEO's characteristics

CEO's Tenure (Tenure): Following many papers, I control CEO's tenure for whatever effect it might have. For example, CEO's with longer tenure tend to have more equity incentives, which could increase pay for performance relationship due to better aligned interests between CEO and shareholders. Some researchers have offered supportive evidence for this theory as they have found that the coefficient is significantly negative. For example, Coombs et al. (2005) got one percent significance level, Ozkan (2007) five percent level and Conyon et al. (2011) ten percent level. Based on these kinds of theories and findings, I expect negative sign for the coefficient of this variable.

CEO's Stock Ownership (%CEO stocks): The principal agent theory argues that CEO's higher stock ownership indicates better aligned interests between shareholders and CEO. This may have many kinds of consequences for pay for performance relationship and prior studies have offered supportive evidence for this theory. For example, Hwang and Kim (2009) have found that this coefficient is significantly negative at one percent level, Coombs et al. (2005) and Bricks et al. (2006) that it is significantly negative at five percent level and Barnhart and Rosenstein (1998) that it is significantly negative at ten percent level. Based on these kinds of findings and the principal agent-theory, I expect negative sign for the coefficient of this variable.

Firm's characteristics

Firm Size (Sales): According to the principal agent theory, when a firm becomes bigger, it tends to become more complex because of that, different kinds of agency problems may increase. Moreover, the managers of bigger companies tend to be wealthier so they need larger compensation to become motivated. Based on these kinds of theories, the prior literature argues that the optimal level of compensation increases with firm size (e.g. Core and Guay 1999). There are many options for the proxy of size but because e.g. Core et al. (1999), Coombs et al. (2005), Bricks et al. (2006) and Ozkan (2007) have found that a sales is significantly positive at one percent level and Conyon et al. (2011) that it is significantly positive at five percent level, I decided to use the sales as my main proxy for the size of company. In addition, I make a robustness check by using other measurement of the size, the total assets. Based on these theories and prior findings, I expect positive sign for the coefficient of this variable.

Leverage and risk (D/A): Not only return but also risk is a significant factor that determines CEO's performance. There are many alternative proxies for controlling risks but interestingly, many of them tend to be insignificant. For example, Conyon and He (2009) have offered evidence that a volatility of stock return is insignificant and Brick et al. (2006) have found that a cash flow risk is insignificant. However, Frye (2004), Duffhues and Kabir (2008) and Schultz et al. (2013) have found that debt to asset ratio is significant at one percent level in some of their similar kinds of regressions (not in all). In addition, Conyon et al. (2011) have offered evidence that the coefficient for D/A is significant at five percent level in some of their similar kinds of regressions (not in all), so I decided to use D/A ratio as a proxy for leverage and risk. However, based on the prior evidence, I do not know if the coefficient will be significant.

Growth opportunities (M/B): According to the principal agent theory, it is more difficult for shareholders of a growth company to determine an appropriate strategy for their company, so they tend to give more equity incentives for managers to align interests (e.g. Gaver and Gaver 1993). There are some alternative proxies for growth opportunities but because Leone et al. (2006), Hwang and Kim (2009), Fahlenbrach (2009) and Conyon and He (2011) have found that the book to market ratio is significantly negative at one percent level and Conyon and He (2011) that it is significantly negative at five percent level, I decided to use market to book ratio a proxy for he growth opportunities. Based on these kinds of finding and the principal agent theory, I expect negative sign for the coefficient of this variable.

Industry: Following many papers (e.g. Cooper et al. 2009 and Brick et al 2006) I calculate industry-controlled (or in other words, industry-adjusted returns). There are many reasons, which make industry important. For example, Cooper et al. (2009) found that different industries tend to have different structure of executive compensation and this can have significant effects to the pay for performance relationship. Following the prior literature, I use industry groups offered by the database (in my case the BoardEx). I have 24 industry groups and a comprehensive description about the industry groups can be found from the appendix 2.

Year: Lastly, following many papers (e.g. Core et al. 1999, Brick et al. 2006, Cooper et al. 2009,) I calculate year-controlled returns. I use years 2006 and 2010 as base years in pre- and post-crisis regressions and add dummy variables for the other years (2007, 2008, 2009, 2011, 2012, 1013).

3.3.5 Variables for robustness checks

Because of a large amount of prior research, some researches have used many alternative variables. Given that significance of these variables has varied substantially depending on the data and variables, I decided to make robustness checks by using the following variables, even though my main variables tend to be more significant.

Stock return: Following a large part of the literature, I use this variable as a market based return to make a robustness check. For example, Hartzell and Starks (2003), Brick et al. (2006), Ozkan (2007), Fahlenbrach (2009), Hwang and Kim (2009) and Conyon and He (2009) have found that the stock return is significant at one percent level and Conyon et al. (2011) that it is significant at five percent level. Based on these kinds of findings and new legislations, I expect positive and statistically and economically significant coefficient for this variable, even though Duffhues and Kabir (2008) have found very interesting results, which state that the coefficient is significantly negative at one percent level in similar kind of regression. To test if the pay for performance relationship varies depending on the period, I use periods of one, three and five years.

Percentage of busy board directors (%Busy): As described earlier, some researchers have used a dummy variable for the busy board (at least 50% of the board members are members of four or more boards) and found that it is more often significant in comparison to percentage of busy members. However, because for example, Core et al. (1999) have used the percentage of busy members and theoretically, it could be a more accurate proxy, I make robustness check by using this variable.

Size: To test if a proxy for size of company makes some difference, I test alternative proxy, the total assets. I use the total asset because e.g. Schultz et al. (2013) and Alexander and Sherif (2016) have found that it is significant at one percent level.

CEO age: Similarly, to test if a proxy for power of CEO makes some difference, I test alternative proxy, the CEO age, which has been significant at ten percent level (e.g. Ozkan 2007).

Based on my best knowledge, there seems to be no important alternative variables for the other control variables. Moreover, based on following reasons, I argue that my models are an appropriate way to study my research questions. First, I use the variables that have been the

most significant ones (e.g. the board size, CEO=chairman dummy variable) in pay for performance regressions. Second, I only slightly modified variables that have been slightly less significant (e.g. slightly different way to control outsider directors who are former employees of the company), so many other papers have used almost the same variables than I do. Some small differences exist basically because other papers have slightly different research questions. Third, I have already quite many variables that measures independence and power of boards and one should not add too many variables, which measure the same thing (e.g. Stock and Watson 2007). Fourth, I make robustness checks to mitigate challenges related to the variables (e.g. some researchers have had non-public information that I cannot get). A more comprehensive discussion about the limitations of this paper can be found from the chapter 5. Below is the descriptive table that summarizes my variables.

Table 3. Descriptive statistics of the variables, the whole data sample (2006-2013)

Compensation variables	Mean	Median	Standard deviation
Total Compensation (\$ million)	5.7	3.7	8.9
Cash compensation (\$ million)	1.0	0.8	1.5
Salary (\$ million)	0.8	0.7	0.4
Performance variable			
ROA	4.2%	4.0%	9.5%
Corporate governance variables			
Size	9.1	9.0	2.5
Duality	0.6	1.0	0.5
%Outsiders	78.2%	81.8%	14.5%
%Aged	19.7%	15.8%	18.9%
Busy	0.03	0.0	0.2
%Related	15.1%	14.3%	14.0%
%Females	12.0%	11.1%	12.7%
CEO characteristics			
Tenure (years)	8.1	6.3	7.2
%CEO stocks	2.7%	0.9%	5.4%
Company controls			
Sales (\$ million)	6.5	1.1	22.1
D/A	55.7%	56.0%	23.0%
M/B	1.2	0.9	1.1
Robustness check			
Stock Return (1 year)	22.5%	15.9%	62.3%
Stock Return (3 years)	9.4%	9.0%	22.7%
Stock Return (5 years)	8.1%	7.0%	19.2%
Total Assets (\$ millions)	18.7	2.2	112.6
%BUSY	9.0%	0.0%	16.9%
CEO age (years)	54.7	54.0	6.8

n=3199

This table presents means, medians and standard deviations of my variables, with the whole data set from the years 2006-2013 (3199 observations).

Given that the purpose of this paper is to study effects of the financial crisis of 2007-2008 and its consequences for a pay for performance relationship point of view, I do not offer a comprehensive comparison of data between my paper and prior studies. Generally, my data looks quite similar than data used in prior studies. For example, the average size of board is approximately nine members, as it was in Fahlenbrach's (2009) paper. Some differences exist as I include smaller companies than many of the other papers, which have focused on large companies (e.g. S&P500). However, given the scope of this paper, it is more interesting to compare pre-and post-crisis data. Below is the descriptive statistics for the pre- (2006-2009) and post-crisis data sets (2010-2013), respectively.

