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List of Abbreviations

Abbreviation:	Meaning:
BHC	Bank Holding Company
CDS	Credit Default Swap
CRD	Capital Requirements Directive
EU	European Union
KPI	Key Performance Indicator
LTI	Long-term Incentive
LTIP	Long-term Incentive Plan
M&A	Mergers and Acquisitions
OLS	Ordinary Least Squares
ROA	Return on Assets
ROAE	Return on Average Equity
ROE	Return on Equity
STI	Short-term Incentive
TARP	Trouble Asset Relief Program
VIF	Variance Inflation Factor

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1. Introduction

Executive compensation, being one of the primary corporate governance mechanisms to align managerial incentives with company stakeholders' interests, has been fiercely debated in literature and practice. Scholarly works, starting with Jensen and Meckling (1976), stress the importance of designing pay contracts that motivate managers to engage in value enhancing activities in the interest of shareholders, and at the same time mitigate the risk-shifting problematic embedded in principal-agent conflicts between bondholders and shareholders. Meanwhile it is clear that not only the level, but the type of pay components is what incentivizes executives, and that compensation should be tied to long-term performance.[1] In particular, after the recent financial crisis the question was raised about whether incentive misalignment in executive compensation was responsible for excessive risk taking that resulted in extremely poor performance, which in some instances was even accompanied by the need for government support to avoid bankruptcy. This compensation-risk-performance problematic is particularly severe in the banking industry as it is directly linked to the stability of the whole financial system.[2] The aim of this thesis is to shed light on the link between executive compensation structures and performance in the banking industry in the years following the financial crisis.

I employ a unique "hand-collected" compensation data set of 52 Eurozone banks during the period 2010 – 2014 to analyze the relationship between executive pay structure and performance in the banking industry. [3] The compensation data is gathered from the annual, remuneration, corporate governance reports, and pillar 3 disclosures of banks. The list of my sample banks emerges from the SNL Financial database, from which I extract all financial, and stock market information for my dependent and control variables.

My approach differs from prior literature in that I analyze the direct relationship between several remuneration structure elements and performance by fragmenting compensation as precisely as possible in long- and short-term pay components. In particular, I account for the term-structure of compensation in that I decompose executive pay in long- and short-term incentives. I further examine the form in which managerial pay is granted by studying the

[1] The idea that compensation structure is relevant for incentivizing managers goes back to Jensen and Murphy (1990), while the notion that compensation should be tied to long-term performance is related to Bebchuk and
[2] See Bolton, Mehran, and Shapiro (2015).
[3] Most prior studies that analyze compensation structure and firm performance concentrate on the U.S. and include among others Fahlenbrach and Stulz (2011), Jokivuolle, Keppo, and Yuan (2015), Bennett, Güntay, and Unal (2015).

contribution of cash- and share-based long and short-term portions of compensation to performance. In a subsequent model specification, I employ short-term incentives and decompose long-term incentives further in deferred pay and other forms of long-term incentives, in order to incorporate the effect of specific mechanisms of compensating managers, such as inside debt compensation.

My analysis concentrates primarily on the whole management board, including CEO and non-CEO members, as I assume that executive pay of all managers, irrespective of their executive board function should be tailored in a way to contribute to performance. Nevertheless, I perform my baseline analysis for both CEO and non-CEO members, in order to compare and contrast my results between these two groups.[4] I further analyze the differences between large banks that hold over €50 billion in total assets and small banks that hold less than €50 billion. Finally, I also look at the impact of government ownership. I use annualized continuously compounded stock returns to measure performance, but also provide a robustness check for the validity of my results, employing two measures of operating performance- return on average risk-weighted assets and Return on Average Equity (ROAE). I control for bank size and leverage in my baseline models.

Generally, I find that irrespective of how compensation structure is decomposed, long-term forms of compensation contribute more and positively to explaining performance than short-term remuneration elements. This effect, however, is absent in the case of large banks, which exhibit a significant association between total short-term incentives and performance. The latter relationship disappears when controlling for government ownership.

In particular, the results for the whole management board show that total long-term incentives have significantly positive relationship with stock market performance. This relationship is considerably stronger than the association of total short-term incentives with performance. Accounting for the form in which incentives are granted leads to strong and significant evidence that long-term cash-based incentives have a greater positive contribution to performance than long-term share-based incentives. I find no evidence that this is true for short-term cash, and equity-based incentives. In my third baseline model specification, I observe that deferred pay has the most powerful and positive association with stock market

[4] I define the sample consisting of all CEO and non-CEO management board members as the "Management Board" sample; the sample with all non-CEO management board members is referred to as the "Key Management" sample, whereas the sample with the CEO board members only is defined as the "CEO" sample. The construction of all three samples is described in the "Samples" section.

performance as compared to short-term incentives and other forms of long-term incentives. Overall, the effects from the baseline analysis for the whole management board are confirmed both for CEOs and non-CEO board members. Interestingly, when comparing the results for the CEO and Key Management samples, although the main effects are the same in both groups, all compensation variables exhibit a stronger relationship to performance in the case of non-CEO board members than in the case of CEOs. Splitting the Management Board sample in large and small banks gives very different results for large and small banks. While almost all compensation variables are significant in the case of small banks, with long-term components having stronger contribution to stock market performance than short-term incentives over the three baseline models, large banks exhibit the opposite effect. The only significant variable that has a positive contribution to performance among large banks are total short-term incentives. When accounting for the level of government ownership stake, I find a significantly negative relationship between government ownership and performance. Moreover, only the long-term compensation variables are significant across my three models in this setting. After splitting the sample in large and small banks I find that government ownership is insignificant in small banks and has a highly significant negative performance contribution in large banks. The remuneration structure effects remain the same in small banks, while among large banks even short-term incentives are insignificant in the presence of government ownership. My control variables exhibit consistent patterns over the three model specifications and in all settings, except for the split in large and small banks. While total assets are on the whole negatively and significantly associated with performance, the variable is insignificant in the case of large banks and significant among small banks. Leverage exhibits a strong and significantly positive association with performance. However, it is insignificant in the case of small banks, and highly significant among large banks. On the whole, the results of my baseline models are robust to changes in performance measures, when I use return on average risk-weighted assets and ROAE. Interestingly however, the relationship between long-term compensation components and performance is stronger when the performance measure is continuously compounded stock returns and weakest when the performance measure is ROAE, while exactly the opposite holds for short-term incentives. In the course of this work I will elaborate on all these effects in greater detail.

The rest of the thesis is structured as follows. The next section, “Motivation and Research Agenda” presents the general motivation for analyzing pay structure and performance in the banking industry and discusses the chosen research design and the examined research

questions. Section 3, “Literature Review”, provides the theoretical context for my analysis by reviewing the banking compensation literature. Subsequently, I present the statistical tools employed in my analysis in Section 4, “Methodology”, and introduce my data, samples and variables in Section 5, “Data”. Section 6, “Empirical Analysis” is the main part of this thesis. It contains all results of my empirical analysis in all its model specifications and settings. The last section concludes and provides an outlook for future research.

2. Motivation and Research Agenda

Why is the composition of executive pay and its association with bank performance an interesting topic and what kind of settings could shape the presence and strength of this relationship? In this section, I discuss my motivation for examining these questions. Moreover, I formulate my general research agenda and outline the reasoning behind my research design choices. I conclude the section by discussing specific research questions that are addressed as part of my analysis.

There are a handful of studies in the banking literature that examine the direct association between compensation and performance in the banking industry.[5] To the best of my knowledge, there is no study that analyzes the remuneration composition - performance relationship in banks by taking into account the term structure of remuneration, the forms in which executive pay is granted, as well as particular mechanisms to reward managers, such as deferred pay in combination with other long- and short-term incentives. My aim is to shed light on this relationship by analyzing executive pay structure in several settings and with a couple of model specifications. Specifically, I concentrate on countries from the Eurozone and create a unique "hand-collected" compensation data set consisting of 52 Eurozone banks between 2010 and 2014.[6] The reasons for my choice of the Eurozone are twofold. The first reason is that I would like to supplement the existing body of literature which focuses almost exclusively on the U.S. by analyzing the effects of remuneration composition on performance in Europe.[7] On the other hand, it is convenient to choose countries from the Eurozone for the purpose of studying banks in Europe, because of the common currency union and the uniform bank regulatory requirements within the European Union (EU).

I perform a baseline analysis for the whole management board and then place the derived models in several different contexts. I compare the results for CEOs and other non-CEO board members, for large and small banks, and further account for the presence of government

[5] Studies in the banking literature that examine the relationship between compensation structure and performance include Fahlenbrach and Stulz (2011), and Bennett, Güntay, and Unal (2015). Their main findings are presented in detail in the "Literature Review" section.

[6] The compensation data has been collected from the annual, compensation, corporate governance reports and pillar 3 disclosures of the relevant banks during the sample period. Further details on the collection process and sample construction are provided in the "Data" section.

[7] Vallascas and Hagendorff (2013) conduct their analysis on a sample consisting of U.S. and European banks. However, their focus lies on the relationship between CEO cash bonuses and default risk. IMF (2014) also employs a sample of banks from several countries from all continents around the globe, still the study deals with the relationship between risk and governance characteristics, among which also compensation.

ownership. My choice of the whole management board as a setting for my baseline analysis has a relatively straightforward reasoning. As it is commonly known, the aim of executive compensation is to align all managerial interests with those of investors, and in that to induce performance. Therefore, I suppose that the compensation of all managers in the management board, irrespective of their concrete function, should be tailored in a way that relates positively with performance. Thus, I first look at the management board as a whole, hypothesizing that the general findings would also hold for the other two groups of executives. Subsequently, I compare and contrast the results for CEOs and other non-CEO management board members. In the following, I discuss the subtopics in my analysis and the motivation for examining them.

As mentioned before, the academic literature concedes that compensation should be tied to long-term performance.[8] Consistently, during the process of collecting my compensation data, I find that in practice an increasing number of banks integrate long-term compensation components as compared to short-term components in their remuneration policies. This tendency is present in the cross section of Eurozone banks, as well as over the period 2010 – 2014. I assume that this trend is not random, but is related to the measures aligning bankers' incentives with those of investors interested in long-term performance. Therefore, I hypothesize that long-term forms of incentives associate positively and stronger with performance than short-term compensation components. The term-structure of compensation and its relationship to performance is the first and most general question that I examine in my empirical analysis.

Turning to the form of granting of executive pay, it is common in practice that managers receive their compensation in a mixture of cash and equity based instruments. It is interesting to examine how the particular term-structure of incentives in combination with the form of granting relates to performance, and which form of short- versus long-term cash and share-based incentives relates stronger to performance. Again, this research question remains untouched in the banking literature. I expect that share-based forms of short- and long-term compensation are more strongly related to performance than cash-based components. The reason lies in the nature of equity compensation. The aim of remunerating executives with equity and equity-based instruments is to integrate managers in the ownership structure of a company in order to mitigate agency conflicts and to align managerial interest with those of

[8] See, for example, Bebchuk and Fried (2010).

shareholders. Holdings of company equity should motivate managers to increase firm performance both in the short- and in the long-run, as compared to cash holdings. A similar argument is presented by Fahlenbrach and Stulz (2011), who state that in an efficient market where changes in the bank's long-term performance are properly reflected in the share price, it is beneficial for CEOs to improve banks' long-term performance when their wealth exhibits greater sensitivity to the banks' stock price.

Scholars in the recent banking literature, as well as policy makers in practice, promote the role of deferred pay in aligning managerial incentives with long-term goals.[9] Van Bekkum (2015) finds that inside debt managerial holdings (deferred pay and pensions) are related to less bank risk and risk-taking behavior. Edmans and Liu (2011) show analytically that debt-like forms of compensation serve as a solution to the agency cost of debt, since its payoffs are tied to firm value in financial distress and in bankruptcy. Consistent with the literature, in practice it can be seen that a higher number of banks integrate deferred pay in executive remuneration contracts with the purpose of inducing long-term performance.[10] Therefore, I develop a model specification where I account for the performance effects of deferred pay. I hypothesize that there would be a strong and positive relationship between deferred pay and performance measures.

I expect that the main empirical findings for the whole management board will also hold for each of the two subgroups, CEOs and non-CEO board members. However, there might be a difference in the strength of the pay structure – performance relationship between these two types of managers. It is well known that CEOs receive higher total remuneration as compared to the rest of the management board members. Furthermore, CEOs are considered the ones who determine the general company direction and bear the overall responsibility for important strategic decisions. As a result not only the level, but also the composition of pay may differ between CEO and non-CEO members, in order to tie CEO incentives to an even larger extent to long-term performance. For example, while collecting my data, I observed that in many cases CEOs are granted a higher portion of deferred pay, as compared to other managers.[11]

[9] Some of the studies examining deferred pay will be shortly mentioned here and presented in a greater detail in the "Literature Review" section. Concerning policies related to deferred pay, cf. Appendix A1.1., where I state some of the regulations under the Capital Requirements Directive (CRD) IV related to compensation, as discussed by IMF (2014).

[10] I observe this trend during the data collection process when extracting the compensation information from banks' annual, remuneration reports, and Pillar 3 disclosures.

[11] In many cases bank CEOs receive 60% of their variable pay deferred over several years, while the other board members receive 40% of their variable pay deferred.

CEO incentives are in many cases structured slightly differently in order to emphasize the link to long-term performance even more than in the case of their non-CEO board colleagues. Therefore, I expect that CEO compensation components relate stronger to bank performance than those of non-CEO board members. The hypothesis that the overall effects in the relationship between structure and performance are the same in both groups remains untouched.

Another interesting question in this context is whether bank size matters in the relationship between compensation structure and bank performance. In other words, is there a difference in the presence and strength of the association of pay components with performance between small and large banks? Distinguishing between these two groups is relevant for several reasons. In contrast to small banks, large banks have more diversified business activities and engage in more risky types of businesses different from the classical commercial banking. In many cases, mega banks are also relevant for the stability of the financial system. Bennett, Güntay, and Unal (2015) state that in many instances mega banks are considered "too big to fail", meaning that regulators are unwilling to let large financially distressed banks go bankrupt, but instead bail them out. The authors find that in contrast to smaller bank CEOs, mega bank CEOs are not sensitive to changes in their inside debt holdings. Penas and Unal (2004) and Minnick, Unal, and Yang (2011) find the same results, but for equity holdings. Consistent with the existing literature, I expect that compensation structure in large banks exhibits a weaker relationship to performance than in small banks.

The last topic touched in this thesis relates to the role of government ownership stake for the compensation structure - performance relationship. I incorporate government ownership stake in my analysis as it is highly relevant for the underlying research period 2010 – 2014. Especially the first years of the 2010 – 2014 time frame were dominated by economic stagnation in the Eurozone. It was a time when regulators were forced to undertake substantial measures in order to stabilize the financial system. Several banks, especially the large ones, received government bailouts because they were deemed relevant for the stability of the entire financial system. As a result, some of the largest Eurozone banks have a government ownership stake. Short (1979) hypothesizes that government owned banks are not profit oriented. Therefore, I expect that in the presence of government ownership compensation structure is not as strongly related to performance as without a government stake.

Before elaborating on all of the above questions, and in order to establish a contextual setting for the conducted empirical analysis, I use the next section to provide an overview of the existing relevant literature on compensation structure in the banking industry.

