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The effects of pre-crisis CEO compensation on during crisis bank performance in the U.S.

Master's thesis

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Abstract

This thesis attempts to clarify the relationship between pre-crisis (2002 to 2006) CEO compensation and during crisis (2007 to 2009) bank performance. This is tested by focusing both on the attracted CEO's risk level and the probability of resignation during a difficult management period like the financial crisis (CEO turnover).

In the pre-crisis period, banks that offered compensation packages with large salary or option fractions attracted a CEO with a higher risk level compared to banks with lower fractions. Bonus and stock did not have an effect on the attracted CEO's risk. Banks that attracted CEOs with a higher risk level performed worse during the crisis compared to banks with lower risk CEOs. Furthermore, pre-crisis compensation did not determine during crisis CEO turnover and CEO turnover did not affect during crisis bank performance. Last, testing pre-crisis compensation components directly on during crisis bank performance shows no significant relation which is a result contrary to the proven relation between salary and options, CEO risk level and bank performance. Thus, there is an opposing force that neutralizes this significant effect but it is a matter of further research to discover what this is.

What is key is that even during the financial crisis, results show that pre-crisis CEO compensation was unrelated to bank performance. This is contrary to literature concluding that compensation caused both an increase in pre-crisis risk taking and the likelihood of turnover which both contributed to the deterioration of crisis bank performance.

Preface

This thesis presents the results of my research on pre-crisis CEO compensation and the performance of banks during the financial crisis of 2007 to 2009. This master's thesis is the conclusion of the master study Financial Economics at Erasmus University Rotterdam.

I could have not completed my research without the help of several people. Firstly, I would like to thank my thesis supervisor, Prof. dr. Inglof Dittmann, professor of Corporate Governance and Managerial Accounting at the Erasmus School of Economics at the Erasmus University Rotterdam. He was always very swift in answering all my questions and guided me well through obstacles. This has resulted in an increase in the quality of the thesis but has also increased my knowledge on corporate governance research techniques.

Last, I would like to thank my parents, friends and peers for inspiring me and for being useful and motivating discussion partners.

Table of contents

1 Introduction

In October 2007, a global financial crisis hit our economic systems (Crotty, 2009). Americans defaulted on mortgages and house prices fell. Banks suffered large losses and started to question their viability. This escalated to the collapse of Lehman Brothers which threatened our whole financial system as we know it today (Brunnermeier, 2009).

As a result of the fiasco banks created in our economic systems, society became increasingly distrusting of the whole financial sector. Researchers started to focus on how banks were run and similarly also focused on CEO compensation. Scholars discovered that in the pre-crisis period stock and option compensation increased steadily and that total compensation at banks was considerably higher than other industries (Edmans & Gabaix, 2009).

The consensus at the time was that the increase in stock and option pay pre-crisis, drove excessive risk taking at banks that materialized negatively during the crisis. Also, during the crisis CEOs were paid their full salary even though the bank performed poorly. This increased public outrage towards banks because the people that were responsible for the problems still received salaries and bonuses that were much higher than the average worker. Hence, there was an outcry of society for regulation on bank CEO compensation to prevent this excessive risk taking from occurring again.

For this type of regulation to actually help prevent such a catastrophe from reoccurring, it should help increase the chances of attracting a capable CEO that makes good investment decisions (no high levels of risk taking) and stays at the firm in difficult times (low CEO turnover).

To attract this CEO, a "suitable" remuneration package needs to be offered. The information on how this "suitable" remuneration package should be set up can be extracted from the recent global financial crisis. Therefore, the research question in this thesis is: *What are the effects of pre-crisis CEO compensation components on during crisis bank performance?* The data in this period shows: what pre-crisis compositions of compensation packages attracted CEOs that took less risk pre-crisis, did not voluntarily resign from the CEO position during the crisis and the effects this had on during crisis bank performance. Accordingly, CEO compensation guidelines at banks could be based on these results and help the banking sector to reduce losses in times of crisis.

The answer to the research question is of societal importance as a sound and stable financial sector is desirable because performance problems have spill-over effects to the real economy, effecting the wealth and well-being of normal households. Therefore all solutions, either contributing largely or slightly to the reduction of bank losses, contribute to households not experiencing the wealth losses, as seen during the crisis, again.

Moreover, this thesis contributes to scientific literature as it attempts to fill the research gap on pre-crisis CEO compensation and during crisis bank performance. The only influential paper dedicated to this subject is that of Fahlenbrach & Stulz (2011) which only focuses on compensation components

that create incentives for CEOs. The main conclusion is that the more aligned the CEO was to shareholder's interests before the crisis, the worse during crisis bank performance was.

This thesis can add to this research as it has a slightly different approach. In principal, I believe that different compositions of compensation packages attract different types of CEOs with different characteristics. I define these characteristics as the risk lovingness of the CEO (CEO risk level) and the likeliness the CEO will resign from this position in times of difficulty (CEO turnover). Some CEOs are more attracted by the level of compensation than the actual task at hand and are more likely to resign during times of crisis as managing a bank in this economic state is very hard work. These characteristics determine how the bank is managed and therefore have an effect on the bank's performance.

As a result, I split the relation between pre-crisis compensation components and during crisis bank performance, which I call the full effect, into separate effects, which I call middle effects. The middle effects are the relations between pre-crisis compensation and CEO risk-taking, pre-crisis CEO risk-taking and during crisis bank performance, pre-crisis compensation and during crisis CEO turnover and during crisis CEO turnover and during crisis bank performance.

To test the middle and full effects, I extract data on bank financials from Compustat bank, stock prices from CRSP, the executive compensation variables from Execucomp and corporate governance variables from RiskMetrics. I select 2002 to 2006 as the pre-crisis period and 2007 to 2009 as the during crisis period. I use 4 OLS regression models and 1 logit model, based on the middle effects mentioned above, to test and either accept or reject hypotheses to come to an answer on the research question.

The results in the thesis show several interesting facts. Banks that offered a high fraction of salary or options compared to total CEO compensation package before the crisis, were less likely to attract a CEO with a high risk level than firms that offered lower fractions. Bonus and stock did not have an effect on the risk level of the attracted CEO. Also, banks that attracted a CEO with a higher risk appetite pre-crisis, had lower performance during the crisis than firms that did not appoint such a CEO.

Thereafter, compensation components pre-crisis had no effect on the likelihood of the resignation of the CEO during the crisis. Furthermore, CEO turnover does not have an effect on crisis bank performance. This shows that, the resignation of a CEO and appointing a new one did not affect during crisis bank performance immediately.

The last result is that the full effect regression. Here pre-crisis compensation components are tested on bank performance directly which shows no significant relation. This is a surprising result as the middle effect regression between compensation, CEO risk level and bank performance does show significant results. It therefore must be that other forces cancel this relation out and neutralize the regression coefficients. What this force or forces are, is a matter for further research.

The main result and main contribution to literature, however, is that pre-crisis CEO bank compensation is unrelated to during crisis bank performance. This is the opposite result to early consensus that concluded that there was a significant relation and especially in this time period. Before the crisis, increased fractions of stock and option pay reportedly increased the chances of attracting a more risk loving CEO and a CEO more likely to resign in times of problems. It was thought that these were the contributing factors of the decrease in during crisis bank performance. The result shows this is not the case and is therefore consistent with the literature sceptical of the correlation between compensation and firm performance. Pre-crisis CEO pay therefore did not determine the bank's performance during the crisis.

I structure the thesis as follows. In section 2 I discuss several topics relevant to understanding all parts of the thesis. Readers already familiar with the concept of corporate governance and its mechanisms, how banks work and the sequence of events of the financial crisis of 2007 to 2009 can skip this part. In section 3, I deliberate on several papers relevant to existing knowledge on relations that are important to answer the research question. I use this existing research to form hypotheses in section 4. In section 5, I explain what data I extract, what variables I use and how I structure my models. In this section I also clarify some necessary robustness tests. In section 6 I analyse the models of section 5 and show the regression results. Last, in section 7 I conclude and answer the research question, discuss areas of research improvement and suggest subjects for further research.

2 Theoretical framework

The focus of this research is to discover whether the composition of CEO compensation packages in the pre-crisis period contributed to the poor performance of banks during the financial crisis of 2007 to 2009. As a result, the main topic of this thesis is CEO compensation.

The concept of CEO compensation is a component of a larger concept: corporate governance. It is therefore essential to understand why corporate governance exists and how CEO compensation is related to this. Also, as the study focusses on the financial crisis, it is important to have an understanding of what happened before and during this time period and what the consequences were for bank performance. The knowledge I gather in this chapter, I later use to select control variables for the models in section 5 and use to better understand the results from the regressions. Readers already familiar with these concepts can skip this section or only read the summaries.

In this chapter I first attempt to illustrate the most important topics of corporate governance Hence, first in section 2.1 I define corporate governance and why it is important. Second, in section 2.2 I elaborate on the agency problem; where it originates, necessary assumptions and the agency costs. Third, in section 2.3 I look at important and widely researched corporate governance topics. Then, I continue by explaining how banks work and what their relation is to the financial crisis. Thus, in section 2.4 I elaborate on banks followed by a summary of the financial crisis in section 2.5. Last, in section 2.6 I give a summary of 2.4 and 2.5.

2.1 Corporate governance

In the exact words of Shleifer & Vishny (1997) "corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment". In other words, the main question in corporate governance is: how can investors persuade managers to return fractions of the profit instead of stealing or recklessly investing their invested capital (Shleifer & Vishny, 1997). The answer to this question lies in solving the agency problem.

2.2 The Agency problem

Most corporates have a separation of ownership and control. To see why this is a problem consider a manager that can either raise funds to invest in growth opportunities or to cash out his holding in the firm (Shleifer & Vishny, 1997). On the flip side, investors are seeking destinations for their capital that can make them positive returns. They are motivated to invest in firms because they believe the business and its managers are capable of effectively coordinating firm activities and hence making the assets of the firm perform (Coase, 1992). The better the assets perform the higher the returns are to investors.

The side effect of an investor investing in a firm is, however, that a new agency relationship starts (Jensen & Meckling, 1976). This is the relationship between an investor (principal) and the

firm's managers (agents). This fact is the essence of the agency problem as described by Coase (1937); Demsetz (1983) Jensen & Meckling (1976); Fama (1980); Fama & Jensen (1983); Bebchuk & Weisbach (2010); etc.

For an agency problem to be classified as an agency problem 3 assumptions need to be fulfilled. According to Eisenhardt (1989): conflict of interest, asymmetric information and different risk characteristics are the three main pillars of assumptions.

The first assumption is that a conflict of interest between the principal and the agent should exist. Investors want the maximum amount of return on their investment and need to be reassured that their funds are not wasted on negative net present value (NPV) projects or expropriated by management that wants the highest possible benefit from the firm transferred to themselves.

For the second assumption to be fulfilled there should be a degree of asymmetric information where the principal cannot monitor the actions of the agent (hidden action) and where the agent has more information than the principal. When actions are hidden the agent can use this to his or her advantage by pursing own goals and investing recklessly (high risk investments) without the principal knowing and inflicting disciplinary punishment. Investors are aware of these facts which makes these principals less willing to invest in firms/agents (adverse selection problem). This is harmful to the development of firms.

The third and final assumption is the difference in risk characteristics of the principal and the agent. When the risk of the agent is higher than the principal, the agent might invest in more risky projects than the principal expects. On the other hand, when the risk preference of the principal is higher than that of the agent, the agent might underinvest and the principal might be unsatisfied with the return on investment.

The consequence of having an agency problem is that it creates agency costs. Reducing the divergence between principal and agent can, for example, be done by: giving the agent incentives to act more in the interests of the principals (executive compensation), monitoring the agents better to reduce asymmetric information and hidden actions (shareholder coordination, block holder, board of directors) and finally by paying bonding costs which is a fee paid to agents to NOT take certain actions (Jensen & Meckling, 1976). The sum of these three measures are all part of the agency costs and are considered residual losses (Jensen & Meckling, 1976).

In summary, the agency problem creates agency costs and therefore there is a significant amount of interest to solve this problem.

2.3 Corporate governance topics

The complexity in solving this problem originates from the fact that there are several sources of agency problems. The solutions to these problems are partly offset because the solutions themselves can create new sources of agency problems. In the following text I illustrate this mechanism by describing important corporate governance topics: shareholders, block holders, controlling

shareholder, board of directors, executive compensation, and corporate governance laws (Bebchuk & Weisbach, 2010). This also gives an idea of the context of executive compensation within corporate governance.

2.3.1 Shareholders, block holders and controlling shareholders

One of the sources of the agency problem is the fact that listed firms have a vast amount of different investors. The larger this amount, the more dispersed the ownership of the firm and the lower the power of individual investors in the firm. The costs for these investors to give incentives to CEO's, monitor the CEO's and offer bonding costs outweigh the benefits (section 2.3.3). This lack of shareholder involvement increases the divergence between principals and agents (Berle & Means, 1932)[1]. As a consequence, high levels of dispersion are linked to poorer firm performance compared to firms with lower levels of dispersion.

The three most common corporate governance mechanisms to reduce the dispersion and improve firm performance are: better monitoring by combining the power of small shareholders, shareholder activism and introducing large block holders to the pool of investors.

For investors that only own a small fraction of the firm, monitoring costs are higher than expected returns on their investments and therefore there is no payoff in monitoring management. A solution would be for the small shareholders to combine forces with other small shareholders and share all monitoring costs according to the fraction of ownership. Now, the expected profits are higher than the monitoring costs.

A second method is shareholder activism. Shareholders can put forward proposals at shareholder meetings and vote on these proposals. The larger the shareholder's share of the company the more voting power the shareholder has. By combining voting power, proposals can be forced on management and interests can be aligned. According to the survey of Bebchuk & Weisbach (2010), many studies conclude that this increases shareholder value and reduces agency costs.

The third solution to this problem is to introduce a large block holder among the investors (Shleifer & Vishny, 1986). These suppliers of funds typically own about 5% of all shares and it therefore pays off to incur the costs of monitoring management. Moreover, block holders make a hostile takeover more likely (Shleifer & Vishny, 1986).

A takeover is hostile when management is bought out of the firm. A takeover of this type is more likely when the firm has large block holders because the acquirers can buy a large amount of the shares by only convincing the block holder to sell them. A block holder that experiences disappointing returns and high agency costs will be more willing to sell its shares to the hostile takeover party. Consequently, the mere presence of block holders force management to minimize agency costs and

[1] This article is not available, however I found the conclusion in the paper of Jensen & Meckling 1976. The owners of this conclusion are however Berle & Means (1932).

provide returns on investment. Therefore, a block holder creates firm value (McConnell & Servaes, 1990; Morck et al. 1988; and others)

In contrast, when the block holder acquires too much power, for example by owning dual-class shares with more voting power, it can force decisions in their favour and it can extract rents from the firm which are harmful to ordinary shareholders (La Porta, Lopez-de-Silanes, and Shleifer 1999; Bebchuk and Hamdani 2009; Bebchuk and Roe, 1999). This can be achieved by: building company pyramids. Here, wealth is transferred from companies where the controlling shareholders have a small fraction of ownership, up to the top of the pyramid where they have a large fraction of ownership.

Consequently, the agency problem now shifts from a too high level of investor dispersion to a too low level of dispersion. It thus appears to be the case that joint shareholder forces and block holders are important corporate governance mechanisms that reduce the agency problem but on the other hand no shareholder should have controlling power as it increases the problem.

2.3.2 The board of directors

Besides the pressure that a combined shareholder effort and a block holder can exert to minimize the agency problem, these two groups can also appoint a board of directors to act on their behalf.

The board of directors is a group chosen by shareholders to represent them. Their main role is to monitor and strategically advise management (Hermalin & Weisbach, 2003). The board of directors comprises of directors that are both insiders (dependent) and outsiders (independent). Directors are said to be independent when a board member has not been an employee at the firm, has no family ties or is not affiliated to the firm whatsoever prior to the directorship (Francis et al., 2002). A dependent director is the opposite. Inside directors have more firm specific knowledge and are therefore more capable to advise the firm strategically. Also, it is highly likely these directors have a good working relationship with management and are therefore less likely to monitor them closely. Outside directors have less firm specific knowledge, do not know management yet and are therefore more equipped to objectively monitor management (Rosenstein & Wyatt, 1997).

However, even though it is the director's job to monitor and advise on behalf of the shareholders, these individuals can too have alternative interests in the firm. Directors enjoy the directorship because of the good salary and the prestige and want to therefore continue the directorship for as long as they can. This gives incentives to please the firm's management, which could lead to less objective monitoring and an increase in the agency problem. On the other hand, the monitoring has to be satisfactory as the shareholders have the power to fire directors.

To reduce the problem of pleasing management, several options exist. These include (among others) creating an independent board and appointing a board with an optimal size.

A board classifies as independent when the fraction of independent directors is higher than the fraction of dependent directors (Bebchuk et al., 2010). Rosenstein & Wyatt (1997) and Byrd & Hickman (1992) argue that the higher independence, the more monitoring and the less management

expropriation. Conversely, Hermalin & Weisbach (2003), Klein (1998), Adams & Mehran (2005) and many others identify no relationship between independence and firm value. Hence, firms with independent boards seem to not perform worse than firms without.

Besides the fraction of independent directors, the size of a board also has an effect on shareholder's value. Many scholars conclude that size is negatively related to firm performance (Yermack, 1996; Jensen, 1993 and Lipton & Lorsch, 1992). This can be explained by free-riding behaviour of directors on large boards which reduces the marginal effectiveness per board member. However, a small board is not able to monitor and advise at a high standard because of time issues (Yermack, 1996). Hence the board should not be too small but also not be too large. Overall literature identifies 10 to 12 directors as the optimum (Bhagat & Black, 2000;Yermack, 1996).

As one can see from the above, the board of directors has great potential in reducing agency costs but can also be responsible for a widening of the principal-agent problem. As a consequence, researchers still do not agree completely on what the optimal composition of a board is.

2.3.3 Executive Compensation

Besides the role of monitoring and advising managers, the board of directors also negotiates with the CEO (and other executives) on his or her compensation package on behalf of the shareholders. Compensation is another mechanism to reduce the divergence between principals and agents.

During the financial crisis of 2007 to 2009 banks were pressured by the public to explain why their firm's performance was decreasing and CEO's were still earning large sums of money. This sparked a hefty debate and as this is the main topic of this thesis I explain this more extensively than the other corporate governance mechanisms.

Executive compensation is a broad topic that encompasses every type of pay that is earned by executives (CEO, COO, CFO). The role of executive compensation is to attract a suitable CEO (or COO, CFO) for the lowest possible cost and align his or her interests to those of the shareholders. It is therefore essential that the compensation package is designed in such a way that the agency problem is reduced or mitigated. Several components exist for this purpose.

To understand better how CEO compensation packages are negotiated and how agency problems persist despite this, there are 2 dominant approaches: optimal contracting approach and managerial power approach (Bebchuk & Fried, 2003). I first explain optimal contracting in section 2.3.3.1. Then, I clarify managerial power as an approach to reduce the costs in section 2.3.3.2. Lastly, it is important to understand how certain components of the compensation package can incentivize specific CEO behaviour that is desired by the shareholders. I describe this is in section 2.3.3.3.

2.3.3.1 The optimal contracting approach

In the optimal contracting approach incentives to align interests and maximize shareholder's value need to be created as maximizing shareholder's value is not the manager's priority (Bebchuk & Fried,

2003; Jensen & Meckling, 1976; Holmstrom, 1979). Which incentives are used to what extent will come about by arm's length bargaining between the board and the executives (Bebchuk & Fried, 2003). Arm's length bargaining is executives and board members acting in their own self-interest and negotiating the best deal possible for both sides, which creates an equilibrium.

Nevertheless, in practice, contracts deviate from these optimal equilibria for several reasons. The first reason, according to Bebchuk & Fried (2003) are market constraints. Examples of these constraints are: takeover defences, capital constraints and constraints in executive labour. Takeover defences minimize the threat of a (hostile) takeover which are: staggered boards, golden parachute, poison pills etc. In particular, the golden parachute can increase executive compensation substantially above optimal contracting levels. Thereafter, laws in countries can prohibit boards from offering certain capital compensation because it is restricted. Last, executive labour is scarce in the sense that every candidate has different knowledge and experience and very specific knowledge and experience in required. It is rare to find an executive that has all the credentials the company is looking for.

The second reason for deviation from optimal contracts has to do with the board of directors. As was elaborated on in section 2.3.2 board members have an incentive to please management. This tendency could result in contract bargaining that is more favourable to management.

The third reason for the discrepancy originates from recruiting an outside CEO. This means the director and the CEO start their working relationship by negotiating compensation. As a result, an incentive to please the CEO arises because the director wants to be nominated by the CEO for the next directorship term. Also, if the CEO is already in the compensation negotiating phase of recruitment it is very costly for the firm to find new candidates. Hence, the optimal contract is in practice never reached.

2.3.3.2 Managerial power approach

The managerial power approach also tries to explain the deviations from the optimal contract. Under this approach the paradigm is that executive compensation is both a remedy and part of the agency problem. The two building blocks are outrage and camouflage (Bebchuk & Fried, 2003).

Managers can have more power than the directors in the pay setting process, especially when ownership is dispersed as was explained in section 2.3.1. Deviations from the optimal equilibrium occur in this instance as the managers are able to extract rents (Bebchuk & Fried, 2003; Yermack, 1996; Bertrand & Mullainathan, 2001).

As the directors want to please the CEO, a balancing act between outrageous and acceptable pay levels appears. The equilibrium in the managerial power approach is the point where compensation is high enough to please the CEO without causing public outrage (Bebchuk & Fried, 2003). Outrage creates image damage and an incentive to "camouflage" manager's earnings (Bebchuk & Fried, 2003). Accordingly, pay deviations from the optimal equilibrium and distorts incentives. Thus, executive compensation aligns interests but can also be misused to extract rents.

2.3.3.3 Compensation package components

As the text above has made clear, creating an optimal compensation package is a balancing act. This is not any different when choosing the exact components of the package. The subsequent text shows components of the compensation package that directors can choose when trying to incentivize managers. A compensation package comprises of several components. The largest components are: base salary, bonuses, stock options, stock, long-term incentive plans and various miscellaneous pay. They all have different outcomes in incentivizing managers.

Base salary, is a fixed amount earned by the executive with certainty every year (Murphy, 1999). This component is not used to incentivize managers as it is distributed to the executive with certainty independent of their performance. It, however, is a means to attract CEOs and retain them but it does not increase shareholder value.