Table 4: Descriptive statistics of the variables, the pre-crisis data sample (2006-2009)

Compensation variables	Mean	Median	Standard deviation
Total Compensation (\$ million)	4.2	2.5	5.1
Cash compensation (\$ million)	0.9	0.7	1.1
Salary (\$ million)	0.7	0.6	0.4
Performance variable			
ROA	3.1%	3.3%	10.7%
Corporate governance variables			
Size	8.7	8.0	2.4
Duality	0.7	1.0	0.5
%Outsiders	76.6%	80.0%	14.0%
%Aged	17.1%	14.3%	18.1%
Busy	0.03	0.0	0.2
%Related	13.9%	14.3%	13.9%
%Females	10.0%	9.1%	13.2%
CEO characteristics			
Tenure (years)	9.2	7.0	7.4
%CEO stocks	4.4%	1.8%	7.0%
Company controls			
Sales (\$ million)	3.9	0.8	14.7
D/A	54.9%	54.4%	24.3%
M/B	1.2	0.9	1.2
Robustness check			
Stock Return (1 year)	17.5%	5.9%	85.2%
Stock Return (3 years)	0.5%	-0.2%	22.3%
Stock Return (5 years)	8.2%	7.1%	20.5%
Total Assets (\$ million)	12.4	1.3	85.7
%BUSY	9.2%	0.0%	16.5%
CEO age (years)	54.0	54.0	6.9

n=952

This table present means, medians and standard deviations of my variables with the pre-crisis data set from the years 2006-2009 (952 observations).

Table 5: Descriptive statistics of the variables, the post-crisis data sample (2010-2013)

Compensation variables	Mean	Median	Standard deviation
Total Compensation (\$ million)	6.4	4.3	10.0
Cash compensation (\$ million)	1.2	0.8	1.6
Salary (\$ million)	0.8	0.8	0.4
Performance variable			
ROA	4.7%	4.2%	8.9%
Corporate governance variables			
Size	9.3	9.0	2.6
Duality	0.6	1.0	0.5
%Outsiders	78.9%	83.3%	14.6%
%Aged	20.8%	16.7%	19.1%
Busy	0.03	0.0	0.2
%Related	15.6%	14.3%	14.0%
%Females	12.9%	12.5%	12.3%
CEO characteristics			
Tenure (years)	7.6	5.8	7.0
%CEO stocks	2.0%	0.6%	4.4%
Company controls			
Sales (\$ million)	7.6	1.4	24.4
D/A	56.1%	56.7%	22.4%
M/B	1.2	0.9	1.1
Robustness check			
Stock Return (1 year)	24.6%	19.2%	49.4%
Stock Return (3 years)	13.2%	12.4%	21.8%
Stock Return (5 years)	8.1%	7.0%	18.6%
Total Assets (\$ million)	21.3	2.7	122.1
%BUSY	8.9%	0.0%	17.0%
CEO age (years)	55.0	55.0	6.7

n=2247

This table present means, medians and standard deviations of my variables with the post-crisis data set from the years 2010-2013 (2247 observations).

Based on these tables, one can see that there have been some changes in corporate governance policies. The average size of board has increased as well as the percentages of outsiders, aged members, related members and females. In addition, there are more non-CEO chairs of the board. However, one cannot see from these tables if these changes are statistically significant and analysis that is more comprehensive is offered in the fourth chapter. Before that, I present correlation table to make sure that my variables are not too correlated with each other's.

Table 6. Correlation table

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Total Compensation (1)	1																				
Cash compensation (2)	0.39	1																			
Salary (3)	0.45	0.52	1																		
ROA (4)	0.09	0.03	0.07	1																	
Size (5)	0.21	0.20	0.34	0.01	1																
Duality (6)	0.07	0.10	0.15	0.08	0.08	1															
%Outsiders (7)	0.03	-0.06	0.04	-0.002	0.24	-0.02	1														
%Aged (8)	0.004	0.06	0.07	-0.01	-0.07	-0.02	-0.2	1													
Busy (9)	0.01	0.02	0.01	-0.01	-0.2	-0.07	-0.5	0.27	1												
%Related (10)	-0.002	-0.0	-0.003	0.01	-0.09	-0.05	0.13	-0.1	-0.1	1											
%Females (11)	0.07	0.05	0.12	0.02	0.15	-0.03	0.03	0.07	0.30	0.02	1										
CEO tenure (12)	-0.05	0.03	0.03	0.005	-0.1	0.29	-0.1	0.08	0.02	-0.09	-0.1	1									
%CEO stocks (13)	-0.1	-0.0	-0.2	-0.009	-0.2	0.19	-0.1	-0.0	0.0003	-0.03	-0.1	0.47	1								
Sales (14)	0.32	0.21	0.35	0.05	0.22	0.08	0.05	-0.02	0.05	-0.03	0.09	-0.02	-0.04	1							
D/A (15)	0.09	0.10	0.22	-0.2	0.34	-0.02	0.02	-0.007	0.03	-0.07	0.14	-0.09	-0.1	0.10	1						
M/B (16)	0.01	-0.06	-0.1	0.42	-0.2	0.07	-0.006	-0.04	-0.01	0.06	-0.04	0.03	0.03	-0.05	-0.5	1					
Stock return (17)	0.02	0.02	0.02	0.09	-0.01	-0.02	-0.01	0.01	0.001	0.01	0.01	-0.03	-0.04	-0.01	0.14	1					
Market Value (18)	0.41	0.21	0.35	0.10	0.21	0.07	0.04	-0.01	0.05	-0.02	0.07	-0.001	-0.04	0.83	0.05	0.05	1				
Total Assets (19)	0.13	0.16	0.19	-0.02	0.20	0.003	0.02	-0.01	0.01	-0.02	0.05	-0.02	-0.04	0.46	0.16	-0.1	-0.006	0.43	1		
%BUSY (20)	0.07	0.04	0.08	-0.03	-0.1	-0.05	-0.4	0.25	0.82	-0.07	0.32	-0.01	-0.04	0.11	0.06	-0.02	0.01	0.11	0.05	1	
CEO age (21)	0.04	0.09	0.14	-0.02	0.0005	0.18	-0.08	0.18	0.06	-0.08	-0.03	0.46	0.15	0.07	0.01	-0.05	0.02	0.06	0.02	0.02	1

This table present pair correlations between my variables.

As in the prior literature, I did not find large correlations. Only significant correlations are between the dummy variable for busy board and percentage of busy members (obviously) and between sales and market value. These variables are not in same models so there will not be any problems related to correlations between dependent variables.

3.4 Regression models

Based on the prior literature, the research questions and my variables, I use three different regression models with both pre- and post-crisis data to answer to the second and third research questions:

$$\begin{aligned} \text{Total Compensation} = & B_0 + \beta_1 \text{ROA} + \beta_2 \text{Size} + \beta_3 \text{Duality} + \beta_4 \% \text{Outsider} + \beta_5 \% \text{Aged} + \beta_6 \text{Busy} + \\ & \beta_7 \% \text{Related} + \beta_8 \% \text{Females} + \beta_9 \text{Tenure} + \beta_{10} \% \text{CEO Stocks} + \beta_{11} \text{Sales} + \beta_{12} \text{D/A} + \\ & \beta_{13} \text{M/B} + \sum \beta \text{industry} + \sum \beta \text{Year} \end{aligned}$$

$$\begin{aligned} \text{Cash Compensation} = & B_0 + \beta_1 \text{ROA} + \beta_2 \text{Size} + \beta_3 \text{Duality} + \beta_4 \% \text{Outsider} + \beta_5 \% \text{Aged} + \beta_6 \text{Busy} + \\ & \beta_7 \% \text{Related} + \beta_8 \% \text{Females} + \beta_9 \text{Tenure} + \beta_{10} \% \text{CEO Stocks} + \beta_{11} \text{Sales} + \beta_{12} \text{D/A} + \beta_{13} \text{M/B} + \sum \beta \\ & \text{industry} + \sum \beta \text{Year} \end{aligned}$$

$$\begin{aligned} \text{Salary} = & B_0 + \beta_1 \text{ROA} + \beta_2 \text{Size} + \beta_3 \text{Duality} + \beta_4 \% \text{Outsider} + \beta_5 \% \text{Aged} + \beta_6 \text{Busy} + \beta_7 \% \text{Related} + \\ & \beta_8 \% \text{Females} + \beta_9 \text{Tenure} + \beta_{10} \% \text{CEO Stocks} + \beta_{11} \text{Sales} + \beta_{12} \text{D/A} (t- \\ & 1) + \beta_{13} \text{M/B} + \sum \beta \text{industry} + \sum \beta \text{Year} \end{aligned}$$

Furthermore, I do robustness check by using stock return with different periods, one, three and five years. Dependent variables and control variables are the same as in the previous models with ROA, so these models look like the following:

$$\begin{aligned} \text{Total Compensation} = & B_0 + \beta_1 \text{Stock Return} + \beta_2 \text{Size} + \beta_3 \text{Duality} + \beta_4 \% \text{Outsider} + \beta_5 \% \text{Aged} + \\ & \beta_6 \text{Busy} + \beta_7 \% \text{Related} + \beta_8 \% \text{Females} + \beta_9 \text{Tenure} + \beta_{10} \% \text{CEO Stocks} + \beta_{11} \text{Sales} + \beta_{12} \text{D/A} + \beta_{13} \text{M/B} \\ & + \sum \beta \text{industry} + \sum \beta \text{Year} \end{aligned}$$

$$\begin{aligned} \text{Cash Compensation} = & B_0 + \beta_1 \text{Stock Return} + \beta_2 \text{Size} + \beta_3 \text{Duality} + \beta_4 \% \text{Outsider} + \beta_5 \% \text{Aged} + \\ & \beta_6 \text{Busy} + \beta_7 \% \text{Related} + \beta_8 \% \text{Females} + \beta_9 \text{Tenure} + \beta_{10} \% \text{CEO Stocks} + \beta_{11} \text{Sales} + \beta_{12} \text{D/A} + \beta_{13} \text{M/B} \\ & + \sum \beta \text{industry} + \sum \beta \text{Year} \end{aligned}$$

$$Salary_{(t)} = B_0 + \beta_1 Stock\ Return_{(t-1)} + \beta_2 Size_{(t-1)} + \beta_3 Duality_{(t-1)} + \beta_4 \% Outsider_{(t-1)} + \beta_5 \% Aged_{(t-1)} + \beta_6 Busy_{(t-1)} + \beta_7 \% Related_{(t-1)} + \beta_8 \% Females_{(t-1)} + \beta_9 Tenure_{(t-1)} + \beta_{10} \% CEO\ Stocks_{(t-1)} + \beta_{11} Sales_{(t-1)} + \beta_{12} D/A_{(t-1)} + \beta_{13} M/B_{(t-1)} + \sum \beta industry + \sum \beta Year$$

In addition, I use alternative variables and models described in the third chapter and these results are presented in the chapter 4.5.