3. Literature Review

This part of the thesis aims at providing the theoretical context associated with the presented research question. The section is divided in four subsections. First, a general theoretical background concerning compensation structure and its importance for incentivizing managers is given. The second subsection explains why banks are particularly interesting for analyzing compensation structure and how they differ from firms in other industries. The third and the fourth subsections discuss compensation structures and risk-shifting, and compensation structures and performance, respectively.

3.1. General Theoretical Background

There is an extensive body of literature dealing with executive pay and its role in aligning managerial interests with those of firm stakeholders. Agency theory that goes back to Jensen and Meckling (1976) states that in order to alleviate agency conflicts in the firm, compensation contracts should be designed in a way that aligns managerial and shareholder interests. Jensen and Murphy (1990) stress the importance of executive pay structure by pointing out that not the level, but the composition of managerial incentives should be the crucial consideration in designing optimal contracts. The work of Bebchuk and Fried (2010) expands on this idea by emphasizing the need to tie executive remuneration to long-term performance. There are various views on how to structure executive compensation. Jensen and Murphy (1990) argue that remuneration should be based on equity instruments rather than on cash in order to tie managerial incentives to shareholders' interests. Jensen and Meckling (1976) suggest that equity-based compensation aligns CEO interests with those of shareholders, but increases the risk appetite of the CEO. In contrast, when CEO remuneration is based on inside debt, i.e. paid in the form of deferred compensation or pensions, the CEO is interested in the long-term solvency of the firm. For this reason, the authors argue that the ratio of inside debt to inside equity in CEO compensation should reflect the debt-to-equity ratio of the firm's capital structure in order to optimally align CEO incentives with those of equity and debt holders. John and John (1993) also point out that executive compensation contracts should be tailored in a way that takes into account all external claims issued by the firm. Supplementing this view, Bolton, Mehran, and Shapiro (2015) argue that CEO compensation at financial institutions, and the associated level of risk-taking, affects not only

creditors, but also other stakeholders, such as taxpayers, depositors, and the whole stability of the financial system. The authors stress that aligning managerial interests with those of shareholders in levered firms, especially in highly levered ones such as banks, leads to increasing risk appetite of executives which should be mitigated by tying compensation to market estimates of default risk. Indeed, the banking industry represents a very interesting context for studying the alignment of executive compensation structures with stakeholders' interests. The reasons for this are presented in the following subsection.

3.2. Why are Banks Interesting for Studying Compensation Structure?

The banking industry represents not only a convenient, but also a particularly attractive framework to examine compensation structure for several reasons. First, the uniform regulatory requirements in the industry make it an appropriate setting for analyzing pay composition. This close regulatory oversight ensures more complete, accurate and relatively homogeneous financial reporting. Additionally, in contrast to non-financial firms, banks are more comparable across several criteria, such as non-debt tax shield due to similar asset depreciation, and lower level of R&D expenditures.[12] John, Mehran, and Qian (2007) show that there is little variation in leverage ratios among banks, which is not the case in industrial companies. The more stringent disclosure requirements in the banking industry make banks' investment patterns more easily observable than those of non-financial firms.[13] Adams and Mehran (2003) argue that the differences in the investment decisions and the regulatory framework between bank holding companies (BHC) and manufacturing firms affects their corporate governance structures.

Second, another particularly interesting characteristic of banking compared to other industries is the difference in terms of total executive pay level and structure. Adams and Mehran (2003) demonstrate that stock options are used as incentive component in CEO pay to a much lower extent at BHCs than at manufacturing firms. Their contribution confirms the finding of Houston and James (1995) of the persistence of difference in the relative importance of pay components and the total level of remuneration in the banking versus the non-banking industry. Kaplan and Rauh (2010) also show that the level of pay in the banking industry

[12] See Mehran and Rosenberg (2007).
[13] See Mehran and Rosenberg (2007).

significantly differs from that in other industries by documenting the presence of higher and increasing percentage of bank executives in the top income brackets in the U.S. between 1994 and 2004, as compared to non-financial firms, corporate lawyers, athletes and celebrities.

A notable argument for concentrating on the banking industry vis-à-vis other industries is the presence of an exacerbated moral hazard problem in banks' governance structures. Van Bekkum (2015) notes that banks, having per-se highly levered capital structure, are characterized by particularly severe debt agency problems. The importance of effective risk management and alignment of incentives in banks as a result of the risk-taking embedded in banks' business model is also stressed by IMF (2014). Additionally, Bebchuk and Spamann (2009) point out that among banks the classical risk shifting problematic between equity holders and debt holders is even more extreme than in other industries due to the typically high levels of debt on banks' balance sheets. Shareholders profit from the full upside of risky investments, while the downside is borne by debt holders and by the government issuing guarantees in the case of bankruptcy. Moreover, depositors whose deposits are guaranteed by the government do not have the incentive, nor have the resources to explore banks investment and risk shifting behavior before depositing their funds in the bank, or to monitor it afterwards. Depositors being unable to hinder excessive risk taking and the government having limited information on bank investment decisions aggravate agency problems in the industry. Srivastav and Hagendorff (2015) also emphasize the unique role of the government in the banking industry in issuing guarantees and structuring bailout deals, which leads to guarantees acting as a put option on the banks' assets with its value increasing in risk. Accordingly, Dam and Koetter (2012) find for the case of German banks between 1995 and 2006 that bank bailouts increase the risk-taking behavior of banks.

Finally, alongside the structurally and policy driven exacerbation of agency conflicts in the banking industry discussed before, increased pay-risk sensitivity of bank CEOs contributes to excessive risk-taking behavior of bank CEOs as compared to other companies. DeYoung, Peng, and Yan (2013) show that while total pay of CEOs at large U.S. commercial banks did not differ substantially from total CEO compensation at large U.S. industrial corporations in the 2000s, bank CEOs had considerably higher pay-risk sensitivity ('vega') than their non-banking counterparts.[14] Bank deregulation in 1999 enabled CEOs to engage in riskier business activities, such as investment banking and mortgage securitization. At the same time boards

[14] Hagendorff and Vallascas (2011) explain that pay-risk-sensitivity, as measured by 'vega', reflects the sensitivity of CEO wealth to changes in the stock return volatility.

tailored compensation contracts in order to incentivize executives to explore growth opportunities with these types of activities. [15] CEO pay-risk sensitivity also increased in this period suggesting that CEOs responded to these incentives in the decade leading up to the 2008 financial crisis. Referring to their line of arguments, Srivastav and Hagendorff (2015) summarize the common notion that the banking crisis was at least to some extent caused by excessive risk-taking and misalignment of incentives before the crisis. IMF (2014) stresses the importance of tying compensation to long term goals in order to avoid incentivizing bankers to manipulate their pay by undertaking investments, which appear to be profitable in the short term but bear hidden long-term losses.

Most of the existing studies in the banking literature deal with the relationship between compensation structure characteristics and risk-taking behavior of executives. Some scholars also shed light on the relationship between compensation structure, risk-taking and performance. These two main groups are presented in the next two subsections.

3.3. Compensation Structure and Risk-taking in Banks

A lot of studies in the banking literature deal with the relationship between pay structure and risk-taking behavior, either by decomposing executive pay in several parts, or by looking at the relationship between a specific component of pay (shares, stock options, deferred pay, etc.) and/or manager's sensitivity to it, and their association with some risk measure.

For example, Balachandran, Kogut, and Harnal (2011) explore how equity based compensation (options and restricted stock), and non-equity based compensation, are related to default risk. The study is based on data of US financial firms before the financial crises from 1995-2008.[16] By the use of a Heston-Nandi specification the authors isolate the default probabilities associated with compensation and apply them to a panel regression model.[17]

[15] DeYoung, Peng, and Yan (2013) explain that the Gramm-Leach-Bliley Financial Modernization Act of 1999 in the U.S. leads to deregulation in the banking industry by allowing banks to engage in a wider range and riskier type of activities, such as insurance underwriting, securities brokerage, investment banking, and mortgage securitization.

[16] The sample includes banks, investment banks, and credit and mortgage companies.

[17] Heston and Nandi (2000) construct a closed form generalized autoregressive conditional heteroskedasticity process to model firm value. They extended the Black-Scholes formula to allow for volatility that varies over time. Based on this extended pricing model the authors treat firm equity as a call option on the assets with exercise price at value of debt. The default risk is then given by the implied call option price.

They find that equity-based remuneration increases the probability of default, whereas non-equity pay decreases it.

The relationship between CEO pay-risk sensitivity embedded in executive pay contracts and insolvency, as well as market-based risk measures is studied by Bai and Elyasiani (2013). They find that in the period from 1992-2008 the sensitivity of bank CEO compensation to stock return volatility went through three distinct phases. First, it increased in response to the deregulation of the financial sector in the late 90s, then it fell after the burst of the NASDAQ stock price bubble, and finally increased again in the run-up to the banking crisis until 2009. Overall, they find a strong relation between the sensitivity of the CEO's compensation to risk and bank instability.[18] This relation is bi-directional meaning that higher sensitivity of CEO compensation to risk induces greater risk and vice versa. Size plays an important role in this relationship as CEOs of larger banks show greater risk-taking than those of smaller banks. Furthermore, they find that pay-share inequality between CEOs and the other board members is associated with greater stability.

Hagendorff and Vallascas (2011) examine the association between CEO compensation sensitivity to stock-return volatility and default risk by concentrating on mergers and acquisitions (M&A) as a specific investment decision undertaken by banks. In line with the previously mentioned papers, they find that CEOs with higher pay-risk sensitivity engage in risk-inducing mergers.[19] In contrast to the often used risk diversification argument in the context of M&A, they document that M&A activity does not reduce default risk.

Chesney, Stromberg, and Wagner (2012) explore the risk-taking induced by stock and option holdings, employing write-downs as a measure of asset risk. Instead of using CEO compensation sensitivity to stock return volatility as a measure of CEO risk-taking incentives, they employ a novel approach by looking at asset risk. They find that risk-taking incentives from stock holdings add substantially to those from options during the financial crisis period from 3Q 2007 to 4Q 2008. Overall, they find incentives to take asset risk were large relative to incentives to increase firm value. Incentives of CEOs of U.S. banks to take asset risk in the years before the financial crisis were significantly positively correlated with write-downs

[18] Instability is defined the likelihood of default as measured by the following score: Ln((ROA+CAR)/σROA), where ROA denotes the return on assets and CAR denotes the capital asset ratio.
[19] Their study period ranges from 1992-2007. Stability is measured by Merton distance to default at time t and is defined as $DD_t = (\ln(V_{A,t} / L_t) + (r - 0.5\sigma^2_{A,t})T/\sigma_{A,t}\sqrt{T}$ where $V_{A,t}$ is the market value of assets, L_t the book value of total liabilities, r the risk free rate, $\sigma_{A,t}$ the annualized asset volatility, and T the time to maturity.

during the crisis, while incentives to increase the firm value were significantly negatively correlated with write-downs during the crisis.

Mehran and Rosenberg (2007) also focus on option grants and their high-vega nature related to greater asset and equity volatility. When analyzing the effects of CEO stock options on investment choice, amount of borrowing, and level of bank capital, they find that stock option grants create incentives for CEOs to undertake riskier investments. In particular, higher levels of option grants are associated with higher levels of equity and asset volatility. Furthermore, they show that option grants are negatively related to interest expenses and federal funds borrowing, i.e. there is a negative relation between options and the banks' incentive to borrow.[20] With respect to bank capital levels, they show that increases in CEO and employee stock option grants are associated with higher bank capital levels. The authors argue that this is because option grants create contingent liabilities that require in advance funding.[21]

Chen, Steiner, and Whyte (2006) look at the relationship between option-based compensation and market measures of risk. They study the period between 1992 and 2000 with a sample that consists of 68 banks with a total of 591-bank-year observations. This is a time where as a consequence of a series of deregulation in the banking sector the overall risk taking in the banking industry increased.[22] Their main finding is that option based compensation induces risk taking. More precisely, banks whose CEOs receive more stock options as a percentage of their total compensation are riskier with respect to total, systematic, idiosyncratic, and interest rate risks.

DeYoung, Peng, and Yan (2013) find that banks with CEOs that have higher pay-risk sensitivity are characterized by greater diversifiable and systematic risk, that the non-diversifiable risk was in part caused by exploiting these new investment opportunities and that these effects were particularly strong for the largest commercial banks following the post deregulation period. The banks' boards tried to moderate overly risky behavior by adjusting CEO incentives. However, this was not the case for the largest banks that had the highest growth rates at that time.[23]

[20] This is in line with the use of options as a non-debt tax shield as proposed by DeAngelo and Masulis (1980).
[21] The empirical analysis uses a sample of 549 bank-year observations for publicly traded banks from 1993 to 2002. In each year there are between 30 and 69 observations by different U.S. banks.
[22] This includes in particular the Interstate Banking and Branching Efficiency Act of 1994 and the Gramm-Leach-Bliley Act of 1999 completely lifting the borders between banking, securitization and insurance business.
[23] The study makes use of 1057 bank-year observations of U.S. banks from 1995-2006.

Houston and James (1995) study compensation components, equity and cash based, and risk taking. In contrast to most studies they do not find any evidence that equity incentives promote risk-taking. Their study period ranges from 1980 – 1990, thus prior to the deregulation of the banking sector. This was a time when bank CEOs had a vastly different compensation structure than they have today. Bank CEOs received less option based incentives than CEOs in other industry sectors and significantly less than what bank CEOs receive today. Overall, the authors' findings may be robust, but I emphasize that the U.S. banking sector in the 80s differs a lot from the post deregulation era, and in particular, also from the study period that this master thesis focuses on.

Acrey, McCumber, and Nguyen (2011) examine the relationship between CEO compensation components (salary, bonus, shares, options) as a percentage of total pay and different measures of default risk or risky activities undertaken by banks, in order to elaborate on the association between short-term incentives and excessive risk taking.[24] Contrary to other authors, they find that pay components normally considered as very risky, such as unvested options or bonuses are not associated with risk. Overall, they find little evidence that compensation structure is associated with excessive risk taking. This is also confirmed by the findings of Fahlenbrach and Stulz (2011). Their study focuses more on CEO compensation structure and performance and is discussed in detail in the subsequent section.

Cheng, Hong, and Scheinkman (2015) study the relationship between residual compensation, defined as the total pay of the top five executives and different measures of risk, such as stock return volatility and stock market beta, whereby controlling for firm size and finance sub industry effects. In doing so, the authors explore whether higher total pay among bank executives is due to the higher risk embedded in banks' business model and the need to compensate risk-averse managers for it. They cast doubt on the interpretations of previous researches, in that they show that the relationship between pay and risk emerges naturally like in the classical principal-agent framework without entrenchment. From their perspective compensation is not the reason for risk taking, but higher compensation is simply the result of CEO risk aversion when contracting with a risky firm. In addition, they find that riskier firms

[24] To measure risky behavior of banks Acrey, McCumber, and Nguyen (2011) employ variables proxying for the engagement in activities such as mortgage backed securities trading, trading of assets held at fair value, which are to be sold quickly, such as credit default swaps, etc. Their study period is 2004-2008.

tend to be more productive and are therefore more likely to be held by institutional investors.[25]

Bhagat and Bolton (2013) recommend that executive compensation should only consist of restricted stock and restricted stock options. They explicitly refute the hypothesis that the banking crisis was caused by unforeseen risk and insist that the bank CEOs compensation structure was a key factor that encouraged banks to engage in excessive risk taking. They draw their conclusions by comparing the 14 largest U.S. banks that received help from the Trouble Asset Relief Program (TARP) with 37 banks that did not participate in that program.[26]

Vallascas and Hagendorff (2013) point out the risk reducing effect of cash bonuses. They use an international sample including U.S as well as European banks.[27] Their finding that banks that pay higher cash bonuses to their CEOs are less likely to default is robust as long as the bank is not in financial distress or operates under weak regulatory regimes.