A component that does incentivize managers to increase shareholder's value are bonuses. Bonuses are an amount that can only be cashed in by the executive when a predetermined qualitative or quantitative goal is met that will benefit shareholders (Murphy, 1999). The disadvantageous of bonuses are however that when the goal is reached there is no incentive for the executive to exert more effort and increase shareholder's value further as they cannot benefit from this. Moreover, CEOs will shirk when the goal is far out of reach as they will not receive a bonus. Furthermore, bonuses are yearly goals which incentivizes the CEO to focus on the short-term which can harm long-term performance (Murphy, 1999).

One way to solve the shirking and short-term mind-set is to use stock-options. Stock-options as CEO compensation are options usually given out at the money (Murphy, 1999). If the CEO leads the company well, the stock price increases and hence the value of the stock-option increases. In turn, beyond bonus goal levels, the CEO compensation level still rises which mitigates executive shirking. Also, for the options to hold value over a longer time-period the CEO takes decisions that increase long-term firm performance. However, if the CEO does not perform well and the stock price decreases under the strike price the stock-options are worthless and the CEO is more likely to stop exerting effort.

To minimize this consequence, board members can give out stock and install long-term incentive plans. The value of the stock moves with the stock price. Hence, even when the firm is performing less than when the CEO started the stock still holds value and the CEO is incentivized to stay at the firm and also keep exerting effort. Long-term incentive plans can strengthen the incentives created by stock because these plans typically hold restricted stock that cannot be traded in the coming years and can also not be hedged against (Murphy, 1999). As a result, the value of long-term incentive plans can only be pocketed after a few years which encourages the CEO to remain at the firm and exert effort as he or she otherwise loses the potential wealth from restricted stock (Murphy, 1999).

The last component is miscellaneous pay that can have several forms like: retirement plans, life insurance, gifs etc.

In summary, executive compensation is a corporate governance mechanism to align executive and shareholder's interests by combining several compensation components in an optimal manner.

2.3.4 Corporate governance and Law

Another factor that complicates how corporate governance should be enforced at firms is the difference in corporate governance investor protection law across countries. This is: "The degree to which investors are protected against expropriation of company funds by managers and even the degree to which their rights are enforced "(LaPorta et al., 2000).

Across the spectrum of laws, 2 absolute opposites exist namely: Common law and French civil law. Common law gives shareholders the best legal protection because laws are enforced by a judge (LaPorta et al., 2000). It is easy for shareholders to start a lawsuit and claim returns on investment. Examples of countries with this type of law are the United States of America and the United Kingdom. In French civil law, companies have to adhere to the corporate governance code that is set up by a supervisory institution. When the firm does not comply to the code, it has to explain this to the supervisors who decide on actions. As a consequence, it is hard for shareholders to start a lawsuit and demand returns on investments. Investor protection is therefore higher in countries with common law than civil law.

As a result, in countries with common law small shareholders have more power than small shareholders in civil law countries. Accordingly, in common law countries ownership is more dispersed as there is a higher chance of returns on investments being paid.

2.3.5 Summary of corporate governance

From sections 2.1 to 2.3 it is important to understand executive compensation's role in corporate governance at firms. The main problem corporate governance tries to solve is the agency problem. The agency problem creates agency costs which shareholders want to avoid.

Agency problems can appear everywhere in the firm. Even the solutions to the divergence of interest between principals and agents hold new agency problems. Figure 2.2 below shows an overview. High shareholder dispersion levels increase the divergence which can be reduced by combining shareholder efforts, shareholder activism and having a block holder in the investor formation but this block holder cannot become a controlling shareholder as this widens the principal-agent gap. Likewise, the shareholders could also appoint a board of directors that act on their behalf but the directors also have incentives to please the firm's management so the board both increases and decreases the discrepancy. Similarly, executive compensation is a way to align the interests of managers and investors but in practice the optimal contract is not reached as the compensation committee of the board of directors again has interests in pleasing the CEO. Finally, law is also an important factor as common law gives more power to investors than civil law does.

Figure 2.2: Overview of corporate governance topics considered and their effects on the agency problem

2.4 Banks

Besides corporate governance, this thesis also focusses on compensation and during crisis bank performance. I therefore explain very briefly what a bank is and what makes it unique. This helps to understand how the financial crisis unfolded during 2007 to 2009. The best way to explain the function of a bank is to explain several firm characteristics that are unique to banks.

What makes a bank unique, is that it is the only institution that is permitted (by banking permit) to hold savings money from consumers and businesses, otherwise known as deposits. The deposits are the supply of money (among other sources) within the banks. The bank transfers this capital to consumers or companies with a credit need. The bank provides loans to these customers and receives the interest rate on these loans. On the flip side, the bank offers deposit clients an interest rate for depositing their money at that bank. The difference between earned and paid interest rates is called the (bank) margin and are (very roughly) the bank's profits.

In addition, the section of the business model that is exclusive to a bank is that it can finance on a short-term basis and give out loans on a long-term basis. Interest rates on long-term loans are higher than short-term loans because of time risk. The bank cannot predict the probability of all scenarios in the future and therefore requires compensation for bearing this risk. The longer the time period, the higher time risk (Carlson, Mitchener & Richardson, 2010; Diamond, 2007). As a result, the bank can earn large margins by giving out loans with maturity up to 30 years and financing this asset with the shortest maturity debt allowed.

The business model of banks, transferring short-term financing to long-term loans (the transformation function), creates a large account on the liabilities side of the balance sheet. Large accounts are for example deposits, current liabilities (debt with a maturity up to 1 year) and long-term liabilities (debt with a maturity above 1 year). The equity level compared to total debt is much lower compared to non-banks. Therefore, banks are highly levered firms (measured by debt-to-equity ratio) (Diamond, 2007).

This firm characteristic is not without risk. Banks need to refinance the short-term debt on the long-term outstanding assets when debt on the liabilities side reaches maturity. Imagine a situation where credit is not easily available (like during the recent financial crisis, explained in more detail in section 2.5) then either refinancing is very expensive, which reduces the margin, or banks are not able to refinance the loans. As a consequence of not being able to refinance the loans, banks need to sell the loans on the asset side of the balance sheet (Brunnermeier,2009). This is usually a fire sale, which means the bank has to write down on this asset. The problem that now arises is that the bank cannot pay back the loan financing the asset in full. The bank has to use equity capital to pay off the loan or face bankruptcy.

There is a catch however, banks have access to the lender of last resort, the country's central bank. Banks can borrow from the central bank and therefore always have access to credit. This way, banks are able to refinance the outstanding loans. Consequently, the banking business model can persist. However, the recent crisis shows that this mechanism is not always robust which the next paragraph explains.

2.5 The financial crisis of 2007 to 2009

The paper by Brunnermeier (2009) describes an extensive log of the sequence of events prior and during the crisis. The preceding facts are all based on this paper and only differ if otherwise mentioned.

The 2 key circumstances leading up to the housing bubble, that sparked the 2007 start of the crisis, is that the U.S. economy was experiencing a low interest rate environment, because of large capital inflows from Asian countries, and because the Federal Reserve (FED) followed a sloppy interest rate policy. The capital inflows from Asia were the result of Asian countries pegging their exchange rate against the dollar to achieve an export-friendly rate. This was a lesson that the Asian countries learned during the Southeast Asian crisis[2]. What is more, the run up to the financial crisis of 2007 to 2009 was the recovery period of the internet bubble. Hence, the FED feared deflation and did not want to counteract on the rising prices and thus also not on rising house prices.

On top of this macro-economic climate, the banking business model changed from the traditional banking model, where banks attract deposits, lend these deposits to customers and hold the loans until maturity, to the originate and distribute model, where all loans sold are pooled, then tranched and resold per tranch via securitization. The large capital inflows from foreign countries to the U.S. could now be processed through this system.

[2] In the build up to this Asian crisis , East-Asian countries experienced huge capital inflows because of their high growth. In Thailand the government had tried to peg the baht to the dollar but after some time this was untenable and the decision was made to let the baht float against the dollar. Moreover, Thailand had such a high level of public debt that the country basically was bankrupt. The baht devalued against the dollar and export earnings started to fall. This spilled over to other Asian countries which sparked decreases in prices of stock and an increase in private debt which caused a crisis.

The securitization process is a process where risk is offloaded to investors that are willing to bear it. Banks created collateralized debt obligations (CDOs) that consisted of for example a pool of mortgages that were split into tranches according to investor's risk appetite. On top of that, investors could insure against losses on these CDOs by buying credit default swaps (CDS). Now the CDOs seemed a very safe investment as the investors expected the probability of default of the companies that gave out CDSs as very small. This made these securities highly appealing as they were perceived as low risk investments with a higher yield than the yield on government bonds.

The only problem for banks was that they had to hold 8% of all loans in capital on their balance sheet. This capital requirement increases bank liquidity and acts as a buffer when banks have to write down on assets (as explained in section 2.4). Logically, this creates opportunity costs for banks and therefore banks created structure investment vehicles. The capital requirements for these vehicles were much lower. As a result, banks transferred the loans to these vehicles. These vehicles sold asset backed commercial paper (ABS) which are securities backed by collateral. The collateral is a pool of mortgages where the ownership is transferred to the ABS investors in the case of default. The ABSs that were sold had a maturity of between 90 days and 1 year. Comparing this to mortgage maturity and huge funding liquidity risk appears.

As a result of the potential funding liquidity risk, the sponsoring bank had to grant a credit line to these investment vehicles to fill up funding gaps where they arose. This in fact means that the sponsoring bank still bears all liquidity risk but that this does not appear on the balance sheets of this bank. If ever the financing to the vehicle stopped, this would create a huge burden on the sponsoring bank as the bank would have to start providing capital.

But before this worry became a reality, the popularity of the structured products increased immensely. The advantages of this were that the interest rates on loans decreased and that institutional investors could invest in assets that they were previously prohibited to invest in. This rise in popularity flooded the market with money and therefore lending standards fell. Moreover, the common assumption was that house prices would rise forever.

Eventually, the poor lending standards materialized and people could not afford their mortgage anymore. The first defaults on subprime mortgages started in February 2007. This was followed by a downgrade of mortgage related products by Moody's which then lost even more value. As a result, house prices started to drop in June 2007 until late 2008. Investors became increasingly worried and in July 2007 the liquidity in the market for asset backed commercial paper started to dry up and especially the market for mortgage backed securities. Now banks had to open their credit lines to their structured vehicles and the first bank that was unable to provide enough finance was a small German bank which went bankrupt. This increased the distrust between banks because they did not know whether the other bank was able to afford their credit lines. This stopped interbank lending completely.

From October 2007 onwards large banks had to write down on their assets or even fire sale them. Investors were then hesitant to buy any assets offered because they thought only "lemons" were left in the market (adverse selection problem). This depressed prices even further.

The financial crisis had now fully unfolded. The write downs, fire-sales, dry up of funds etc. all contributed to bank performance decreasing heavily during this period.

2.6 Summary banks and the financial crisis of 2007 to 2009

In section 2.4 and 2.5 I give a brief overview of the firm characteristics of a bank and the recent financial crisis.

Banks are firms that primarily allocate funds from people with a supply of money (depositors) to people with a demand for money (creditors). A bank can increase margin by offering loans with long-term maturity and financing these loans with short-term debt. This business model creates a high levered firm which is only feasible for banks as they have access to the lender of last resort.

This business model does create high liquidity risks for banks. The risk increases when banks set up structured vehicles. These vehicles sold very popular products that increased housing prices severely. It was assumed that the house prices would never fall and credit in the market was so plentiful that lending standards dropped. Eventually, the mortgages started to default; all the popular CDO's became worthless and funding dried up. Banks had to finance these drops in value and liquidity dry up and had to write down severely on their balance sheet. This of course depressed financial firm performance rigorously during this period.

The chapter hereby shows that aligning the interests of principals and agents is a balancing act between several corporate governance topics. The optimal mix of agency problem solutions is therefore a hard task. It also shows what makes banks unique institutions and why certain bank performance decreased heavily during the crisis. This gathered knowledge contributes to understanding the interlinkages between pre-crisis compensation package and during crisis bank performance. In the next chapter, I investigate these linkages in detail.

3 Literature review

To understand better how pre-crisis compensation is related to during crisis bank performance, I analyse literature on this subject.

In the wake of the crisis, a lot has been written on CEO compensation. Countless researchers claim that before the financial crisis, performance based pay like stocks and stock options caused CEOs at banks to take excessive risk and that CEOs were attracted that resigned during crisis times. These papers claim these were the sole reasons banks suffered large losses during the crisis (Hagendorff & Vallascas, 2011; Bebchuk & Spamann, 2009). Figure 3.1: shows the linkages between compensation, risk, turnover and performance.

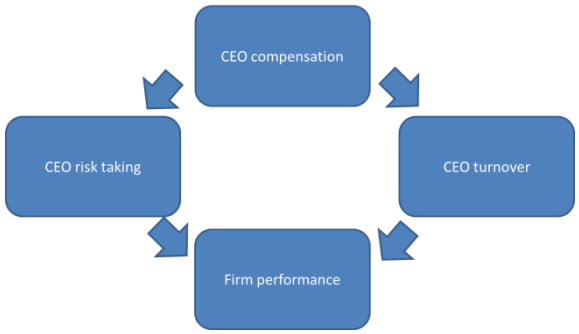

Figure 3.1: The relation of CEO compensation to firm performance via CEO risk taking and turnover as a result of the composition of the compensation package

This thesis investigates whether these claims are indeed true. However, much of the available literature, only focuses on the relation between compensation and CEO risk taking, CEO risk taking and firm performance, compensation and CEO turnover, CEO turnover and firm performance, which I call middle effects, and finally a limited amount of papers investigate the direct relation between CEO compensation and firm performance, which I call the full effect. Also, these effects are explained only for non-banking firms. Thus, currently there is no literature available that connects pre-crisis compensation to during crisis bank performance by taking both pre-crisis CEO risk taking and during crisis CEO turnover into account.

I therefore chose to take a closer look at the literature on the separate subjects instead of the total effect to get to an approximation of this correlation. In section 3.1, I look at the literature on the correlation between CEO compensation package components and the CEO risk level. In section 3.2, I elaborate on the relation between risk and firm performance. In section 3.3 I turn to the relation between certain compensation components and CEO turnover. Subsequently, I explain the effects on firm performance following CEO turnover in section 3.4. In the last section 3.5, I research the connection between compensation components and CEO turnover.

3.1 CEO compensation and the CEO risk level

The first effect I analyse is the composition of the compensation package on the risk level of the CEO. Currently, the literature specific to CEO risk level is limited. I therefore also use the literature on (bank) firm risk and compensation components as bank risk is an outcome of the risk preferences of the CEO as this shows through investment decisions, financial structure of the firm, stock price volatility, etc. (Myers & Majluf, 1984).

The text explains various facts about different compensation components and their link to risk taking. In particular, I give an overview of the two differing opinions on CEO risk level and CEO compensation relationships in the literature. One part concludes that specific compensation components do indeed have a significant effect on risk taking of the firm and the other share does not find this relationship.

As was extensively shown in chapter 2 section 2.3.3, the main goal of executive compensation is to align the risk preferences of the shareholders to the risk taking of the CEO (Murphy, 1999). To achieve this alignment, the components of section 2.3.3.3 form 2 groups.

The first group is the amount of base salary CEOs receive with certainty in each year of their contract as it is specified (Gomez-Mejia & Wiseman, 1998). The second group is contingent pay where the level of pay cannot be predicted beforehand because it depends on various unpredictable market and economic factors (Gomez-Mejia & Wiseman, 1998). These are for example: bonuses, options, stock and long term incentive plans. Hence, contingent pay comprises of pay with greater uncertainty than base pay since base pay is fixed over the contract's period and contingent pay is not (Gomez-Mejia & Wiseman, 1998).

As a consequence of this uncertainty, attitudes towards risk differ per attracted CEO. Compensation contracts with an emphasis on salary are expected to attract a risk averse CEO as taking a lot of risk puts the firm and therefore the CEO's salary and continued employment at risk (Arcey et al., 2011). On the other hand, the larger the fraction of contingent pay to the complete compensation package the higher the chance of attracting a risk loving CEO because of his or her capability to bear uncertainty (Brewer, Hunter & Jackson, 2004; Cheng, Hong & Scheinkman, 2010).

Also, the larger the uncertain component, the more gain a CEO can get from taking more risk and the more aligned he or she is to shareholders. By taking more risk the expected future earnings of the firm increase (March & Shapira, 1987). This increases the share price and with that the value of the stocks and options owned by the CEO (Hagendorff & Vallascas, 2011). Over the years the share of bonus, stock, and options to total pay has increased enormously and especially in the banking industry (Chen et al., 2006; Cuñat & Guadalupe, 2009; Hubbard & Palia, 1995).

The above text shows that compensation components attract CEOs with differing risk levels. There is much debate on these effects and many scholars do not agree with each other. Therefore, 2 groups of literature have emerged.

The first dominant group all conclude that there is a direct relation between CEO compensation and CEO risk taking. Examples of researchers that conclude this are: Bebchuk & Spamann (2009); Brewer et al. (2004); Chen et al. (2006); DeYoung et al. (2010); Mehran & Rosenberg (2007); etc. The differences between conclusions lie in how risk and compensation are defined and whether the tested sample contains all industries or only the banking industry.

Bebchuk & Spamann (2009), Douglas (2006) , Mehran & Rosenberg (2007) all conclude that compensation contracts where CEO pay is highly correlated to firm performance (large fraction of contingent pay), indeed induces firms and CEOs to participate in more risky projects which attracts a risk loving CEO. Bebchuk & Spamann (2009) even conclude that this was the contributing factor to excessive risk taking before the crisis at banks.

Furthermore, Brewer et al. (2004) test bank risk, defined as an increasing proportion of non-interest income sources, on compensation and find that the larger this non-interest income proportion the larger the equity based (contingent pay) component in compensation. Hence the same conclusion as Bebchuk & Spamann (2009) and Mehran & Rosenberg (2007) applies.

Another study that concludes the high levels of risk-taking following large fractions of contingent pay in the compensation package is that of Chen et al. (2006). Chen et al. (2006) test the relation between compensation and risk by defining compensation as option-based compensation and risk as total risk, systematic risk, idiosyncratic risk and interest rate risks. They conclude that when the value of options is increasing, it increases risk taking (especially in the banking industry) but beyond a certain threshold decreases risk taking. Beyond this threshold the CEO becomes risk averse because he or she can now lose a lot of option value if a project turns out to be bad risk.

Additionally, DeYoung et al. (2010) find strong evidence for a relation between contractual risk-taking incentives and actual risk-taking of CEOs. In this paper they look closely at an event where compensation was altered so that CEOs would exploit new growth opportunities. As a result of the alteration in the compensation, CEOs invested in these new opportunities and took more risk. Hence, a great body of literature does detect a positive effect between compensation, particularly contingent pay like stock and options, and increased CEO and firm risk-taking by a risk loving CEO.

The other group of literature is however less convinced of this relation. Examples are: Arcey et al. (2011), Cheng et al. (2009), Fahlenbrach & Stulz (2011); Hagendorff & Vallascas (2011) and Houston & James (1995).

Hagendorff & Vallascas (2011) find that the results on the relation between how pay incentives affect risk-taking in the banking industry is very limited. This is echoed by Fahlenbrach & Stulz (2011) that also do not find an effect between compensation and risk taking even before and during the crisis. Thereafter, Houston & James (1995) find a similar conclusion as they test a sample of banks and compare the results on risk taking to the industrial sector. No differences in the level of risk taking between these sectors appear even though society seems to believe banks take excessive risk following the CEO pay settings.

Also, Arcey et al. (2011) find that CEO compensation components do not predict the heterogeneity in bank risk-taking activities. Hence, according to these papers overall compensation components do not seem to attract a risk loving CEO that increases risk.

To conclude, there is not a consensus on the relation between CEO risk taking and the compensation components in the remuneration package. Some papers conclude a positive relation, particularly between contingent pay and CEO risk taking. Nonetheless, other research does not find any relation. Taking into account how divided the literature is on this matter, even for banks pre- and during the recent financial crisis, this relationship is not at all certain and this thesis will attempt to clarify the effect of compensation package components on bank performance further.

3.2 CEO risk level and firm performance

"In general, the CEO risk level is reflected in firm risk-taking and as a result influences firm performance" (Coles et al., 2006). Studies on risk-return relations define risk as "the variation of the firm's income stream" which shows that a correlation between risk-taking and firm performance exists (Bowman 1980, Montgomery & Singh, 1984). By understanding this correlation and the correlation of section 3.1 more insight is developed on the effect of compensation components on firm performance regarding CEO risk-taking as the middle effect.

In the literature, two focal ideas on the effect of risk on performance exist. In some circumstances risk is positively related to performance in other conditions these variables relate negatively. Particularly during the recent financial crisis (2007 to 2009) differences in this relation between industries and firms became apparent which were especially large at banks.

In the following text I attempt to clarify why the risk-performance relations can switch from negative to positive and vice versa. First, I give a general explanation for the differences in the relationship by using different points of view namely: time, industries and firms. Then, I look at firm specific characteristics and their effects on risk-taking by the CEO. Last, I extend that discussion to banks in the pre-crisis period and the consequences on during crisis bank performance.

As briefly mentioned, the risk-performance relationship is either positive or negative depending on which industry and time period is focused on (Fiegenbaum & Thomas,1988). Within industries, firms are influenced by many comparable elements which can have an equivalent negative or positive effect on performance at all firms in the entire industry but can differ cross-industry.

An example could be farmers in the Netherlands. The farmers have a choice of what type of crop to cultivate. Some crops have more risks, because they are for example more susceptible to receiving too much rain water. However, over the past month a vast amount of rain has fallen which destroys not only the high risk but also the lower risk crop. As a result, farmers lose income and the relation between risk and performance in this industry is strongly negative. Nonetheless, for example for the IT-sector, risks could lie in development of new software and whether or not this appeals to clients. The amount of rain that falls from the skies does not affect the amount of software these firms

sell nor does it influence the decision on developing new software or not. Hence, the rain has no effect on the risk-return relationship and it remains positive. This shows that outcomes of risk-taking can differ cross-industry because whether or not the risk materializes positively or negatively is dependent on different economic shocks.