4. Results

In this chapter, I present my results. In the chapter 4.1, I present my answer to the first research question by calculating t-values for differences of corporate governance variables between pre- and post-crisis data. Then, I present my answers to the second and third research questions by my doing regression analyses with the pre-crisis data (chapter 4.2) and with the post-crisis data (4.3).

4.1 T-values for differences of the corporate governance policies

To answer to the first research question, I calculated t-values for the differences (an unpaired sample t-tests that two means are equal) based on the values presented in the descriptive tables (the third chapter) and got the following results.

Table 7: T-values for the differences of corporate governance policies

Corporate governance variable	Pre-crisis	Post-crisis	T-value for the difference
Size	8.74	9.28	5.65
Duality	0.66	0.56	5.10
%Outsiders	76.58%	78.85%	4.13
%Aged	17.13%	20.83%	5.21
Busy	0.03	0.03	0.67
%Related	13.88%	15.55%	3.09
%Females	10.04%	12.86%	5.60
%Busy	9.18%	8.90%	0.01

This table presents t-values for the differences of corporate governance variables between pre- and post-crisis data. The critical values for the 10 %, 5% and 1% significance levels are approximately 1.65, 1.96 and 2.56, respectively. Therefore, all variables except the “Busy” and the “%Busy” are statistically significantly different pre- and –post-crisis.

Based on these results, it seems that corporate governance policies have at least partially changed because all variables except proxies for an urgency of boards (Busy and %Busy) have t-values, which are significant at one percent level. However, there are two issues to consider before further interpretations. First, even though initially these results seem to offer supportive evidence for Murphy (2012) and Kaplan (2013) as corporate governance policies have become different, they actually offer mostly evidence about less effective corporate governance policies. Second, the economic significance of the changes is questionable.

One example from potentially less effective corporate governance policies is an increased average size of board. On the one hand, one could argue that the prior literature has offered evidence about negative effects of the larger board size due to more significant free rider problem. On the other hand, one could argue that companies have become more complex, which could cause a need of larger boards (e.g. Coles et al. 2008). Based on these theories, one could not know which one is a more appropriate interpretation and regression analysis presented in the following chapters may offer some further evidence about the current state of corporate governance policies.

However, some changes seem to offer more powerful evidence about less effective corporate governance policies after the financial crisis of 2007-2008. To my best knowledge, there is no theory about positive effects of larger percentage of related members. Given the decreased percentage of insider members, one could claim that the public pressure and new regulations (e.g. new listing requirements) have pressured companies to take larger number of outsiders but they have done that by taking more related members (i.e. former managers of the company). This is at least one potential explanation for the quite small change in percentage of members who are neither insiders nor related (from 62.5% to 63.3%). Moreover, percentage of aged members has increased even though they tend to be less effective monitors, so companies might have taken their former, retired managers to increase the number of outside directors. Unfortunately, my database does not offer detailed enough data to check if aged members tend to be related members, so I cannot test this theory.

The second major issue to consider is the economic significance of the changes. On the one hand, one could ask does it matter if the average size of board has increased by 0.6 members and argue that this has happened most likely because companies have become more complex. On the other hand, one could ask if there is some evidence about increasing complexity and argue that positive trends of corporate governance policies are important issues because it is

unrealistic to assume that corporate governance policies could change quickly. Based on these, it could be that the change in long-term trend of decreasing board (e.g. 13 in the paper of Core et al. in 1999, 10 in the paper of Conyon and He in 2011) is a significant issue. Which one is a more appropriate interpretation is a difficult question and out of the scope of this study.

As the previous examples show, the current state of corporate governance policies is not a straightforward issue to analyze because there have been both negative and positive developments. On the one hand, there have been positive (based on the prior literature) and statistically significant changes, a smaller portion of CEO-chair dualities as well as increased percentages of female and outside members of board are positive developments. On the other hand, most developments are against prior findings about effective corporate governance policies (i.e. some part of corporate governance policies seem to have become less effective) and the economic significance of all the changes is questionable. Based on all these, there is no straightforward answer to the first research question and I cannot reject the first hypothesis. However, the following regression analysis may offer more evidence about the current state of corporate governance policies.

4.2. Pre-crisis regressions

When I used ROA as a performance measurement and did regression analyses with pre-crisis data set, I got the following results.

Table 8: Pay for performance regressions with ROA and pre-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
ROA	+	49.55*** 15.49	8.11*** 3.09	3.32*** 0.93
Corporate governance variables				
Size	+	456.36*** 103.14	87.21** 43.29	24.11*** 5.62
Duality	+	1204.15*** 279.07	191.38*** 57.91	125.84*** 18.56
%Outsiders	-	1065.45 1131.6	-728.23** 311.93	-12.21 87.49
%Aged	+	56.79 998.86	64.09 244.21	94.86 64.11
Busy	?	1466.32 1474.52	-55.37 254.21	-27.51 117.39
%Related	+	481.90 1115.45	-56.37 191.15	6.31 67.00
%Females	-	359.40 1227.07	184.49 334.27	99.47 89.64
CEO characteristic variables				
Tenure (years)	?	0.13** 0.06	0.05*** 0.01	0.02*** 0.005
%CEO stocks	-	-121.68*** 19.41	-19.93*** 3.30	-13.89*** 1.80
Company characteristic variables				
Sales (\$ thousands)	+	74.10*** 1.83	7.14** 3.14	6.29*** 1.73
D/A	?	2934.75*** 790.84	44.14 210.23	209.19*** 50.90
M/B	+	-135.15 132.65	-92.74*** 28.00	-30.90*** 9.56
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		952	952	952
Adjusted r-squared		0.29	0.14	0.38

This table shows pre-crisis (2006-2009) pay for performance regressions with ROA as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from

2007 to 2009, with 2006 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Given that the scope of this paper is to study effects of the financial crisis of 2007-2008 and its consequences, I do not make a comprehensive comparison to findings of prior literature. However, it is important to notice that contrary to the prior findings, four corporate governance variables (outsiders, aged, busy, related) are insignificant. Based on that, one could argue that for some reason, corporate governance policies have become less significant from the pay for performance point of view. Moreover, given the changes of corporate governance policies and the strong link between corporate governance policies and pay for performance relationship, it is particularly interesting to test if corporate governance policies have become even less significant after the financial crisis of 2007-2008.

4.3 Post-crisis regressions

When I used ROA and post-crisis data set, I got the following results.

Table 9: Pay for performance regressions with ROA and post-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
ROA	+	78.55*** 29.50	2.87 2.23	4.55*** 0.88
Corporate governance variables				
Size	+	526.35*** 122.16	102.25*** 29.17	34.24*** 5.20
Duality	+	815.41* 485.53	201.28*** 50.82	82.15*** 15.66
%Outsiders	-	-461.69 1499.45	-899.46*** 268.35	12.53 86.15
%Aged	+	1304.60* 786.81	508.34* 288.76	170.82*** 43.61
Busy	?	1572.28 1871.17	-118.48 218.93	141.89 102.76
%Related	+	1654.17** 751.82	326.55** 141.38	256.72*** 63.57
%Females	-	-1854.56 1179.60	-61.14 252.93	-38.79 85.49
CEO characteristic variables				
Tenure (years)	?	0.09 0.07	0.05*** 0.01	0.03*** 0.004
%CEO stocks	-	-237.41*** 28.41	-29.60*** 5.04	-21.19*** 2.27
Company characteristic variables				
Sales (\$ thousands)	+	107.87*** 34.15	11.09*** 1.43	4.77*** 0.53
D/A	?	5242.07*** 669.48	266.55** 130.49	274.76*** 41.00
M/B	+	537.13* 300.96	-44.28** 20.82	-22.66 8.26
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		2247	2247	2247
Adjusted r-squared		0.16	0.18	0.35

This table shows post-crisis (2010-2013) pay for performance regressions with ROA as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of

the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from 2011 to 2013, with 2010 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Regarding of the second research question, the first interesting finding from the tables 8 and 9 is a decreased significance of the variable “Duality”, which offers some evidence against my first and second hypotheses. It seems that the recent changes, the financial crisis of 2007-2008, followed new legislation and public pressure, have encouraged companies to take more non-CEO chairmen, which is a more effective corporate governance policy based on the prior literature. Moreover, the significance of this variable has decreased from one percent level to ten percent level, offering supportive evidence for the strong link between corporate governance policies and pay for performance relationship. However, given that this is the only variable, which offers evidence against my first and second hypotheses, I cannot reject them. Generally, my results offer supportive evidence for my first and second hypothesis and for the strong link between corporate governance policies and pay for performance relationship based on the following arguments.