In contrast, Van Bekkum (2015) studies the relationship between compensation granted in the form of pensions and deferred pay – the so called inside debt (compensation), and tail risk in the U.S. during the financial crisis.[28] The author finds that higher amounts of inside debt are associated with lower risk. Further, institutions that award higher pensions and more deferred pay are more conservative with respect to balance sheet accounting, hold higher quality assets, and focus more on traditional banking activities. Edmans and Liu (2011) analytically justify the use of inside debt in the composition of compensation contracts. Debt compensation can be a meaningful way to reduce agency costs in particular during times of financial distress since the payoff of pensions depends on the solvency of the bank. The authors point out that inside debt compensation is superior to solvency-contingent equity compensation which only depends on the incidence of bankruptcy and not on the firm value in bankruptcy. Overall, they recommend a mix of both equity- and debt-based compensation. The balance between the two financing sources should reflect the bank's likelihood to default.

[25] Their study uses data from the 1992 – 2008 period, but is not restricted to the banking sector. Their sample includes commercial banks, non-deposit lenders, bank holding companies, security brokers, and insurers.
[26] The study focuses on the period between 2000 and 2008.
[27] Their sample contains 76 U.S. and 41 European banks between 2000 and 2008. The European banks are predominantly from Italy and the UK and comprise 35% of the overall sample size.
[28] Van Bekkum (2015) limits his study period to the years 2007 – 2009. He uses a very broad definition of banks as it includes all institutions in the SIC range between 6000 and 6300. In total, he considers 429 institutions.

Closely related to the article of Edmans and Liu (2011), Bolton, Mehran, and Shapiro (2015) recommend the use of Credit Default Swaps (CDS) spreads instead of other forms of debt-based compensation. They argue that CDS spreads have superior properties compared to ordinary deferred or inside debt compensation when trying to minimize agency costs. Ordinary performance-compensation fully relies on outcomes and is therefore noisier than CDS-based compensation that allows for the inclusion of information regarding the likelihood of default from an ex-ante market perspective.

3.4. Executive Compensation and Performance of Banks

The very purpose of managerial compensation is to induce performance. Interestingly, the majority of papers that analyze the compensation structure of banking CEOs do not focus on performance. Instead they discuss the interrelation of compensation structure with excessive risk-taking. This is in particular the case in the context of the financial crisis. However, there are a handful of papers with explicit focus on performance. Overall, there seems to be little to no consensus in the literature regarding the question how compensation should be optimally structured to induce performance. The state of the art with respect to the interrelation of CEO compensation structure and bank performance is summarized in the following.

Fahlenbrach and Stulz (2011) study pay components such as the ratio between cash, bonus, and salary and equity portfolio value of bank CEOs before the crisis and analyze their association with performance proxied by buy-and-hold stock returns, ROA and ROE, during the 2008 credit crisis in the U.S.[29] Overall, they find that neither cash bonus nor stock option compensation had a negative impact on performance. Looking at bank performance in the cross section, they do find evidence that equity-based incentives are associated with worse performance during the credit crisis. At the same time, they argue that the poor performance of banks that provided their CEOs with higher equity-based incentives was ex-ante unforeseeable. CEOs acted fully on behalf of the shareholders taking the necessary risks to maximize shareholder profits. Their argument is based on the fact that better incentivized CEOs suffered significant and overproportional losses during the financial crises as they did

[29] They investigate 95 banks in 2007 and 2008. By the end of 2008 18 of them were removed from the capital market exchange due to acquisition by another institution, bankruptcy, or listing requirement violations.

not sell shares before the crises hit their stock price. Moreover, they find that government ownership does not alter the relation between CEO incentives and performance.

Bennett, Güntay, and Unal (2015) find that BHCs whose CEO remuneration consisted of higher level of inside debt relative to inside equity before the 2008 crisis in the U.S. performed better in terms of return on equity (ROE), return on assets (ROA) and excess stock returns during the crisis.[30] In times of financial turbulences, the improved incentive alignment between debt-holders and CEOs that induces lower risk taking is also beneficial for shareholders. On the one hand, during normal times less risk taking implies lower performance. On the other hand, in times of financial turbulences less risk taking prevents extreme negative performance. Thus, the opportunity cost of debt compensation during normal times can be regarded as a form of insurance against extreme losses in times of crisis. This incentive effect of inside equity as well as inside debt compensation is moderated by the CEO's total remuneration. The authors state that this is in line with prior results of Penas and Unal (2004) and Minnick, Unal, and Yang (2011) who find that the CEO's responsiveness to incentives decreases for higher levels of total CEO remuneration.

Jokivuolle, Keppo, and Yuan (2015) model CEO bonuses as a sequence of call options on bank profits and analyze their association with risk-taking incentives. In a second step, they examine the relationship between these incentives and performance during the crisis, measured by buy-and-hold stock returns.[31] They suggest that regulating leverage has a similar effect as regulating bankers' compensation structure, in particular bonuses. They find that bonus caps that limit bonuses at level of the fixed compensation do indeed reduce banks risk level significantly. On the other hand, they show that bonus deferrals have only a minor effect on risk-taking and performance.

In summary, there is a meager body of literature, discussing the direct relationship between performance and compensation structure in banking. Moreover, none of the presented studies decomposes compensation in such a detailed manner that accounts for the term-structure of pay and the form of granting. In the following, I develop my empirical analysis about the relationship between pay structure and bank performance. In the next section I discuss the methodology that I use. Subsequently, I present the data, samples, and variables. Afterwards I discuss my empirical results and provide interpretations for them.

[30] Their sample is consists of 371 institutions. Their study period spans from 4Q 2006 to the end of 2008.
[31] Their sample focuses on the time period leading up to the financial crisis of 2007-2008 and consists of 78 U.S. banks. The sample is very similar to that of Fahlenbrach and Stulz (2011).

4. Methodology

The following section briefly discusses the statistical procedures that are used to study the relationship between compensation structure and bank performance. In addition to descriptive statistics, I conduct a correlation analysis and a multiple linear regression to build a hierarchical model that describes the relationship between compensation structure and performance. This is accomplished with the help of IBM's Statistical Package for Social Science (SPSS) for Microsoft Windows.[32]

4.1. Descriptive Statistics

I summarize the data by calculating the mean, variance, minimum, maximum, and median of all compensation variables, performance metrics and key bank characteristics used in the subsequent regression analysis. Descriptive statistics provide a good overview about the data at hand. Moreover, they allow for a first interpretation of the data through the comparison of means, variances, etc.

4.2. Correlation Analysis

Correlation analysis is a tool to analyze the interdependencies among variables. The correlation coefficient, ρ, describes the strength of the relation between to variables *X* and *Y*. It is defined by,

$$\rho(X,Y) = \frac{\mathbb{Cov}(X,Y)}{\sigma(X) \cdot \sigma(Y)},$$

where $\sigma(X)$ and $\sigma(Y)$ denote the standard deviation of *X* and of *Y*. The correlation coefficient is always between -1 and 1. A correlation coefficient that approaches 1 indicates a strong positive relation, whereas -1 indicates a strong negative relation. Values around 0 indicate that the two variables are unrelated.

[32] All inferences in this section are drawn from Backhaus et al. (2008) Chapter 2, Section 1, or Hair et al. (2010) Chapters 2 and 4.

4.3. Multiple Regression Analysis

Multiple regression is frequently used to analyze a linear relation between a dependent variable Y and multiple independent variables $X_1, X_2, \ldots, X_n$. Both dependent and independent variables have to be metric variables. The result of the multiple regression analysis is a set of estimated coefficients, $\beta_1, \beta_2, \ldots, \beta_n$, which allow us to describe the linear relation between the dependent and the independent variables in the following functional form, $Y = a + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \varepsilon$. The error term, ε, is assumed to be normally distributed with expected value 0 and variance σ^2. The estimated regression coefficients are derived such that the sum of squared errors between the observed values and the estimated values is minimized:

$$\min_{\hat{a},\hat{\beta}_1,\hat{\beta}_2,\ldots,\hat{\beta}_n} \sum_{i=1}^{m} \left(y_i - \hat{a} - \hat{\beta}_1 x_{1i} - \hat{\beta}_2 x_{2i} - \cdots - \hat{\beta}_n x_{ni}\right)^2 .$$

I use a multilevel approach which controls for bank size and leverage before regressing the compensation components on firm performance.

4.3.1. Testing the Regression Requirements

To ensure the validity of the resulting regression model a couple of statistical checks are performed. This includes tests for heteroscedasticity, the normality of the error terms, autocorrelation and multicollinearity.

Homoscedasticity describes a situation in which the residuals of the regression model have the same constant variance. This is necessary to ensure the proper estimation of confidence intervals as well as proper significance testing. A violation of homoscedasticity- the so called heteroskedasticity, leads to inaccuracies in the estimation of confidence intervals and to situations in which the researcher is not able to reject or accept a hypothesis for a given significance level α. The variance of the residuals is visually examined by the use of scatterplots.[33]

In addition to having the same constant variance, residuals should follow a normal distribution. A violation of this requirement may result in incorrect significance tests. The

[33] Alternatively, heteroscedasticity could have also been verified by the use of statistical tests like the White-, Breush-Pagen, or Koenker-Test.

normality of the residuals is ensured with the Kolmogorov-Smirnoff-Test with Lilliefors significance correction and the Shapiro-Wilks-Test.

Another issue is the possible autocorrelation of the regression residuals. The residuals should not be autocorrelated otherwise the significance tests may not be meaningful. The model is tested for autocorrelation using the Durbin-Watson-Test. The resulting test statistic is distributed between 0 and 4. A Durbin-Watson-Test statistic of 2 indicates that the autocorrelation hypothesis can be rejected. Test statistic values between 1,5 and 2,5 are tolerable in particular when working with time series data.

In regression analysis, multicollinearity is present when at least one independent variable can be expressed by a linear combination of other independent variables. Any variable that fulfills this criterion should be excluded from the regression otherwise the resulting coefficient estimates will not be as precise. Multicollinearity of a regression variable is tested via the tolerance level. In all instances, the tolerance level of all regression variables is adequately high ensuring a variance inflation factor (VIF) of less than 10. The VIF is the reciprocal tolerance. It is an index measures in how far the variance is inflated due to collinearity.

4.3.2. Coefficient of Determination R^2

The quality of a regression model can be assessed by the coefficient of determination, R^2, which is defined as the ratio between the explained variance and the total variance,

$$R^2 = \frac{\sum_{i=1}^{m}(\hat{y}_i - \bar{y}_i)^2}{\sum_{i=1}^{m}(y_i - \bar{y}_i)^2}.$$

The coefficient of determination can take up any value between 0 and 1. The coefficient tells us to what extend the variance of the dependent variable can be explained by the present regression model. A coefficient of 1 means that the entire variance of the dependent variable is explained by the regression model, whereas a coefficient of determination of 0 means that nothing is explained.

4.3.3. T-test

The T-Test statistic t is used to test the significance of each independent variable in the regression model. For any given confidence level $1-\alpha$ the T-Test statistic has to exceed the critical level of the corresponding theoretical t-distribution. Unless otherwise noted the confidence level throughout this thesis is at 95%. In SPSS the result of a t-test is displayed in form of a p-value in the "Sig" column. If the p-value is equal or smaller than α then the variable is deemed significant at the significance level α.

4.3.4. F-test

The Fisher-Test statistic, F, is used to test the overall model significance. It is defined by

$$F = \frac{R^2}{1-R^2}\frac{N-p-1}{p},$$

where p is the number of parameters used in estimating the coefficients and N is the number of observations. If for a given confidence level $1-\alpha$, the null hypothesis, $0 = \beta_1 = \beta_2 = \ldots = \beta_n$, is accepted then the observed values cannot be explained by the present model. Depending on the degrees of freedom the test statistic needs to exceed the corresponding value of the theoretical Fisher-distribution. The null hypothesis should be rejected if $F > F(p, N-p-1;1-\alpha)$.

All of the statistical tools mentioned above are used as part of my empirical analysis presented in section 6. Before moving to the empirical analysis, I provide an overview over the underlying data. Specifically, I discuss the data collection process, the characteristics of the three different research samples (Management Board, CEO, and Key Management), and properties of the regression analysis variables.

5. Data

This section of the thesis provides all relevant information about the data used in the empirical analysis. The first subsection explains the steps in the data collection process and further focuses on three main points- the kind of compensation and financial data available, the omission criteria for filtering the data during the collection process, and the classification criteria used. The section then continues by introducing the three samples in the second subsection and finishes by presenting the variables used.

5.1. Data Collection

I obtain the data for the empirical analysis from two main sources- the SNL Financial database on the one hand, and form the annual, remuneration, corporate governance and Pillar 3 reports disclosed by the banks as a part of their compulsory annual reporting, on the other. The data collection process involves several steps.

The starting point for the data collection and the sample construction is the SNL database. I first download a list of all listed operating parent and subsidiary companies in the Eurozone, fully covered by SNL Banking. All downloaded information described in this and the following subsections is queried on a consolidated basis, in order to ensure data aggregation on a listed entity level. These search criteria result in a list of 111 banks.

In a second step I start to extract manually the executive compensation data for these 111 banks for the years 2010 – 2014 from bank annual, corporate governance, remuneration and Pillar 3 reports. I look for information about the compensation of CEOs and all other non-CEO members of the executive management board, which is granted for the performance in the respective year. The aim is to extract data on how much, and most importantly, in what mixture of fixed, variable short- and long-term incentives the executive compensation is granted. However, the data availability concerning remuneration composition differs among banks. Therefore, companies disclosing only a limited amount of pay structure information, as discussed in the following subsections, are excluded from the initial list of 111 banks. The exclusion criteria, which are described subsequently, result in a list of 43 banks.

The last step of the collection process involves the classification of the disclosed compensation information in categories reflecting the short- and long-term executive pay structure, as well as the cash and non-cash mix. These categories assist the definition of variables later on.

Before explaining what kind of data I have collected and what criteria I have employed in order to collect and classify it, it is worth shortly discussing the type of information provided in the banks' reports, so that the reader gets a feeling for the way the remuneration data is disclosed by the banks.

5.1.1. Disclosure Practices in Bank Remuneration Reports

The most common way to disclose executive pay information is in the so called "remuneration" or "compensation" report, which is prepared on an annual basis. In some cases the report is added to the company consolidated financial statements, while in other it is published in a separate corporate governance report or is solely uploaded on the company website. Some sample banks, like for example most of the Italian ones, disclose the compensation data only quantitatively and with highly aggregated figures in the "Related Party Transactions" section in the company consolidated financial statements, and provide more detailed information on the remuneration policies in their Pillar 3 disclosures. There are also cases, where there is no separate report, but only a section in the annual report shortly describing the compensation practices and disclosing only an aggregated figure for executive remuneration.