Similarly, the second factor Fiegenbaum & Thomas (1988) consider is time. Over the years different economic climates can appear. As economic cycles exist, economic booms and busts arise and these economic states can have stronger or less strong effects across firms and industries. To return to the previous example, in the event of a financial crisis farmers tend to not experience decreasing returns because there is always market for their crop as food is a vital human need. Thus, this economic climate will not (or hardly) influence the risk-performance relationship at these firms. On the other hand, a lot of IT-companies develop expensive software for big companies and financial institutions which will postpone investment, in for example IT, to first solve the crisis they are facing. Hence, IT-companies experience declining returns and are reluctant to take risk. Thus, the risk-performance relation is more negative at the IT-firm than at the farm. Accordingly, differences in the risk-performance relationship can appear across industries and time.

Next, Bowman (1982) defines why differences across firms exist. This paper finds that firms that have below average performance ex-ante tend to seek risk. In this situation the paper finds that, on average, the risk that is taken by firms is bad risk and decreases firm performance ex-post. For convenience, to illustrate this, I again use the farmer and IT-company example.

Consider a year where a lot of rain fell and the farmer lost his or her crop. The farmer now probably has a choice between growing a new type of crop that is better equipped against a lot of rainfall but yields lower returns or a crop that is less robust against rainfall but yields higher returns. This choice depends on the risk appetite and current financial situation of the farmer which differs across farms. Therefore, the risk-taking decision and subsequent performance outcome differs cross-sectionally .

The difference in returns is dependent on the crop cultivated and how much rain falls in the next year when the new crop is harvested. There could either be too much rain for both of the types of crop, too much rain for the risky crop but enough for the less-risky crop, both enough rain for the risky and less-risky crop or a draught that kills both types of crop. The correlation between risk and performance is negative for all farmers in circumstance 1, negative for farmers growing the risky crop and positive for the farmers cultivating the less risky crop in circumstance 2, positive for all farmers in circumstance 3 and negative for all farmers in circumstance 4. Therefore, the risk-performance relationship can differ across farms dependent on the type of crop they decided to grow and the amount of rainfall.

For the IT-company a similar story exists. An IT-company has two choices, developing new software or continue selling the current software. Developing new software is a highly risky undertaking because the software system could fail in its purpose or the development costs could rise

to a level where selling the software would not cover all the costs. However, the new software could also be a huge improvement for some companies and could therefore be highly profitable. If the development project succeeds, the risk-performance relation is positive and otherwise negative.

On the other hand, the IT-company could chose a less risky path and continue selling its current software. The two situations that could arise is that the software sells because it is already a proven concept or the software could become outdated and the IT-company loses its market. The risk-performance relation is positive (negative) but less strong than the risky development circumstance when the company succeeds (fails) to sell the old software. Thus, the choice to develop new software or not and the subsequent performance from these investment decisions vary across the IT-firms. So, these two examples clearly show that risk-taking and the performance that follows from these decisions are firm-dependent.

The examples above clearly hint to prospect theory of Kahneman & Tversky (1979) that describes how people choose between options when risk is considered. The theory states that losses of the same actual magnitude as gains create a larger utility loss than the utility gain. In other words, losses are perceived as more negative than gains are perceived positive by people. Consequently, firms that experience below average performance have a higher chance of conducting risky projects and also a higher chance that these projects are bad risk. So, the choice for farmers and IT-firms (from the example above) to adopt risky projects is highly dependent on previous performance according to prospect theory.

Apart from the risk seeking by troubled firms, several other firm characteristics determine the sign in the risk-performance relationship and therefore the differences across firms. One of which is the risk tolerance of firms. In a paper by Dyer & Walls (1996) they follow the risk tolerance measure of Howard (1988) defined as the sum of money that can be invested where the investment decision makers are indifferent between losing half the invested sum or gaining the total sum invested with 50-50 percent chance. As a result, Dyer & Walls (1996) find evidence that the larger the firm (high level of assets), the higher the sum of money where the point of indifference for decision makers is met and thus the higher risk tolerance. In the event that risk is taken beyond this risk tolerance level the investment tends to have a "hazardous" character (Dyer & Walls, 1996). This means that up until the risk tolerance level the risk-performance relation is positive and beyond this level the relation is negative. Risk loving CEO's are more likely to invest beyond risk tolerance levels.

Other firm characteristics that have an effect on the relationship studied are: total R&D expenditure, investment level, M&A activity (Wang ,2015; Dong et al., 2010) and the level of capital, leverage and the duration of firm financing, where the level of capital, leverage and duration of firm financing are the most researched topics.

The more capital a firm owns the more resilient it is to negative shocks on profits hence the lower firm risk (Berger & Bowman, 2013). A paper by Berger & Bowman (2013), focusses on how capital affects bank performance in normal and crisis periods in the U.S. The two main results show

that number one: for small banks increasing the level of capital increases the probability of survival during crises and normal times and number two: for medium to big banks increase performance during crises.

For the level of leverage, as a general rule, high levels of leverage are associated with more risk (Belratti & Stulz, 2011). Belratti & Stulz (2011) conclude that banks that had less leverage before the crisis performed better during the crisis. Hence, high levels of leverage are associated with worse during crisis performance than firms with lower levels of leverage. This shows that the risk-performance relationship is negative when considering the firm characteristic leverage in a crisis time period.

The same can be said about the duration of a firm's financing and in particular short-term financing. When a firm finances itself with short term debt it means it needs to roll over this debt in a short period of time of up to 1 year (Brunnermeier, 2009). The advantage is that short-term financing is cheaper than long-term financing, however the disadvantage is that it makes the firm vulnerable to credit dry ups (Brunnermeier, 2009). As a result, risk loving CEO's are likely to finance the bank with the shortest maturity finance possible to not endanger the firm but produce the highest returns possible creating a positive risk-return relation in normal economic times and negative relationship during crisis times.

All in all, the risk-performance relations differs across time periods, industries and firms. A negative correlation is associated with: troubled firms ex ante, low risk tolerance or investment beyond the risk tolerance level, low capital levels, high leverage levels and a lot of short-term financing. Also, the risk-return relation is usually negative during crisis periods and positive during economic booms. Hence, from the literature it follows that the pre-crisis CEO risk taking and during crisis performance is highly likely to be negatively related.

3.3 CEO compensation and CEO turnover

Apart from the effects of compensation on CEO risk-taking and this risk-taking on performance, another important connection of compensation and firm performance is CEO turnover. CEO turnover is defined in this thesis as the probability the CEO resigns in times of management difficulty like during a crisis period.

It is relevant to know how CEO turnover increases and decreases in relation to the compensation given because, according to Dowell et al. (2011) and Francis et al. (2012), firms that have powerful CEOs in times of crisis benefit from the greater speed of which decisions are made. Especially during crises this rapid anticipation and swift decision-making is crucial because sudden great changes in economic circumstances can occur which threaten the firm's survival (Francis et al., 2012).

Hence, turning over the CEO during a crisis is highly likely to have negative consequences for firm returns. First in section 3.3.1 I explain CEO turnover in more detail to enhance the understanding

why CEO's are dismissed voluntarily or involuntarily. Second, in section 3.3.2 I give an overview of the literature on how compensation components affect CEO turnover in normal economic times. Third, in section 3.3.3 I cover the same topic as the section before but focus on economic crisis circumstances. Last, in section 3.3.4 I conclude with a summary.

3.3.1 A few reasons for CEO turnover

CEO turnover can be forced or unforced (Brickley, 2003; Chakraborty et al., 2009; Jenter& Kanaan, 2006; Kaplan & Minton, 2012; etc.). Forced CEO turnover usually is the consequence of poor firm performance which could reflect poor CEO performance (Brookman & Thistle, 2009; Chakraborty et al., 2009; Jensen & Murphy, 1990; Weisbach, 1998; etc.). The main reasons for unforced CEO turnover are either because of retirement reasons (Brookman & Thistle, 2009; Jensen & Murphy, 1990) or because the CEO has to exert too much effort to increase performance that he or she resigns or because performance is so poor that the CEO has incurred large wealth losses on stock option and option compensation. In this case CEOs can feel that they are no longer sufficiently compensated for their exerted efforts and therefore CEOs are more likely to leave the firms when stock-price and accounting performance is poor (Brickley, 2003).

CEO turnover can also be forced by internal or external forces. The internal force is the dismissal of the CEO by the board voting for his or her removal. External forces are takeovers and bankruptcy (Kaplan & Minton, 2012). When the firm is taken-over by another firm, 2 CEOs exist which means one is superfluous. Usually the target firm's CEO is bought out by the acquiring firm. In the case of a bankruptcy, control is passed on to the debt holders and hence the CEO losses decision power.

Thus, when investigating literature on the effects of compensation components on CEO turnover it is important to keep in mind that CEO turnover is not only caused by how the CEO is compensated but is also by other factors.

3.3.2 Compensation and the effects on turnover

This is confirmed by Brookman & Thistle (2009) that find that greater CEO compensation, stock ownership, age and number of years the CEO has credited to his or her retirement plan decreases CEO turnover, while greater firm size, higher levels of leverage and more frequent board meetings increase CEO turnover. Also, Brickley (2003) find that age is the most important component of CEO turnover.

A reasonable amount of literature has been dedicated to compensation components and its effect on CEO turnover. I first explain the effect of base salary on turnover and then proceed to explain the contingent pay components on turnover.

For base salary, Rose and Shepard (1997) conclude that firms that offer higher than average base salaries have a higher chance of a good match between the CEO and firm. A good match is defined as matching the ability of management to the characteristics of the firm. An example of this is,

a firm with a high need for organizational change that attracts a manager that has highly developed organizational change management skills. According to this paper, a good match is linked to longer CEO tenure and thus lower CEO turnover. Therefore, base salary relates negatively to CEO turnover. Likewise, Brookman & Thistle (2009) find the same evidence for this relation.

For the contingent component of the compensation package, defined here as stocks and options, several lines of reasoning exist. First, when the board of directors has a good bargaining position in comparison to the CEO, the proportion of pay-at-risk (contingent pay) is large and salary is smaller than when the board has a bad bargaining position (Elsaid & Davidson, 2009). Boards with a better bargaining position are usually small boards (Boyd, 1994). Firms that have these small boards tend to have higher turnover which makes the relationship between stock and stock options to CEO turnover positive (Boyd, 1994).

In a more detailed report, Chakraborty et al. (2009) try to study the relationship between incentive contracts and CEO turnover in relation to poor firm performance. They find that incentives and turnover are positively related. This means that the larger the fraction of bonus, stock and stock options to total compensation in a compensation package, the larger the chance the CEO is dismissed. This relation becomes stronger when the firm performs worse compared to the industry average. All these results are robust for various performance measures, several definitions of turnover and simultaneity.

The second line of reasoning in the compensation and turnover relation is that a high level of CEO ownership (defined at different levels in research, usually 1% or 5% of total outstanding equity) is associated with entrenchment and thus with a lower probability of CEO turnover. In the same Chakraborty et al. (2009) paper as above they find that the relation of equity ownership and CEO turnover switches from positive to negative after a threshold of 5% equity ownership by the CEO. At this percentage the CEO is considered entrenched by Chakraborty et al. (2009).This was also concluded by Florackis, Kostakis & Ozkan (2009).

This entrenchment research was extended to UK data by Dahya et al. (1998) who concluded that this switch in relation sign occurred at 1% equity ownership. In other words, there is debate at which level of equity ownership the entrenchment takes effect but there is a consensus that this entrenchment reduces CEO turnover but that ownership below these percentages has a positive relation to CEO turnover.

The third line of reasoning is CEOs with large equity holdings are better equipped against disciplinary forces of capital markets, like hostile takeovers. CEOs are reluctant to sell their shares to a hostile takeover party as the CEO is almost certainly replaced. Consequently, here, stock and stock options are negatively related to CEO turnover.

3.3.3 Compensation and the effects on turnover during crises

The relation of compensation and CEO turnover can differ during crises. However, the literature on this effect is very limited. As mentioned above, firms benefit from CEOs remaining at the firm during a crisis. Therefore, sometimes, unorthodox measures are set to ensure the CEO remains and hence lowers CEO turnover.

During crisis times, members of current senior management incur large personal losses which is a reason for management to terminate their positions (Stuart et al., 1993). However, when the stock price falls below the option's strike price, almost a third of the firms in Stuart et al. (1993) sample lower the exercise price to create options that remain in the money.

This not only incentivizes the CEO to stay at the firm but to also make the right choices so the firm survives the crisis. As a result, this pay modification now compensates the CEO sufficiently for their exerted effort which was one of the reasons given above for a CEO to leave the firm. Hence, the compensation to CEO turnover relation is negative because of the crisis compensation alterations.

3.3.4 Summary

To summarize, CEO turnover can be forced or unforced. Poor performance is usually followed by forced turnover and retirement and large losses on stock and option compensation by unforced turnover. Forced turnover could be the cause of internal forces, like a dismissal vote from the board of directors, or external forces, like bankruptcy and takeovers. This shows that CEO turnover is influenced by many factors as well as compensation.

Compensation contracts with high base pay have a negative CEO compensation-CEO turnover relation. Compensation contracts with high levels of contingent pay have positive relationships to CEO turnover up to an equity ownership threshold of either 1% or 5% depending on the circumstances. Beyond these levels of equity ownership the relation switches to negative because of entrenchment effects and more protection against disciplinary market forces.

During crisis periods the relationship between stock and stock options to CEO turnover also changes to negative as firms revise compensation packages to try to induce CEOs to remain at the firm and solve problems. This lowers the CEO turnover level.

3.4 CEO turnover and firm performance

The literature on CEO turnover and firm performance is mostly divided between two literary movements. If the event is CEO turnover, research focusses on the firm performance pre-CEO turnover and firm performance post-CEO turnover where considerably more has been written on the former relation. In this section, I attempt to clarify the latter relation.

The effect CEO turnover has on subsequent performance is of importance in this thesis because firms need to know whether or firm performance changes when a CEO resigns. To give an overview of the available literature and current status of research on this matter I start in section 3.4.1

by giving an overview of the literature on the CEO turnover and subsequent firm performance relationship. In section 3.4.2 , I focus on the CEO turnover to performance relationship at banks. I summarize and conclude in section 3.4.3.

3.4.1 Cross-firm differences in the CEO turnover to performance relationship

The consensus in the literature seems to be that CEO turnover on average improves firm performance over time (Barr, Suchard & Singh, 2001; Deszo, 2007; Jensen & Murphy, 1990; Kato & Long, 2006; Weisbach, 1988; etc.). However, when looking at the individual firms, CEO turnover can induce an increase, stagnation or decrease in firm performance. Therefore, the main question to be answered in this section is why these cross-firm differences in size and sign of the CEO turnover to performance relationship exist.

It seems that the general observation is that not the event of CEO turnover per se, but the circumstances of the succession affect post-succession firm performance (Finkelstein & Hambrick, 1996). According to literature the main differences in the relation stem from differences in inside and outside succession and forced and unforced turnover. I first discuss these two concepts separately and then I combine the concepts into 4 groups: natural turnover and inside succession, natural turnover and outside succession, forced turnover and inside succession and forced turnover and outside succession (Khurana & Nohria, 2000).

Most studies focus separately on either forced or unforced turnover or insider and outsider successors. An example of a paper that investigates the difference in post-succession performance is Falato & Kadyrzahaova (2012). They find that overall CEO turnover improves performance but that outsider succession achieves a larger improvement than an inside succession. The reason why insiders do not improve performance much is that these persons are "still constrained by their social networks (top management team) within the firms" which hampers change and hence performance improvement.

The gap between inside and outside succession performance improvement widens when the board of directors has a low level of independence because low independence is associated with entrenched CEOs that remain in position even when performance is poor (Falato & Kadyrzahaova, 2012). In the event of a turnover, following such an entrenched CEO, the outside successor can then considerably improve performance (Falato & Kadyrzahaova, 2012). Nevertheless, Jensen & Murphy (1990) do conclude that firm-specific knowledge makes it hard for outside CEOs to come into the firm and run a giant company and expect immediate positive effects on firm performance. Hence, the turnover-performance relation is slightly negative in the short-term and heavily positive in the long-term when the successor is an outsider.

Jalal & Prezas (2012) add to this debate between insiders and outsiders by concluding that firms hiring CEOs from the industry in which the firm operates creates higher positive returns than a CEO from outside the industry in the first year after the turnover. Whereas, in subsequent years

returns, profitability, capital spending and growth potential of the firm that hired the outside industry CEO are higher compared to the firms with inside industry CEO successors. The turnover-performance relationship therefore seems to be stronger in the long-run for outside successions with an out of industry successor than for inside successions.

Besides literature on in and outside succession, a body of literature exists that focuses on the difference between forced and unforced turnover to performance. Dezso (2007) concludes that performance improvements are largest when turnover is forced. The reason for this discrepancy is the fact that usually forced turnover is the consequence of poor performance and organizational change is necessary to improve performance (Houson et al. 2004). Unforced turnover usually follows after retirement and organizational change and performance improvement is not a necessity (Brookman & Thistle, 2009; Jensen & Murphy, 1990).

Besides the static differences between inside and outside, forced and unforced takeover, Khuranan & Nohria (2000) combine these 4 types into 4 groups: unforced turnover and inside succession, unforced turnover and outside succession, forced turnover and inside succession and forced turnover and outside succession. They find that the biggest difference in performance improvement is between the unforced turnover followed by an inside succession and a forced turnover followed by an outside succession.

Forced turnover with an outside succession is the most disruptive type of turnover and results in significant performance improvements (Khuranan & Nohria, 2000). The source of the disruption is the organizational change (Huson et al. 2004) and less containment by social networks as mentioned above. Unforced turnover with an inside succession has little effect on firm performance. This type of CEO turnover is the least disruptive type as there is less need for organizational change and the inside successor is bounded by old social networks. As a result, the expected changes in firm performance are smaller than in the forced and outside successor CEO turnover..

For the two CEO turnover groups in-between the two extremes, different effects exist. In the situation of forced turnover followed by an inside succession Khuranan & Nohria (2000) do not find any evidence for performance improvement but also not for performance deterioration. The clarification for this follows from previous explanations that insiders are less likely to change the organization significantly. Nonetheless, Shen & Cannella (2002) conclude that insiders that were contenders, successors that did not agree with the departing CEO, indeed have a positive impact on firm performance because they induce strategic change.

In contrast, in the case of an unforced turnover followed by an outside succession, declining firm performance is detected (Khuranan & Nohria, 2000). As unforced turnover usually follows from retirement and not poor performance, the probability that staff is content with their performance is

high. As a result, Grusky (1964)[3] finds evidence that the established team actively sabotages the outside CEO which hurts firm performance.

3.4.2 Banks and the CEO turnover to performance relationship

As the focus of this thesis is on financial firm performance in the recent financial crisis, it is also important to look at the turnover to performance relation in the context of banks and the financial crisis. Banks are very complex organisations and hence it is reasonable to assume that the relations at these firms differ from non-bank firms. Unfortunately, not many scholars have focused on the turnover to performance relation at banks and especially not during the recent financial crisis. Opportunities for research lie in these fields.

After the 1999, the performance gap between inside and outside successions increased at banks (Falato & Kadyrzhanova, 2012; Brunnermeier, 2009). During this year the Gramm Leach Bliley Act allowed investment banks, commercial banks and insurers to consolidate. This created heavily complex firms. It is therefore highly likely that the widening of the performance gap is related to this act and it subsequent increased banking sector complexity. Finding ways to improve performance is difficult in this complex environment and if found is thus rewarded with large payoffs.

If the bank succeeds in attracting a CEO that is able to find these performance improvement opportunities, banking performance will increase significantly. From the previous conclusion it seems that especially outside CEO's are capable of this. As a result, the CEO turnover to performance correlation at banks is highly positive when the successor is an outsider.

3.4.3 Summary

To summarize and conclude, CEO turnover improves firm performance in the long-run. The circumstances of the succession affects the post-succession firm performance. Outside successions are associated with larger organizational change and higher firm performance improvement than inside successions. However, insiders that are contenders create more change than insiders who are not contenders and therefore also create more firm performance than the normal insiders.

Furthermore, forced turnover is connected to poor performance ex-ante and hence a need for improvement. Unforced turnover is usually the result of retirement and as a consequence there is less of a need in performance improvement. Accordingly, forced turnover with outside succession is linked to the most performance improvement and hence with the strongest positive turnover to performance relation. The second strongest positive relation is between forced turnover and inside succession. The third, unforced turnover and outside succession and the fourth unforced turnover and inside succession.

[3] Conclusion mentioned in Khuranan & Nohria (2000) but was first conluded by Grusky (1964). This paper is not available for downloading.

When focussing on the CEO turnover-performance relationship at banks the literature concludes that an outside succession increases firm performance and makes the relationship highly positive. This relation is stronger than for non-banks as banking is a more complex industry.

Overall, it seems that CEO turnovers do not immediately change performance but, on average, does over a longer time period. The level of improvement is however dependent on the CEO turnover circumstances, the type of firm and its level of organizational complexity.

3.5 The compensation components and the effect on subsequent performance

The sections 3.1 to 3.4 have shown many different effects of compensation on risk, risk on firm performance, compensation on CEO turnover and CEO turnover on performance. These sections all show middle effects between compensation and performance. In this section I try to give an overview of the literature on the overall effect of compensation components on firm performance.

In the literature scholars have typically focused more on the pay-performance relationship, otherwise known as the sensitivity of pay to performance. This is a measure to see the level of alignment of the CEO to the shareholder's interests. Not as much research has been conducted on compensation components and the effects it has on the resulting future firm performance.

Therefore, I structure the text as follows. First, I briefly take a look at the pay-performance relation at non-banks and banks. Then, I look at compensation components and their effect on subsequent future firm performance. Last, I focus on this relationship at banks and also briefly focus on the financial crisis.

Chapter 1 shows that a CEO is aligned with shareholder's interest if the CEO's wealth from compensation fluctuates with high correlation to shareholder's value. In this case the pay-performance relation is strong and positive. This can be achieved by granting the CEO equity-based pay like stock and stock options. The theory predicts that CEOs are now motivated to increase firm performance. A reasonable amount of literature has focused on finding evidence for this theory.

Papers that find evidence for the theory are, for example, Mehran (1995) and Durham & Bartol (2000). They argue that it is essential to have equity based pay because it motivates managers to increase firm value. This is repeated by Gomez-Mejia & Balkin (1992) that say that the more aligned CEO compensation to firm value, the higher firm performance and hence the positively stronger the pay-to-performance relation.

On the other hand, Florackis et al., (2007); Main, Bruce & Buck (1996), all find a positive but weak link between CEO pay and firm performance. Ozkan (2007) discovers that the cause of this is CEO entrenchment as mentioned in section 3.4. In addition, Bulan, Sanyal & Yan(2009) find that the relationship is positive up to CEO equity wealth of $2.3million and after this threshold the relationship becomes negative. The authors think that this is caused by CEOs becoming increasingly risk averse when equity wealth increases beyond threshold level. As a consequence, the CEO takes less risk and performance decreases.