Even though the variable “Duality” offers evidence against my first hypothesis, other variables do not. Excluding the “Duality”, there are two groups of variables. The first group of variables is the ones with increased significance, “Size”, “%Aged” and “%Related”. Interestingly, these parts of corporate governance policy seem to have become less effective and more significant in the pay for performance regression, offering supportive evidence for my first and second hypotheses and for the strong link between corporate governance policies and pay for performance relationship. The second group of variables is the ones with the unchanged significance, “%Outsiders”, “%Females” and “Busy”. One can see from the tables 7, 8 and 9 that the percentage of busy boards as well as significance of its coefficient have stayed at the same level, so no further interpretations can be made from the strong link point of view. More interestingly, significance of variables “%Outsiders” and “%Females” have stayed insignificant even though these parts of corporate governance policies seem to have become more effective.

Therefore, one could ask if these variables offer evidence against the strong link between corporate governance policies and pay for performance relationship.

Basically, there are two alternative explanation for this as either i) these changes of efficiency (i.e. larger percentages of females and outsiders in board of directors) are not significant from the pay for performance point of view or ii) the link between corporate governance policies and pay for performance relationship is not as strong as the prior literature has argued. I argue that based on the following arguments, the first one is more likely explanation. First, to my best knowledge, there is no empirical evidence about if the larger percentage of females has a significant effect from the pay for performance point of view. It could be that the larger gender diversity has some positive consequences, such as better risk management, but no significant effects to the pay for performance relationship. Small statistical significance of coefficients of this variable offers some supportive evidence for this theory but it would be interesting to see some further studies about effects of female board members. Second, I argue that related members are as likely to have social ties with CEO as insiders are, so they are as ineffective monitors as outsiders are. Based on that, the unchanged significance of the coefficient of outsiders is an expected result, given that the amount of purely outsider (that is, not insider or related) members have increased only slightly from 62.7 % to 63.3 %. Therefore, the unchanged significance of the coefficient of outsiders is not evidence against the strong link.

I argue that above-mentioned theories are quite plausible and all variables offer some supportive evidence for the strong link between corporate governance policies and pay for performance relationship. This is because one part of corporate governance policies (Duality) has become more effective and the significance of this coefficient has decreased in pay for performance regressions, as it theoretically should. Moreover, three parts of the corporate governance policies (Size, %Aged, %Related) have become less effective and the significance of the coefficients of these variables have decreased in pay for performance regressions. In addition, there is a plausible theory for the insignificant effect of female board members so the unchanged significance of variable “%Female” is not evidence against the strong link. However, robustness checks with regression models without this variable are presented in the next chapter. Lastly, an urgency of board members and amount of purely independent members have stayed at the same level, so unchanged coefficients are the expected result. To summarize this

discussion about the second research question, the next table presents key findings related to the second research question.

Table 10: Summary of findings related to the second research question

Variable	Change	Homogeneity	Theory behind the homogeneity interpretation	Significance	Interpretation
Size	Negative	Less	Larger standard deviation implies wider distribution	Larger	Seems to offer supportive evidence for the strong link because of less effective corporate governance policy and more significant coefficient in the pay for performance regression
Duality	Positive	-	No reasonable interpretation for the distribution of the dummy variable	Smaller	Seems to offer supportive evidence for the strong link because of more effective corporate governance policy and less significant coefficient in the pay for performance regression
%Outsiders	Positive	Less	Larger standard deviation implies wider distribution	No change	Unchanged significance could be caused by larger amount of ineffective related members
%Aged	Negative	Less	Larger standard deviation implies wider distribution	Larger	Seems to offer supportive evidence for the strong link because of less effective corporate governance policy and more significant coefficient in the pay for performance regression
Busy	No change	-	No reasonable interpretation for the distribution of the dummy variable	No change	No change after the crisis
%Related	Negative	Less	Larger standard deviation implies wider distribution	Larger	Seems to offer supportive evidence for the strong link because of less effective corporate governance policy and more significant coefficient in the pay for performance regression
%Females	Positive	More	Smaller standard deviation implies narrower distribution	No change	Inconclusive results could be caused by relatively small significance of gender diversification from a pay for performance point of view

This table summarizes key findings related to the second research question. The first column has the variables defined in the table 1. The second column has a type of change after the financial crisis of 2007-2008, i.e. if the

given part of corporate governance policy has become more (positive) or less (negative) effective. The third column offers information if a homogeneity of given part of corporate governance policy has changed after the financial crisis of 2007-2008. The fourth column has the argument behind the interpretation presented in the third column. Fifth column presents the change of significance of the given variable in pay for performance regression. The last column has my interpretation about the whole change after the crisis, i.e. what the change of the given part of the corporate governance policy (i.e. given variable), change of homogeneity and change of significance all together indicate.

Regarding of the third hypothesis, the first finding is increased significance of the coefficient of ROA, which offers some evidence against the third hypothesis. However, as e.g. Mehran (1995) and Core et al. (1999) have argued, it is important to separate compensation into different forms to get additional information and interestingly, the evidence is inconsistent between different forms of compensation. More closely, even though the coefficient of ROA has become larger in regression with total compensation, it has stayed at the same level in regression with salary. More interestingly, the coefficient of ROA has become statistically insignificant in regression with cash compensation.

There are few alternative explanations for this insignificant coefficient. First, one could argue that probably the portion of fixed salary has increased and the fixed compensation is not correlated with short-term performance. However, both seem to be inappropriate expectations as increase of salary (from 0.7 to 0.8) has been slower than increase of bonus (from 0.2 to 0.4) and interestingly, the fixed compensation seems to be correlated with ROA. Second and more likely explanation is that after the financial crisis of 2007-2008, companies might not want to encourage short-term risk taking, which is one focus area of the new legislation. Based on all that, one can see that the new legislation may decrease the pay for performance relationship because it highlights the importance of risk management.

Further analysis offers more evidence about a trade-off between the stronger pay for performance relationship and better risk management, which has been important part of the new legislation. As one can see, the pay for performance relationship is stronger with the total compensation. Moreover, the total compensation is a combination of cash compensation (i.e. salary and bonus) and equity-based compensation. Given that the cash compensation is not correlated with the past ROA but the total compensation does, one can see that the pay for performance is stronger with equity-based compensation. Therefore, on the one hand, companies might be able to increase the level of pay for performance relationship by increasing

the portion of equity-based compensation. On the other hand, they might not want to do that, as one purpose of the new legislation has been to decrease the amount of equity-based compensation to mitigate risk taking (e.g. Adams 2012). Based on that, it is interesting that the portion of equity-based compensation has increased and the pay for performance relationship has become stronger in regression with the total compensation due to stronger pay for performance relationship between ROA and equity-based compensation.

To summarize my results regarding of the third research question, the pay for performance relationship seems to have become stronger after the financial crisis of 2007-2008 and the reason for this is most likely the increased correlation between past ROA and equity-based compensation. This presents an interesting trade-off between stronger pay for performance relationship and better risk management, which is one focus area of the new legislation. More closely, if one gives CEO large amount of equity-incentives, one probably gets stronger pay for performance relationship but at the same time, one also encourages CEO to take more risks. Finding the optimal balance between these two issues is one key thing of compensation policy.

5. Robustness checks

Because my answer to the first research question is based on simply statistics, there is no need to make any robustness checks related to this question. However, given that many kinds of variables and models have used in pay for performance regressions, I do robustness checks related to the second and third research questions. First, I use alternative performance measurement, stock returns with different periods (one, three and five years). Then, I test if I get similar kinds of results with alternative variables and models.

5.1 The stock return as a performance measurement

When I used stock return as a performance measurement, I got the following results with the pre- and post- crisis data, respectively.

Table 11: Pay for performance regressions with the one year's stock return and pre-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
Stock return	+	-0.10 1.40	0.43 0.35	0.05 0.09
Corporate governance variables				
Size	+	472.08*** 103.50	90.09** 43.25	25.20*** 5.73
Duality	+	1237.53*** 281.57	196.14*** 58.62	128.00*** 18.67
%Outsiders	-	948.43 1131.73	-723.84** 305.39	-17.09 88.21
%Aged	+	33.12 1006.73	58.20 245.50	92.97 64.46
Busy	?	1563.39 1149.53	-35.76 259.81	-20.49 118.91
%Related	+	527.69 1124.76	-37.17 198.92	10.84 67.47
%Females	-	392.95 1242.70	186.79 337.28	101.31 90.40
CEO characteristic variables				
Tenure (years)	?	0.13** 0.06	0.05*** 0.02	0.02*** 0.004
%CEO stocks	-	-121.29*** 19.49	-20.00*** 3.31	-13.88 1.80
Company characteristic variables				
Sales (\$ thousands)	+	75.22*** 18.61	7.42** 3.15	6.38*** 1.74
D/A	?	2702.34*** 803.56	-17.87 213.08	190.61*** 51.97
M/B	+	67.37 130.33	-64.53** 30.48	-17.95 9.33
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		952	952	952
Adjusted r-squared		0.28	0.13	0.38

This table shows pre-crisis (2006-2009) pay for performance regressions with one year stock return as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from