A classical remuneration report states the parties to which it is applicable (management board, other senior managers, employees, etc.), the compensation policies applied for fixed and variable short- and long-term pay for each party, as well as quantitative remuneration data. The compensation policies may provide the following pieces of information:

- applicable regulatory requirements
- the ratio of variable to fixed pay
- the composition of fixed pay (annual salary and/or fringe benefits)[34]

[34] Fringe benefits include perks, such as the use of a company car, social security benefits, etc.

- the qualitative and quantitative individual and corporate targets that have to be fulfilled in the financial year in order to grant variable remuneration
- the percentage weight of the quantitative and of the qualitative targets for determining the amount of variable remuneration
- the variable compensation amount for 100% target achievement and the ratio at which variable pay increases (decreases) when performance is above (below) targets
- the minimum company performance requirements- the so called "gates", in the respective year that have to be fulfilled in order to "access", or receive, the respective compensation component paid out
- the applicable clawback and malus clauses in case performance targets have not been met[35]
- the form in which variable pay is granted and the mixture of short- and long-term variable remuneration (e.g. cash bonus and/or shares with immediate entitlement, deferred cash and/or deferred share bonus, participation in a share bonus plan, option plan, some other form of long-term incentive plan)
- the applicable deferral schedules, vesting and holding periods[36]

It should be noted that only a few of the banks in the SNL list provide the remuneration policies information in the detailed manner described above. In some extreme cases there is no information regarding the composition of variable pay, which leads to the exclusion of such banks from the list.

In addition, there are differences in the level of personalized disclosure that each bank chooses in its remuneration report. Some banks report the compensation composition of the CEO and of all other non-CEO management board members in a personalized manner. Other banks disclose information about the CEO separately and the sum of the amounts paid to the other executive board members. There are cases where aggregation on the level of the whole

[35] Clawback and malus clauses describe how much of the variable payment is forfeited if the minimum company performance targets are not met.

[36] The deferral schedules define in how many tranches the respective component is paid out and in what time intervals the payments to the beneficiary are made. In most of the cases vesting period applies to the remuneration paid in instruments and defines the period between the time of granting of the compensation component for the performance in the respective year, and the time at which the beneficiary receives the instrument. Holding period is the number of periods for which the beneficiary has to hold the instrument after vesting, before being able to sell it or exercise it in the case of options. For example, in the case of deferred shares, a certain amount of the compensation assigned for the respective year (t=0) is *granted* in the form of shares in t=0, but is *deferred* over 3 years, where three equal tranches are *vested* in each t=1, t=2 and t=3. After vesting a one-year *holding* period might apply before the beneficiary is able to sell them.

management board, including the CEO is provided, as well as cases where there is information about the remuneration of the CEO only.[37] Again, in the extreme cases the quantitative figures in the reports of some banks include not only the management board members, but also other key and senior managers that are incomparable to the executive management board in terms of duties and responsibilities. In such cases where the collection of data even on the whole management board level is impossible, the bank needs to be excluded from the SNL list. All omission criteria are provided in the next section.

5.1.2. Omission Criteria

As mentioned above, the final sample size is highly determined by the compensation data availability. Out of the 111 banks in the initial SNL list, 25 banks do not have a remuneration report or any compensation information at all in English in 2014 (2013: 20 banks; 2012: 19 banks; 2011: 22 banks; 2010: 24 banks). There are several banks for which no quantitative and/or qualitative disclosure at all can be found (2014: 6 banks; 2013: 6 banks; 2012: 8 banks; 2011: 10 banks; 2010: 8 banks), as well as some which do not have variable compensation as a part of their remuneration policies (2014: 6 banks; 2013: 8 banks; 2012: 7 banks; 2011: 5 banks; 2010: 5 banks). The latter are excluded because an only-fixed-remuneration policy basically does not allow studying the influence of different compensation components on performance. Further, some banks do not disclose information about their short- and long-term incentives, which is the minimum requirement for compensation composition disclosure for the purpose of this thesis, and are thus excluded from the initial list, as well (2014: 14 banks; 2013: 17 banks; 2012: 13 banks; 2011: 16 banks; 2010: 14 banks). There are a couple of banks that also need to be excluded from the SNL list, because despite describing the compensation mix qualitatively in their policies, they do not report separately the level of fixed and variable pay, but provide a total figure of remuneration of the management board, thus not allowing to analyze compensation structures (2014: 7 banks; 2013: 6 banks; 2012: 9 banks; 2011: 8 banks; 2010: 10 banks). As stated above, some of the banks provide information on an aggregated basis, not allowing extracting the data for the management board only. (2014: 4 banks; 2013: 3 banks; 2012: 3 banks; 2011: 1 bank; 2010: 1 bank).

[37] The number of banks, which disclose their information for the CEO only, for the whole management board altogether, and for the CEO and all other non-CEO members separately, is presented later on in this section in the "Samples" subsection.

Finally, I have excluded some banks due to assumptions made when collecting the data. A list of these exclusion assumptions, and of other more general ones, made when collecting the data, is provided in Appendix A1.2. They lead to the exclusion of 6 banks in 2014, 8 banks in 2013, 9 banks in 2012, 6 banks in 2011, and 6 banks in 2010. An overview of the number of banks excluded per year for every of the mentioned reasons is given in Table A1.3.1. in Appendix A1.3. The exclusion criteria resulted in completely omitting 68 out of the 111 banks in the initial SNL list, for all years 2010 - 2014.[38] The compensation data for the rest 43 banks is collected from the reports and classified in compensation categories as described in the next subsection.

One more thing should be noted concerning the remuneration data availability. Out of these 43 banks there are some that do not have information for every year between 2010 and 2014 due to the above stated reasons (2014: 6 banks; 2013: 10 banks; 2012: 11 banks; 2011: 15 banks; 2010: 20 banks). In such cases only the years for which the compensation data is available are taken into account in the analysis. More precisely, this yields a sample of bank-year observations.[39] A list with the 43 banks having compensation composition data for any of the 5 relevant years- and are thus used in the sample, their country, ticker, and exchange listing abbreviation are provided in Table A1.3.2. in Appendix A1.3.

5.1.3. Classification of Extracted Data

This subsection discusses the criteria employed to classify the remuneration data from the reports in categories, which assist the development of compensation structure variables later on. For each bank which has available executive pay data for any year between 2010 and 2014 I extract the fixed and variable pay components. The total fixed pay is the sum of fixed salary and fringe benefits, the latter of which represent non-monetary fixed compensation, such as the use of a company car, social security benefits, etc.

[38] Note that the 68 banks excluded are the same in each year. However, the number of banks excluded for a particular reason is different in each year, because there are some cases, where a bank is omitted from the list in a certain year due to one of the mentioned reasons, in another year due to a different reason. This is because compensation disclosure policies generally change in the years 2010 – 2014 and thus even a single bank modifies its disclosure patterns throughout the sample period.

[39] The final sample size reached after exclusion of some bank-year observations due to missing compensation and financial data is discussed in the "Samples" subsection.

As stated above the most interesting part of the executive pay structure for the purposes of this thesis is the variable part. Therefore, I try to decompose variable compensation as precisely as possible in different types of short and long-term compensation. In most of the cases my classification of a certain pay component as a short-term incentive (STI) or long-term incentive (LTI) corresponds to the way the particular bank defines it in its disclosures. However, there are a few cases where my classification departs from the way the particular component is labeled in the bank reports. The reason lies in the assumptions I make for categorizing a component as a short- or long-term incentive. Concretely, in order to be classified as a long-term incentive the remuneration should be based on a performance measurement over several periods, where the beneficiary is not entitled to the (whole) payment/ set of instruments immediately at the end of the financial year of granting. Furthermore, the incentive should be either structured to provide the payments in several tranches, or granted as a part of a long-term incentive plan in the form of instruments that are closely related to firm performance, or in cash, strongly tied to performance criteria over several years. Conversely, short-term incentives involve entitlement at the end of the financial year of granting and are settled in cash or instruments. In the case of instruments, even if a holding period of one or two years applies, they are considered as short-term remuneration, because there is no uncertainty as to whether or not the manager would be granted the respective component.

In this sense, I classify cash bonus and share-based compensation where the individual is immediately entitled to the payment/instrument, as a short-term incentive. Share-based remuneration includes compensation settled in the form of bank common stock, virtual or phantom shares, share equivalents, as well as in the form of a payment corresponding to the value of a cash index linked to the share price. Long-term incentives in turn, comprise deferred remuneration, share bonus plans, option plans and long-term incentive plans (LTIP). Their design involves not only link to performance, but also incentive to sustain performance over the long-run, because of the uncertainty embedded in the payments and the multi-period evaluation for sustaining that performance criteria. For example, deferred remuneration is granted in a couple of tranches over several years. Most of the 43 banks in my list grant deferred compensation in three equal tranches over three years, whereby certain minimum firm key performance indicators (KPIs) determine whether the component will be paid out or vested in the respective year. Further, even if the minimum “gates” are met, clawback or malus clauses, cutting the compensation amount granted, apply if the management does not

fulfill their predetermined individual and corporate targets to a certain degree of achievement. Deferred compensation is very often granted to 50% in cash and to 50% in shares (or other share-based instruments, as described above) with a further holding period of 1 or 2 years. Share bonus plans and option plans also last for several years and are based on multi-year performance criteria. LTIPs are long-term incentive plans that are based on multi-period performance evaluation and exist in different forms. For example, they may be granted in the form of certificates that involve cash payment and oblige the beneficiary to invest at least some part of the payout in shares with a subsequent holding period, like in the case of Intesa Sanpaolo SpA. Alternatively, a LTIP may involve a payment if certain criteria are met, for example if the stock price increases at a certain minimum percentage over several years as in the case of BNP Paribas SA's LTIP. It should be noted that only a few banks still have option plans in place. The number of banks in the list having share bonus plan and LTIPs is also limited. That is, deferred remuneration is a very common way to structure long-term incentives.

As described above, the data collection process leads to the construction of a unique data set with executive compensation data for 43 banks over the 5-year period between 2010 and 2014. In the following subsection I will discuss the final adjustments made to the set of bank-year observations, leading to the final sample(s) size(s).

5.2. Samples

My analysis of the relationship between compensation structure and performance is based on three different samples- a Management Board sample consisting of the bank CEOs and all other non-CEO members of the executive board, a CEOs only sample, and a Key Management sample comprising all non-CEO board members only. The choice of these three samples has both theoretical and practical reasons.

The first argument reflects a purely theoretical perspective. A substantial part of the existing studies in the banking literature analyze compensation of CEOs only.[40] Several, considerably

[40] Examples of studies that analyze compensation of CEOs in the banking industry include Chen, Steiner, and Whyte (2006), Mehran and Rosenberg (2007), Acrey, McCumber, and Nguyen (2011), Balachandran, Kogut, and Harnal (2011), Hagendorff and Vallascas (2011), Chesney, Stromberg, and Wagner (2012), Bhagat and Bolton (2013), Vallascas and Hagendorff (2013), Jokivuolle, Keppo, and Yuan (2015), Bennett, Güntay, and Unal (2015), Van Bekkum (2015).

fewer, scholars consider also other top managers.[41] Thus, by analyzing three different samples I am able to extend the existing literature by comparing and contrasting the effects observed in the three different groups of executives. Similarly to the approach of Fahlenbrach and Stulz (2011) I first examine the relationship between pay structure and performance in the case of the whole management board including the CEO, hypothesizing that the general effects holding for the whole management board also hold for the two subgroups of executives. Then I test the compensation structure – performance relationship in the sample of CEOs only and compare the results to those for a sample of all other non-CEO management board members.

The second reason for the sample choice has practical considerations, namely that compensation of CEOs often differs in level, and sometimes in structure or component weight, from those of non-CEO members. Thus, it is extremely interesting to compare the relationships between bank performance and CEO and non-CEO compensation composition respectively, in order to infer whether there is also significant statistical difference in remuneration design between these two groups and which design relates stronger to performance.

The last aspect that determines the final sample sizes is the availability of financial data in the SNL database. One of the 43 banks (DAB Bank AG) is excluded from all three samples for all years, because no complete financial data is obtainable in SNL, as it is not covered anymore. Out of the remaining 42 banks there are some, for which no financial information is available in SNL for each of the years 2010 -2014. Therefore, the number of banks differs per year and the final samples consist of bank-year observations, whose size is determined by the financial data availability.[42]

The Management Board sample consists of observations, representing the sum of the remunerations of all members of the management board- CEO and non-CEO members, for every compensation component used by a particular bank. As stated in the "Data Collection" section, there are banks that disclose the compensation structure data for the whole

[41] For example, Cheng, Hong, and Scheinkman (2015) collect data for the top-five highly paid managers. Bai and Elyasiani (2013) focus on CEOs, but also take into account remuneration of other executives by employing a measure of compensation accounting for the pay share inequality between CEOs and the other top managers. Fahlenbrach and Stulz (2011) have a different approach in that they analyze CEOs' incentives and compare them to those of the average of the top-four managers. In a subsequent step the authors examine the sum of the remunerations of the top-five executives including the CEO.

[42] My approach of employing bank – year observation sample, where not every bank is included in each year, is similar to the way Mehran and Rosenberg (2007) form their sample. They employ different number of BHCs in each year during the period 1993 – 2002, with the number of banks varying between 30 and 64 per year.

management board altogether (7 out of 42 banks), and some that report the pay composition data for the CEO and the other members of the executive management board separately (30 out of 42 banks). In the latter cases, the respective amount of compensation for each remuneration component is summed across all members of the board. Thus, the Management board sample consists of 37 banks for the years between 2010 and 2014.

The CEO sample comprises banks that disclose remuneration data for the CEO only (5 out of 42 banks), as well as banks that provide information for the CEO and all other non-CEO board members separately (30 out of 42 banks). In the latter cases only the CEO remuneration is considered as an observation in this sample. The CEO sample thus comprises 35 banks for the period 2010 – 2014.

The Key Management sample includes the sum of the remuneration components of all non-CEO members of the management board. Some banks report their compensation as a group, others in a personalized manner. In the case of personalized disclosure the compensation amounts for every component is summed across the members. In this sample there are 30 different banks for the years 2010 – 2014.

5.3. Variables

This section provides information on the formation of the dependent and independent variables used in the regression analysis. The dependent variables are financial and market performance measures. I employ three different measures of performance- annualized continuously compounded stock returns, return on average risk-weighted assets and return on average equity. I first perform my analysis using continuously compounded stock returns, and afterwards perform a robustness check employing the other two operating performance measures. The independent variables are compensation structure variables, defined as the respective component percentage of total compensation, and control variables, proxying for bank specific characteristics. In the following, each variable block- compensation structure variables, firm performance measures and variables controlling for bank characteristics, is described separately.