In contrast to all the positive and significant relations, Michaud & Gai (2009) detect that because of a large increase in CEO compensation over the last 15 years (1994 to 2009) the sensitivity of pay to performance has decreased. This was the result of compensation committees appointing consultancy firms to independently set up a fair compensation package. In order to attract managerial talent the committees want the compensation to rise slightly above industry benchmark. However, other firms also want to attract talent and therefore offer pay above the benchmark. This raises the benchmark and for that reason compensation levels and is called the "ratcheting up" effect.

In short, the CEO pay-to-performance relation differs notably between research, however, the pattern seems to be that earlier research finds positive significant relations and new research finds no significant relation. In the context of banks, also not one consensus exists. Houston & James (1995) conclude that at banks, CEOs receive and hold smaller fractions of salary, stock and options to total pay than other industries. They continue by illustrating that the cash compensation (defined here as base salary plus bonus) has a stronger pay to performance relationship than non-banking industries. This means the cash component is revised according to previous year performance. In contrast, Gregg, Jewell & Tonks (2012) reject this conclusion and find there is no difference in the salary-performance correlation from non-banking industries.

Hubbard & Palia (1995) try to investigate the differences across industries further by focussing on deregulated markets, like the banking industry. They find that the pay-performance relation is stronger in these deregulated markets. Houston & James (1995) confirm this by concluding that the relation between equity-based incentives and the value of the bank is positive and significant. The dispersion in the conclusions indicates that it is not certain whether or not the banking sector pay-to-performance relation differs notably compared to the non-banking sector. However, it does seem that the relation is positive at banks.

The pay-to-performance relation is an interesting concept to understand how CEO's can be motivated to increase firm performance by means of pay. It is even more interesting to find out whether pay motivates CEO's enough to improve future firm performance and in particular during the recent financial crisis. To keep to the same order as section 2.3.3.3, I first discuss base salary effects and then the equity-based pay components effect on future firm performance.

In a paper by Ozkan (2007) the compensation components to performance relation is featured. The paper concludes that the base salary component of compensation has a positive relation to future firm performance. However, when the same model is tested, using not base salary but total compensation as an independent variable, the coefficient is positive but not significant (Murhpy, 2009; Ozkan, 2007). Thus, Murphy (2009) and Ozkan (2007) argue that, base salary does not explain much of the variance in future firm performance.

The equity-based component of compensation on future firm performance is a more widely researched field. Mehran (1995), Shleifer & Vishny (1997) and Finkelstein & Boyd (1998) all find that the larger the fraction of equity-based pay in the CEO package, the higher future firm

performance. Firm performance was defined as Tobin's Q, ROE and return on assets (ROA). In the words of Finkelstein & Boyd (1998): "if pay and context are not aligned, firm performance should be lower". The same conclusion holds for the banking industry, higher equity based pay relates positively with future bank performance (Houston & James, 1995). Michaud & Gai (2009) also investigate the relation using a sample of firms across all industries. However, they do not find any relation between CEO pay and future performance once they control for endogeneity in their models.

Overall, the research shows that the relation between pay and performance is positive but not necessarily always significant. I now continue by explaining the relationship at banks during the financial crisis.

One of the most cited papers in financial crisis bank performance research is Fahlenbrach & Stulz (2011). This paper investigates the relation between CEO incentives before the crisis on firm performance during the crisis. The firms of better aligned CEOs performed worse during the crisis than firms with less aligned CEOs (same as Suntheim, 2010). The alignment is defined as "the amount of dollar value of their stake in the company's equity". Therefore, the larger the stock component of compensation the worse during crisis bank performance. Conversely, banks that offered their CEO a large fraction of option compensation before the crisis did not perform worse during the crisis. Accordingly, large option fractions in remuneration packages seemingly did not have a prominent negative effect on bank performance during the crisis but stock did.

The explanation they give for the poor crisis performance is in fact that better aligned firms served the interests of shareholders better. The shareholders forced bankers to invest heavily in sectors that had growth opportunities and ex-ante high expected profits (Edmans & Gabaix, 2009) . These sectors were however heavily influenced by bubble formation. During the crisis this bubble burst and the risks materialized negatively. Hence, the aligned banks experienced worse returns than banks that were less aligned and less heavily invested in these sectors (Fahlenbrach & Stulz, 2010). Hence, stock is negatively related to during crisis firm performance.

In summary, for the compensation components to future firm performance relation base salary does not seem to affect future firm performance. Equity-based pay shows to have a significant effect on future performance in several papers but following robustness checks usually lose that property. During the recent financial crisis in the financial sector, the higher the stock fraction in CEO pay packages the more aligned the CEO to shareholder's interest and the more negative this impact on during crisis firm performance. Stock options show no significant negative effect on during crisis firm performance. Therefore at banks, the increase of CEO motivation due to close alignment, predicted by theory, actually emerged as bad performance during the crisis. Hence, this makes the relation of interest negative.

This chapter has given a very extensive overview of all literature available on the different effects. Using this literature I now develop hypotheses ready for testing.

4 Hypothesis development

The literature review of chapter 3 shows several effects between compensation and bank performance. The first 4 effects all split this relation into 4 separate correlations which I henceforth refer to as middle effects. The fifth relation is the overall correlation of the compensation components and bank performance and therefore I denote this: the full effect. From this literature I develop several hypotheses.

Keeping the literature in mind, I believe that the composition of the compensation package determines the type of CEO that is attracted to the bank. I define the CEO's type by the level of risk lovingness of the person attracted (CEO risk level) and the likeliness he or she leaves the bank in times of crisis because of the level of difficulty of the job (CEO turnover). These two "personal characteristics" have an impact on how the bank is managed and consequently on how a bank performs during crises.

To investigate this thoroughly, the first linkage of interest is the connection between compensation components and the CEO's risk level. The components of interest are: salary, bonus, stock and stock options. It is appropriate to only focus on these components as they are the largest groups of the compensation package and have very similar, or identical, definitions across firms as opposed to the remaining components. I do not go into the remaining components explained in chapter 2 section 2.3.3.3 for this reason.

From the literature review section 3.1 it follows that salary is negatively related to CEO risk. An explanation for this is that salary has downside potential with regards to risk-taking. In the case a CEO takes a lot of risk and things go bad, the CEO's employment is likely to be terminated and the CEO loses his or her salary which is otherwise an amount he or she would earn with certainty (Arcey et al., 2011). On the other hand, if the risk taken by the CEO turns out good and the investment produces positive returns, the CEO does not personally benefit as his or her salary will not increase. As a result, a high salary component fraction in compensation packages is expected to attract a more risk averse CEO than packages with a low fraction of base salary. In other words, I expect base salary to be negatively related to the CEO's risk level.

Thereafter, the effect of bonus, stock and stock options (contingent pay) on the level of risk of the CEO is not at all clear, according to the literature from section 3.1. The papers show either no significant relation between the contingent pay components and risk-taking (e.g. Hagendorff & Vallascas, 2011; Houston & James, 1995; Fahlenbrach & Stulz, 2011) or a positive significant relation between the variables (e.g. Brewer et al., 2004; Cheng et al., 2006,2010; DeYoung et al., 2010) . This positive relation was prevalent during the pre-crisis period as compensation contracts were altered by increasing the fraction of bonus and equity based pay components (stock and stock options) to induce the CEO to exploit new growth opportunities. The CEO's attracted reacted to this by actually taking risk and investing in these opportunities and profiting hugely from this. Hence,

these contingent pay components increased the chance of attracting a risk loving CEO. As a result, I expect stock and stock options to be positively related to the CEO's risk level. Knowing this, I expect that *hypothesis 1: during the pre-crisis period the CEO compensation package components: salary decreased and bonus, stock and options increased the chance of banks appointing a risk loving CEO.*

The next step is to assess the effect of the pre-crisis CEO's risk level on firm performance. During a crisis, risk that was taken ex-ante materializes negatively and makes the risk performance relation negative. The literature also shows that banks that before the crisis offered high levels of equity based pay, persuaded the CEO's to invest in areas that had large growth opportunities but that turned out bad during the crisis (Fahlenbrach & Stulz, 2011). The more risk loving the CEO in the pre-crisis period, the more willing this CEO was to take risk which they took in area's that suffered the biggest losses during the financial crisis (Fahlenbrach & Stulz, 2011). Hence, I believe the pre-crisis CEO's risk level is negatively related to during crisis bank performance. Therefore, *hypothesis 2: banks that had a higher chance of attracting a risk loving CEO during the pre-crisis period experienced lower firm performance during the crisis than banks with a lower chance of attracting a risk loving CEO.*

After analysing the first possible source of during crisis poor bank performance, the CEO's risk level, the focus now switches to the second source: CEO turnover. I first analyse the effects of the pre-crisis remuneration package components on CEO turnover during the crisis. Yet again I only focus on the three pay components as mentioned above.

When focussing on crisis circumstances, it is highly likely that the firm does not want to dismiss the CEO as during this period leadership and swift decision making is key (Francis et al., 2012). However, not every CEO feels up to or wants to face the huge task of leading a bank through a severe financial crisis and hence resigns. CEOs that are only motivated by compensation are types that would display this behaviour (Francis et al., 2012).

Considering the effect of pre-crisis remuneration on during crisis CEO turnover, for salary, I expect that the higher this fraction to total compensation the lower CEO turnover, because literature shows that at firms with higher base salary, the match between firm characteristics and CEO skills is better which reduces the chance of turnover (Rose and Shepard, 1997).

For the contingent pay components, I expect a positive relation to CEO turnover. During the pre-crisis period, the bonus, stock and option components of the bank CEO compensation packages increased significantly and were of much higher value than all other industries (e.g. Edmans & Gabaix, 2009). Therefore, it is more likely that CEOs attracted at banks were more interested in the compensation given than the task at hand. Especially when difficulties arise these type of CEOs are more likely to leave the firm. As the financial crisis of 2007 to 2009 was the most severe financial crisis in history, I expect these components to be positively related to turnover during this period. Accordingly, *hypothesis 3: during the pre-crisis period CEO compensation package components:*

salary decreased and bonus, stock and options increased the chance of CEO turnover at banks during the crisis.

The logical follow up question to this CEO turnover is what the consequences are for during crisis bank performance. Section 3.4 shows that in normal economic times, after CEO dismissal, firm performance keeps the trend it had under the reign of the predecessor (Finkelstein & Hambrick, 1996; Jensen & Murphy, 1990). This is mostly because investment decisions made by the predecessor materialize later, which is the new CEOs time period. The effects of the investment decisions of the new CEOs are lagged and come into effect at a later date than the CEO turnover event. Furthermore, during a crisis, swift decision making is fundamental (Francis et al., 2012). CEO turnover can hamper this which causes even worse firm returns.

Considering these two facts and I expect that banks where CEOs decided to resign, had worse performance than banks that did not. As a result, I expect during crisis CEO turnover to be negatively related to during crisis bank performance and therefore, *hypothesis 4: banks that turned over their CEO during the crisis experienced lower during crisis firm performance than banks that did not.*

The final step is to analyse a combination of the previous 4 hypotheses by looking at the full effect between the components in a compensation package and bank performance.

When all hypotheses are taken into account it is to be expected that when focussing on the CEO's risk level, salary is positively related to firm performance because salary decreases the chance of attracting a risk loving CEO which increases during crisis performance. On the other hand, bonus, stock and stock options increase the chance of attracting a risk loving CEO and this decreases during crisis bank performance.

For CEO turnover, salary decreases the chance of CEO turnover which increases during crisis bank performance. Bonus, stock and options increase the chance of during crisis CEO turnover which results into decreasing during crisis firm performance. Hence, I overall expect that salary and bonus is positively related to during crisis bank performance whereas stocks and options are negatively related to during crisis bank performance..

As a result, *hypothesis 5: during the pre-crisis period the CEO compensation package components: salary caused an increase and bonus, stock and options caused a decrease in bank performance during the crisis.*

Testing all these hypotheses, gives an answer to the research question.

5 Methodology

In this chapter I discuss how I test the hypotheses from chapter 4 to come to an answer to the research question. In section 5.1, I elaborate on the collection of the data and the sample selected. In section 5.2, I discuss the dependent, independent and control variables of importance in the econometric models. In section 5.3, I display the econometric models. In the last section I highlight robustness checks of significance to this research.

5.1 The sample

To test the hypotheses, data on bank financials, stock prices, executive compensation and corporate governance is required. I extract the bank financials from Compustat bank[4], the stock prices and returns from CRSP, the executive compensation variables from Execucomp and corporate governance variables from RiskMetrics. The data I obtain has a focus on U.S. data. This is not only because U.S. data is easily available but also because the bursting of the housing bubble in 2007 and ensuing financial crisis had an immediate effect on the financial firms in the U.S which makes measuring the consequences of the 2007 to 2009 crisis more palpable (Francis et al., 2012).

As I want to test pre-crisis compensation components on during crisis bank performance I require bank data from the time-period 2002 to 2009. I designate 2002 to 2006 as the pre-crisis time period as it captures the run up to the crisis. Here, the remuneration package amendments to capture new growth opportunities that had disastrous returns during the crisis were completed (as mentioned in previous sections). I select the beginning of 2007 to the end of 2009 as the crisis period following Francis et al. (2012). I decide to not use data beyond 2009 because in literature it has been recognized as a period of recovery for banks. The data has annual frequency because CEO compensation packages can only be revised yearly and are only reported on once a year

To come to the total dataset for this thesis I merge the Compustat, CRSP, Execucomp and RiskMetrics databases. My final sample consists of 113 firms and 432 observations.

5.2 The variables

I divide the variables into dependent, independent and control variables. A thorough explanation of all variables, data sources and their construction can be found in appendix A table A5.1.

5.2.1 Dependent variables

As chapter 4 shows, I test 5 hypotheses. The dependent variable in the first hypothesis is the risk level of the CEO attracted. In the third hypothesis, CEO turnover is regarded as the dependent variable. For the second, fourth and fifth hypothesis this is bank performance.

[4] Using Compustat Bank assures the sample only contains banks. This is different when downloading the whole Computat dataset and dropping all firms with sic-codes below 6000 and above 6999. This modified sample then also contains other types of financial firms and some consulting firms.

The risk level of the CEO (RiskLevelCEO) attracted is a risk measure score based on literature on CEO risk taking. From a variety of papers I select risk proxies that show CEO risk preferences. I use variables suggested by Wang (2015) , Dong et al. (2010) and Dong (2015). These are: level of firm leverage, R&D expenditure, stock return volatility, investment return volatility, level of cash holdings, M&A activity and whether or not the CEO is an outsider.

The level of firm leverage is an indicator of CEO risk taking as a higher level of leverage increases the chance of a firm going bankrupt (Myers, 1984). Next, R&D expenditure is a proxy of risk taking because it is an investment decision which could produce usable and valuable results or not. In the latter case the invested money is lost. The higher R&D expenditure the more willing the CEO is to take this risk.

Other proxies are stock return volatility and investment return volatility. The higher the stock return volatility the more risky the firm's activities and the more risk the CEO is willing to bear. The investment return volatility is a risk proxy as it measures exactly for every project the realized returns and when this is volatile it means that some projects were more successful than others. This shows how much risk CEO's are willing to take when investing, the more volatile the more risk loving the CEO. Furthermore, the level of cash holdings is an important proxy because cash can replace losses which reduces the chance of bankruptcy and thus the firm's risk. A higher cash position at a bank means lower firm risk but also lower returns which only a risk averse CEO is willing to tolerate.

Similarly, M&A activity is seen as one of the most risky investment strategies a CEO can take. A lot of literature has shown that on average mergers are value destroying instead of enhancing (Bruner,2002). In addition, a large amount of M&A transactions can indicate empire building by the CEO which is one of the agency costs as described in the second chapter. As a consequence, M&A indicates a high level of CEO risk taking. Last, literature has shown that CEO outsiders take more risk than insiders. These 7 proxies are used to construct the score.

I construct the variable by assigning a risk level score to the first 5 variables. This score can take on number 1 to 4, 4 being the highest risk level. The scores are based on quantiles calculated over variables over all firms per year. For every variable I calculate the first (up to the 25^{th} percentile), second (25^{th} to 50^{th} percentile), third (50^{th} to 75^{th} percentile), and fourth quantiles (beyond the75^{th} percentile). Then I compare the value of a firm's variable in a given year to the quantiles and assign number 1 if the variables scores in the lowest quantile and 4 for the highest. So, for example, if the median of the variable leverage is 0.5 and the 25^{th} percentile is 0.25 and a firm scores 0.48 then the risk level score for leverage is 2. For the first 5 variables except cash holdings the relationship to risk is positive. For cash holdings, the higher the cash amount the lower the firm's risk so the lower the assigned risk score.

Regarding the last two variables of the proxies mentioned, I create dummy variables. M&A is such a risky strategy that if the firm used it in the time period researched it is assigned a risk level

score of 4. If no mergers have taken place, a 0 risk level number is allocated. For the variable CEO outsider, I appoint risk level 4 to the firm and otherwise a 0.

To get to the full CEO risk level variable the risk level scores for all 7 proxies are summed up for every firm in every year. As a result, the minimum CEO risk level score is 5 and the maximum is 28. For some models an average over the years 2002 to 2006 is necessary and accordingly the average risk score for every firm is taken over these years.

The second dependent variable is CEO turnover. This variable is a dummy which has the value 1 when a CEO turnover took place in that year and 0 otherwise. The dependent variable being a dummy variable has implications for the testing method used.

The third dependent variable is financial firm performance during the crisis. There are several ways to measure this. I choose to use return on assets (ROA), return on equity (ROE), Tobin's Q and buy-and-hold stock returns because they all follow from literature (Fahlenbrach & Stulz, 2011).

ROA is a performance measure that reveals how efficient the firm is in creating returns from their assets owned. It is constructed by dividing net income by total assets. ROE shows how much profit is generated with the money invested by shareholders. It is calculated by dividing net income by total shareholder's equity. Stock returns are the buy-and-hold returns for investors between two years. It is the percentage difference in stock prices between years. A positive percentage means the firm performed better than in the previous year and vice versa. Tobin's Q measures how the stock market estimates the firm to perform in the coming years. It is a ratio where market value is divided by the replacement costs of the assets. In brief, if this is higher than 1 the market perceives future performance as positive and if the ratio is lower than 1 as negative. For Tobin's Q I follow an estimation method proposed by Perfect & Wiles (1994). The variable is constructed by first multiplying the closing stock price by the amount of common shares outstanding. Then adding preferred stock and the difference between long-term debt and current liabilities and assets. Last, dividing this sum by total assets.

The advantage of Tobin's Q and stock returns over ROA and ROE is that the former 2 are based on expected future returns as well as current returns and ROA and ROE are measures of static current returns (Kapopoulos & Lazaretou, 2007). Therefore, the former two are better measures for this thesis because I test on CEO risk taking and CEO turnover which are both firm decisions that do not necessarily have an immediate but do have a future effect on firm financials.

5.2.2 Independent variables

The independent variables that follow from the hypotheses in section 4 are the 4 pre-crisis compensation package components: salary, bonus, stock and options followed by CEO risk level and CEO turnover. As the latter two were already explained extensively, I only explain the compensation package components. All details on calculations and data sources can be found in appendix table A5.1.

The construction of compensation components is fairly straight forward. For salary the actual dollar amount earned by the CEO in a given year is divided by the total compensation package called TDC1. The bonus variable contains the actual dollar amount of bonus earned in a given year also divided by TDC1. The option variable contains the total value of the granted options in a given year. When constructing the option variable is it important to note that accounting rules changed at the end of 2005. It was decided that the valuation methods of the granted options to CEOs should be changed from Black and Scholes to fair value accounting. During 2006 a transition period arose where some firms adopted fair value accounting and some firms Black and Scholes. Hence, between 2002 and 2005 I use the Black and Scholes value of options and between 2007 and 2009 I use the fair value of options. In 2006 I use Black and Scholes where available and fair value otherwise. Yet again, the total option value of the granted options in that year is scaled by TDC1.

The values are all scaled to be able to compare compositions of compensation packages across banks. The fractions of the 3 components add up to a number smaller than one, because I do not include all the compensation variables into the analysis. This has the added benefit of avoiding multicollinearity problems.

The final independent variable is stock. Stock is calculated by multiplying all stocks owned by the CEO in a given year by the stock price. This variable is not scaled as the total value of all outstanding stock owned is important to gage risk-taking and resignation decisions.

In some models I test different time periods and therefore I calculate an average of the salary, bonus stock and options variables over the time period 2002 to 2006.

5.2.3 Control variables

From the literature in chapter 2 I propose several control variables. I divide the control variables into 3 groups according to the dependent variable they have an effect on: the CEORiskLevel group (hypothesis 1), Financial Firm Performance group (hypothesis 2,4 and 5) and CEO turnover group(hypothesis 3).

The control variables for hypothesis 1 are: a lagged performance variable, market-to-book, firm diversification, CEO age, CEO tenure, CEO turnover, the CEO's time to retirement and firm size. To control for risk, Bowman 1982 suggest to add a lagged performance variable because as was explained in chapter 3 section 3.2 previous performance has an effect on future risk taking. I take a 1 period lag, which is 1 year, for all performance variables (ROA, ROE, Tobin's Q, buy-and-hold returns)

In addition, DeYoung et al. (2010) proposes to control for market-to-book as this is a measure of investment opportunities for banks. The more investment opportunities the more risk banks take. The market-to-book measure is based on the calculation method from Lemmon et al. (2008). Also, the amount of diversification of a firm shows the risk appetite of the CEO (Chen et al., 2005). In this paper Chen et al. (2005) use the fraction of non-interest income at banks as the measure for

diversification. Non-interest income is usually income from non-banking activities which inherently means that the bank diversifies its activities beyond banking. These activities can have more or less risk than banking activities but because it is not part of the core business it usually has more risk.

Another important control that focusses more on the firm's financials, is the firm's size. Various corporate governance scholars acknowledge this as an important control in numerous corporate governance contexts. Acrey et al., (2011); Cheng et al., (2010); DeYoung et al (2010) and Houston et al. (2009) are a few examples that propose this control variable for risk taking. The larger the bank the more likely it is bailed out in times of difficulty which increases risk taking. Firm size is defined as the log of all assets on the balance sheet.