2007 to 2009, with 2006 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Table 12: Pay for performance regressions with the one year's stock return and post-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
Stock return	+	2.58	0.88*	0.07
		2.45	0.44	0.12
Corporate governance variables				
Size	+	553.80***	103.83***	35.78***
		116.30	28.91	5.29
Duality	+	860.24*	204.72***	84.56***
		471.80	50.76	15.74
%Outsiders	-	-531.48	-907.15***	9.02
		1523.29	268.65	86.98
%Aged	+	1318.75*	510.19*	171.50***
		791.18	288.67	43.68
Busy	?	1590.3	-114.23	142.56
		1870.90	219.20	103.56
%Related	+	1693.57**	327.83**	259.02***
		754.97	140.91	63.76
%Females	-	-1717.05	-46.72	-31.80
		1188.87	252.95	86.15
CEO characteristic variables				
Tenure (years)	?	0.09	0.05***	0.03***
		0.07	0.01	0.003
%CEO stocks	-	-246.45***	-29.83***	-21.72***
		28.71	5.00	2.31
Company characteristic variables				
Sales (\$ thousands)	+	109.74***	11.17***	4.88***
		34.85	1.43	0.53
D/A	?	4627.52***	225.81*	241.06***
		635.76	126.51	42.05
M/B	+	751.70**	-43.26*	-9.51
		360.79	22.11	7.48
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		2247	2247	2247
Adjusted r-squared		0.16	0.18	0.34

This table shows post-crisis (2010-2013) pay for performance regressions with one year stock return as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the

company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from 2011 to 2013, with 2010 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Regarding of the second research question, these results are consistent with initial results presented in the table 10. Again, “Duality” and percentages of related and aged members have become less significant, “Size” has become more significant and other corporate governance variables have stayed insignificant. Therefore, this offers more supportive evidence for the first and second hypotheses and for the strong link between corporate governance polies and pay for performance relationship.

However, regarding of the third research question, these results are completely different with ROA and with one year’s stock return as the coefficient of one year’s stock return tend to be insignificant. Therefore, this offers supportive evidence for my third hypotheses as the change in level of pay for performance relationship seems to depend on the performance measurement. Similar kinds of results have found by Firth et al. (2007) in China and there are few likely explanations for this phenomenon. First, it could be that companies use more accounting based performance measurement (e.g. ROA) than market based performance measurements (e.g. stock return) in their compensation policies. Furthermore, given that the difference of significance between one year’s stock return and ROA is highest in regression with total compensation, one could argue that one year is too short time period to measure market-based return. This is because large part of the total compensation seems to be equity based, which tends to be based on long-term performance (quite often e.g. 3 years’ stock return). Moreover, the new legislation encourages long-term policies rather than short-term, so it is interesting to study if the pay for performance relationship is stronger with longer-term stock return. Therefore, the next robustness check is about the relationship between different forms of compensation and three years’ stock return.

5.2 Other robustness checks

Given the different results with ROA and with one year’s stock return, it is interesting to study the pay for performance relationship with three years’ and five years’ stock returns, especially because the new legislation has highlighted the importance of long-term policies. Secondly,

given that many kinds of models and variables have used to study pay for performance relationship, I test alternative control variables.

5.2.1 Stock returns of longer periods

The financial crisis of 2007-2008 and the followed new legislation may have pressured companies to focus on long-term performance and due to that, companies may have taken more long-term focused compensation policies. Based on this theory and inconsistent results regarding of the third research question, I decided to test if the relationship between different forms of compensation and stock return is stronger if I use longer time periods, three and five years' stock return. I got the following results with three years' stock return and i) pre-crisis data and ii) post-crisis data, respectively.

Table 13: Pay for performance regressions with three years' stock return and pre-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
Stock return (3 years')	+	28.60*** 8.10	6.15** 2.43	-0.48 0.51
Corporate governance variables				
Size	+	454.30*** 100.05	85.97** 41.59	25.47*** 5.70
Duality	+	1250.32*** 281.57	199.60*** 59.40	127.85*** 18.68
%Outsiders	-	960.96 1142.29	-744.97** 309.11	-19.79 88.37
%Aged	+	118.37 997.25	78.57 244.65	91.75 64.56
Busy	?	1354.29 1510.44	-84.88 262.56	-17.41 118.59
%Related	+	646.71 1125.19	-23.42 201.45	7.60 67.64
%Females	-	606.29 1252.84	235.90 334.59	98.06 90.08
CEO characteristic variables				
Tenure (years)	?	0.12** 0.06	0.04*** 0.01	0.02*** 0.004
%CEO stocks	-	-120.61*** 20.05	-19.72 3.49	-13.88*** 1.79
Company characteristic variables				
Sales (\$ thousands)	+	75.34*** 18.31	7.37** 3.15	3.37*** 1.74
D/A	?	2609.67*** 787.29	-13.52 210.93	194.70*** 52.35
M/B	+	-184.92 157.12	113.80** 44.34	-13.18 10.11
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		952	952	952
Adjusted r-squared		0.29	0.14	0.38

This table shows pre-crisis (2006-2009) pay for performance regressions with three years' stock return as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from

2007 to 2009, with 2006 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Table 14: Pay for performance regressions with three years' stock return and post-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
Stock return (3years')	+	30.48***	3.92**	0.79*
		10.81	1.61	0.38
Corporate governance variables				
Size	+	552.93***	103.31***	35.75***
		116.43	28.75	5.30
Duality	+	841.43*	201.04***	84.08***
		477.14	50.05	15.69
%Outsiders	-	-577.92	-909.53***	7.82
		1527.94	268.68	86.72
%Aged	+	1340.53*	512.06*	172.06***
		788.50	288.60	43.65
Busy	?	1441.51	-135.86	138.71
		1899.22	219.94	103.65
%Related	+	1664.18**	324.16**	258.26***
		754.33	139.97	63.79
%Females	-	-1561.60	-33.30	-27.79
		1195.58	251.41	86.01
CEO characteristic variables				
Tenure (years)	?	0.08	0.04***	0.03***
		0.07	0.001	0.004
%CEO stocks	-	-243.87***	-29.57***	-21.65***
		29.26	5.00	2.31
Company characteristic variables				
Sales (\$ thousands)	+	109.92***	11.18***	4.88***
		34.83	1.42	0.53
D/A	?	4515.13***	224.15*	238.16***
		624.04	126.12	41.57
M/B	+	554.31*	-63.86***	-14.60*
		312.26	23.50	7.72
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		2247	2247	2247
Adjusted r-squared		0.16	0.19	0.34

This table shows post-crisis (2010-2013) pay for performance regressions with three years' stock return as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the

company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from 2011 to 2013, with 2010 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Again, regarding of the second research question, these results are consistent with the previous results. Even though I use three years' stock return, I still get similar kinds of results than the initial results presented in the table 10 and therefore, this offers more supportive evidence for my first and second hypotheses and for the strong link between corporate governance polices and pay for performance relationship.

However, regarding of the third research question, results are again inconsistent. Contrary to the results with one year's stock return, coefficients of stock returns are statistically significant in regressions with total compensation and with cash compensation, both pre- and post-crisis. Furthermore, contrary to results with ROA, those coefficients are about at the same level in pre-crisis and post-crisis regressions. In other words, the pay for performance relationship between CEO's total compensation and ROA has increased but the pay for performance relationship between different forms of compensation and stock return has not. Given that all three performance variables (ROA, one year's stock return, three years' stock return) have given different kinds of evidence, it is interesting to test what happen with five years' stock return. Therefore, next tables present pay for performance regressions with five years' stock return and i) pre-crisis data and ii) post-crisis data, respectively.

Table 15: Pay for performance regressions with five years' stock return and pre-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
Stock return (5 years')	+	25.76*** 9.73	5.76** 2.25	-0.76 0.50
Corporate governance variables				
Size	+	471.18*** 102.02	89.59** 42.71	25.19*** 5.72
Duality	+	1267.34*** 285.57	203.52*** 59.93	127.18*** 18.72
%Outsiders	-	863.50 1144.59	-766.72** 314.02	-17.00 88.28
%Aged	+	-18.23 1008.52	48.76 245.04	94.69 64.35
Busy	?	1489.74 1512.86	-56.40 260.04	-18.74 118.41
%Related	+	579.27 1130.36	-37.49 198.90	8.12 67.41
%Females	-	644.33 1247.62	246.27 332.50	94.23 90.10
CEO characteristic variables				
Tenure (years)	?	0.12* 0.06	0.04*** 0.01	0.02*** 0.004
%CEO stocks	-	-118.44*** 20.09	-19.23*** 3.50	-13.95*** 1.78
Company characteristic variables				
Sales (\$ thousands)	+	75.79*** 18.48	7.45** 3.14	6.35*** 1.73
D/A	?	2555.58*** 799.91	-26.33 213.81	197.39*** 52.48
M/B	+	-107.46 150.26	-98.65** 39.00	-12.29 9.69
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		952	952	952
Adjusted r-squared		0.29	0.14	0.38

This table shows pre-crisis (2006-2009) pay for performance regressions with five years' stock return as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from

2007 to 2009, with 2006 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Table 16: Pay for performance regressions with five years' stock return and post-crisis data