5.3.1. Compensation Structure Measures

As stated above all remuneration structure components are expressed as a percentage of total compensation, which is defined as the sum of total fixed and total variable compensation granted. Several scholars in the literature employ compensation component percentage of total pay as a measurement of pay structure. For example, in the non-banking literature, Mehran (1995) uses stock options, equity-based compensation, and pay granted in the form of salary plus bonus, all of them expressed as a percentage of total pay, in order to study the relationship between remuneration composition and firm performance. In the banking stream of literature, Acrey, McCumber, and Nguyen (2011) employ salary, bonus, short-term cash compensation, value of shares granted, value of options granted, as well as other long term compensation proxies, all scaled by total pay, in order to examine the association between bank CEO pay structure and risk-taking. Following this approach, I also employ compensation components as a percentage of total pay. In doing so, I eliminate scale differences between higher managerial compensation at larger banks and lower executives' remuneration at smaller banks. In this way, I am able to concentrate my analysis only on the interaction of compensation structure and performance, instead of remuneration level and performance.

As I explain thoroughly in the next section, my empirical analysis is based on several regressions using different explanatory compensation variables, depending on the decomposition of compensation structure that I examine. Table 1 introduces all compensation structure variables and their definitions, which are closely related to the described classification of the collected remuneration data.

Table 1. Compensation variables: measurement and definition

Variable	**Description**
	Fixed compensation
Total fixed pay (%)	The sum of the absolute Euro values of annual fixed salary and fringe benefits, as a percentage of total compensation
	Variable short-term incentive (Variable STI)
Cash-based STI (%)	The Euro value of the annual cash bonus with immediate entitlement, scaled by total pay

Share-based STI (%)	The Euro value of share-based compensation (common stock, virtual / phantom shares, cash index linked to the share price, share equivalents) granted for the performance during the financial year with immediate entitlement, scaled by total compensation
Total STI (%)	The sum of the absolute values of cash-based STI and share-based STI, scaled by total compensation
	Variable long-term incentive (Variable LTI)
Cash deferral (%)	The Euro value of deferred compensation granted in the form of cash for the performance in the respective year, as a percentage of total pay
Share deferral (%)	The Euro value of deferred share-based compensation (common stock, virtual / phantom shares, cash index linked to the share price, share equivalents) granted for the performance in the respective year as a percentage of total pay
Deferred pay (%)	The sum of the absolute values of *cash deferral* and *share deferral*, as a percentage of total pay
Other forms of LTI (%)	The sum of the absolute values of compensation granted in the form of an option plan, share bonus plan, and LTIP, scaled by total compensation[43]
Total LTI (%)	The sum of the absolute values of *Deferred pay* and *Other forms of LTI*, scaled by total pay
Cash-based LTI (%)	The sum of the absolute values of cash deferral and compensation granted in the form of LTIP, scaled by total pay[44]
Share-based LTI (%)	The sum of the absolute values of share deferral and compensation granted in the form of an option plan or a share bonus plan, scaled by total pay
	Total Variable compensation
Total cash-based variable pay (%)	The sum of the absolute values of *cash-based STI* and *cash-based LTI*, scaled by total pay
Total share-based variable pay (%)	The sum of the absolute values of *share-based STI* and *share-based LTI*, scaled by total pay

[43] I construct a variable *Other forms of LTI* by summing the compensation granted in the form of LTIP, stock options and share bonus plans following the example of Bennett, Güntay, and Unal (2015) who define inside equity as the sum of the values of equity holdings and stock options.

[44] LTIP is considered to be a cash based long-term compensation component, because the sample banks having it as a compensation instrument, settle it in cash or cash alike form, even if there are cases where the manager is obliged to invest some relatively small part of the cash in company shares.

5.3.2. Firm Performance Measures

The data for the dependent variables is obtained from SNL. I first employ a proxy for market performance in my analysis and afterwards provide a robustness check of the results with operating performance measures, in order to decrease measurement error and to provide a more comprehensive analysis of the relationship between performance and compensation structure. Market performance measures used in the banking literature include among others buy-and-hold stock returns and annualized cumulative monthly logarithmic stock returns in excess of an index.[45] I collect the monthly stock prices for the period 2010 – 2014 for the 42 banks, provided by SNL, and compute the continuously compounded monthly returns. In a second step, I calculate the annualized continuously compounded returns for each bank, and employ them as a measure of market performance. A lot of scholars in the banking literature use ROA and ROE as a measure of bank operating performance.[46] As Athanasoglou, Brissimis, and Delis (2008) ROA measures banks' ability to generate profits with the bank's assets, and ROE indicates the return to the shareholders on their equity. Following the existing empirical literature I employ two similar measures of operating performance- return on average equity and return on average risk-weighted assets.[47] I use return on average risk-weighted assets instead of ROA, because the former profitability ratio incorporates the bank-specific operating risk. Operating risk lies in the responsibility of the management board, as it is directly influenced by managerial decisions, for which executives are compensated at the end.[48] Table 2 introduces the dependent variables used and their definitions.

[45] Scholars using buy-and-hold stock returns to measure market performance include Fahlenbrach and Stulz (2011), and Jokivuolle, Keppo, and Yuan (2015). In contrast, Bennett, Güntay, and Unal (2015) measure market performance with excess stock returns.

[46] Examples for authors that use ROA and ROE as a measure of firm performance, are Fahlenbrach and Stulz (2011), and Bennett, Güntay, and Unal (2015).

[47] Both operating performance ratios- Return on Average Risk-weighted assets and ROAE are provided by SNL.

[48] Risk-weighted assets is the basis for measuring the minimum capital requirement for banks according to the Basel II regulatory framework, and weights banks' assets by their risk. See Bank for International Settlements, (2013) for more information on risk-weighted assets.

Table 2. Bank performance variables: measurement and definition

Variable	Description
	Market Performance
Continuously compounded stock returns	The annualized continuously compounded monthly stock returns
	Operating Performance
Return on Average Risk-weighted assets	Net income as a percentage of total average risk-weighted assets
ROAE	Net income as a percentage of average equity

5.3.3. Bank Characteristics

The financial data for the control variables in the regression analysis is also obtained from SNL. I control for several bank specific characteristics that might have explanatory power for bank performance. I first account for company size and bank leverage in all my regression equations, and subsequently analyze in a separate section the additional influence that government ownership might have on performance by employing the percentage government ownership as an additional control variable.

Short (1979), who investigates the determinants of bank profitability in several countries, states that size is a variable used in the empirical literature to account for economies or diseconomies of scale. Athanasoglou, Brissimis, and Delis (2008) argue, based on the existing literature, that growing bank size could affect positively performance, but also point out that larger size may negatively impact profitability due to "bureaucratic and other reasons". Chen, Steiner, and Whyte (2006) explain that larger banks are more diversified in terms of product lines and customer base, which is associated with lower risk. Due to this obvious relevance of size for performance, I also control for size by using total assets as a proxy, motivated by the

existing body of literature.[49] As stated above, there are contradictory findings as to whether size relates positively or negatively to performance, thus the sign of the variable coefficients remains unpredictable.

Another variable that might affect bank performance in several ways is financial leverage. Grove et al. (2011) hypothesize that high leverage in banks is a sign of weak corporate governance and thus negatively associated with financial performance.[50] Jensen and Meckling (1976) argue that shareholder risk-shifting incentives increase with leverage as equity represents a call option on firm's assets with its value increasing in risk with an unlimited upside and a limited downside. Thus, in the cases of high leverage the call option properties of equity incentivize bank CEOs to increase bank assets' volatility and engage in activities that affect performance only on the short-term, but have adverse performance effects on the long-run.[51] For this reason higher level of debt might have a negative impact on performance. I employ the banks debt to equity ratio to control for leverage, following the approach of Bennett, Güntay, and Unal (2015).

Another interesting effect to control for is the relationship between government ownership and performance. Short (1979) hypothesizes that government owned banks might not pursue profit maximization because of a government policy. My sample period consists of years of economic turbulence, when several banks, like for example Commerzbank AG, received financial aid in the form of (partial) government shareholding participation. Thus, controlling for government ownership would account for the effect of government policy in place. Table 3 lists the three control variables and their operationalization.

[49] For example, Bennett, Güntay, and Unal (2015) employ total assets to control for size.
[50] Grove et al. (2011) explain that debt holders at banks do not have the incentives to actively monitor managerial decisions and are thus more risk tolerant, which exacerbates agency conflicts. Thus, the higher the leverage, the weaker the corporate governance structure, because of the lack of monitoring.
[51] See Fahlenbrach and Stulz (2011).

Table 3. Bank characteristics control variables: measurement and definition

Variable	Description
	Firm Characteristics
Total Assets	The absolute Euro value of bank's total assets
Leverage ratio	Bank's debt to equity ratio measured by the absolute value of total debt divided by the absolute value of total equity
Government ownership (%)	The percentage of common shares owned by the government (percentage provided by SNL)

The summary statistics for all variables are presented in the subsequent "Empirical Analysis" section.

6. Empirical Analysis

The relationship between compensation structure and performance can be examined in several settings. In particular, it is quite interesting to infer whether the association of remuneration composition and performance exhibits the same patterns in the whole management board and among both - CEO and non-CEO members. The importance of designing remuneration systems in banks in a way that strongly relates to performance emerges additionally because banks are highly relevant for the stability of the financial system, whereby large "too big to fail" banks have a very prominent role. Therefore, I try to capture size effects in the relationship between compensation structure and performance by examining the differences in the pay structure-performance relationship between large and small banks. Finally, exactly because banks are relevant for the financial system, the government has become an important player in the recent years by "saving" the "too big to fail" banks from going bankrupt. Thus, I also examine whether the presence of government ownership in banks influences the association between compensation structure and performance.

My empirical analysis is structured as follows. The section starts by introducing descriptive statistics and correlations for the three samples – the Management Board, the CEO, and the Key Management samples, in the next two subsections, respectively. Next, the baseline statistical model analyzing compensation composition and performance in terms of stock market returns in the Management Board sample is presented. The fourth subsection compares and contrasts the results derived from the baseline model in the CEO and the Key Management samples. The fifth and the sixth subsections deepen the analysis by examining the association between compensation structure and performance in two different frameworks. I first incorporate the impact of bank size in the analysis by splitting the samples in large and small banks, using a threshold of €50 billion in total assets. I further examine the explanatory power of government ownership for bank performance by including an additional variable that controls for a government ownership stake. The last subsection provides a robustness check by employing two additional dependent variables – return on average risk-weighted assets and ROAE.

6.1. Descriptive Statistics

The following section provides descriptive statistics for all regression variables. I begin with bank characteristics and performance measures. Subsequently, I present the descriptive statistics for the components of managerial pay, starting with management board, followed by CEOs, and concluding with key management executives.

6.1.1. Bank Characteristics and Performance Variables

The bank sample is fairly heterogeneous in terms of total assets, leverage ratio and government ownership. The sample consists of small as well as very large bank institutions with total assets ranging from €568 Million to €2.1 trillion. The median is well below the mean which indicates the presence of mega banks that are several times larger than most of their competitors. As usual in the banking sector, the banks in this sample are characterized by the use of debt as a key financing instrument with an average leverage ratio at 1.44 and a somewhat higher median at 2.36. The highest observed leverage ratio is 35.58. Most banks have no or very limited percentages of government ownership, but the ones that have go up to almost 95%.

The mean annualized continuously compounded return is negative at -0.083 with relatively high standard deviation of 0.418. This effect is not surprising, since the period 2010 – 2014, especially in its first half, represents years of economic turbulence in the banking sector with dynamic trends in stock prices, negative returns and high share price volatility. This interpretation is also supported by the median value, which lies well above the mean and approaches zero (-0.003). This difference indicates that there are banks in the sample with highly negative stock returns, driving down the average bank return. The mean (0.007) and the median (0.008) for the return on average risk-weighted assets are both close to zero and almost identical, suggesting the relatively low ability to generate high profits with the (risk-weighted) bank assets during the sample period. The minimum (-0.104) and the maximum (0.132) values exhibit an almost symmetrical pattern around the zero point, as compared to the other variables' extreme values. My second operating performance measure, ROAE, has higher mean (0.012) and median (0.057) values than the return on average risk-weighted assets, with higher standard deviation at 0.277 across the sample bank-year observations.

Table 4 presents descriptive statistics for bank characteristics and performance variables.

Table 4. Descriptive Statistics for bank characteristics and performance variables in the Management Board, CEO and Key Management samples

Descriptive Statistics of Bank Characteristics and Performance Variables						
Bank Characteristics	N Valid	Mean	Median	Std. Deviation	Minimum	Maximum
Total Assets (Mio. €)	183	338,517	42,629	559,128	568	2,164,103
Leverage ratio	182	1.44	2.36	27.24	-358.53[52]	35.58
Government ownership (%)	183	.033	.000	.131	.000	.944
Performance Variables						
Continuously compounded stock returns	170	-.083	-.003	.418	-2.107	.973
Return on Average Risk-weighted assets	168	.007	.008	.027	-.104	.132
ROAE	177	.012	.057	.277	-2.237	.413

The table shows descriptive statistics for the dependent performance variables and the independent control variables, measuring bank characteristics. The first column presents the variable name, the second column states the number of observations; the rest of the columns provide information on the mean, median, standard deviation, minimum and maximum values in the samples. The descriptive statistics for the bank characteristics and performance variables apply to all three samples, as the only difference among the Management Board, CEO and Key Management samples lies in the compensation composition variables.

6.1.2. Compensation Variables

The largest component of executive compensation is fixed salary, followed by cash-based short-term incentives, and share-based long-term incentives with averages 64%, 13% and 9.9%, respectively. The median fixed compensation share is at 60.6%. The fixed pay component is the only one present in all banks with a minimum of 15.6%. Total short-term and total long-term incentives are almost of equal size averaging at 18.9% and 17.2%, respectively. Furthermore, 68% of short-term incentives are cash-based whereas only 37% of long-term incentives are cash-based. Overall, cash-based incentives are a significantly larger

[52] The negative leverage ratio pertains to Dexia SA, which has a negative total equity in 2011. This is one of the banks that received government bailout during the crisis.

proportion of variable pay and contribute 55% to total variable pay. Deferred compensation averages at 13.9% of total compensation and reaches a maximum value of 73.5% of total remuneration, pointing out at the relative importance of this component for executive pay design. Table 5 presents compensation summary statistics for the Management Board sample.

Table 5. Descriptive Statistics for the components of managerial compensation in the Management Board sample

Descriptive Statistics of Compensation Variables: Management Board						
	N Valid	Mean	Median	Std. Deviation	Minimum	Maximum
Total fixed pay (%)	135	.640	.606	.246	.156	1.000
Cash-based STI (%)	130	.128	.094	.144	.000	.740
Share-based STI (%)	130	.056	.029	.073	.000	.375
Total STI (%)	135	.189	.174	.169	.000	.740
Cash deferral (%)	130	.054	.000	.075	.000	.368
Share deferral (%)	130	.085	.045	.102	.000	.463
Deferred compensation (%)	130	.139	.101	.151	.000	.735
Other forms of LTI (%)	130	.022	.000	.066	.000	.309
Total LTI (%)	135	.172	.118	.177	.000	.735
Cash-based LTI (%)	130	.063	.000	.088	.000	.368
Share-based LTI (%)	130	.099	.061	.126	.000	.607
Total cash-based variable pay (%)	130	.191	.187	.161	.000	.740
Total share-based variable pay (%)	130	.155	.141	.144	.000	.607

The table shows descriptive statistics for the independent compensation variables in the Management Board sample. The first column presents the variable name, the second column states the number of observations, and the rest of the columns provide information on the mean, median, standard deviation, minimum and maximum values in the sample.