Apart from the financials, more CEO specific control variables are also important for the CEORiskLevel variable. The CEO's time to retirement, age, tenure and turnover are all important factors in risk taking (Acrey et al., 2011). The older the CEO, the lower the time to retirement. This means the CEO is less willing to take risk because he or she wants to ensure that his or her stock and options have value when he or she retires and exercises them. I calculate time to retirement based on data from the social security administration of the U.S. where the full retirement age is 65 for people born before 1959 and 67 for people born after 1959. Subtract the age in a specific year by the appropriate retirement age to get to the time to retirement.

Thereafter, some research shows that the age of the CEO has an effect on risk taking and that younger CEO's are more risk loving than older CEO's. In addition, CEO tenure explains some variation in CEO risk taking as the longer CEO tenure the more likely the CEO is entrenched which means the CEO could be willing to take more risk because the chances of dismissal are lower. This measure of entrenchment is calculated by adding up the total years in the CEO position. Finally, it is known that after CEO turnover there is a change in the risk profile of the CEO attracted which is on average more risk loving than its predecessor. As a consequence, I control for CEO outsiders.

The second group of control variables are all related to financial firm performance measures required to analyse hypothesis 2, 4 and 5. These are: firm size, market-to-book, lagged performance variable, market value, tier-1-capital, leverage, CEO turnover, CEO outside, CEO duality, board size, independence level of the board and CEO equity ownership levels. I however leave out market-to-book, market value, tier-1-capital and leverage for hypothesis 2 because they are all adopted into the CEO risk level variable and this would cause multicollinearity. However, they are used in the remaining 2 models. Calculations of variables that have already been explained are not repeated.

The firm size variable controls for bank performance because the larger the firm the larger the money making capability. Hence, it needs to be controlled. Then, the lagged performance variable corrects for previous very good or very bad performance that has a spill over effect on the year tested. Furthermore, CEO turnover is added as a control variable (only in model 2 and 5 as it is the independent variable of interest in model 4) because the turnover can change performance either negatively or positively. If the CEO is replaced by an outsider usually it improves performance

significantly over time (section 3.4) which is also essential to correct for. Next, CEO duality is a variable that measures whether the CEO is a chairman of the board of directors and board of executives. If this is the case, this is associated with higher agency costs as the chances of an entrenched CEO are higher and hence performance is expected to be poorer. This control variable is a dummy variable that adopts value 1 when the CEO is chairman at both boards and 0 when not.

The variables left out in hypothesis 2 but inserted for hypothesis 4 and 5 are market-to-book, market value, tier-1-capital, leverage. Market-to-book effects performance as it is a measure of bank investment opportunities (Fahlenbrach & Stulz, 2011). The more investment opportunities the more likely performance is positive. The tier-1-capital is the level of capital held to abide to capital requirements from the FED. The higher this type of capital to total debt the less capital can be invested by financial firms and hence the lower performance. The variable leverage is important because financial firms are highly levered. High leverage is associated with high performance in good economic times but in busts, this can cause bankruptcy.

Thereafter, from chapter 2 it follows that the board and several board characteristics also have an important effect on firm performance. Board size can affect performance both positively and negatively. The board size variable is based on the number of executives on the board. Following board size, the board has a certain level of independence which affects monitoring efficiency and hence performance, as was again explained in chapter 2. The independence level is gauged by counting the outside number of executives and dividing that by the board size. Finally, the control for equity ownership is a control for the value of the stocks that the CEO owns as a fraction of all outstanding equity. Literature has shown that at a high level of ownership (around 5%) performance can decrease. Therefore, financial firms with higher ownership levels have worse performance than their peers which needs to be corrected for.

For the final control variable group, the CEO turnover group (hypothesis 3), I assign equity ownership, CEO age, CEO time to retirement, CEO tenure, firm size, leverage, board size board independence, value change in stock and value change in options as control variables. All the variables are calculated in the same way as was stated above but the reasons for adding them into the model are different.

Again, from chapter 3 it follows that the higher CEO equity ownership, the more difficult it is to dismiss the CEO and therefore the lower CEO turnover. Furthermore, the older the CEO, the lower time to retirement and the more likely he or she is turned over. For tenure, the line of reasoning is that the longer the CEO has stayed at the firm, the more likely he or she is entrenched and thus the lower the chance of CEO turnover. The firm's size also has an effect on CEO turnover. The bigger the firm, the lower CEO tenure levels and thus the higher CEO turnover is. For leverage, the reasoning is that CEO turnover is higher at firms with high leverage. In addition, board size and board independence have an effect on turnover as boards of a certain size (around 10, chapter 2), have optimal monitoring capacity. Also when they are more independent (chapter 2) monitoring quality increases. The chances

of CEO turnover are larger in both these cases. Next, a reason for CEO turnover during the crisis could be that the CEO suffered severe losses in value of the total stocks and unexercised options owned because of stock price decreases. The CEO could resign as he or she could feel not adequately compensated for the effort exerted. Therefore, the change in the value of the total stock and option packages owned are control variables in this model.

Last, for all models the final control is time fixed effects which controls for unobserved heterogeneity that changes every year but has an effect on all financial firms. An example could be change in banking regulation. Some researchers also suggest industry and country fixed effects but because the sample only contains 1 industry (financial industry, banking) and 1 region (U.S.) this is already controlled for. Fixed effects reduce the chance of endogeneity in the models.

5.3 The models

Now the variables are clear I continue by presenting the models that I use to test the hypotheses from section 4. I use OLS and logit regressions that either show significant or non-significant coefficients.

For the first hypothesis I test the relation between the pre-crisis compensation package components and CEO risk level. I am only interested in the pre-crisis period so the time period in this model is 2002 to 2006. As a result, the model has the following form:

$$RiskLevelCEO_{it} = \beta_0 + \beta_1 BasePay_{it} + \beta_2 Bonus_{it} + \beta_3 Stock_{it} + \beta_4 Options_{it} + \beta_n ControlVariables_{it} + \alpha_t + \varepsilon_{it} \quad (1),$$

Where :

- $RiskLevelCEO_{it}$ is the total risk level score of the CEO at every firm over the tested years based on the 7 proxies from section 5.2.1
- $BasePay_{it}$ is the fraction of total base pay to total CEO remuneration awarded to a CEO at every firm for every year over the tested time period.
- $Bonus_{it}$ is the fraction of total bonus to total CEO remuneration awarded to a CEO at every firm for every year over the tested time period.
- $Stock_{it}$ is the total value of all stocks owned by the CEO at every firm for every year over the tested time period.
- $Options_{it}$ is the fraction of yearly stock option value to total CEO remuneration awarded to a CEO at every firm in the sample over the tested years.
- $\beta_n ControlVariables_{it}$; 1 year performance lag ($LAG_{ROA}, LAG_{ROE}, LAG_{tobinq}, LAG_{RET}$); market-to-book ($MarketBook$); firm diversification ($Diversification$); CEO's age (Age); CEO tenure($Tenure$); CEO turnover($CEOTurnover$); CEO's time to retirement ($Time\_retirement$) and firm size ($Firm\_size$)
- α_t is the time fixed effect
- ε_{it} is the error term

In the second hypothesis, I test the effects of the pre-crisis CEO's risk level on during crisis financial firm performance. To be able to run this regression I take the average level of the pre-crisis risk level of the CEO and test this on the bank performance during the crisis. This means that the tested period in this model is equal to the crisis period from 2007 to 2009. By using an average of the pre-crisis CEO's Risk Level and testing this variable on the bank performance during the crisis any causality issues are solved as the risk variable is based on an earlier time period than the bank performance variable. This yields the following form:

$$PerformanceFF_{it} = \beta_0 + \beta_1\, RiskLevelCEOprecrisis_i + \beta_n ControlVariables_{it} + \alpha_t + \varepsilon_{it} \quad (2)$$

Where all variables are specified in model 1 except:

- $PerformanceFF_{it}$ is the financial firm performance for every firm over the tested years. The variables used to measure performance are ROA, ROE, Tobin's Q and stock returns.
- $RiskLevelCEOprecrisis_i$ is the CEO risk level score as specified in number 1, only in this model this variable contains the average CEO risk level score over 2002 to 2006.
- $\beta_n ControlVariables_{it}$; $LAG_{ROA}, LAG_{ROE}, LAG_{tobinq}, LAG_{RET}$; $CEOTurnover$; CEO duality ($CEO\_duality$); CEO outsider ($CEOoutside$); $Firm\_size$; board size $Board\_Size$; board independence ($Independence\_level$); CEO equity ownership level ($Equity\_ownership$)

The third hypothesis tests whether there is an effect between particular fractions of compensation package components offered to the CEO pre-crisis on CEO turnover during the crisis. It is therefore again necessary to take the average levels for the compensation components over 2002 to 2006 for every firm and test this on 2007 to 2009 CEO turnover. This again solves causality problems. Moreover, as the dependent variable in this model is a dummy variable it is necessary to use a logit model. In appendix part A I explain how logit models work and why this is a better testing method than OLS for these types of models. The tested period is again 2007 to 2009. This gives the following logit model:

$$CEOTurnover_{it} = \beta_0 + \beta_1 BasePay_i + \beta_2 Bonus_{it} + \beta_3 Stock_i + \beta_4 Options_i + \beta_n ControlVariables_{it} + \alpha_t + \varepsilon_{it} \quad (3)$$

Where all variables are specified in model 1 except:

- $CEOTurnover_{it}$ is a dummy variable that adopts a value 1 when there is a turnover of the CEO and zero otherwise for every firm over the years 2007 to 2009.
- $BasePay_i$ is the average amount of base pay a CEO received over the years 2002 to 2006
- $Bonus_{it}$ the average amount of bonus a CEO received over the years 2002 to 2006
- $Stock_i$ is the average amount of stock value a CEO owned over the years 2002 to 2006
- $Options_i$ is the average amount of option value granted over the years 2002 to 2006
- $\beta_n ControlVariables_{it}$; $Equity\_ownership$; Age; $Time\_retirement$; $Tenure$; $Firm\_size$; leverage ($Leverage$); $Board\_Size$; $Independence\_level$, $value\_change\_stock$, $value\_change\_options$.

To test the fourth hypothesis, I set up a model that tests whether at financial firms, CEO turnover decreased bank performance. The model therefore tests the time period 2007 to 2009. In this model averages are not necessary. This results in a model that has the form:

$$PerformanceFF_{it} = \beta_0 + \beta_1\, CEOTurnover_{it} + \beta_n ControlVariables_{it} + \alpha_t + \varepsilon_{it} \quad (4)$$

Where all variables were already specified in previous models except the list of control variables:

- $\beta_n ControlVariables_{it}$; $LAG_{ROA}, LAG_{ROE}, LAG_{tobinq}, LAG_{RET}$; $MarketBook$; $CEOTurnover$; $Firm_{size}$; $Market_{Value}$; $Tier_{1_{Capital}}$; $Leverage$; $CEO_{duality}$; $CEOoutside$; $Board_{size}$; $Independence_{level}$; $Equity\_Ownership$.

To connect all the results from the previous models, the fifth hypothesis tests the effects of the pre-crisis components on during crisis firm performance. As a consequence, averages of the pre-crisis compensation package components are again needed to be able to test these on financial firm performance during the crisis. Yet again, the time period in this model is 2007 to 2009, the averages of the compensation components are based on the years 2002 to 2006 and causality problems are mitigated. The model I use to test the relation is:

$$PerformanceFF_{it} = \beta_0 + \beta_1 BasePay_i + \beta_2 Bonus_i + \beta_3 Stock_i + \beta_4 Options_i + \beta_n ControlVariables_{it} + \alpha_t + \varepsilon_{it} \quad (5)$$

Where all variables were already specified in previous models except the list of control variables:

- $\beta_n ControlVariables_{it}$; $LAG_{ROA}, LAG_{ROE}, LAG_{tobinq}, LAG_{RET}$; $MarketBook$; $CEOTurnover$; $Firm_{size}$; $Market_{Value}$; $Tier_{1_{Capital}}$; $Leverage$; $CEO_{duality}$; $CEOoutside$; $Board_{size}$; $Independence_{level}$; $Equity\_Ownership$.

5.4 Robustness tests

To check the results of the models above several problems need to be addressed: robustness of results using several performance measures, serial correlation, heterogeneity, multicollinearity and reverse causality. As the last issue and its solutions were already highlighted in the models in section 5.4 I do not explain this further.

First, It is important to research if the regression results hold across performance measures. Therefore, in all models where the dependent variable is a performance measure, I test the regression on ROA, ROE, buy-and-hold stock returns and Tobin's Q. If the results hold for these 4 measures, the conclusions are more likely to be true.

Second, it is important to address serial correlation in the sample. The standard errors of specific observations can be grouped as banks have similar exposures and similar assets on their books. Banks with similar assets can react similarly to economic shocks which makes the standard errors within groups of banks correlated. In accordance with Fahlenbrach &Stulz (2011), I therefore correct this by clustering the errors at the firm level.

Third, an important robustness check is to test for heterogeneity which can be detected using a White-test in Stata. Heterogeneity needs to be corrected because in the sample the variance of the errors increases exponentially which biases the results. To correct for heterogeneity I use the robust option in Stata.

Fourth and last, I test for multicollinearity between variables by looking at the correlation between all the variables in the regression, which a correlation matrix shows. I do not find any highly correlated variables except for firm size and market value. I then test all regressions, once leaving out firm size and once market value. The results then show that the coefficient of the variable of interest does not change significantly and so I leave out market value as corporate governance literature is certain firm size is an important control variable.

I can now test models 1 to 5 using the U.S. sample of banks with a time period of 2002 to 2009 containing all dependent, independent and control variables discussed. Using OLS or logit regressions techniques and correcting for econometric model problems I can reject or accept the hypotheses from chapter 4.

6 Results

In this section I describe the data by presenting summary statistics and I show the empirical results of the regressions of the models explained in section 5. I present the results in various tables in this text and in appendix B, depending on importance.

In section 6.1 I show the summary statistics. In the sections following 6.1, I present regression tables where I test models with and without: time fixed effects, robust option and clustering of errors at the firm level. At the bottom of every table I show whether one or more options are incorporated into the model or not. In section 6.2 I test hypothesis 1: compensation components on CEO risk level. In section 6.3 I analyse hypothesis 2: CEO risk level on firm performance. In section 6.4 I regress compensation components on CEO turnover regarding hypothesis 3. In section 6.5 I investigate CEO turnover on bank performance. Last, in section 6.6, I look into the correlation of pre-crisis compensation components and during crisis bank performance.

6.1 Summary statistics

To test models 1 to 5, I create a sample from 2002 to 2006 and a sample from 2007 to 2009. Table 6.1 depicts the summary statistics for the 2002 to 2006 sample. As model 1 is the only model that tests for this time period, the table only contains variables incorporated in this model. The final sample contains 113 firms and demonstrates interesting characteristics.

Table 6.1 Summary statistics for the pre-crisis period

The table below gives the summary statistics for banks during the pre-crisis period of 2002 to 2006, from the Compustat, Execucomp, CRSP and RiskMetrics databases. The table shows the number of observations, mean, median standard deviation, minimum and maximum. A detailed explanation of the construction of the variables is given in appendix A table A5.1. The final sample contains 113 firms.

[1] in millions

	Summary statistics sample period 2002 to 2006					
Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Dependent variable						
CEO Risk Level	152	13.59	13.00	2.81	7.00	20.00
Independent variables						
Salary (as a fraction of TDC1)	166	0.39	0.38	0.26	0.00	0.97
Bonus (as a fraction of TDC1)	166	0.14	0.00	0.20	0.00	0.79
Stock[1]	166	52.1	13.2	152	0.00	1120
Options (as a fraction of TDC1)	166	0.09	0.00	0.16	0.00	0.67
Control variables						
CEO tenure	166	8.08	6.00	7.70	0.00	42.00
Firmsize (as the log of total assets)	166	9.35	9.06	1.41	7.14	14.19
Market-to-book	166	0.40	0.38	0.11	0.21	0.76
ROA (1-period lag)	166	0.01	0.01	0.01	-0.04	0.04
ROE (1-period lag)	166	0.10	0.11	0.11	-0.82	0.39
Stock returns (1-period lag)	166	-0.01	-0.01	0.03	-0.10	0.07
Tobin's Q (1-period lag)	155	1.05	1.05	0.06	0.78	1.29
Time to retirement	160	8.99	8.00	7.17	0.00	33.00

The statistics show a CEO risk level mean of 13.6 and a median of 13.0 on a scale from 5 to 28. As a result, the average CEO risk level is below the scale median of 16.5. Additionally, the minimum CEO risk level is 7 and the maximum is 20 and on average the deviation from the CEO risk level mean is 2.75. This means that for the whole sample the pre-crisis CEO risk level is more at the lower end of the scale of 5 to 28 than the expected higher end for this economic boom period.

Moreover, the statistics show that for salary the mean is 0.39 and median is 0.38, for bonus the mean is 0.14 and median 0.00 and for options the mean is 0.09 and median is 0.00. The total value of stocks owned by the CEO (Stocks) are not scaled by TDC1 and therefore show a mean value of 52.1 mln dollars and median of 13.2mln. Banks in this sample therefore offered their CEOs on average a package consisting of 39% salary, 14% bonus and 9% options and a total stock package worth 52.1 mln.

The summary statistics also display that large differences in the fractions of salary, stock and option pay and the size of the total stock grants exist. The standard deviation for salary shows a deviation from the mean of on average 0.26, for bonus 0.2, for options 0.16 and 152mln dollars. Also, the minimum fraction and size of all compensation adopts value 0.00 and the maximum fraction is all above 0.5 and 1120 mln for stocks. As medians for the components are all below the mean values, this indicates that the distributions are skewed to the right, increasing standard deviations and increasing the likelihood that results are driven by a few high values.

What is more, the remaining variables show various striking aspects. CEO tenure is on average 8 years with the most loyal CEO being in the position for 42 years. The bank's firm size is between 7 and 14 which is normal as this sample is skewed to listed banks. The market-to-book measure in this sample has a maximum of 0.76, which is remarkable for this period as there were ample investment opportunities for banks and I would expect it to at least have a maximum above 1. The time to retirement is on average 8.99 years which is not surprising as being a bank CEO requires a lot of working experience and therefore people only become CEO's of banks late in their careers.

For the lagged performance measures: ROA ROE Tobin's Q and stock returns the summary statistics show varying performance. ROA, ROE and Tobin's Q show means, mediums and maxima I would expect from an economic boom era: all positive values and for Tobin's Q a value above 1: ROA 0.01, 0.01 and 0.04, ROE 0.10, 0.11, 0.39 and Tobin's Q: 1.05, 1.05, 1.29. In words this means that on average every dollar of assets 1% of returns was generated, every dollar of invested capital received a 10% return and the firm is considered 1.05 times more valuable than the book value of assets.

However, buy-and-hold stock returns show bank losses as it has a mean of -0.01, median of -0.01 and minimum of -0.10. In other words, the returns on stock were on average -1%. Moreover, the minima of ROA and ROE show severe negative values and Tobin's Q shows a value far below 1. This is an unusual result for this economic boom period which means even during this boom there were banks struggling for returns in this sample.

Moving on to the financial crisis period sample (2007 to 2009), table 6.2 presents the summary statistics. The table contains all variables applicable to all or one of models 2 to 5. The sample consists of 94 firms.

Table 6.2 Summary statistics for the financial crisis period

The table below gives the summary statistics for banks during the pre-crisis period of 2007 to 2009, from the Compustat, Execucomp, CRSP and RiskMetrics databases. The table shows the number of observations, mean, median standard deviation, minimum and maximum. A detailed explanation of the construction of the variables is given in appendix A table A5.1. The final sample contains 94 firms.
[1,2,3] in millions

	Summary statistics sample period 2007 to 2009					
Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Dependent variables						
ROA	266	0.00	0.00	0.02	-0.16	0.04
ROE	266	-0.05	0.06	0.48	-4.92	0.37
Tobin's Q	266	1.00	1.00	0.08	0.67	1.24
Stock returns	266	-0.02	-0.01	0.04	-0.15	0.09
CEO turnover	266	0.10	0.00	0.30	0.00	1.00
Independent variables						
CEO risk level 2002-2006	263	13.00	12.75	2.61	8.00	21.00
Salary 2002-2006	266	0.34	0.32	0.21	0.00	0.84
Bonus 2002-2006	266	0.16	0.15	0.12	0.00	0.52
Stock 2002-2006[1]	266	35.3	13.8	61.3	0.00	411
Options 2002-2006	263	0.13	0.04	0.18	0.00	0.65
Control variables						
Board Independence	205	0.76	0.79	0.11	0.50	0.93
Board size	205	12.40	12.00	2.77	6.00	20.00
Book leverage	266	0.18	0.17	0.09	0.00	0.46
CEO age	265	56.60	57.00	7.03	34.00	78.00
CEO duality	205	0.61	1.00	0.49	0.00	1.00
CEO outsider	266	0.09	0.00	0.29	0.00	1.00
CEO tenure	266	7.97	6.00	6.92	0.00	30.00
Equity ownership	266	0.02	0.00	0.05	0.00	0.35
Firm size	266	9.67	9.33	1.60	7.61	14.74
Market-to-book	266	0.32	0.31	0.10	0.08	0.61
ROA (1-period lag)	266	0.00	0.01	0.02	-0.16	0.04
ROE (1-period lag)	266	-0.07	0.06	0.50	-4.92	0.37
Stock returns (1-period lag)	262	0.00	0.01	0.04	-0.15	0.09
Tier-1-Capital	266	0.02	0.01	0.03	0.00	0.37
Time to retirement	265	9.02	8.00	6.63	0.00	33.00
Tobin's Q (1-period lag)	210	0.99	0.99	0.09	0.67	1.33
Value change options[2]	257	-6.7	-2.0	14.1	-95.2	23.4
Value change stock[3]	257	-12.2	-1.9	54.7	-346	441

For the 2007 to 2009 sample I expect performance measures to show low means, medians, minima and maxima. The statistics do indeed show this as ROA has a mean and median of 0, a minimum of -0.16 and a maximum of 0.04. With a standard deviation of 0.02, the values in this sample for ROA are more likely to be low or negative than positive. The values for ROE and buy-and-hold stocks returns can be described in a similar way and also show hugely negative minimums of respectively: -4.92 and -0.15. Tobin's Q shows a somewhat less bleak picture as the market perceives the value of the banks

equal to the book value with mean and medians of 1. The minimum and maximum do however display very wide spread results indicating that some banks were valued 1.24 times their book value and others 0.67 times. 1.24 is an odd result as according to literature all banks experienced losses during 2007 to 2009. However, overall the performance measures show poor performance over this period.