Variable	Predicted sign	Total Compensation	Cash compensation	Salary
Performance variable				
Stock return (5 years')	+	55.04** 22.80	4.25** 1.91	1.31*** 0.41
Corporate governance variables				
Size	+	541.41*** 118.82	102.37*** 26.66	35.48*** 5.30
Duality	+	829.68* 481.27	200.79*** 50.18	83.82*** 15.76
%Outsiders	-	-470.85 1498.97	-898.01*** 267.39	10.50 86.83
%Aged	+	1480.85* 787.67	521.56* 289.91	175.36 43.67
Busy	?	1399.06 1908.39	-132.11 219.64	137.97 103.35
%Related	+	1752.41** 739.87	332.51** 141.06	260.42*** 63.66
%Females	-	-1423.24 1198.72	-32.17 253.40	-24.85 85.79
CEO characteristic variables				
Tenure (years)	?	0.06 0.08	0.04*** 0.01	0.03*** 0.003
%CEO stocks	-	-244.27*** 29.74	-29.75*** 5.02	-21.67*** 2.32
Company characteristic variables				
Sales (\$ thousands)	+	109.91*** 34.76	11.17*** 1.43	4.89*** 0.53
D/A	?	4287.60*** 631.65	215.41* 125.00	233.07*** 41.58
M/B	+	402.10 249.35	-64.35*** 23.21	-17.81** 7.22
Year-fixed effect		Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes
Observations		2247	2247	2247
Adjusted r-squared		0.17	0.18	0.35

This table shows post-crisis (2010-2013) pay for performance regressions with five years' stock return as a performance measurement. Dependent variables are the following three variables: *Total compensation* is an annual total compensation paid to CEO. *Cash compensation* is a sum of annual salary and bonus. *Salary* is an annual fixed compensation. Independent variables are the following: *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *D/A* is a total debt divided by total assets. *M/B* is a market value of the

company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from 2011 to 2013, with 2010 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Again, regarding of the second research question, these results are consistent with the previous results. Even though I use five years' stock return, I still get similar results presented in the table 10 and therefore, this offers more supportive evidence for my first and second hypotheses and for the strong link between corporate governance polies and pay for performance relationship.

Interestingly, result regarding of the third research question are again inconsistent with all other results. In a regression with total compensation, the statistical significance has decreased slightly (it is significant at 1.6 % level) but economic significance has increased. Furthermore, in the regression with salary, the coefficient of stock return has become statistically more significant but economic significance has stayed quite small. In the cash compensation regression, both statistical and economic significance has stayed approximately at the same level.

Conclusion from these robustness checks is that regarding of the second research question, results are consistent with the initial results presented in the table 10. Therefore, this paper offers some supportive evidence for the strong link between corporate governance policies and pay for performance relationship as more (less) effective corporate governance policies seem to cause smaller (larger) explanatory power in pay for performance regressions. However, even though this kind of link seem to exist, the evidence about level of pay for performance relationship is inconsistent as different measurements of performance give completely different results. Summary of the findings regarding of the third research question can be found from the table below.

Table 17: Summary of pay for performance results

	Total Compensation	Cash compensation	Salary
ROA	Stronger	Weaker	Same level
Stock return (1 year's)	Not significant	Not significant	Not significant
Stock return (3 years')	Same level	Same level	Not significant
Stock return (5 years')	Unclear	Same level	Stronger

This table summarizes my findings regarding of the third research question. *Stronger (weaker)* denotes that pay

for performance relationship with a given combination of performance measurement and form of compensation has become larger (smaller) after the financial crisis of 2007-2008. *Same level* means no significant changes. *Not significant* means that the performance measurement is not statistically significant at five percent level (or at lower level). *Unclear* means that statistical and economic significance have changed to the opposite directions.

As table 17 above presents, the evidence about change of level of pay for performance relationship is highly inconsistent. Therefore, answer to the third research question seems to be that the pay for performance relationship has not become stronger but the answer depends on performance measurement and form of compensation. There are many alternative explanations for the unchanged level of pay for performance relationship. First, it is quite likely that corporate governance policies have not become more effective, given that the decreased percentage of CEO-chair dualities is the only part of corporate governance policies that seem to have become more effective and many parts (size of the board, percentages of aged and related members) seem to have become less effective. Second, as described in the chapter 4, there seems to be the trade-off between stronger pay for performance relationship and more effective risk management, which is one focus area of the new legislation. Supportive arguments for the second explanation has offered e.g. by Kaplan (2013), who has argued that the pay for performance can be too strong (optimal level is not higher than current one) and too high equity-incentives were one reason behind the financial crisis of 2007-2008.

Given that results related to the third research question are inconsistent and strongly dependent on the variables, the last robustness check is to study if the results regarding of the second research question are consistent if I use slightly different variables.

5.2.2 Models with alternative variables and discussion about limitations

Even though I use variables that seem to be the most common ones and my adjusted r-squared are approximately at the same level than in previous studies, as most of regressions with total compensation have adjusted r-squared of approximately 0.3, which is quite similar than 0.37 by Core et al. (1999), 0.35 by Fahlenbrach (2009) and 0.29 by Conyon and He (2011), I decided to test alternative models to make my result more robust. Given the scope of this paper, I only use alternative proxies presented in the third chapter to the total compensation, which is the main interest of this study. First, I test if results are different without the variable “%Females”, which was insignificant in my previous models (model 1 in the following two tables). Next, I

test alternative proxy for potential power of CEO, the age of CEO (model 2 in the following two tables). Third, I use the total assets instead of the sales as a proxy for size of company (model 3 in the following two tables). Fourth, I test a percentage of busy directors instead of the dummy variable for busy board (model 4 in the following two tables). Lastly, given that the fourth model gave different results, I tested the model four without females (model 5 in the following two tables), which has been insignificant in most of the models. The following two tables present my results with pre- and post-crisis data, respectively.

Table 18: Pay for performance regressions with alternative control variables, ROA and the pre-crisis data

Variable	Predicted sign	1	2	3	4	5
Performance variable						
ROA	+	49.59*** 15.47	51.01*** 15.35	53.36*** 15.87	50.75*** 15.04	50.62*** 15.06
Corporate governance variables						
Size	+	459.33*** 101.79	447.92*** 103.70	526.83*** 104.73	461.48*** 103.53	458.72*** 102.11
Duality	+	1205.42*** 277.79	1202.58*** 261.50	1280.37*** 288.74	1205.17*** 275.45	1205.11*** 275.29
%Outsiders	-	1145.72 1088.39	973.43 1163.39	1739.19 1128.75	1256.25 1012.88	1192.02 992.30
%Aged	+	107.39 984.08	-292.37 1038.60	-64.62 1027.97	6.24 977.37	-51.06 951.15
Busy	?	1614.44 1276.90	1503.79 1521.69	2512.75** 1204.09		
%Busy	?				2585.60** 1291.35	2434.16** 1061.11
%Related	+	459.78 1104.60	479.23 1097.38	351.72 1191.01	428.93 1113.30	422.90 1108.68
%Females	-		569.67 1231.47	107.45 1177.07	-391.88 1286.34	
CEO characteristic variables						
Tenure (years)	?	0.13** 0.06		0.13** 0.06	0.13** 0.06	0.13** 0.06
Age (years)	?		60.78** 24.53			
%CEO stocks	-	-121.49*** 19.38	-108.59*** 19.22	-114.03*** 19.11	-118.75*** 19.57	-119.10*** 19.40
Company characteristic variables						
Sales (\$ thousands)	+	74.00*** 18.36	72.16*** 18.02		71.71*** 18.34	71.88*** 18.43
Total assets (\$ thousands)	+			3.37 2.99		
D/A	?	2954.07*** 790.78	2906.45** 795.62	3232.69*** 810.47	2715.54*** 812.45	2706.77*** 814.37
M/B	+	-133.80 133.06	-112.27 133.64	144.71 135.66	-141.81 132.49	-142.48 132.53
Year-fixed effect		Yes	Yes	Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes	Yes	Yes
Observations		952	952	952	952	952
Adjusted r-squared		0.29	0.29	0.25	0.29	0.29

This table shows pre-crisis (2006-2009) pay for performance regressions with alternative variables and ROA as a performance measurement. Dependent variable is the *total compensation*, an annual total compensation paid to

CEO. Independent variables are the following. *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Busy* is a percentage of board of directors who serve on three or more other boards. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *Age* is the age of the CEO in years. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *Total assets* are a total amount of assets owned by the company, as reported in annual report. *D/A* is a total debt divided by total assets. *M/B* is a market value of the company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from 2007 to 2009, with 2006 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Table 19: Pay for performance regressions with alternative control variables, ROA and the post-crisis data

Variable	Predicted sign	1	2	3	4	5
Performance variable						
ROA	+	78.05*** 29.49	78.69*** 29.49	100.55*** 36.96	78.24*** 29.64	77.53*** 29.57
Corporate governance variables						
Size	+	513.79*** 120.09	523.98*** 121.96	702.54*** 94.90	539.69*** 115.86	524.44*** 115.06
Duality	+	811.33* 485.37	896.64* 519.47	1178.84*** 406.96	827.30* 471.15	830.59* 471.25
%Outsiders	-	-856.10 1488.8	-483.15 1482.96	-31.42 1391.96	510.51 1253.90	70.93 1289.53
%Aged	+	1341.04* 787.20	1361.11* 785.93	1129.89 799.46	985.52 795.88	1066.31 799.70
Busy	?	954.35	1563.70 1848.08	3203.74** 1393.81		
%Busy	?				3763.83*** 1307.39	2959.49** 1227.00
%Related	+	1523.29** 744.21	1603.27** 745.86	1026.92 888.71	1649.02** 729.79	1514.48** 732.73
%Females	-		-1962.21* 1176.46	-1204.67 1181.20	-2761.75** 1119.46	
CEO characteristic variables						
Tenure (years)	?	0.09 0.07		0.09 0.07	0.09 0.07	0.10 0.07
Age (years)	?		8.45 19.87			
%CEO stocks	-	-235.20*** 28.26	-218.04*** 28.94	-225.26*** 27.16	-231.51*** 28.29	-228.65*** 28.03
Company characteristic variables						
Sales (\$ thousands)	+	107.52*** 34.10	107.74*** 34.26		105.65*** 34.03	105.30*** 33.95
Total assets (\$ thousands)	+			8.44*** 2.58		
D/A	?	5201.81*** 672.21	5185.94*** 682.04	6384.47*** 880.32	4942.41*** 667.03	4900.48*** 666.33
M/B	+	541.91* 300.55	539.38* 297.42	497.88* 296.80	528.07** 297.41	533.80* 297.55
Year-fixed effect		Yes	Yes	Yes	Yes	Yes
Industry-fixed effect		Yes	Yes	Yes	Yes	Yes
Observations		2247	2247	2247	2247	2247
Adjusted r-squared		0.16	0.16	0.11	0.17	0.17