CEO compensation structure is quite similar to the management board compensation structure in that fixed compensation contributes with 64% to the total compensation. However, in contrast to before, long-term incentives contribute a larger amount to CEO compensation than short term-incentives. For CEOs short-term incentives contribute only 15.7% to total compensation while long-term incentives contribute 20.4% to total compensation. Both the cash-based as well as share-based part of long-term incentives is larger than in the Management Board sample. Moreover, I find that share-based incentives and cash-based incentives are almost of equal size, 18% and 18.1%. Deferred compensation represents a higher portion of total compensation with a mean value of .168, as compared to the whole management board and reaches a maximum of almost 80% of total compensation.

Compensation summary statistics for the CEO Sample are provided in Table 6.

Table 6. Descriptive Statistics for the components of managerial compensation in the CEO sample

Descriptive Statistics of Compensation Variables: CEO						
	N Valid	Mean	Median	Std. Deviation	Minimum	Maximum
Total fixed pay (%)	130	.640	.580	.250	.192	1.000
Cash-based STI (%)	130	.101	.084	.117	.000	.606
Share-based STI (%)	130	.055	.030	.066	.000	.331
Total STI (%)	130	.157	.156	.152	.000	.757
Cash deferral (%)	130	.071	.003	.086	.000	.393
Share deferral (%)	130	.098	.076	.108	.000	.441
Deferred compensation (%)	130	.168	.156	.161	.000	.787
Other forms of LTI (%)	130	.035	.000	.113	.000	.745
Total LTI (%)	130	.204	.182	.193	.000	.787
Cash-based LTI (%)	130	.079	.003	.098	.000	.393
Share-based LTI (%)	130	.124	.095	.154	.000	.745

Total cash-based variable pay (%)	130	.181	.176	.159	.000	.606
Total share-based variable pay (%)	130	.180	.183	.163	.000	.745

The table shows descriptive statistics for the independent compensation variables in the CEO sample. The first column presents the variable name, the second column states the number of observations, and the rest of the columns provide information on the mean, median, standard deviation, minimum and maximum values in the sample.

The compensation structure variables of the Key Management sample differs from the CEO sample in the following respects. First, the fixed compensation component contributes a slightly larger slice to the overall compensation. Second, the proportion of short-term incentives exceeds the proportion of long-term incentives, and third, the proportion of cash-based incentives exceeds the proportion of share-based incentives. Deferred compensation has also slightly lower importance among key managers, with a mean of .141, as compared to .168 in the case of CEOs. Table 7 presents compensation summary statistics for the Key Management sample.

Table 7. Descriptive Statistics for the components of managerial compensation in the Key Management sample

Descriptive Statistics of Compensation Variables: Key Management						
	N Valid	Mean	Median	Std. Deviation	Minimum	Maximum
Total fixed pay (%)	115	.649	.579	.246	.222	1.000
Cash-based STI (%)	115	.126	.098	.147	.000	.740
Share-based STI (%)	115	.060	.029	.080	.000	.466
Total STI (%)	115	.185	.171	.178	.000	.740
Cash deferral (%)	115	.051	.000	.076	.000	.360
Share deferral (%)	115	.090	.045	.105	.000	.477
Deferred compensation (%)	115	.141	.093	.154	.000	.720
Other forms of LTI (%)	115	.025	.000	.070	.000	.323

Total LTI (%)	115	.166	.107	.177	.000	.720
Cash-based LTI (%)	115	.061	.000	.091	.000	.368
Share-based LTI (%)	115	.105	.067	.128	.000	.594
Total cash-based variable pay (%)	115	.187	.183	.164	.000	.740
Total share-based variable pay (%)	115	.165	.178	.146	.000	.594

The table shows descriptive statistics for the independent compensation variables in the Key Management sample. The first column presents the variable name, the second column states the number of observations, and the rest of the columns provide information on the mean, median, standard deviation, minimum and maximum values in the sample.

In summary, I find that the compensation structure of all board members is in average very similar. CEOs do have the highest average compensation in absolute values, but overall the underlying structure differs little in comparison to the other board members. In all three samples fixed compensation contribute almost two thirds to the total compensation, while variable pay is in average only about a third of total compensation. Long- and short-term incentives contribute each about one sixth to the total compensation. I find that CEOs receive more long-term compensation and less short-term compensation than their colleagues on the board. Cash- and share-based compensation also contribute each about one sixth to the total compensation. CEOs receive more share-based compensation and less cash-based compensation than the other board members, as well as higher portion of deferred compensation, as compared to key managers. These findings are consistent with the notion that long-term incentive components are more strongly emphasized in the case of CEOs, who determine the general direction of a company and bear the overall responsibility for strategic decisions, as compared to non-CEO board members

6.2. Correlations

In the following I discuss correlations between the components of managerial compensation, three measures of performance (continuously compounded stock returns, return on average risk-weighted assets, and return on average equity), total assets, leverage ratio, and government ownership. I start with the management board as a whole and subsequently discuss differences between CEOs and the rest of the board.

Table 8. Correlations between the managerial compensation components, performance variables and bank characteristics for the Management Board sample

Pearson Correlation for the Management Board sample						
Variable	***Performance Variables***			***Bank Characteristics***		
Compensation Variables	Continuously compounded stock returns	Return on Average Risk-weighted assets	ROAE	Total Assets	Leverage ratio	Government ownership (%)
Total fixed pay (%)	-.347**	-.348**	-.363**	-.463**	-.112	.237*
Cash-based STI (%)	.188	.303**	.245*	-.153	.043	-.160
Share-based STI (%)	.181	.177	.193*	.031	.053	-.112
Total STI (%)	.238*	.317**	.283**	-.113	.059	-.182
Cash deferral (%)	.239*	.149	.161	.484**	.073	-.107
Share deferral (%)	.191*	.140	.209*	.684**	.092	-.151
Deferred compensation (%)	.242*	.167	.221*	.702**	.099	-.154
Other forms of LTI (%)	.111	.132	.121	.392**	.036	-.049
Total LTI (%)	.254**	.198*	.240*	.766**	.100	-.153
Cash-based LTI (%)	.231*	.165	.173	.572**	.071	-.088
Share-based LTI (%)	.189*	.159	.207*	.645**	.087	-.149
Total cash-based variable pay (%)	.297**	.351**	.310**	.180	.077	-.191*
Total share-based variable pay (%)	.259**	.231*	.279**	.577**	.103	-.187

The table shows the bivariate correlations between compensation variables, performance variables, and control variables accounting for bank characteristics. The first column presents the respective compensation variable, the next three columns relate to the three performance measures- continuously compounded stock returns, return on average risk-weighted assets, and ROAE. The last three columns relate to the control variables- Total Assets, Leverage ratio and Government ownership. Each cell contains the Pearson correlation coefficient between the respective compensation variable and either a certain performance measure, or a particular bank characteristics variable in the Management Board sample.

**. The correlation is significant at level 0.01 (2-sided).

*. The correlation is significant at level 0.05 (2-sided).

Correlation levels for each compensation component are fairly stable across the three performance measures. Most of the significant correlations are observed for continuously compounded stock returns, followed by return on average equity, and finally by return on average risk-weighted assets. This is yet another reason as to why I use continuously compounded stock returns for my baseline analysis. Correlations between compensation components and performance measures are positive with the exception of fixed compensation which ranges from -.347 to -.363. This negativity is due to the non-performance-based nature of fixed compensation, meaning that almost, if not all, of the fixed pay components are paid out regardless of firm performance. Long-term incentives have higher correlation with stock returns than short-term incentives (.254 vs. .238, respectively), which is in line with the common notion that compensation should be designed to align managerial incentives with long-term performance.[53] More surprising is, however, the observation that correlation levels for short-term incentives are higher than those for long-term incentives when the performance measure is a proxy for operating performance. The meaningfulness of this effect, however, is questionable and a simple correlation cannot lead to a general conclusion about the relationship between pay structure and performance.[54] Furthermore, I see that cash-based compensation has a higher correlation with performance than share-based compensation. Overall, total cash-based remuneration has the highest relation to performance than any other component.

Correlations between compensation components and total assets are positive with the exception of fixed pay, cash-based short term incentives, and total short-term incentives. Leverage ratio is also positively correlated with all compensation components except fixed pay, although none of those correlations are significant. Finally, government ownership is negatively correlated with all compensation components except fixed pay. This is not surprising as most of the banks with government ownership were not performing well in addition to having introduced measures to limit excessive bonuses to avoid public discourse.

[53] The idea that compensation should be tied to long-term performance is emphasized, for example by Bebchuk and Fried (2010).

[54] I examine the relationship between short- and long-term incentives and operating performance closer in the robustness check section, when I employ average risk-weighted assets and ROAE as dependent variables in my regression analysis.

Table 9. Correlations between the managerial compensation components, performance variables and bank characteristics for the CEO sample

Pearson Correlation for the CEO sample						
Variable	***Performance Variable***			***Bank Characteristics***		
Compensation Variables	Continuously compounded stock returns	Return on Average Risk-weighted assets	ROAE	Total Assets	Leverage ratio	Government ownership (%)
Total fixed pay (%)	-.326**	-.391**	-.372**	-.514**	-.110	.217*
Cash-based STI (%)	.188*	.302**	.250**	-.066	.047	-.142
Share-based STI (%)	.207*	.250**	.244**	.053	.061	-.113
Total STI (%)	.236**	.338**	.296**	-.030	.063	-.159
Cash deferral (%)	.259**	.290**	.236**	.327**	.071	-.121
Share deferral (%)	.208*	.242**	.246**	.658**	.087	-.144
Deferred compensation (%)	.273**	.314**	.290**	.615**	.097	-.161
Other forms of LTI (%)	.030	-.018	.037	.308**	.026	-.045
Total LTI (%)	.246**	.259**	.265**	.697**	.096	-.161
Cash-based LTI (%)	.284**	.321**	.255**	.412**	.070	-.101
Share-based LTI (%)	.132	.119	.169	.610**	.075	-.138
Total cash-based variable pay (%)	.314**	.410**	.333**	.203*	.077	-.165
Total share-based variable pay (%)	.202*	.207*	.250**	.589**	.094	-.171

The table shows the bivariate correlations between compensation variables, performance variables, and control variables accounting for bank characteristics. The first column presents the respective compensation variable, the next three columns relate to the three performance measures- continuously compounded stock returns, return on average risk-weighted assets, and ROAE. The last three columns relate to the control variables- Total Assets, Leverage and Government ownership. Each cell contains the Pearson correlation coefficient between the respective compensation variable and either a certain performance measure, or a particular bank characteristics variable in the CEOs sample.

**. The correlation is significant at level 0.01 (2-sided).

*. The correlation is significant at level 0.05 (2-sided).

Correlation levels between CEO compensation components and performance are comparable to the ones of the entire board. Again most entries are significant and stable for all three performance measures. In contrast to before, *Total LTI* has a stronger correlation to performance than *Total STI*, for both continuously compounded stock returns and return on average-risk weighted assets. Total assets are significantly positively correlated with all remuneration components, with the exception of the short-term ones. Leverage does not correlate significantly with the components of CEO pay. Government ownership correlations are not significant except for fixed pay, but only at the 0.05 level. Total variable pay has the most positive correlation, while total fixed pay has the most negative correlation. In both instances correlations are at a slightly higher level as compared to the entire board.

Table 10. Correlations between the managerial compensation components, performance variables and bank characteristics for the Key Management sample

Pearson Correlation for Key Management sample						
Variable	***Performance Variable***			***Bank Characteristics***		
Compensation Variables	Continuously compounded stock returns	Return on Average Risk-weighted assets	ROAE	Total Assets	Leverage ratio	Government ownership (%)
Total fixed pay (%)	-.350**	-.330**	-.351**	-.411**	-.106	.267**
Cash-based STI (%)	.193*	.230*	.229*	-.155	.037	-.175
Share-based STI (%)	.172	.184*	.190*	.080	.058	-.132
Total STI (%)	.237**	.274**	.280**	-.120	.057	-.209*
Cash deferral (%)	.244**	.204*	.171	.450**	.074	-.133
Share deferral (%)	.187*	.124	.184*	.714**	.090	-.163
Deferred compensation (%)	.243**	.185*	.210*	.708**	.098	-.177*
Other forms of LTI (%)	.119	.135	.114	.385**	.034	-.049
Total LTI (%)	.257**	.223*	.238**	.690**	.096	-.178*

Cash-based LTI (%)	.255**	.225*	.186*	.531**	.072	-.112
Share-based LTI (%)	.178*	.136	.180*	.673**	.083	-.158
Total cash-based variable pay (%)	.313**	.324**	.302**	.151	.073	-.216*
Total share-based variable pay (%)	.236**	.206*	.245**	.621**	.100	-.199*

The table shows the bivariate correlations between compensation variables, performance variables, and control variables accounting for bank characteristics. The first column presents the respective compensation variable, the next three columns relate to the three performance measures- continuously compounded stock returns, return on average risk-weighted assets, and ROAE. The last three columns relate to the control variables- Total Assets, Leverage and Government ownership. Each cell contains the Pearson correlation coefficient between the respective compensation variable and either a certain performance measure, or a particular bank characteristics variable in the Key Management sample.

**. The correlation is significant at level 0.01 (2-sided).

*. The correlation is significant at level 0.05 (2-sided).

The correlation between the composition components of Key Management members does not differ materially from the CEOs' correlations in the prior table. Overall, fewer entries are significant and the difference between cash-based and share-based compensation is not as large. Total cash based compensation is again the component with the highest level of correlation to performance.

6.3. Baseline Analysis

As mentioned before, compensation structure can be viewed from several different perspectives. One possible way to decompose remuneration is according to its term structure- in short- and long-term incentives. Executive pay can also be examined taking into account the form in which it is granted- cash- and share-based components, or the use of a particular type of compensation mechanisms, such as deferred pay. It could be expected that each of these compensation components has different association with performance. In order to examine this relationship, I first perform a multiple linear regression analysis, which employs only one performance measure as a dependent variable and differentiates only between the compensation variables. In doing so, I am able to make general inferences about the association of compensation structure and performance, which can then be tested for

robustness with other performance variables in later sections. As already mentioned, I hypothesize that the general pay structure-performance effects hold for CEOs and for non-CEO members of the board. Therefore, I first analyze the remuneration composition and performance in the whole management board, before comparing and contrasting my findings in the two subgroups. The aim of this section is to present the core empirical model which serves as a basis for all further model specifications and sample splits that I perform.

More concretely, the baseline empirical analysis is constructed in the following way. The dependent variable in my multiple linear regressions is annualized continuously compounded stock returns. I first derive a model which employs the percentage short-term incentive and long-term incentive of total compensation as explanatory variables, and controls for bank size and leverage. In order to analyze compensation structure in a more detailed manner, I perform two more regressions in the course of the baseline analysis. In the first one I fragment short-term incentive and long-term incentive further in short-term and long-term cash-based and share-based compensation, while in the second one I keep short-term incentive percentage of total compensation as an independent variable and decompose long-term incentives in deferred compensation and other forms of long-term incentives. In both equations I also control for size and leverage. In the following, I describe the derivation of these models, by explaining all stages of the empirical analysis and at the same time present the results of the three main baseline regressions.