For the remaining dependent variable, CEO turnover, it is to be expected that turnovers are high as more CEOs will resign in this period. In contrast, the CEO turnover mean is 0.10 which means 10% of all CEOs during this period were replaced. This makes the CEO turnover event rare. The results on the independent variables are similar or the same as that of the previous sample.

Finally, the control variables show that on average bank boards comprise of more independent than dependent directors. Also, bank's board size has an average size of 12.4 which falls into the optimal board size bracket of 10 to 12 (section 2). Furthermore, book leverage at banks in this sample is on average 0.18 which is low when anticipating that high leverage is characteristic for banks (section 2.5). Moreover, average CEO age is in line with the time to retirement. In addition, at banks during this period 61% of all CEOs over 2007 to 2009 were both the chairman of the supervisory as executive board. Thereafter, of all the CEOs at banks during this period only 9% was an outsider. Besides, the average tenure for CEOs during this period was 7.96 years. Also, on average a CEO owns 2% of all outstanding stock in this sample.

Next, the bank's firm size measured by the book value of assets is again large (average: 9.67, min. 7.61 and max. 14.74), even though during the crisis banks had to write down on assets. Another variable, market-to-book shows that investment opportunities were scarce during the crisis (average 0.32, min 0.08 and max. 0.61). Also, the lagged performance measures show similar results to their non-lagged counterparts. Furthermore, tier-1-capital during the crisis was below the now required 3% to 4% at banks. Moreover, the value changes in total options and stock owned by the CEO compared to 2006 were severely negative. Last, the time to retirement has an average of 9 which is in line with the average CEO age. Hence, the variables show values not aberrant to the extreme economic circumstances present in this sample.

6.2 Compensation package components versus pre-crisis CEO risk level

To test the effect of pre-crisis compensation package components (henceforth compensation components) on the pre-crisis risk level of the attracted CEO (henceforth CEO risk level) I test model 1 of section 5.4 with time period 2002 to 2006. The variables of interest are: CEO risk level, salary, bonus, stock and options. In table 6.3 I show the regression results. The first 4 models (a,b,c and d) do not contain any control variables, the latter 3 do.

The first 4 models all show similar results. Salary and options are negatively and bonus and stock are positively related to CEO risk level. Only the parameter results for salary, stock and options are robust to adding time fixed effects, correcting for heterogeneity and by clustering the errors. The coefficients are significant at, respectively 1% and 10% levels.

Table 6.3: Results model 1: the effects of salary, stock and options on the risk level of the CEO attracted pre-crisis

The sample contains data from banks for the years 2002 to 2006 from Compustat, Execucomp, CRSP and RiskMetrics. I run panel regression on the risk level score of the CEO attracted. In regression b to g, time fixed effects are added. Then, in addition to this correction, in regression c,d,f and g, the errors are corrected for heteroscedasticity. Last, the t-statistics in the table of regressions d and g are robust to serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.
NB. I do not include market-to-book, tier-1-capital, book leverage and equity ownership variables in model 1 as these variables are already incorporated into the CEO risk level variable.

	Dependent variable: CEO risk level						
Variable	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Salary	-2.603***	-2.898***	-2.898***	-2.898***	-2.865***	-2.865***	-2.865**
	(-3.046)	(-3.343)	(-3.485)	(-2.733)	(-3.017)	(-3.051)	(-2.32)
Bonus	2.168*	1.600	1.600	1.600	1.123	1.123	1.123
	(1.926)	(1.33)	(1.414)	(1.164)	(0.868)	(0.864)	(0.735)
Stock	0.000**	0.000**	0.000***	0.000***	0.00	0.00	0.00
	(2.532)	(2.095)	(4.679)	(3.931)	(-0.194)	(-0.273)	(-0.216)
Options	-4.060***	-3.012*	-3.012*	-3.012*	-3.047*	-3.047*	-3.047*
	(-2.838)	(-1.955)	(-1.89)	(-1.831)	(-1.921)	(-1.791)	(-1.794)
Stock return (1-period lag)					-12.568	-12.568	-12.568
					(-1.244)	(-1.413	(-1.417
Market-to-book					-0.509	-0.509	-0.509
					(-0.238)	(-0.217)	(-0.182)
CEO tenure					0.093**	0.093**	0.093*
					(2.315)	(2.259)	(1.944)
Firm size					0.175	0.175	0.175
					(0.955)	(0.991)	(0.782)
Time to retirement					0.031	0.031	0.031
					(0.94)	(1.013)	(0.812)
Constant	14.475***	16.558***	16.558***	16.558***	14.732***	14.732***	14.732***
	(29.331)	(16.346)	(16.92)	(17.159)	(6.383)	(5.55)	(4.655)
Obs	152	152	152	152	146	146	146
R^2	0.13	0.15	0.19	0.19	0.22	0.22	0.22
Time fixed effect?	No	Yes	Yes	Yes	Yes	Yes	Yes
Robust?	No	No	Yes	Yes	No	Yes	Yes
Cluster?	No	No	No	Yes	No	No	Yes

In other words, models a to d show that banks with a large salary or option fraction in the CEO compensation package attracted a CEO with a lower risk level than banks that offered lower fractions. On the other hand, the larger the total value of all stocks owned by the CEO the higher the risk level of the attracted CEO. Lastly, bonus is not related to the risk level of the attracted CEO.

When adding control variables in models e to g, only the salary and option results are robust. The result for the salary component is significant at the 1% level for the first two models and 5% for the final model. More specifically, for example in the final model, an increase of the salary fraction by 0.1 would decrease the CEO risk level by 0.29 points. This result is in line with initial expectations and Arcey et al. (2011).

In addition, the options coefficient is significant at the 10% level and shows that a 0.1 increase of the fraction would decrease CEO risk level by 0.31 points. In contrast, the bonus and stock components do not have a significant relation to CEO risk level. The results of bonus and stock are in line with, and the result on options is contrary to literature that does not find a relationship between these contingent pay components and risk, for example: Arcey et al., 2011; Cheng et al. (2009), Fahlenbrach & Stulz (2012); Gregg et al. (2005); Hagendorff & Vallascas (2011); Houston & James (2010); Ozkan (2007). Furthermore, the results of all 3 components are contrary to literature that concludes bonus, stock and options increase CEO risk level, for example: Bebchuk & Spamann (2009); Brewer et al. (2004); Chen et al. (2006); DeYoung et al. (2010); Douglas (2006); John et al. (2005); Mehran & Rosenberg (2007).

What is more, the only control variable that has a significant relationship to CEO risk level is CEO tenure (model e,f,g). The CEO tenure variable coefficients are significant at the 5% (model e and f) and 10% level (model g). A 1 year increase in CEO tenure would increase the CEO's risk level by 0.1 on average. Said differently, CEO's that have been in the position for a long time had a higher level of risk appetite. This confirms entrenchment fears as, the longer the CEO holds the position, the more likely he or she is entrenched and the less hesitant he or she is to conduct risky investments (Chakraborty et al., 2009). Unfortunately, all the remaining control variables are not significant which is the opposite result of literature that does (section 2).

Concluding, the results show that banks with a high pre-crisis salary or option fraction in the remuneration package attracted a less risk loving CEO before the crisis compared to firms offering lower fractions. Bonus and stock have no effect on the risk level of the attracted CEO. Consequently, hypothesis 1 is partly accepted as only the expectations on salary were correct.

I have to be cautious with these conclusions as there are only 146 observations in models e to g and the R^2 level is 0.22 (models e,f,g). This R^2 is low, which could mean that the model does not explain the variance in the dependent variable very well and many true explanatory variables are not included in the model. However, the salary and option result is robust for all models (a to g).

6.3 CEO risk level pre-crisis versus during crisis bank performance

In this section I test model 2 of section 5.4 for the time period 2007 to 2009 to analyse the effects of the attracted CEO's risk level in the pre-crisis period (henceforth CEO risk level) and the during crisis bank performance (henceforth bank performance). The variables of interest are: CEO risk level 2002-2006, and a firm performance measure. The remaining variables are control variables. To test this relationship I use 4 different firm performance measures: ROA, ROE, Tobin's Q and stock returns.

For convenience[5] I only show the stock return regression here and the remaining 3 regressions in appendix B tables A1 A2 and A3.

Table 6.4: Results model 2: the effects of pre-crisis CEO risk level on during crisis performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable buy-and-hold returns. In regression b to d time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: buy-and-hold stock returns			
Variable	(a)	(b)	(c)	(d)
CEO risk level 2002-2006	-0.003***	-0.003***	-0.003***	-0.003**
	(-3.315)	(-3.167)	(-2.806)	(-2.448)
Firm size	0.002	0.002	0.002	0.002
	(0.847)	(0.805)	(0.818)	(0.811)
Stock returns (1-period lag)	-0.094	-0.156**	-0.156**	-0.156**
	(-1.422)	(-2.313)	(-2.201)	(-2.314)
CEO turnover	0.009	0.009	0.009	0.009
	(1.000)	(1.029)	(1.238)	(1.223)
CEO duality	0.010**	0.010**	0.010**	0.010*
	(2.031)	(2.036)	(2.027)	(1.904)
CEO outsider	0.011	0.012	0.012	0.012
	(1.403)	(1.534)	(1.612)	(1.528)
Board size	-0.001	-0.001	-0.001	-0.001
	(-1.182)	(-1.211)	(-1.228)	(-1.117)
Board independence	-0.001	0.000	0.000	0.000
	(-0.031)	(0.017)	(0.017)	(0.017)
Equity Ownership	-0.242***	-0.229***	-0.229***	-0.229***
	(-3.787)	(-3.651)	(-3.321)	(-3.434)
Constant	0.026	0.014	0.014	0.014
	(0.941)	(0.514)	(0.513)	(0.514)
Obs	200	200	200	200
R^2	0.14	0.14	0.14	0.14
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

[5] As was mentioned above, the Tobin's Q and stock return measure are more suitable measures than the static ROA and ROE performance measures. Thereafter, many papers on CEO compensation and firm performance research use buy-and-hold. stock returns as the dependent variable. I therefore decided that the stock return variable is the appropriate dependent variable to show in this chapter as research is easier compared this way.

In table 6.4 I show the results of the analysis. The results express that for models a, b and c, the CEO risk level is negative and significant at the 1% level and for model d the result is significant at the 5% level. As a result, CEO risk level and risk taking is negatively related to bank performance measured by stock returns. Considering model d, a 1 CEO's risk level score increase, decreased stock returns by 0.003. In other words, bank compensation packages that attracted more risk loving CEOs before the crisis, experienced lower stock returns during the crisis. This result is robust to changing the performance measure to ROA or Tobin's Q and was also predicted by the literature in section 3.2, for example: Belratti & Stulz (2012), Berger & Bowman (2013), Dyer & Walls (1996), Minton et al. (2010) etc.

Regarding the control variables in table 6.4 only lagged stock returns, CEO duality and equity ownership are significant at the 1% and 5% level. This is evidence that current returns are partly based on 1 year historical returns (Bowman, 1982), a CEO that is both a chairman of the executive and supervisory board can make decisions more efficiently which increases firm performance during crises (Arcey et al., 2011) and that CEOs that own large fractions of the total outstanding equity are more entrenched which hurts firm performance (Chakraborty et al., 2009). Importantly, CEO duality is not significant for the other performance measures but the lagged performance and equity ownership variables are.

To conclude, the risk level of the pre-crisis attracted CEO is negatively related to the during crisis bank performance for all performance measures except ROE. This is consistent with what I expected in chapter 4 and therefore hypothesis 2 is accepted.

Still, cautiousness is recommended with these results as the analysis is based on only 200 observations and the R^2 is again low (0.14 for all models). Thus, it seems that there are a lot of explanatory variables missing in the model. Nevertheless, the fact that the CEO risk level result is robust across all model corrections of 3 bank performance measures does strengthen the result.

6.4 Pre-crisis compensation package components versus during crisis CEO turnover.

In contrast to the previous models, in this section I test model 3 of section 5.4 over the time period 2007 to 2009 using the logit regression analysis technique. I investigate the effects of the composition of the compensation package pre-crisis (henceforth compensation) and whether this attracted a CEO that was more likely to resign during the crisis (henceforth CEO turnover).

The variables of interest in this test are the compensation components: salary 2002-2006, bonus 2002-2006, stock 2002-2006 and options 2002-2006 and the CEO turnover variable.

In table 6.5 I illustrate the results of the logit regression. Table 6.5 shows both logit and at means results as the sensitivity of the coefficients for the logit regression are non-interpretable (as mentioned in appendix part A)[6].

[6] The at means coefficients are somewhat interpretable because the coefficients are calculated compared to the means of the variables the coefficients belong to.

Table 6.5 Results model 3: logit model testing the pre-crisis compensation package components on during crisis CEO turnover

The sample contains data from financial firms for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a logit regression on the dependent variable CEO turnover. The table shows the output of the logit model (a,c,e) and the output for the effects of the independent variable on CEO turnover at the means of the independent variables (b,d,f). In regressions c and e time fixed effects are added. The z-statistics in the table of regression e is robust to serial correlation. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: CEO turnover					
	Logit	At means	Logit	At means	Logit	At means
Variable	(a)	(b)	(c)	(d)	(e)	(f)
Salary 2002-2006	-0.179	-0.179	-0.231	-0.231	-0.231	-0.231
	(-0.046)	(-0.046)	(-0.059)	(-0.059)	(-0.113)	(-0.113)
Bonus 2002-2006	2.662	2.662	2.539	2.539	2.539	2.539
	(0.523)	(0.523)	(0.488)	(0.488)	(0.816)	(0.816)
Stock 2002-2006	0.000	0.000	0.000	0.000	0.000	0.000
	(1.609)	(1.609)	(1.404)	(1.404)	(1.564)	(1.564)
Options 2002-2006	-1.798	-1.798	-1.772	-1.772	-1.772	-1.772
	(-0.409)	(-0.409)	(-0.401)	(-0.401)	(-0.458)	(-0.458)
Value change stock	0.000	0.000	0.000	0.000	0.000	0.000
	(0.404)	(0.404)	(0.399)	(0.399)	(0.645)	(0.645)
Value change options	0.000	0.000	0.000	0.000	0.000	0.000
	(0.831)	(0.831)	(0.799)	(0.799)	(1.025)	(1.025)
Equity ownership	-336.980	-336.980	-333.311	-333.311	-333.311**	-333.311**
	(-1.071)	(-1.071)	(-1.003)	(-1.003)	(-1.971)	(-1.971)
CEO Age	-0.217	-0.217	-0.234	-0.234	-0.234	-0.234
	(-0.285)	(-0.285)	(-0.287)	(-0.287)	(-0.383)	(-0.383)
Time to retirement	-0.190	-0.190	-0.205	-0.205	-0.205	-0.205
	(-0.270)	(-0.270)	(-0.273)	(-0.273)	(-0.403)	(-0.403)
CEO tenure	-2.259***	-2.259***	-2.256***	-2.256***	-2.256	-2.256
	(-3.616)	(-3.616)	(-3.563)	(-3.563)	(-1.358)	(-1.358)
Firm size	-0.299	-0.299	-0.314	-0.314	-0.314	-0.314
	(-0.519)	(-0.519)	(-0.501)	(-0.501)	(-0.851)	(-0.851)
Book leverage	4.570	4.570	4.772	4.772	4.772	4.772
	(0.742)	(0.742)	(0.697)	(0.697)	(1.289)	(1.289)
Board size	-0.101	-0.101	-0.094	-0.094	-0.094	-0.094
	(-0.410)	(-0.410)	(-0.352)	(-0.352)	(-0.503)	(-0.503)
Board independence	-0.232	-0.232	-0.120	-0.120	-0.120	-0.120
	(-0.041)	(-0.041)	(-0.021)	(-0.021)	(-0.034)	(-0.034)
Constant	18.696	18.696	19.601	19.601	19.601	19.601
	(0.380)	(0.380)	(0.376)	(0.376)	(0.495)	(0.495)
Obs	199	199	199	199	199	199
Pseudo R^2	0.63	-	0.63	-	0.63	-
Time fixed effect?	No	No	Yes	Yes	Yes	Yes
Cluster?	No	No	No	No	Yes	Yes

The logit regression results show negative relations between salary, options and CEO turnover and positive relations between bonus, stock and CEO turnover. These results are however not significant for all models (a to f). Therefore, salary, bonus, stock and option components did not explain the CEO turnover at banks and hence the composition of the compensation package is unrelated to attracting a CEO who is more or less likely to resign. This was not expected following

literature from 3.3 that expected a decrease in turnover following high salary fractions and an increase for bonus, stock and options factions (Chakraborty et al., 2009).

The only significant variable across all models is equity ownership, which is negatively related to CEO turnover and significant at the 5 % level. In addition, CEO tenure is negatively and significantly related to CEO turnover for models a to d. All other control variables, even the value change in options and stock packages, did not have a significant effect on CEO turnover which shows that even when CEOs lose a lot of options and or stock compensation value because of declining stock prices this is not a reason to resign.

As a result, the table shows that the compensation components pre-crisis did not affect the during crisis CEO turnover. Consequently, hypothesis 3 is rejected. Nonetheless, repeating the above, I again have to be cautious with these results as there are only 199 observations in these equations and only 10% of them contain a CEO turnover event. As the event is so rare, it is more likely that the CEO turnover coefficients are not significant. On the other hand, the pseudo R^2 is quite high for model a, c and e: 0.63. As a consequence, the model explains 63% of all variance in the dependent variable CEO turnover. Additionally, the compensation components are not significant across models a to f. Taken together, the conclusions from the model could be plausible but still carry some uncertainty.

6.5 During crisis CEO turnover versus during crisis bank performance.

In the next analysis, I test model 4 of section 5.4 over the time period 2007 to 2009. I study the effects of during crisis CEO turnover (henceforth, CEO turnover) on that period's bank performance (henceforth, bank performance) to see if the event has a negative or a positive effect. The variables of interest are the CEO turnover variable and the 4 performance measures. The tables for the remaining three performance measures can be found in appendix part B table A4, A5 and A6.

The results in table 6.6 show that for all models, the CEO turnover variable is positively related to stock returns but it is not significant which is echoed by the coefficient results of the other performance measures. This is contrary to the conclusions of literature explained in the literature review and likewise expectations (Chakraborty et al., 2009). Thus, the bank performance trend ex-ante the CEO turnover event continues ex-post (Finkelstein & Hambrick, 1996; Jensen & Murphy, 1990).

In this model only firm size, market-to-book, lagged stock returns, book leverage and equity ownership are significant variables. The larger the firm, the higher stock returns. As the largest firms in the banking industry suffered the greatest losses, this is an odd result. The higher market-to-book the higher stock returns. This is logical as the higher market-to-book, the more investment opportunities and the higher the firm's value and thus stock returns. This was especially true during the crisis as investment opportunities were scarce. If banks were able to find legitimate opportunities they performed better than banks that did not. Moreover, both for lagged stock returns and equity ownership the same explanations as previous models apply. Last, for book leverage, the higher levered the bank the lower stock returns. This was prominent during the crisis as the highest levered banks had

the biggest losses (Diamond, 2007). Most of these results are robust across all other performance measures.

In conclusion, during crisis CEO turnover had no effect on the during crisis performance of a bank. As this result is robust across all model corrections and other performance measures, hypothesis 4 is rejected. The results are, however, based on only 201 observations of which only 10% contain actual CEO turnover events. In addition, the models only explain 18% (model a) and 26% (b,c and d) of the variance of the performance measure buy-and-hold stock returns. Therefore, the results could be based on too few observations and a model that explains too little of the variation.

Table 6.6 Results model 4: the effects of during crisis CEO turnover on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable buy-and-hold stock returns. In regression b to d, time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Buy-and-hold stock returns			
	(a)	(b)	(c)	(d)
CEO turnover	0.008	0.006	0.006	0.006
	(0.931)	(0.721)	(0.771)	(0.771)
Firm size	0.0044**	0.0035*	0.0035*	0.0035*
	(2.025)	(1.689)	(1.846)	(1.846)
Market-to-book	0.1158***	0.2164***	0.2164***	0.2164***
	(2.730)	(4.757)	(4.643)	(4.643)
Stock returns (1-period lag)	-0.092	-0.1805***	-0.1805**	-0.1805**
	(-1.409)	(-2.791)	(-2.617)	(-2.617)
Tier-1 capital	0.3043*	0.147	0.147	0.147
	(1.872)	(0.928)	(1.010)	(1.010)
Book leverage	-0.1312**	-0.1883***	-0.1883***	-0.1883***
	(-2.521)	(-3.698)	(-3.827)	(-3.827)
CEO duality	0.0116**	0.008	0.008	0.008
	(2.275)	(1.633)	(1.528)	(1.528)
CEO outside	0.005	0.008	0.008	0.008
	(0.708)	(1.171)	(1.220)	(1.220)
Board size	-0.001	-0.001	-0.001	-0.001
	(-0.864)	(-1.273)	(-1.308)	(-1.308)
Board independence	-0.001	0.004	0.004	0.004
	(-0.021)	(0.205)	(0.206)	(0.206)
Equity Ownership	-0.2042***	-0.1740***	-0.1740***	-0.1740***
	(-3.167)	(-2.827)	(-2.828)	(-2.828)
Constant	-0.0677**	-0.0933***	-0.0933***	-0.0933***
	(-2.445)	(-3.471)	(-3.973)	(-3.973)
Obs	201	201	201	201
R^2	0.18	0.26	0.26	0.26
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

6.6 During crisis CEO turnover versus during crisis bank performance.

In this section I test the "key-stone" of the story or as I call it, the full effect. This is why this table follows behind all the middle effect regressions.

I test model 5 of section 5.4 and study whether the pre-crisis compensation package components (henceforth components) have an effect on during crisis performance measures (henceforth, performance). The results in this model are important as in the event of significant results between compensation components and bank performance these could be clarified by models 1 to 4, or as I call them, the middle effects. The variables of interest are the pre-crisis compensation package components and the during crisis bank performance measures. The results of the remaining performance measures are shown in the appendix table A7, A8 and A9.

From the analysis of model 5 models a and b only contain the compensation components. The results show that there is no significant relation between either salary, bonus or options and the bank's performance measured by stock returns. In contrast, for stocks there is but this is only for model a. Likewise, the fraction of pre-crisis CEO salary, bonus, stock or options did not have an effect on how the bank performed during the crisis. These results support the literature concluding compensation as a whole is not at all significant to firm performance (Gregg et al., 2012).