This table shows post-crisis (2010-2013) pay for performance regressions with alternative variables and ROA as a performance measurement. Dependent variable is the *total compensation*, the annual total compensation paid to CEO. Independent variables are the following. *ROA* is a return on assets. *Size* is number of directors on board. *Duality* is a dummy variable that gets value of 1 if CEO is also the chair of the board and 0 otherwise. *%Outsiders* is a percentage of board of directors who are not employees of the company. *%Aged* is a percentage of board of directors who are older than 69 years old. *Busy* is a dummy variable that gets value of 1 if at least 50% of board of directors serve on three or more other boards and 0 otherwise. *%Busy* is a percentage of board of directors who serve on three or more other boards. *%Related* is a percentage of board of directors who have been employees of the company but currently are not. *%Females* is a percentage of board of directors who are female. *Tenure* is number of years the CEO has been CEO. *Age* is the age of the CEO in years. *%CEO Stocks* is a stockholding of the CEO (%). *Sales* is an annual revenue. *Total assets* are a total amount of assets owned by the company, as

reported in annual report. D/A is a total debt divided by total assets. M/B is a market value of the company divided by total assets. The regressions contain a set of 24 industry groups and 3 time dummies, from 2007 to 2009, with 2006 as a base year. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively. Standard errors are heteroskedastic -robust standard errors.

Regarding of the second research question, these results are quite consistent with the previous results as the “Size” has become more significant and “Duality” and percentages of related and aged members have become less significant. However, there are some new and interesting findings about corporate governance policies. First, the percentage of busy directors seems to be more significant than the dummy variable for busy board, indicating that the first one might be more appropriate proxy for the urgency of board. Fortunately, this does not have significant effects to the results in general, as there are only two differences. First, the significance of percentages of aged members drops from slightly above ten percent level to slightly below that level. However, the significance level has still increased after the financial crisis of 2007-2008, so these results are still quite consistent with the other results.

The second difference is more interesting and significant. One can see from the tables above that if I use percentage of busy members instead of the dummy variable for busy board, the percentage of female board members becomes significantly negative at five percent level (model four). This raises some questions: Which one is a more appropriate control variable for the urgency of board members? Why different proxies for the urgency of board members do not have significant effects to the other variables but do make percentage of female board members statistically significant? Because these kinds of questions are outside of the scope of this study, I only quickly tested if different proxy for the urgency of board members affects to my results in general by doing my analysis presented in the fourth and fifth chapters with the variable “%Busy” instead of “Busy”. Results in general were consistent with the initial results presented in the table 10 but the significance of female board members was unclear because when I took one form of compensation and one proxy for the performance, the percentage of female board member became statistically significant in some models but not in all models. Based on that, it would be interesting to see further study about the effect of females from a pay for performance point of view.

To conclude this last robustness check, it seems that my results regarding of the second research question are quite robust. However, given the unclear effect of female board member, it would

be interesting to see some further studies about significance of female members from a pay for performance point of view. Moreover, the pay for performance relationship seem to have become stronger with ROA and total compensation, even though other variables give inconsistent results. Lastly, the adjusted r-square seem to stay at approximately same level than in the previous studies.

Even though most of my results seem to be quite a robust, there are always some limitations that should be considered. With regression analysis, a choice of variables is often the most significant challenge. This is a particularly considerable issue in this paper because there are large number of alternative control variables that some papers have used. Probably the most important variables that I do not use are control variables for the stockholdings. For example, on the one hand, one could argue that I should control stockholding of inside members (or related members) because if they have more equity incentives, they could monitor CEO more closely. On the other hand, Core et al. (1999) found that proxy variable for this seem to be insignificant and Adams and Ferreira (2007) have pointed out that it may make sense to not monitor CEO too closely. This is because then a CEO may be reluctant to share all information with the board, because he or she knows that with more information, board members can monitor him or her more easily.

Furthermore, the true effect of stakeholders' equity incentives is questionable from a pay for performance point of view. For example, Bhagat and Bolton (2008) have argued that if one wants to improve corporate governance policies, one should focus on stock ownership of the board of directors but I argue that from the pay for performance point of view, the true effect of equity incentives might be relatively small. For example, if a board member holds 1% of the company and manages to decrease CEO's compensation by 100.000 dollars, he or she "gains" 100 dollars (minus taxes). However, negative effects might be multiple, as the social tie with CEO is likely to become negative instead of positive and CEO may not want to share all information. Therefore, one could argue that the stock holdings of insider members or board members in general, is not a significant issue from the pay for performance point of view.

Similar kind of discussion applies also for the stockholdings of large shareholders (a common limit is >5%). On the one hand, one could argue that I should control the stock ownership of large stockholders because according to principal agent theory, large shareholders have more incentives to monitor CEO. On the other hand, one could argue that this is not a significant

issue from the pay for performance point of view, based on similar kinds of argument than with stockholdings of board members. From a large shareholder point of view, compensation policies seem irrelevant in comparison to other policies, such as investment management, R&D, cost control, or even the dividend policy (timing of cash flow can be important for the large shareholders). Therefore, I argue that large shareholders have incentives to monitor CEO and business in general but not the compensation policies. Supportive evidence for this theory have found e.g. by Core et al. (1999) who have found that variable for large shareholders tends to be statistically insignificant.

In addition to stockholding variables, there could be some other significant control variables that I do not use. For example, attention rate of board meetings could be an important issue because the governance report made by OECD (2009) argues that the information is a one key issue for successful board membership and without the attention on the board meetings, it is difficult to get all the information (Kirkpatrick 2009). In addition, Federal Reserve System have argued that board members should participate in the board meetings (Federal Reserve Bank of Kansas City 2010). However, it is not easy to get appropriate data to build some proxy variable for this, so unfortunately, I cannot test if this variable would change my results. So as one can see, there are many variables, which I could have tested if I had more data. However, other researches have faced similar kinds of challenges and used quite similar variables than I do, so I argue that the omitted variable bias is not that critical problem in this paper.

Other limitations could be caused by inappropriate research method or by biased data collecting process. Given that I follow prior literature, which have mostly used linear regression models and OLS-fitting, the first one is unlikely problem. Moreover, I use similar kinds of databased than other studies have used. Therefore, data-related limitations are mainly related to the generalization of results. First, many prior papers used only large companies (such as S&P500 or FTSE350 companies), which make my results less comparable with these papers, because I use also smaller companies to get a large enough data set for the pre-crisis data set. Related to the number of observations, one could argue that my pre-crisis data set of 952 observations is still too small in comparison to post-crisis data set of 2247 observations. However, I argue that

952 observations are enough to make statistical analysis and therefore, there should not be any problems related to this.

The last significant limitation is related to generalization of my results. Geographical generalization cannot be made because different laws, economic growth levels, cultural differences, taxes etc. can all effect to the corporate governance policies and pay for performance relationship. However, this challenge exists in every paper so a more significant question is the similarity of circumstances between my pre- and post-crisis datasets. More closely, the economic environment is not similar pre-and post-crisis, so one could argue that this might cause some biases to my results. For example, the average three years' stock return is 0.5% in pre-crisis data (because the stock market large crash is included to this data set) and 13.2% in post-crisis data. However, I argue that this is not a significant problem because other performance variables are approximately at the same level. Furthermore, if one is analyzing the effect of some change (e.g. financial crisis of 2007-2008) one cannot have exactly similar circumstances.

Therefore, to conclude discussion about the limitations, I argue that my research methods and data are appropriate but as always, there are some limitations to consider. First, some additional variables could have used if I had had more data. Second, more research need to be done before any geographical generalization.

6. Conclusion

After the financial crisis of 2007-2008, corporate governance policies have got a large amount of public attention, there have been new legislations related to it and according to some researches (e.g. Murphy 2012, Kaplan 2013), companies have taken more effective corporate governance policies. Furthermore, many researchers have found a significant link between corporate governance policies and pay for performance relationship. Therefore, all this offers an interesting opportunity to find new evidence about i) the current state of corporate governance policies ii) the level of pay for performance relationship and iii) the alleged strong link between these two issues.