6.3.1. Model Derivation

My first general model examines the major compensation structure effects between short- and long-term compensation components, which are then fragmented in subsequent regressions, in order to analyze pay structure in a greater detail. The motivation for this first general baseline model emerges from the results of two preceding regressions that I perform and which I briefly describe next. I initially regress *Continuously compounded stock returns* on three compensation variables: *Total fixed pay*, *Total STI* and *Total LTI*, and on two bank characteristics variables: *Total Assets* and *Leverage ratio*. In this model *Total fixed pay* is automatically excluded from the regression in SPSS, due to collinearity. The variable is highly and significantly correlated with both *Total STI* and *Total LTI* (-0.694 and -0.715 Pearson Correlation coefficients, respectively). Moreover, the tolerance value of *Total fixed*

pay is 0, meaning that 0% of the variability in the dependent variable is not explained by other variables in the model, and confirming the effect of multicollinearity. The outcome of this first regression is presented in Table 11. Excluding *Total fixed pay* results in a model with 27.3% R-squared with significant coefficients for all other independent variables.

Table 11. OLS regression of Continuously compounded stock returns on Total fixed pay, Total STI, Total LTI and control variables in the Management Board sample

OLS regression of Continuously compounded stock returns on Total fixed pay, Total STI, Total LTI and bank characteristics variables				
Model	Standardized Coefficients	Significance	Collinearity Statistics	
	Beta		Tolerance	VIF
Total STI (%)	.188*	.020	.974	1.027
Total LTI (%)	.470*	.000	.394	2.540
Total Assets	-.317*	.013	.392	2.548
Leverage ratio	.326*	.000	.985	1.015
Excluded Variables				
Total fixed pay (%)			.000	
Number of observations	122			
R-squared	.273			

The table shows a multiple linear regression model with continuously compounded stock returns as the dependent variable and Total fixed pay (%), Total STI (%) and Total LTI (%) as explanatory compensation variables. Total Assets and Leverage ratio are control variables for size and leverage, respectively. The second column presents the standardized regression coefficients for the dependent variables; the third column states the p-value. The fourth and the fifth columns present the collinearity statistics with the Tolerance and VIF values, respectively.
*. The coefficient is significant at level 0.05.

In order to find out whether *Total fixed pay* should generally be removed from the analysis due to multicollinearity, I employ a different regression model with other compensation structure variables, namely *Total fixed pay*, *Total cash-based variable pay*, and *Total share-based variable pay*.

The effect of multicollinearity appears again in this second model- *Total fixed pay* is not automatically excluded from the model in the Management Board sample, however the variable is highly and significantly correlated with other predictor variables (-.810 Pearson Correlation coefficient with *Total cash-based variable pay*, and -.763 with *Total share-based variable pay*).[55] In contrast to the previous regression model, in this one all three compensation variables have 0 tolerance values and extremely high VIF, which clearly shows the presence of multicollinearity. Moreover, all compensation variable coefficients are not significant and the remuneration structure variables in the model do not contribute to explaining bank performance.[56] Following the examination of these two regression models I exclude *Total fixed pay* from my analysis, in order to deal with multicollinearity. The removal of *Total fixed pay* leads to the following preliminary regression equation:

Continuously compounded stock returns

= f (Total cash-based variable pay, Total share-based variable pay, and Control variables)

The results of this OLS regression as presented in Table 12 are meaningful and significant.

Table 12. OLS regression of Continuously compounded stock returns on Total cash-based variable pay, Total share-based variable pay and control variables in the Management Board sample

OLS regression of continuously compounded stock returns on Total cash-based variable pay, Total share-based variable pay and bank characteristics variables				
Model	Standardized Coefficients	Significance	Collinearity Statistics	
	Beta		Tolerance	VIF
Total cash-based variable pay (%)	.257*	.002	.940	1.064
Total share-based variable pay (%)	.241*	.022	.592	1.688
Total Assets	-.165	.109	.616	1.624
Leverage ratio	.334*	.000	.986	1.014

[55] For the CEO sample SPSS excludes *Total fixed pay* automatically from the regression due to collinearity.
[56] The associated regression table is omitted as the results are not meaningful.

Number of observations	122	
R-squared	.254	

The table shows a multiple linear regression model with continuously compounded stock returns as the dependent variable and Total cash-based variable pay (%) and Total share-based variable pay (%) as explanatory compensation variables. Total Assets and Leverage ratio are control variables for size and leverage, respectively. The second column presents the standardized regression coefficients for the dependent variables; the third column states the p-value. The fourth and the fifth columns present the collinearity statistics with the Tolerance and VIF values, respectively.

*. The coefficient is significant at level 0.05.

I find that both total cash-based and total share-based incentives are significantly associated with performance. They contribute to explaining performance in almost equal parts. The link between total cash-based incentives and performance seems to be a little stronger as the coefficient is slightly higher and the significance is greater, but the overall difference is marginal. The model explains 25.4% of the variance in stock market performance.

In summary, the model from Table 11 exhibits highly significant short- and long-term incentive variables, after fixed pay has been excluded. Therefore, this regression serves as a basis for my further empirical analysis. Differentiating between cash- and share-based variable components (Table 12) also leads to meaningful results. However, the implication of dividing compensation into cash and equity is even more interesting in the context of the particular term structure of remuneration. Therefore, following the inferences from these preliminary regressions, I derive my baseline models, which I present next.

6.3.2. Baseline Models

As stated above, I first employ a general model with *Total STI* and *Total LTI* as predictor variables in order to account for the term structure of incentives. Equation 1 states the model, whereas the results of this regression are presented in Table 13.

Equation 1:

(1) Continuously compounded stock returns = f (Total STI, Total LTI, and Control variables)

Table 13. OLS regression of Continuously compounded stock returns on Total STI, Total LTI and control variables in the Management Board sample

OLS regression of Continuously compounded stock returns on Total STI, Total LTI and bank characteristics variables				
Model	Standardized Coefficients	Significance	Collinearity Statistics	
	Beta		Tolerance	VIF
Total STI (%)	.188*	.020	.974	1.027
Total LTI (%)	.470*	.000	.394	2.540
Total Assets	-.317*	.013	.392	2.548
Leverage ratio	.326*	.000	.985	1.015
Number of observations	122			
R-squared	.273			

The table shows a multiple linear regression model with continuously compounded stock returns as the dependent variable and Total STI (%) and Total LTI (%) as explanatory compensation variables. Total Assets and Leverage ratio are control variables for size and leverage, respectively. The second column presents the standardized regression coefficients for the dependent variables; the third column states the p-value. The fourth and the fifth columns present the collinearity statistics with the Tolerance and VIF values, respectively.

*. The coefficient is significant at level 0.05.

As stated above 27.3% of the variance in stock market performance is explained by the predictor variables in the model. All independent variables are highly significant with *Total LTI* having the highest and positive contribution to explaining bank stock market performance (a standardized coefficient of 0.470). Short-term incentives are also positively related to performance, although their explanatory power, with a beta of 0.188, is well below that of *Total LTI*. The finding that long-term incentives relate stronger to performance than short-term incentives confirms the conclusion of Jensen and Murphy (1990) that the structure of remuneration is crucial for performance. Furthermore, this result reaffirms the existing notion that tying managerial incentives to long-term goals is positively related to firm performance.

Concerning bank characteristics, *Total Assets* are significantly and negatively related to stock market performance with a standardized coefficient of -0.317. This effect might have several explanations. On the one hand, it might be interpreted in the light of the existing literature,

pointing out at the presence of diseconomies of scale in large banks.[57] On the other hand, the explanation might reflect financial crisis arguments. It is commonly known that several large banks in Europe, engaging in business activities different from the classical commercial banking, received bailouts in the period 2010 – 2014. Those large banks were bad performers during the crisis, so the strong negative relationship between size and performance might reflect the poor stock market performance of large financially distressed banks. In contrast, leverage is significantly and positively related to performance, meaning that higher levels of debt are associated with higher stock market returns. This finding is somewhat surprising taking into account the possible adverse effect of high debt levels on managerial incentives.[58] However, the result might again be explained in the light of the recent economic situation in Europe. Because of the low interest rate environment in the years following the financial crisis, banks are able to lend money among each other at very low prices. These low financing costs stimulate taking on debt capital, which can be in turn used to invest in projects. This easy and cheap access to financing might serve as a positive signal to the markets and lead to stock price increases. Moreover, if the capital is invested in projects that create value for investors, then this might also influence stock market returns positively.

The finding that long-term incentives have the strongest relationship to performance raises the questions of, first, how long and short-term incentive decomposition in cash and share-based components relates to stock returns, and second, how the particular types of long-term incentives, such as deferred pay, associate with performance. Therefore, I first decompose both *Total STI* and *Total LTI* in cash- and share-based components in order to make inferences on how the term structure of payments in combination with the form of granting of remuneration elements relates to performance. Afterwards, in a separate regression I study the relationship of deferred compensation and performance.

The results of the linear model regressing continuously compounded stock returns on short-term cash remuneration, short-term share-based remuneration, long-term cash compensation, long-term share-based compensation, and control variables are presented in Table 14. The model itself is stated in Equation 2.

[57] As stated in the "Variables" Section, Short (1979) hypothesizes that bank size might be related to economies or diseconomies of scale.

[58] This argument reflects the hypothesis of Jensen and Meckling (1976) that increasing leverage in banks incentivizes managers to increase asset volatility by engaging in short-term activities, due to the call option property of equity.

Equation 2:

(2) Continuously compounded stock returns

= f (Cash-based STI, Share-based STI, Cash-based LTI, Share-based LTI, and Control variables)

Table 14. OLS regression of Continuously compounded stock returns on Cash-based STI, Share-based STI, Cash-based LTI, Share-based LTI and control variables in the Management Board sample

OLS regression of continuously compounded stock returns on Cash-based STI, Share-based STI, Cash-based LTI, Share-based LTI and bank characteristics variables				
Model	Standardized Coefficients	Significance	Collinearity Statistics	
	Beta		Tolerance	VIF
Cash-based STI (%)	.175*	.033	.944	1.059
Share-based STI (%)	.041	.628	.862	1.160
Cash-based LTI (%)	.345*	.001	.587	1.704
Share-based LTI (%)	.267*	.015	.533	1.875
Total Assets	-.324*	.011	.391	2.557
Leverage ratio	.327*	.000	.985	1.015
Number of observations	122			
R-squared	.284			

The table shows a multiple linear regression model with continuously compounded stock returns as the dependent variable and Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) as explanatory compensation variables. Total Assets and Leverage ratio are control variables for size and leverage, respectively. The second column presents the standardized regression coefficients for the dependent variables; the third column states the p-value. The fourth and the fifth columns present the collinearity statistics with the Tolerance and VIF values, respectively.

*. The coefficient is significant at level 0.05.

Again, in this model both long-term incentive variables are positively and significantly related to stock market performance, with *Cash-based LTI* contributing stronger to explaining

performance than *Share-based LTI*. Interestingly, the same effect is present with short-term incentives. Although *Share-based STI* is the only insignificant variable in the model with a beta of 0.041, it has lower explanatory power than *Cash-based STI* with a significant standardized coefficient of 0.175. On the whole, it seems that incentives granted in the form of cash have a greater contribution to explaining bank performance than do share-based compensation components. This effect is somewhat surprising in the first instance and contrary to initial expectations, as it is a common practice to tie executive remuneration to equity and equity-based instruments for the sake of tying managerial incentives to long-term performance. However, looking closer to the compensation variables in the regression provides a logical explanation for my finding. First, the *Share-based STI* coefficient is not significantly different from 0 with a p-value far above the alpha level of 0.05. Consequently, it cannot be concluded that cash-based short-term compensation exhibits a stronger contribution to performance than short-term equity compensation. Second, the high *Cash-based LTI* coefficient, may be explainable by the fact that compensation tying executive incentives to long-term goals, but still granted in cash creates greater value for the manager because it does not include holding periods after granting, as does equity-based remuneration. Furthermore, in contrast to cash compensation, share-based remuneration is related to stock return volatility, which poses higher remuneration value destruction risk to the manager. For these reasons, cash-based pay when designed to tie managerial incentives to long-term goals might motivate executives more than equity-based pay, and thus positively affect bank performance.

Generally, the effect of long-term incentives exhibiting a stronger relationship to performance than short-term incentives, found in the first baseline model (Eq. (1)), is present also in this second one. Moreover, *Total Assets* still exhibit a negative and significant relationship with performance, and *Leverage ratio* is again positively and significantly related to market performance, thus reaffirming the effects found and their possible interpretations.

Because *Share-based STI* is not a meaningful variable on its own due to its insignificant contribution to performance, I decide to use the total short-term incentives in my next model.[59] The aim of the next regression is to examine the contribution of deferred compensation to bank performance, as compared to other types of incentives. This leads to the third central baseline model, which is stated in Equation 3.

[59] The variable *Share-based STI (%)* is insignificant in the CEO and Key Managers samples, as well.

Equation 3:

(3) Continuously compounded stock returns

= f (Total STI, Deferred compensation, Other forms of LTI, and Control variables)[60]

The results of this regression are presented in Table 15.

Table 15. OLS regression of Continuously compounded stock returns on Total STI, Deferred compensation, Other forms of LTI, and control variables in the Management Board sample

OLS regression of continuously compounded stock returns on Total STI, Deferred compensation, Other forms of LTI and bank characteristics variables				
Model	Standardized Coefficients	Significance	Collinearity Statistics	
	Beta		Tolerance	VIF
Total STI (%)	.189*	.021	.965	1.037
Deferred compensation (%)	.406*	.001	.447	2.235
Other forms of LTI (%)	.184*	.038	.819	1.222
Total Assets	-.317*	.014	.392	2.553
Leverage ratio	.326*	.000	.985	1.016
Number of observations	122			
R-squared	.273			

The table shows a multiple linear regression model with continuously compounded stock returns as the dependent variable and Total STI (%), Deferred compensation (%), and Other forms of LTI (%) as explanatory compensation variables. Total Assets and Leverage ratio are control variables for size and leverage, respectively. The second column presents the standardized regression coefficients for the dependent variables; the third column states the p-value. The fourth and the fifth columns present the collinearity statistics with the Tolerance and VIF values, respectively.

*. The coefficient is significant at level 0.05.

[60] I also look at the relationship between performance and deferred compensation fragmented in cash deferral and share deferral. However, this decomposition is not that interesting, because in most, if not all of the sample banks, managers, irrespective of their function as CEOs or non-CEO board members receive deferred compensation 50% in cash and 50% in equity. Therefore, the percentages deferred cash and deferred shares of total compensation are equal, and do not exhibit statistically significant differences. Therefore, I use deferred compensation as a whole in my OLS model.