In model c,d,e and f control variables and corrections are added. Nevertheless, none of the compensation components are significantly related to firm performance. However, performance measures Tobin's Q and ROE do find a significant positive relation at the 5% and 10% level for stock. This is the opposite of the Fahlenbrach & Stulz (2012) conclusions where CEO's of which their pay was highly correlated to stock price movements (shareholder's value) invested into area's that experienced significant losses during the crisis, resulting in negative correlation between stock and performance.

The proven positive stock relation result is, however, not robust for ROA and buy-and-hold stock return performance measures. Therefore, taking into account that 2 out of 4 performance measures find no significant relationship between the components and bank performance, pre-crisis salary, bonus, stock or options compensation did not have an effect on during crisis bank performance. Regarding the significant results from models 1 and 2 this is surprising.

With respect to the control variables, firm size, market-to-book, lagged performance measures, book leverage and equity ownership are again significant just as in model 2 and 4. This shows that these control variables are robust across all models containing stock returns as the dependent variable. Thus, they explain a lot of the variance of the during crisis bank performance and are important control variables to add in future research.

All in all, the composition of the pre-crisis CEO compensation package did not have an effect on how the bank performed during the financial crisis of 2007 to 2009 contrary to what society believes and what some scholars concluded. I therefore reject hypothesis 5.

Table 6.7: Results model 5: the effects of pre-crisis salary, stock and options on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable buy-and-hold returns. In regression b to f, time fixed effects are added. Then, in regression c to f, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression f, are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Buy-and-hold stock returns					
Variable	(a)	(b)	(c)	(d)	(e)	(f)
Salary 2002-2006	-0.002	-0.002	0.018	0.017	0.017	0.017
	(-0.182)	(-0.1501)	(1.24)	(1.238)	(1.394)	(1.394)
Bonus 2002-2006	-0.029	-0.029	-0.025	-0.013	-0.013	-0.013
	(-1.561)	(-1.54)	(-1.262)	(-0.682)	(-0.860)	(-0.860)
Stock 2002-2006	-0.000*	0.000	0.000	0.000	0.000	0.000
	(-1.760)	(-1.640)	(0.080)	(0.023)	(0.023)	(0.023)
Options 2002-2006	0.012	0.012	0.007	0.005	0.005	0.005
	(0.8562)	(0.832)	(0.459)	(0.354)	(0.390)	(0.390)
Firm size			0.007**	0.005*	0.005**	0.005**
			(2.195)	(1.878)	(2.093)	(2.093)
Market-to-book			0.114***	0.215***	0.215***	0.215***
			(2.615)	(4.567)	(4.603)	(4.603)
Stock returns (1-period lag)			-0.096	-0.178***	-0.178**	-0.178**
			(-1.459)	(-2.729)	(-2.539)	(-2.539)
Tier-1 capital			0.319*	0.161	0.161	0.161
			(1.937)	(0.997)	(0.950)	(0.950)
Book leverage			-0.134**	-0.191***	-0.191***	-0.191***
			(-2.483)	(-3.596)	(-3.974)	(-3.974)
CEO turnover			0.009	0.007	0.007	0.007
			(1.042)	(0.811)	(0.892)	(0.892)
CEO duality			0.012**	0.008	0.008	0.008
			(2.249)	(1.615)	(1.571)	(1.571)
CEO outsider			0.008	0.011	0.011	0.011
			(1.085)	(1.466)	(1.660)	(1.660)
Board size			-0.001	-0.002	-0.002	-0.002
			(-1.358)	(-1.644)	(-1.640)	(-1.640)
Board independence			-0.008	0.000	0.000	0.000
			(-0.333)	(0.008)	(0.008)	(0.008)
Equity Ownership			-0.205**	-0.168*	-0.168**	-0.168**
			(-2.061)	(-1.770)	(-2.317)	(-2.317)
Constant	-0.009	-0.017**	-0.078**	-0.106***	-0.106***	-0.106***
	(-1.394)	(-2.373)	(-2.347)	(-3.275)	(-3.788)	(-3.788)
Obs	263	263	201	201	201	201
R^2	0.02	0.06	0.19	0.27	0.27	0.27
Time fixed effect?	No	Yes	No	Yes	Yes	Yes
Robust?	No	No	No	No	Yes	Yes
Clustering?	No	No	No	No	No	Yes

This result does need to be handled with caution as the results in model a and b are based on 263 observation and c,d,e and f on only 201 observations. The R^2 in model a is 0.02, in model b 0.06

in model c 0.19. and in models d,e and f 0.27. The models therefore only explain a maximum of 27% of the variation in stock returns. Thereafter, 2 out of 4 performance measures do find significant results which makes the conclusions above less certain.

Overall, most of the tables I show depict very differing results from what I expected in chapter 4. All hypotheses but (part of) hypothesis 1 and hypothesis 2 are rejected. The following chapter bases conclusions on this information.

7 Conclusion

In this section I conclude and clarify the results in order of hypothesis number as the conclusions on the final hypothesis determines whether the results on the middle effects, or hypothesis 1 to 4 are plausible.

The main result from model 1 is that banks that offered their CEO large salary or options fractions before the crisis attracted a CEO with less risk appetite than banks that offered lower fractions. The salary result is consistent with Arcey et al., (2011), who clarify this by explaining that taking a lot of risk puts the firm and therefore the CEO's salary and continued employment at risk. In other words, as salary is a fixed amount, taking more risk does not increase the CEOs payoff and only increases the chances of him or her not receiving salary. As a result, high salary compensation only attracts less risk loving types.

The result on options and risk is somewhat surprising as the opposite was expected. However, it is consistent with Chen et al., (2006) and Bulan et al., (2009). The explanation they give is that beyond a threshold level of options value owned, the CEO becomes risk averse because he or she can now lose large quantities of wealth when things go bad. Bulan et al., (2009) estimate this threshold level to be 2.3mln dollars of total options wealth. The CEOs in this sample that received option compensation received amounts far in excess of this threshold as seen in the summary statistics.

Moreover, the pre-crisis bonus and stock fractions did not determine the risk level of the attracted CEO. Said differently, risk loving CEOs were not driven to join a firm because of the potential gains earned via bonus and stock compensation during 2002 to 2006. The fact that bonus and stock do not affect the CEO's risk level was also concluded by Arcey et al. (2011), Cheng et al. (2009) and Hagendorff & Vallascas (2011) .

In model 2, the main conclusion is that banks that attracted a CEO with a higher level of risk during 2002 to 2006 performed worse during 2007 to 2009 than firms without risk loving CEOs. Fahlenbrach & Stulz (2011) explain this phenomena by assuming that the risk taken during the period by bank CEOs were investments into growth opportunities that seemed to have good returns at the time. However, these particular investments turned out bad during the crisis and therefore produced negative firm returns. Hence, the more risk loving the CEO, the more investment into pre-crisis growth opportunities and the worse during crisis performance (Fahlenbrach & Stulz, 2011).

For the results on the models containing CEO turnover it becomes apparent that the pre-crisis composition of the compensation package has no effect on during crisis CEO turnover. Therefore, I can conclude that compensation packages did not determine whether or not the attracted CEO was more or less likely to leave the firm in times of difficulty. Moreover, the control variables show that the value losses in CEO's total stock and options grants also were not a reason to resign during this period. Therefore, the overall conclusion is that compensation does not influence CEO turnover .

Furthermore, CEO turnover does not affect during crisis bank performance. This in turn means that during the crisis, the performance trend ex-ante the CEO turnover event continued ex-post. As the

investment decisions made by the previous CEO have a direct effect on the during crisis bank performance the newly appointed CEOs cannot impact the bank performance in such a short time period (Finkelstein & Hambrick, 1996; Jensen & Murhpy, 1990).

After analysing these results, one would think that because salary and options are both negatively related to CEO risk level and CEO risk level is negatively related to firm performance that pre-crisis salary and options could be positively related to during crisis performance. On the other hand, compensation was unrelated to CEO turnover and CEO turnover to bank performance which shows that the direct relationship between compensation and bank performance could also be non-significant.

The results of the regression that tests whether this is true, shows that pre-crisis compensation components are not related to during crisis firm performance which Gregg et al., (2012) also concludes. Hence, the main conclusion is that all 4CEO compensation components in the pre-crisis period had no effect on the during crisis bank performance. This is, however, contrary to the significant results of models 1 and 2.

As model 1 and 2 resulted in significant relations, there must be an opposing effect that neutralizes this result. What this force might be is an interesting matter for further research. In the face of these facts it seems that when effects between pre-crisis compensation components and during crisis bank performance are broken down into separate regressions (models 1 to 4), the results differ from testing a regression containing the full effect (model 5).

Concluding, the hypothesis I had before starting this research is partly rejected and partly accepted. Pre-crisis compensation components did determine the risk lovingness of the CEO attracted but did not determine whether the attracted CEO was more or less likely to leave the firm during the crisis. In addition, these "CEO personal characteristics" did not determine the performance of the bank during the crisis. Pre-crisis CEO bank pay was therefore a non-significant factor in determining financial crisis bank performance. Hence, it means that it does not matter how the CEO was paid before the crisis as factors other than pay were more important in explaining the variance of the bank performance in this period. As a result, guidelines on CEO bank pay would not prevent large bank losses from reoccurring.

8 Discussion and further research

From the analysis, the conclusions I draw in chapter 7 seem plausible. However, among the reasons given in chapter 6, there are 4 reasons why the results could deviate from the truth.

The first is the fact that the tested sample is biased towards large banks as the data contains only listed firms. As mentioned, large firms have the ability to bear more risk and also take more risk as large banks are more likely to be bailed out in times of crisis because of the large impact a bankruptcy has on financial systems. Yet, the risk that the banks bore during the pre-crisis period materialized negatively during the crisis. Consequently, the biggest banks also made the biggest losses. This especially has an effect on the conclusions of models 1 and 2 which could be the reason of the significant relations in these models.

The second reason is that all corporate governance research models are riddled with endogeneity problems where important explanatory variables are missing in the models. In particular, the models where the dependent variable is bank performance has this problem as a lot of factors determine bank performance. I have attempted to minimize the possibility of endogeneity by adding an abandons of control variables that were concluded to be important in other corporate governance research, by using time fixed effects, by testing 1 industry and by testing 1 country. Still, some models show low R^2 results which could indicate that models are still missing crucial independent variables. As a result, the models could have biased coefficients.

The third reason is that the results are only applicable to the crisis of 2007 to 2009. This crisis had a specific run-up that had such a distinct consequence to bank performance that the conclusions probably do not apply to other time periods. Mainly the relation between CEO risk level and bank performance is expected to change from negative (during crises) to positive (during booms). Further research will tell whether this is the case or not.

The fourth and final reason is that the number of observations in the regressions for the financial crisis period all have around 200 observations. This is not too shocking as this sample only contains U.S. banks and 2 years of data but the lower the number of observations the less certain are the results. This especially has consequences for the CEO turnover regressions as this this makes it a very rare event which could bias results and could be the reason why the variable is not significant in models 3 and 4.

Future research can address these problems to reach a higher level of understanding how compensation flows through to bank performance but I also introduce a suggestion where other future research could focus on.

More research should be done on the middle effects like CEO risk and CEO turnover, that connect compensation to performance. As model 1,2 and 5 showed, there is an opposing force neutralizing the effect of compensation on risk and risk on performance, causing compensation to be unrelated to bank performance. It would be interesting to find out what this force is.

A suggestion would be the bank's culture that follows from the idea's the CEO implements within the bank. If, for example, the CEO is convinced that firms should always cut the bottom 5% performers, this could create a culture of fear. This could either result in great bank performance or people could get nervous, make mistakes and create bad bank performance. In this instance, compensation could be responsible for attracting a CEO with typical company culture preferences.

There are several other suggestions but I think the most likely effects are "soft" variables like the one I suggest, as they are hard to quantify but can have a large influence on numbers. Additionally, not many scholars have investigated the qualitative variables that could have significant correlations to compensation and bank performance.

In short, the results of this thesis could be made more certain by: creating a dataset containing not only listed banks but also smaller unlisted banks, adding more control variables to reduce endogeneity problems, testing over several other time periods both in normal and crisis economic circumstances and creating a dataset with more observations and maybe more CEO turnover events. In addition, scholars could attempt to find the opposing factor/variables that neutralizes the significant effect of compensation on risk and risk on bank performance.

All this further research helps to understand how compensation truly affects bank performance and how different economic circumstances have a differing effect on these relations. When this becomes more clear firms can make very informed CEO compensation decisions.

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Appendix

This appendix contains 3 parts. Part A explains OLS and logit regressions and shows the variable tables that hold the explanations and calculations to construct the variables mentioned in chapter 5. Part B shows the results of models 2,4 and 5 using the performance measures: ROA ROE and Tobin's Q.

APPENDIX A

Testing methods

The variables from section 5.2 eventually form models. To confirm or reject the hypotheses these models need to be tested. In this thesis I use ordinary least squares (OLS) and the logit regression method.

OLS is an econometric method that estimates the parameters in a linear regression model.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + + \beta_n X_n + \varepsilon_i \quad (1),$$

Where β_0 is the intercept, β_n are the coefficients and together they form the set of parameters of the regression to be estimated. Y_i is the dependent variable and X_n are the independent variables that explain the dependent variable. Last, ε_i is the error term which captures all variance of the dependent variable not explained by the independent variables in the model.

The coefficients are estimated using an OLS estimator. The OLS estimator estimates the regression coefficients so that the sum of squared residuals is minimized. In other words, the estimator tries to find a line where the line is as close as possible to the data and the mistakes made in predicting Y given X are minimized.

To be able to use OLS, 3 assumptions have to be satisfied. First, the error term cannot be correlated with the independent variables in the model. If this is the case, there is endogeneity because an omitted variable is correlated both with the error term and with an independent variable making the estimates biased. I minimize the chance of endogeneity by adding control variables and time fixed effects. Second, the variables need to be independently and identically distributed (i.i.d.). In simpler terms this means that the sample you take from the population should not be biased towards an answer to the research question. For example, if a researcher investigates the number of times families in the Netherlands go on holiday on average and takes a sample of families that all live in het Gooi (very wealthy area) then the estimates will be biased upwards. I avoid this problem by taking the whole sample of available data on U.S. banks. However, this can be slightly skewed to large financial corporations as only these firms are listed and data is collected. Third, large outliers should be unlikely. More specifically, observations for X and Y that are far out of range from usual data are unlikely. I solve this by removing these observations by winsorizing at the 1 percent level for all variables. When all 3 assumptions are satisfied the OLS estimators are unbiased and efficient.

To test hypothesis 3, a nonlinear regression model designed to deal with binary dependent variables is needed because CEO turnover either adopts number 0 or 1. To force the predicted probabilities to always adopt values between 0 and 1, probit and logit regressions can be used. These regressions yield nearly the same estimates but researchers used to use logit regression more before the introduction of fast computers (Stock & Watson, 2012). Probit and logit regressions estimate the probability that the dependent variable Y takes on value 1 by first estimating the coefficients in either the cumulative normal distribution function (probit) or the cumulative logistic distribution function by using maximum likelihood estimators.

To calculate the probability that Y=1, the probit model has the following form:

$$\Pr(Y = 1|\, X_1, X_2, \ldots\, X_k) = \varphi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k) \quad (5.1)$$

In words this means, the probability that the dependent variable Y is 1, given values for independent variables X which is used to estimate the parameters from which I calculate the z-value z=($\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k$). Where the z-value can be looked up in the cumulative standard normal distribution table to get to the probability that Y=1.

For the logit model, the difference with the probit model is that this method uses logit cumulative distribution instead of normal. That yields the following model:

$$\Pr(Y = 1|\, X_1, X_2, \ldots\, X_k) = F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k) \quad (5.2)$$

$$= \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k)}} \quad (5.3)$$

Here, to calculate the probability that Y=1, again the parameters are estimated first but now they are inserted into a logit cumulative distribution function (model 5.3) to come to the actual probabilities.

As models 5.1 and 5.2 of the the probit and logit regressions show, the functions of the regression methods fall into the cumulative normal distribution function (φ) and cumulative logistic distribution function (F). These distributions have non-linear properties and as a result the coefficients cannot be estimated using OLS.

The method the software program STATA uses to predict the probit model is maximum likelihood estimation. The maximum likelihood estimator calculates the values of the parameters that maximize the probability of drawing the data that is observed. To obtain this an expression of the likelihood function is needed. This function is a joint probability distribution and is treated as a function of unknown coefficients.

When using the output from STATA it is only suitable to make conclusions on whether the relation between the independent and dependent variable is positive or negative. To somewhat make inferences from the regression I use the at means command. This gives results on the change in the probability that Y=1 seen from the mean of the independent variable.

Variables tables of chapter 5

Table A5.1

Variable name	Database	Description
Dependent variables (performance measures)		
Return on assets (ROA)	Compustat bank	ROA = net income / total assets
Return on equity (ROE)	Compustat bank	ROE = net income / shareholder's equity
Tobin's Q	Compustat bank	Tobin's Q= ((stock price * common shares outstanding) + total preferred stock + (total liabilities – cash and due from banks total)) / total assets Based on Perfect & Wiles (1994) calculation method
Buy-and-hold stock returns	CRSP	12 month mean of CRSP stock return data
Dependent variables (CEO risk level variables)		
Leverage	Compustat bank	Leverage = total liabilities / total assets
R&D expenditure	Compustat bank	R&D = taxable investment / total assets The measure on R&D expenditures can be seen as the amount of investment needed to create new growth opportunities. As in the Compustat database no R&D expenditure variable exists and the capital expenditure variable contained little data, the choice was made to use the taxable investment variable instead.
Stock return volatility	CRSP	Stock return volatility = SD(buy-and-hold stock returns)
Investment return volatility	Compustat bank	Investment return = SD(aggregate loan and investment revenue) As I chose taxable investment as the variable to measure R&D expenditures and alternative for investment returns is needed. I chose aggregate loan and investment revenue because these are the core banking investment activities. The more volatile this number the more risky banking investment activities.
Cash	Compustat bank	Cash = Cash and due from banks / total assets I chose an alternative proxy for cash than the cash variable given by Compustat because the column was empty.
Merger Activity	Compustat banks	Dummy variable: Merger activity = 1 if aqc or aqa> 0 and zero otherwise. The data in Compustat on acquisitions is rather limited. Therefore, I create a dummy variable for merger activity

		that adopts value 1 if the value for aqc or aqa variables from Compustat is above zero.
CEO outsider	Execucomp	Dummy variable: CEO outsider = 1, if date became CEO = date joined company. CEO outsider = 1, if date became CEO < date joined company CEO outsider = 0, in all other situations I assume that in the event date became CEO < date joined company that this is a database mistake and that the CEO is also an outsider.
Risk Score Leverage	Compustat bank	Risk Score Leverage = leverage quantile score over the period 2002 to 2006. I create 4 quantiles, by calculating the 25^{th}, 50^{th} and 75^{th} percentiles, for the variable leverage over the 2002 to 2006 time period. I choose this time period as I need the pre-crisis risk scores. Then, for every year and every firm I compare the value of leverage to the 2002 to 2006 quantiles for leverage. I assign risk score 1 for the first, 2 for the second, 3 for the third and 4 for the fourth quantile as the higher the quantile the higher the risk. The risk score leverage variable now reflects the level of leverage risk of the firm in a specific year.
Risk Score R&D expenditure	Compustat bank	The same calculation method as Risk Score Leverage applies only switching leverage to R&D expenditure. The higher R&D expenditure, the more investment so the more risky the investment policy.
Risk Score Stock return volatility	CRSP	The same calculation method as Risk Score Leverage applies only switching leverage to stock return volatility. The higher stock return volatility, the more risky the firm's activities.
Risk Score Investment return volatility	Compustat bank	The same calculation method as Risk Score Leverage applies only switching leverage to investment return volatility. The higher investment return volatility the more volatile cash flows are and hence the more risky the firm.
Risk Score Cash	Compustat bank	The same calculation method as Risk Score Leverage applies only switching leverage to cash and changing the highest quantile to firms with the lowest cash amounts. The higher the fraction of cash in the firm the less risky the firm because buffers for losses exist.
Risk Score Merger Activity	Compustat bank	Risk score merger activity = Merger activity * 4 Firms that conduct mergers or acquisitions are more risky than other firms as mergers are on average not

		profitable investment strategies.
Risk Score CEO Outsider	Compustat bank	Risk score CEO outsider = CEO Outsider * 4 Firms that have CEOs that were not previously employees at the firm tend to take more risk than insider CEO's.
CEO Risk Level	Compustat bank & CRSP	CEO Risk Level = Risk Score Leverage + Risk Score R&D expenditure + Risk Score Stock return volatility + Risk Score Investment return volatility + Risk Score Cash+ Risk Score Merger Activity + Risk Score CEO Outsider
CEO Risk Level 0206	Compustat bank & CRSP	CEO Risk Level 0206 = mean(CEO Risk Level) for each firm over 2002 to 2006 The CEO Risk level is the average CEO risk level score over the years 2002 to 2006 for all firms.

Dependent variable (CEO turnover)		
CEO turnover	Execucomp	Dummy variable: CEO turnover = 1 if, CEO identifier previous year ≠ CEO identifier current year For this method manual corrections are needed as sometimes execid (CEO/executive identifier) changes without the CEO changing title or name.