Regarding of the current state of corporate governance policies, I found that companies have

taken slightly different corporate governance policies after the financial crisis of 2007-2008. However, most parts of the corporate governance policies seem to have become less effective after the financial crisis of 2007-2008. However, even though many parts of corporate governance policies have become less consistent with academic findings about effective corporate governance policies, this does not necessarily mean less effective corporate governance policies, as there are many alternative explanations for this phenomenon. Adams et al. (2010) have highlighted that there is at least some possibility that some corporate governance policies, which are inconsistent with academic findings, may be appropriate choices for some companies. One good example is the size of the board: even though most researchers have found that the size of board should be relatively small, Coles et al. (2008) have argued that simple firms should have small boards and complex firms should have large board, so one size does not fit for all. Therefore, I can say that after the financial crisis of 2007-2008, companies have taken corporate governance policies, which are slightly less consistent with academic findings and based on that, seem to be less effective. This means that the first hypothesis is not rejected. However, there is a possibility that for different companies, different kinds of corporate governance policies are effective and it would be interesting to see some further studies about the performance of companies with different kinds of corporate governance policies. In addition, it would be interesting to know reasons behind these changes of corporate governance policies, especially because most of the changes seem to be against the academic findings.

The second interest of this paper is the alleged strong link between corporate governance policies and pay for performance relationship. I found supportive evidence for this link, as it seems that more (less) effective corporate governance policies means less (more) significant coefficients for these variables in pay for performance regressions. In other words, when there are smaller number of companies with ineffective corporate governance policies, the explanatory power of corporate governance policies decreases, as it theoretically should. Interestingly, the link seems to exist but unexpectedly, companies seem to have mainly taken less effective corporate governance policies, causing mainly more significant coefficients. Therefore, the second hypothesis is not rejected. These results were robust with all models.

The third interest of this paper is the level of pay for performance relationship after the financial crisis of 2007-2008. Based on my main performance measurement, ROA, and CEO's total compensation, the pay for performance relationship seem to have become stronger. However,

this result is highly depended on performance measurement and form of compensation. With different variables, results are completely inconsistent and based on this, the third hypothesis is not rejected. Therefore, it would be interesting to see more research about the pay for performance relationship after the financial crisis of 2007-2008 and especially, about reasons behind the inconsistent results with different performance measurements. These kinds of studies could help to understand if one reason for unchanged level of pay for performance relationship is the trade-off between stronger pay for performance relationship and better risk management, which is one focus area of the new legislation.

To summarize, my key findings are the following issues. First, it seems that companies have taken slightly different corporate governance policies after the financial crisis of 2007-2008. Interestingly, most of the changes are against academic findings about effective corporate governance policies. Given that some parts seem to have become more effective and some less effective, I cannot say which one of my cases (a-h on pages 21-23) is the most appropriate description of current state of corporate governance policies in general. Second, the strong link between corporate governance policies and pay for performance relationship seem to exist as more (less) effective corporate governance policies seem to be linked with less (more) significant coefficients in pay for performance regressions. Third, the pay for performance relationship has become stronger between ROA and CEO's total compensation but not between ROA and other form of compensation or between stock return and any forms of compensation. One potential reason behind inconsistent results between short- medium- and long-term performance measurements could be the new legislation, which highlights importance of risk management and tries to mitigate short-term risk taking.

Given these inconsistent results, it would be interesting to see some further studies about the pay for performance relationship. First, it would be interesting to study the effect of female board members as I got inconclusive results. Second, more robustness check could be done for example with additional variables, new countries, more recent data and with different sized companies. Third, it would be interesting to try to separate a luck and skill parts of pay for performance relationship, for example by using Kim's (2010) methods. Lastly, it would be interesting to study reasons behind the differences of pay for performance relationship with alternative performance measurement and different forms of compensation.

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Appendix

Appendix 1: Mathematical proof for the decreasing significance of the coefficient, given the decreasing variance of the variable

An independent variable can have a large amount of explanatory power in a regression model only if the variance of the variable (X_i) is relatively large (i.e. distribution is relatively wide). This is because a smaller variance of the independent variable (X_i) means a larger variance for the coefficient of that variable (B_i), which means higher p-value for this variable. Mathematically, this is true because in regression model with the most common approach called the Ordinary Least Square (OLS) fitting, the variance of the coefficient (B_i) is calculated based on the following formula:

$$Var(\beta_i - B_i) = \frac{1}{n} * \frac{var\{(X_i - \mu_x)\mu_i\}}{(\sigma_x^2)^2}$$

where

β = estimated coefficient

B = true value of coefficient

n = sample size,

X_i = estimated value X_i

μ_X = estimated mean of the variable X

μ_i = mean of the error term μ

σ_X = standard deviation of the X variable

and the p-value of the coefficient is calculated based on the following formula:

$$p = 1 - \Phi \left(\frac{\bar{Y} - \mu_{Y,0}}{\frac{S_y}{\sqrt{n}}} \right),$$

where

p = p-value

Φ = z-value from the cumulative normal distribution table

\bar{Y} = estimated mean of the variable

$\mu_{Y,0}$ = value of zero hypothesis (often zero)

S_y = sample standard error of the variable

n = sample size

Based on these two formulas, one can see that smaller variance of the independent variable (X_i) means higher variance for the coefficient (B_i) of this variable, which means higher p-value i.e. lower statistical significance of this variable

2. Industry groups

Industry name	Industry group
Coal & Consumable Fuels	1010
Integrated Oil & Gas	1010
Oil & Gas Drilling	1010
Oil & Gas Equipment & Services	1010
Oil & Gas Exploration & Production	1010
Oil & Gas Refining & Marketing	1010

Oil & Gas Storage & Transportation	1010
Aluminum	1510
Commodity Chemicals	1510
Construction Materials	1510
Diversified Chemicals	1510
Diversified Metals & Mining	1510
Fertilizers & Agricultural Chemicals	1510
Forest Products	1510
Industrial Gases	1510
Metal & Glass Containers	1510
Paper Packaging	1510
Paper Products	1510
Silver	1510
Specialty Chemicals	1510
Steel	1510
Aerospace & Defense	2010
Agricultural & Farm Machinery	2010
Building Products	2010
Construction & Engineering	2010
Construction Machinery & Heavy Trucks	2010
Electrical Components & Equipment	2010
Industrial Conglomerates	2010
Industrial Machinery	2010
Trading Companies & Distributors	2010
Commercial Printing	2020
Diversified Support Services	2020
Environmental & Facilities Services	2020
Human Resource & Employment Services	2020
Office Services & Supplies	2020
Research & Consulting Services	2020
Security & Alarm Services	2020
Air Freight & Logistics	2030
Airlines	2030
Railroads	2030
Trucking	2030
Auto Parts & Equipment	2510
Tires & Rubber	2510

Apparel, Accessories & Luxury Goods	2520
Consumer Electronics	2520
Footwear	2520
Home Furnishings	2520
Homebuilding	2520
Household Appliances	2520
Housewares & Specialties	2520
Leisure Products	2520
Photographic Products -- Discontinued effective 02	2520
Casinos & Gaming	2530
Education Services	2530
Hotels, Resorts & Cruise Lines	2530
Restaurants	2530
Specialized Consumer Services	2530
Advertising	2540
Broadcasting	2540
Cable & Satellite	2540
Movies & Entertainment	2540
Publishing	2540
Apparel Retail	2550
Automotive Retail	2550
Catalog Retail	2550
Computer & Electronics Retail	2550
Department Stores	2550
Distributors	2550
General Merchandise Stores	2550
Home Improvement Retail	2550
Home furnishing Retail	2550
Internet Retail	2550
Specialty Stores	2550
Drug Retail	3010
Food Distributors	3010
Food Retail	3010
Hypermarkets & Super Centers	3010
Agricultural Products	3020
Brewers	3020
Distillers & Vintners	3020

Packaged Foods & Meats	3020
Soft Drinks	3020
Tobacco	3020
Household Products	3030
Personal Products	3030
Health Care Distributors	3510
Health Care Equipment	3510
Health Care Facilities	3510
Health Care Services	3510
Health Care Supplies	3510
Health Care Technology	3510
Managed Health Care	3510
Biotechnology	3520
Life Sciences Tools & Services	3520
Pharmaceuticals	3520
Diversified Banks	4010
Regional Banks	4010
Thriffs & Mortgage Finance	4010
Asset Management & Custody Banks	4020
Consumer Finance	4020
Investment Banking & Brokerage	4020
Multi-Sector Holdings	4020
Specialized Finance	4020
Insurance Brokers	4030
Life & Health Insurance	4030
Multi-line Insurance	4030
Property & Casualty Insurance	4030
Reinsurance	4030
Diversified REITs	4040
Health Care REIT's	4040
Hotel & Resort REIT's	4040
Industrial REITs	4040
Mortgage REITs	4040
Office REITs	4040
Real Estate Development	4040
Real Estate Services	4040
Residential REITs	4040

Retail REITs	4040
Specialized REITs	4040
Application Software	4510
Data Processing & Outsourced Services	4510
Home Entertainment Software	4510
Internet Software & Services	4510
IT Consulting & Other Services	4510
Systems Software	4510
Communications Equipment	4520
Computer Storage & Peripherals - Discontinued	4520
Electronic Components	4520
Electronic Equipment & Instruments	4520
Electronic Manufacturing Services	4520
Technology Distributors	4520
Technology Hardware, Storage & Peripherals	4520
Semiconductor Equipment	4530
Semiconductors	4530
Alternative Carriers	5010
Integrated Telecommunication Services	5010
Electric Utilities	5510
Gas Utilities	5510
Independent Power Producers & Energy Traders	5510
Multi-Utilities	5510
Water Utilities	5510