Independent variables		
Salary	Execucomp	Salary = Salary($)/ tdc1
Salary 0206	Execucomp	Average of the salary variable over the years 2002 to 2006 for every firm
Bonus	Execucomp	Bonus = + Bonus($) / tdc1
Bonus 0206	Execucomp	Average of the bonus variable over the years 2002 to 2006 for every firm
Options	Execucomp	Before 2006: Options = (option_awards_blk_value*old_datafmt_flag) / tdc1 After 2006: Options = (option_awards_fv*old_dtamt_flag) / tdc1
Options 0206		Average of the options variable over the years 2002 to 2006 for every firm
Stock	Execucomp	Stock = shrown_excl_opts * stock price
Stock 0206	Execucomp	Average of the Stock variable over the years 2002 to 2006 for every firm

Control variables		
Total debt	Compustat	Total debt = debt in current liabilities + long term debt total (based on Lemmon, Roberts & Zender)
Book leverage	Compustat	Book leverage = total debt/ total assets (based on Lemmon, Roberts & Zender)
Firm Size	Compustat	Firm size = log(total assets)
Market value of equity	Compustat	Mequity = stock price * total common shares outstanding (based on Lemmon, Roberts & Zender)
Market value of leverage	Compustat	Mleverage = total debt / (total debt + mequity) (based on Lemmon, Roberts & Zender)
Market-to-book	Compustat	Market-to-book = (mequity + total debt + preferred stock liquidating value) / total assets (based on Lemmon, Roberts & Zender)
Diversification	Compustat	Diversification = total non-interest income / net income Proxy for diversification is the fraction of income from non-banking activites, so non-interest income activites in this case (based on Chen et al., 2005)
CEO age	Execucomp	CEO age = age
Time to retirement	Execucomp	Time to retirement = (65-age CEO) But only: if for 2002 the age of the CEO was 43 or above, if for 2003 the age of the CEO was 44 or above, if for 2004 the age of the CEO was 45 or above, if for 2005 the age of the CEO was 46 or above, if for 2006 the age of the CEO was 47 or above, if for 2007 the age of the CEO was 48 or above, if for 2008 the age of the CEO was 49 or above, if for 2009 the age of the CEO was 50 or above, Otherwise the formula changes to Time to retirement = (67-age CEO) According to the social security administration of the U.S. the retirement age is 65 for people born before 1959 and 67 for people born after.
CEO tenure	Execucomp	CEO tenure = (current year – year became CEO)

Tier-1-Capital	Compustat	Tier-1-capital = risk-adjusted capital ratio – tier 1 / total debt This is the amount of cash held to comply to FED capital requirements. Usually, banks hold more than the required amount. To compare how much more capital is held at one bank than other banks it should be compared to total debt.
Lag performance	Compustat	Lag performance = 1-year lag on a performance variable performance variables: ROA, ROE, Tobin's Q, buy-and-hold returns.
Equity Ownership	Execucomp	Equity ownership = shrown_excl_opts_pct
CEO duality	Risk Metrics	Dummy variable: CEO duality =1, if the CEO is also the chairman of the supervisory board and zero otherwise.
Board size	Risk Metrics	Board size = number of board members
Board independence	Risk Metrics	Board independence = amount of independent directors / board size
Value change options		Value change options = (opt_unex_exer_est_val + (opt_unex_unexer_est_val)2006 - (opt_unex_exer_est_val + opt_unex_unexer_est_val) in year x
Value change stock		Value change stock = (shrown_excl_opts * PRC) for 2006 – (shrown_excl_opts * PRC) in x year

Table A5.1: All variables and variable descriptions.

APPENDIX B

Other result tables from chapter 6

Table A1: Results model 2: the effects of pre-crisis CEO risk level on during crisis performance
The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable ROA. In regression b to d time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Return on Assets			
Variable	(a)	(b)	(c)	(d)
CEO risk level 2002-2006	-0.001*	-0.001**	-0.001*	-0.001**
	(-1.844)	(-2.351)	(-1.699)	(-2.248)
Firm size	0	0.001	0.001	0.001
	(0.077)	(0.567)	(0.714)	(0.688)
ROA (1-period lag)	0.156**	0.188***	0.188**	0.188*
	(2.333)	(2.840)	(1.998)	(1.920)
CEO turnover	-0.006	-0.005	-0.005	-0.005
	(-1.119)	(-0.978)	(-0.885)	(-0.872)
CEO duality	-0.001	-0.001	-0.001	-0.001
	(-0.428)	(-0.331)	(-0.334)	(-0.338)
CEO outsider	-0.003	-0.003	-0.003	-0.003
	(-0.622)	(-0.735)	(-0.339)	(-0.388)
Board size	0.000	0.000	0.000	0.000
	(-0.289)	(-0.387)	(-0.539)	(-0.568)
Board independence	-0.018	-0.019	-0.019*	-0.019*
	(-1.392)	(-1.517)	(-1.863)	(-1.752)
Equity Ownership	-0.086**	-0.090***	-0.09	-0.090*
	(-2.377)	(-2.624)	(-1.561)	(-1.714)
Constant	0.033**	0.042***	0.042***	0.042***
	(2.102)	(2.852)	(2.866)	(3.584)
Obs	204	204	204	204
R^2	0.11	0.20	0.20	0.20
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

Table A2: Results model 2: the effects of pre-crisis CEO risk level on during crisis performance
The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable ROE. In regression b to d time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Return on Equity			
Variable	(a)	(b)	(c)	(d)
CEO risk level 2002-2006	-0.005	-0.009	-0.009	-0.009
	(-0.637)	(-1.146)	(-0.979)	(-1.07)
Firm size	0.003	0.01	0.01	0.01
	(0.174)	(0.636)	(0.813)	(0.79)
ROE (1-period lag)	0.165***	0.163***	0.163***	0.163***
	(3.968)	(4.027)	(3.188)	(3.517)
CEO turnover	-0.101	-0.083	-0.083	-0.083
	(-1.4)	(-1.205)	(-1.358)	(-1.345)
CEO duality	-0.024	-0.016	-0.016	-0.016
	(-0.579)	(-0.414)	(-0.443)	(-0.403)
CEO outsider	-0.054	-0.062	-0.062	-0.062
	(-0.851)	(-1.011)	(-0.569)	(-0.604)
Board size	-0.005	-0.006	-0.006	-0.006
	(-0.67)	(-0.746)	(-0.954)	(-0.982)
Board independence	-0.468**	-0.479***	-0.479**	-0.479**
	(-2.504)	(-2.685)	(-2.262)	(-2.152)
Equity Ownership	-4.396***	-4.456***	-4.456**	-4.456**
	(-8.323)	(-8.828)	(-2.066)	(-2.144)
Constant	0.553**	0.692***	0.692***	0.692***
	(2.482)	(3.213)	(3.155)	(3.309)
Obs	204	204	204	204
R^2	0.35	0.41	0.41	0.41
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

Table A3: Results model 2: the effects of pre-crisis CEO risk level on during crisis performance
The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable Tobin's Q. In regression b to d time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Tobin's Q			
Variable	(a)	(b)	(c)	(d)
CEO risk level 2002-2006	-0.003	-0.004*	-0.004**	-0.004
	(-1.314)	(-1.92)	(-1.99)	(-1.594)
Firm size	-0.015***	-0.011***	-0.011***	-0.011**
	(-3.245)	(-3.027)	(-2.904)	(-2.211)
Tobin's Q (1-period lag)	0.307***	0.530***	0.530***	0.530***
	(4.602)	(8.479)	(5.328)	(4.848)
CEO turnover	0.016	0.014	0.014	0.014
	(0.799)	(0.918)	(1.158)	(1.218)
CEO duality	0.007	0.009	0.009	0.009
	(0.631)	(0.972)	(1.053)	(1.107)
CEO outsider	0.011	0.009	0.009	0.009
	(0.622)	(0.607)	(0.789)	(0.69)
Board size	-0.001	-0.001	-0.001	-0.001
	(-0.437)	(-0.715)	(-0.849)	(-0.753)
Board independence	-0.144***	-0.106**	-0.106***	-0.106**
	(-2.644)	(-2.462)	(-2.653)	(-2.45)
Equity Ownership	-0.041	-0.084	-0.084	-0.084
	(-0.278)	(-0.716)	(-0.645)	(-0.627)
Constant	0.997***	0.751***	0.751***	0.751***
	(9.552)	(8.089)	(6.367)	(6.247)
Obs	157	157	157	157
R^2	0.32	0.58	0.58	0.58
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

Table A4: Results model 4: the effects of during crisis CEO turnover on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable ROA. In regression b to d, time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Return on Assets			
	(a)	(b)	(c)	(d)
CEO turnover	-0.0076*	-0.0062	-0.0062	-0.0062
	(-1.6765)	(-1.3866)	(-1.1654)	(-1.1654)
Firm size	0.0014	0.0015	0.0015*	0.0015*
	(1.279)	(1.4085)	(1.732)	(1.732)
Market-to-book	0.1460***	0.1373***	0.1373***	0.1373***
	(6.5962)	(5.5652)	(6.4983v	(6.4983)
ROA (1-period lag)	0.1439**	0.1359**	0.1359*	0.1359*
	(2.372)	(2.1749)	(1.7536)	(1.7536)
Tier-1 capital	0.0311	0.0354	0.0354	0.0354
	(0.3668)	(0.4208)	(0.7496)	(0.7496)
Book leverage	-0.1271***	-0.1185***	-0.1185***	-0.1185***
	(-4.669)	(-4.3102)	(-6.1927)	(-6.1927)
CEO duality	-0.0027	-0.0022	-0.0022	-0.0022
	(-0.9962)	(-0.8469)	(-0.8397)	(-0.8397)
CEO outside	-0.0039	-0.0045	-0.0045	-0.0045
	(-0.9937)	(-1.1847)	(-0.6222)	(-0.6222)
Board size	-0.0003	-0.0003	-0.0003	-0.0003
	(-0.6671)	(-0.5589)	(-0.7615)	(-0.7615)
Board independence	-0.0195*	-0.0184	-0.0184*	-0.0184*
	(-1.6593)	(-1.5974)	(-1.8935)	(-1.8935)
Equity Ownership	-0.0562*	-0.0566*	-0.0566	-0.0566
	(-1.6717)	(-1.7155)	(-1.2599)	(-1.2599)
Constant	-0.0143	-0.0105	-0.0105	-0.0105
	(-0.9984)	(-0.7331)	(-0.9981)	(-0.9981)
Obs	205	205	205	205
R^2	0.26	0.31	0.31	0.31
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

Table A5: Results model 4: the effects of during crisis CEO turnover on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable ROE. In regression b to d, time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Return on Equity			
	(a)	(b)	(c)	(d)
CEO turnover	-0.1216*	-0.099	-0.099	-0.099
	(-1.798)	(-1.497)	(-1.636)	(-1.636)
Firm size	0.021	0.024	0.024	0.024
	(1.298)	(1.493)	(1.615)	(1.615)
Market-to-book	1.7400***	1.5532***	1.5532***	1.5532***
	(5.253)	(4.245)	(5.245)	(5.245v
ROE (1-period lag)	0.1447***	0.1361***	0.1361**	0.1361**
	(3.739)	(3.492)	(2.572)	(2.572)
Tier-1 capital	0.222	0.383	0.383	0.383
	(0.176)	(0.307)	(0.492)	(0.492)
Book leverage	-1.6011***	-1.4415***	-1.4415***	-1.4415***
	(-3.936)	(-3.527)	(-3.812)	(-3.812)
CEO duality	-0.034	-0.025	-0.025	-0.025
	(-0.854)	(-0.629)	(-0.664)	(-0.664)
CEO outside	-0.052	-0.063	-0.063	-0.063
	(-0.904)	(-1.114)	(-0.703)	(-0.703v
Board size	-0.008	-0.007	-0.007	-0.007
	(-1.098)	(-0.977)	(-1.170)	(-1.170)
Board independence	-0.5084***	-0.4947***	-0.4947**	-0.4947**
	(-2.905)	(-2.892)	(-2.133)	(-2.133)
Equity Ownership	-4.0093***	-4.0462***	-4.0462**	-4.0462**
	(-7.963)	(-8.211)	(-2.058)	(-2.058)
Constant	0.102	0.169	0.169	0.169
	(0.473)	(0.785)	(0.797)	(0.797)
Obs	205	205	205	205
R^2	0.43	0.47	0.47	0.47
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

Table A6: Results model 4: the effects of during crisis CEO turnover on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable Tobin's Q. In regression b to d, time fixed effects are added. Then, in regression c and d, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression d are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Tobin's Q			
	(a)	(b)	(c)	(d)
CEO turnover	0.007	0.011	0.011	0.011
	(0.429)	(0.740)	(0.813)	(0.813)
Firm size	-0.0147***	-0.0098***	-0.0098**	-0.0098**
	(-3.558)	(-2.619)	(-2.048)	(-2.048)
Market-to-book	0.6664***	0.3913***	0.3913***	0.3913***
	(7.900)	(4.507)	(2.890)	(2.890)
Tobin's Q (1-period lag)	0.2887***	0.4753***	0.4753***	0.4753***
	(5.148)	(7.868)	(3.847)	(3.847)
Tier-1 capital	-0.281	0.165	0.165	0.165
	(-0.922)	(0.587)	(0.463)	(0.463)
Book leverage	-0.4926***	-0.3081***	-0.3081*	-0.3081*
	(-5.063)	(-3.365)	(-1.954)	(-1.954)
CEO duality	-0.005	0.004	0.004	0.004
	(-0.439)	(0.451)	(0.572)	(0.572)
CEO outside	0.013	0.007	0.007	0.007
	(0.891)	(0.529)	(0.721)	(0.721)
Board size	-0.002	-0.001	-0.001	-0.001
	(-0.951)	(-0.746)	(-0.861)	(-0.861)
Board independence	-0.1232***	-0.1088***	-0.1088**	-0.1088**
	(-2.648)	(-2.628)	(-2.497)	(-2.497)
Equity Ownership	0.057	0.011	0.011	0.011
	(0.443)	(0.099)	(0.093)	(0.093)
Constant	0.8496***	0.6656***	0.6656***	0.6656***
	(10.825)	(8.476)	(5.712)	(5.712)
Obs	157	157	157	157
R^2	0.52	0.63	0.63	0.63
Time fixed effect?	No	Yes	Yes	Yes
Robust?	No	No	Yes	Yes
Cluster?	No	No	No	Yes

Table A7: Results model 5: the effects of pre-crisis salary, stock and options on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable ROA. In regression b,d e and f, time fixed effects are added. Then, in regression e and f, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression f, are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Return on Assets					
Variable	(a)	(b)	(c)	(d)	(e)	(f)
Salary 2002-2006	0.009	0.009	0.0141*	0.0160**	0.016	0.016
	(1.392)	(1.510)	(1.859)	(2.163)	(1.337)	(1.337)
Bonus 2002-2006	-0.011	-0.011	-0.001	0.000	0.000	0.000
	(-1.018)	(-1.141)	(-0.053)	(-0.036)	(-0.030)	(-0.030)
Stock 2002-2006	0.000	0.000	0.000	0.000	0.000	0.000
	(-0.289)	(-0.421)	(0.886)	(0.788)	(0.708)	(0.708)
Options 2002-2006	0.010	0.010	0.005	0.006	0.006	0.006
	(1.184)	(1.350)	(0.662)	(0.778)	(0.705)	(0.705)
Firm size			0.002	0.002	0.002	0.002
			(1.359)	(1.612)	(1.418)	(1.418)
Market-to-book			0.1468***	0.1390***	0.1390***	0.1390***
			(6.499)	(5.506)	(5.040)	(5.040v
ROA (1-period lag)			0.1292**	0.1174*	0.117	0.117
			(2.097)	(1.858)	(1.281)	(1.281)
Tier-1 capital			0.051	0.056	0.056	0.056
			(0.588)	(0.659)	(0.914)	(0.914)
Book leverage			-0.1254***	-0.1178***	-0.1178***	-0.1178***
			(-4.451)	(-4.160)	(-5.308)	(-5.308)
CEO turnover			-0.007	-0.006	-0.006	-0.006
			(-1.604)	(-1.290)	(-1.091)	(-1.091)
CEO duality			-0.002	-0.002	-0.002	-0.002
			(-0.795)	(-0.658)	(-0.585)	(-0.585)
CEO outsider			-0.003	-0.003	-0.003	-0.003
			(-0.631)	(-0.754)	(-0.482)	(-0.482)
Board size			-0.001	-0.001	-0.001	-0.001
			(-1.122)	(-1.089)	(-1.381)	(-1.381)
Board independence			-0.019	-0.019	-0.0186*	-0.0186*
			(-1.596)	(-1.559)	(-1.846)	(-1.846)
Equity Ownership			-0.085	-0.080	-0.080	-0.080
			(-1.637)	(-1.577)	(-1.003)	(-1.003)
Constant	-0.002	0.0068*	-0.025	-0.023	-0.023	-0.023
	(-0.585)	(1.729)	(-1.427)	(-1.344)	(-1.017)	(-1.017)
Obs	263	263	205	205	205	205
R^2	0.02	0.13	0.28	0.33	0.33	0.33
Time fixed effect?	No	Yes	No	Yes	Yes	Yes
Robust?	No	No	No	No	Yes	Yes
Clustering?	No	No	No	No	No	Yes

Table A8: Results model 5: the effects of pre-crisis salary, stock and options on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable ROE. In regression b,d e and f, time fixed effects are added. Then, in regression e and f, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression f, are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Return on Equity					
Variable	(a)	(b)	(c)	(d)	(e)	(f)
Salary 2002-2006	0.100	0.102	0.000	0.029	0.029	0.029
	(0.629)	(0.657)	(-0.002)	(0.269)	(0.171)	(0.171)
Bonus 2002-2006	(-0.152	-0.164	-0.052	-0.062	-0.062	-0.062
	(-0.612)	(-0.675)	(-0.341)	(-0.415)	(-0.342)	(-0.342)
Stock 2002-2006	0.000	0.000	0.0000***	0.0000***	0.0000*	0.0000*
	(-1.157)	(-1.286)	(3.821)	(3.793)	(1.807)	(1.807)
Options 2002-2006	0.166	0.179	-0.026	-0.015	-0.015	-0.015
	(0.859)	(0.944)	(-0.224)	(-0.134)	(-0.123)	(-0.123)
Firm size			-0.009	-0.002	-0.002	-0.002
			(-0.388)	(-0.082)	(-0.073)	(-0.073)
Market-to-book			1.5611***	1.3672***	1.3672***	1.3672***
			(4.728)	(3.727)	(4.011)	(4.011)
ROE (1-period lag)			0.1584***	0.1493***	0.1493***	0.1493***
			(4.135)	(3.868)	(3.339)	(3.339)
Tier-1 capital			0.449	0.660	0.660	0.660
			(0.363)	(0.537)	(0.835)	(0.835)
Book leverage			-1.3036***	-1.1526***	-1.1526***	-1.1526***
			(-3.169)	(-2.795)	(-3.312)	(-3.312)
CEO turnover			-0.1260*	-0.103	-0.1028*	-0.1028*
			(-1.910)	(-1.594)	(-1.818)	(-1.818)
CEO duality			-0.010	0.000	0.000	0.000
			(-0.243)	(-0.007)	(-0.007)	(-0.007)
CEO outsider			-0.068	-0.074	-0.074	-0.074
			(-1.147)	(-1.288)	(-0.974)	(-0.974)
Board size			-0.009	-0.009	-0.009	-0.009
			(-1.202)	(-1.165)	(-1.436)	(-1.436)
Board independence			-0.4266**	-0.4231**	-0.4231**	-0.4231**
			(-2.417)	(-2.448)	(-2.343)	(-2.343)
Equity Ownership			-6.1041***	-6.0641***	-6.0641**	-6.0641**
			(-8.122)	(-8.261)	(-2.338)	(-2.338)
Constant	-0.065	0.088	0.308	0.346	0.346	0.346
	(-0.710)	(0.902)	(1.196)	(1.349)	(0.875)	(0.875)
Obs	263	263	205	205	205	205
R^2	0.01	0.06	0.47	0.51	0.51	0.51
Time fixed effect?	No	Yes	No	Yes	Yes	Yes
Robust?	No	No	No	No	Yes	Yes
Clustering?	No	No	No	No	No	Yes

Table A9: Results model 5: the effects of pre-crisis salary, stock and options on during crisis financial firm performance

The sample contains data from banks for the years 2007 until 2009 from Compustat, Execucomp, CRSP and RiskMetrics. I run a panel regression on the performance variable Tobin's Q. In regression b,d e and f, time fixed effects are added. Then, in regression e and f, the errors are corrected for heteroscedasticity. The t-statistics in the table of regression f, are robust to heteroskedasticity and serial correlation across firms. Statistical significance at 10%, 5% and 1% level is denoted by *, ** and ***, respectively.

	Dependent variable: Tobin's Q					
Variable	(a)	(b)	(c)	(d)	(e)	(f)
Salary 2002-2006	0.0475*	0.0460**	0.014	0.018	0.018	0.018
	(1.874)	(2.065)	(0.523)	(0.737)	(0.672)	(0.672)
Bonus 2002-2006	-0.054	-0.0585*	0.006	-0.032	-0.032	-0.032
	(-1.357)	(-1.675)	(0.164)	(-0.920)	(-0.654)	(-0.654)
Stock 2002-2006	0.000	0.000	0.0000*	0.0000**	0.0000**	0.0000**
	(0.101)	(-0.253)	(1.672)	(2.374)	(2.241)	(2.241)
Options 2002-2006	-0.025	-0.022	0.018	0.023	0.023	0.023
	(-0.800)	(-0.792)	(0.590)	(0.883)	(0.635)	(0.635)
Firm size			-0.0182***	-0.0128**	-0.0128**	-0.0128**
			(-3.218)	(-2.555)	(-2.314)	(-2.314)
Market-to-book			0.6436***	0.3366***	0.3366**	0.3366**
			(7.402)	(3.790)	(2.266)	(2.266)
Tobin's Q (1-period lag)			0.2870***	0.4847***	0.4847***	0.4847***
			(5.113)	(8.122)	(4.134)	(4.134)
Tier-1 capital			-0.236	0.241	0.241	0.241
			(-0.766)	(0.863)	(0.644)	(0.644)
Book leverage			-0.4516***	-0.2521***	-0.252	-0.252
			(-4.467)	(-2.697)	(-1.544)	(-1.544)
CEO turnover			0.006	0.010	0.010	0.010
			(0.327)	(0.675)	(0.734)	(0.734)
CEO duality			-0.001	0.009	0.009	0.009
			(-0.120)	(0.929)	(1.094)	(1.094)
CEO outsider			0.010	0.003	0.003	0.003
			(0.650)	(0.192)	(0.233)	(0.233)
Board size			-0.002	-0.002	-0.002	-0.002
			(-0.995)	(-0.976)	(-1.074)	(-1.074)
Board independence			-0.1126**	-0.1051**	-0.1051**	-0.1051**
			(-2.324)	(-2.483)	(-2.333)	(-2.333)
Equity Ownership			-0.198	-0.3058*	-0.3058*	-0.3058*
			(-1.021)	(-1.793)	(-1.823)	(-1.823)
Constant	0.9879***	1.0337***	0.8646***	0.6845***	0.6845***	0.6845***
	(67.658)	(73.668)	(9.978)	(8.301)	(6.190)	(6.190)
Obs	263	263	157	157	157	157
R^2	0.04	0.26	0.54	0.65	0.65	0.65
Time fixed effect?	No	Yes	No	Yes	Yes	Yes
Robust?	No	No	No	No	Yes	Yes
Clustering?	No	No	No	No	No	Yes