In this model all predictor variables are significant and the model explains 27.3% of the variation in the dependent variable. *Deferred compensation,* with a highly significant beta coefficient of 0.406, has the strongest association with stock market performance, whereas *Total STI* and *Other forms of LTI* have about the same contribution to explaining performance. On the whole, the effect that long-term forms of compensation have a stronger relationship with bank performance, as compared to short-term incentives, is confirmed also in this model. The finding that deferred compensation has the strongest relationship with performance is also consistent with the existing literature on compensation structure and performance in the banking industry. My results are in line with those of Bennett, Güntay, and Unal (2015), who find that remuneration in the form of inside debt (pension benefits and deferred compensation) is associated with better bank performance in terms of excess stock returns, ROA, and ROE, than compensation in the form of inside equity. As the authors point out, inside debt aligns managerial interests not only with those of shareholders, but also with debt holders' interests, and has important implications for stakeholders' investment choices between risky and non-risky banks. The stronger contribution of deferred compensation to performance, relative to other short- and long-term incentives, is also consistent with the recent tendency in the banking industry to integrate more deferred components in bankers' pay.

In order to analyze whether there are material differences in my findings, when separating the management board in CEO and non-CEO members, I perform the three baseline models in the CEOs and Key Management samples in the next subsection.

6.4. CEOs vs. Key Managers

As stated above, in some cases the structure of incentives of CEO and non-CEO board members differs, in order to reflect the distinct level of strategic responsibility of both types of executives. Therefore, as I already hypothesized, it is very likely that CEOs' incentives in general are more strongly related to bank performance than those of the other management board members. The results of the three baseline models in the CEOs and Key Management samples are presented in Table 16.

Table 16. CEOs vs. Key Managers: OLS regression of Continuously compounded stock returns on compensation and control variables in the CEO and Key Management samples

OLS regression of continuously compounded stock returns on compensation structure variables and bank characteristics variables for in the CEOs and in the Key Management samples						
	CEOs			**Key Managers**		
Model	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
Total STI (%)	.181*		.154	.188*		.187*
	(.028)		(.071)	(.032)		(.034)
Total LTI (%)	.347*			.418*		
	(.003)			(.003)		
Cash-based STI (%)		.130			.147	
		(.127)			(.102)	
Share-based STI (%)		.042			.089	
		(.651)			(.323)	
Cash-based LTI (%)		.300*			.305*	
		(.003)			(.008)	
Share-based LTI (%)		.203			.243*	
		(.051)			(.036)	
Deferred compensation (%)			.357*			.363*
			(.002)			(.005)
Other forms of LTI (%)			.143			.166
			(.113)			(.084)
Total Assets	-.215	-.226*	-.239*	-.256	-.276*	-.256
	(.062)	(.050)	(.042)	(.064)	(.048)	(.065)
Leverage ratio	.321*	.320*	.318*	.332*	.332*	.332*
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Number of observations	124	124	124	108	108	108
R-squared	.232	.249	.239	.259	.268	.259

The table shows the outcomes of the three baseline models (Eq.1,2 and 3) for CEOs vs. Key Managers, respectively. Equation (1) regresses continuously compounded stock returns on Total STI (%), Total LTI (%), and control variables. Equation (2) regresses continuously compounded stock returns on Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) and control variables. Equation (3) regresses continuously compounded stock returns on Total STI (%), Deferred compensation (%), Other forms of LTI (%), and control variables. The control variables are the same in each model and include Total Assets as a proxy for size, and Leverage ratio as a control for bank leverage. The first row for each variable indicates the standardized coefficient beta, and in the second row in brackets the p-values are presented.

*. The coefficient is significant at level 0.05.

Contrary to initial expectations, I find that in the Key Management sample there are more significant compensation variables than in the CEO sample, and that on the whole, key managers' incentives seem to be stronger related to performance, as they exhibit higher standardized beta coefficients.

Table 16 shows that short-term incentives are significant for CEOs only in total and only in equation (1). Dividing *Total STI* in cash- and share-based compensation does not result in significant results neither for CEOs, nor for Key Managers. Consistent with the baseline analysis, *Cashed-based LTI* has a stronger contribution to performance than *Share-based LTI,* with a greater impact in the case of the non-CEO board members (0.305 for Key Managers vs. 0.300 for CEOs in the case of *Cashed-based LTI*). In contrast to before, the share-based long-term incentive for CEOs is not significant at the 0.05 level. On the whole, apart from *Other forms of LTI* all long-term compensation variables contribute to explaining performance in the Key Management sample. This is not the case in the CEOs sample, where only *Total LTI* and *Deferred compensation* are significant. Most interestingly, CEOs' deferred compensation exhibits a weaker association with stock market performance as compared to non-CEO deferred compensation (0.357 and 0.363 standardized coefficients, respectively). This effect is somewhat surprising considering the fact that in many cases CEOs receive a higher percentage of their variable remuneration deferred than non-CEO executives do.[61] This result has an important implication for both bank remuneration committees and policy makers. On the one hand, deferred remuneration contributes to performance to a greater extent as compared to short-term incentives and other forms of long-term incentives, and should thus be integrated in executive remuneration contracts. However, on the other hand, it might be that the percentage of variable pay deferred over time starts to play a role at some point as the deferred potion increases. When the portion of variable compensation deferred is smaller, like in the case of Key Managers, this reward type might have a greater positive effect on performance. It would be interesting for future research to analyze this hypothesis and the exact percentage of variable compensation at which the contribution of deferred pay to performance starts to decrease.

Generally, the finding that compensation structure relates stronger to performance in the case of Key Managers than in the case of CEOs, might be interpreted in several ways. It is possible that the results are at least in part affected by a model misspecification, which fails to consider

[61] In my sample banks in most of the cases, where deferred pay is part of the compensation system, 40% of the variable pay is deferred for Key Managers, whereas 60% of the variable pay is deferred for CEOs.

an important performance relevant difference between these two groups. Alternatively, the fact that CEO compensation structure contributes less to performance than that of Key Managers might illustrate a relatively simple point: the common belief that CEOs play the most important role in strategic decision making leads to incentive pay systems for CEOs which overemphasize the relevance of tying incentives to performance as compared to policies implemented for other managers. This results in remuneration policies employing an unnecessary high percentage of deferred compensation, and long-term incentives in general, for CEOs as compared to non-CEO executives. Actually, other board members might be as important in strategic decision making, as CEOs are, so overemphasizing CEO long-term compensation design might not necessarily contribute to performance. It would be interesting to verify this interpretation in future research.

In contrast to compensation structure, size is mostly significant in the CEO sample as compared to Key Management. In both regressions (2) and (3) larger size is associated with lower performance among CEOs than among non-CEO executives. In the case of the Key Management sample the negative relationship between *Total Assets* and performance is present only in equation (2). Turning to leverage, the variable is again significant and positively related to performance in both samples with Key Managers exhibiting again slightly stronger relationship to performance.

On the whole, the major effects from the Management Board sample that long-term incentives relate stronger to performance than short-term incentives, that cash-based long-term incentives associate stronger with stock returns than share-based long-term incentives, and that deferred pay has a more powerful relationship with performance as compared to other long- and short-term components, are also evident in the CEOs and Key Management samples. However, when comparing both groups, the effects are stronger for Key Management. Thus compensation system design should be treated with caution, as the current non-CEO remuneration policy design might contribute more to bank performance than the current CEO compensation systems. Thus, the role of compensation structure among non-CEO managers should not be overlooked and underestimated when analyzing compensation structures both in the literature, and in practice.

6.5. Large Banks vs. Small Banks

In the following I discuss differences between larger and smaller size banks. For this purpose I divide the Management Board sample into two subgroups. Group 1, small banks, consists of all banks with total assets of less than €50 billion. Group 2, large banks, consists of all banks with more than €50 billion in total assets. According to this definition, my sample contains 58 small banks and 64 large banks. The smallest bank in my sample has total assets of just over €500 million, while the biggest bank holds over €2 trillion in total assets. For ease of presentation, the analysis is limited to the Management Board sample, since all observations presented in this section do also hold for the CEO as well as the Key Management sample.[62]

Analyzing the group of large and small banks separately is interesting as well as meaningful for a couple of reasons. First, large and small banks operate in very different environments, each with different opportunity sets. Small banks tend to operate locally and to concentrate on the core banking business, while big banks operate globally and engage in all possible forms of financial transactions. Second, ever since the financial crisis, the regulators around the globe consider large banks as "too big to fail". Any bank that carries this unofficial title cannot go bankrupt as the public hand will always bail it out to prevent further economic damage to other parts of the economy. Thus, the level of total assets is associated with the regulator's reluctance to close a bank in financial distress.[63] Third, large banks pay their managers more total compensation than smaller, i.e. there is a high correlation between total compensation and total assets. This in itself may not be a problem, but there is evidence that compensation schemes of large banks fail to serve the purpose of incentivizing management performance. Penas and Unal (2004) as well as Minnick, Unal, and Yang (2011), find that CEOs of large banks do not respond to changes in their equity compensation. Similarly, Bennett, Güntay, and Unal (2015) cannot find evidence that large bank CEOs can be incentivized by inside debt compensation schemes.

Indeed, I find that regressions for large and small sized banks come to quite different results as it can be inferred from Table 17.

[62] The regression tables for the CEO and the Key Management Sample can be found in Appendix A1.3.
[63] This argument is in line with Bennett, Güntay, and Unal (2015).

Table 17. Small vs. Large Banks: OLS regression of Continuously compounded stock returns on compensation structure and control variables in the Management Board sample

OLS regression of continuously compounded stock returns on compensation structure variables and bank characteristics variables for Small vs. Large Banks in the Management Board sample						
	Small Banks			**Large Banks**		
Model	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
Total STI (%)	.230*		.232*	.237*		.248*
	(.048)		(.048)	(.048)		(.047)
Total LTI (%)	.520*			.324		
	(.000)			(.073)		
Cash-based STI (%)		.259*			.172	
		(.027)			(.236)	
Share-based STI (%)		.066			.093	
		(.568)			(.605)	
Cash-based LTI (%)		.580*			.179	
		(.000)			(.350)	
Share-based LTI (%)		.075			.245	
		(.525)			(.111)	
Deferred compensation (%)			.477*			.251
			(.000)			(.151)
Other forms of LTI (%)			.230*			.173
			(.049)			(.155)
Total Assets	-.381*	-.343*	-.379*	-.305	-.305	-.301
	(.006)	(.011)	(.007)	(.078)	(.095)	(.085)
Leverage ratio	.159	.161	.160	.403*	.403*	.403*
	(.209)	(.194)	(.211)	(.000)	(.001)	(.000)
Number of observations	58	58	58	64	64	64
R-squared	.334	.437	.335	.325	.323	.326

The table shows the outcomes of the three baseline models (Eq.1,2 and 3) for small vs. large banks, respectively. The threshold for the sample split is €50 billion of Total Assets. Equation (1) regresses continuously compounded stock returns on Total STI (%), Total LTI (%), and control variables. Equation (2) regresses continuously compounded stock returns on Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) and control variables. Equation (3) regresses continuously compounded stock returns on Total STI (%), Deferred compensation (%), Other forms of LTI (%), and control variables. The control variables are the same in each model and include Total Assets as a proxy for size, and Leverage ratio as a control for bank leverage. The first row for each variable indicates the standardized coefficient beta, and in the second row in brackets the p-values are presented.

*. The coefficient is significant at level 0.05.

The influence of total short-term incentives in models (1) and (3) is the only commonality between the two subsamples with coefficients ranging from .230 to .248 across the four models. Moreover, total short-term compensation is the only significant compensation variable for the group of large banks. All other compensation variables of all three models are not significant and deviate considerably from the small bank group. It appears that the time horizon of the large bank management board members is short-term oriented. Moreover, compensation structure does not influence performance for large banks.[64] This is in line with the argument that CEOs of large banks are not responsive to marginal changes in their compensation.[65] Similarly to Bennett, Güntay, and Unal (2015), and Minnick, Unal, and Yang (2011) I suggest that as bank size rises, total managerial compensation increases to such a high extent, that the sensitivity of executives' behavior (aiming at inducing performance) to their debt and equity holdings significantly declines.

In contrast to large banks, almost all components of the management compensation structure are associated with performance in the case of small banks. Model (1) shows that short-term and long-term incentives have a significant and positive relation to performance. Note that the coefficient for long-term incentives is more than double of the short-term incentive coefficient. When further splitting the compensation components into their cash- and share-based subentities, Model (2) shows that performance is only associated with cash-based components. Share-based short term-incentives and share-based long-term incentives are not significant. The strongest relation is observed for cash-based long-term incentives with a coefficient of 0.58. [66]

Looking at the control variables, I find that *Leverage ratio* is highly significant for large banks and contributes 0.403 to performance in all three models. The coefficients for small banks range only between 0.159 and 0.161, but are not significant at the 0.05 level. [67] Large and small banks seem to operate on very different business models. Large banks use leverage

[64] All compensation variables in the large banks group, apart from *Total STI*, are insignificant.
[65] This argument is provided by Bennett, Güntay, and Unal (2015) for inside debt holdings, and by Penas and Unal (2004) and Minnick, Unal, and Yang (2011) for equity compensation.
[66] Concerning the CEO and Key Management samples, there are no significant compensation variables for large banks, whereas in the small banks group only long-term components are significant. On the whole, the effect found in the "CEOs vs. Key Managers" section that pay structure variables are more strongly related to performance among non-CEO members than among CEOs cannot be elaborated on when the samples are further split in small and large banks, due to the high number of insignificant compensation variables in both samples. The respective results for CEOs and Key Managers with a split in total assets are presented in tables A1.3.3. and A1.3.4. in Appendix A1.3.
[67] Leverage is a positive and significant variable for large banks only in the CEOs and Key Management samples, as well.

far more extensively to induce performance than small banks. This could be fueled to some extent by the recent "too-big-to-fail" discussion among regulators and politicians. Under normal circumstances higher levels of leverage are associated with an increased probability of going bankrupt. At the same time, this probability may not be of interest to large banks as bankruptcy will always be avoided through last resort bail outs programs by the public hand.

6.6. Government Ownership Effects

The thread of bankruptcy to financial institutions during the recent banking crisis was a huge issue that affected almost all sectors of the economy. Several banks had to be recapitalized with the help of the public hand. Those banks went partially into government ownership. This triggered discussions among regulators, politicians, scholars, and practitioners about how sustainable banking should look like in the future. One of the things discussed were ways to improve the alignment between managerial compensation and performance. In the following, I want to discuss the impact of government ownership on the relation between compensation structure and performance. First, I look at the impact on the whole Management Board sample, see Table 18. Subsequently, I look at the impact of government ownership on large and small banks separately in Table 19.

Table 18. Government Ownership: OLS regression of Continuously compounded stock returns on compensation structure variables and control variables in the Management Board sample

OLS regression of continuously compounded stock returns on compensation structure variables and controlling for size, leverage and government ownership in the Management Board sample			
Model	***(1)***	***(2)***	***(3)***
Total STI (%)	.151		.152
	(.061)		(.061)
Total LTI (%)	.398*		
	(.002)		
Cash-based STI (%)		.142	
		(.080)	
Share-based STI (%)		.025	
		(.761)	

Cash-based LTI (%)		.313* (.003)	
Share-based LTI (%)		.210 (.055)	
Deferred compensation (%)			.339* (.005)
Other forms of LTI (%)			.162 (.062)
Total Assets	-.270* (.032)	-.278* (.028)	-.269* (.034)
Leverage ratio	.343* (.000)	.344* (.000)	.343* (.000)
Government ownership (%)	-.198* (.016)	-.201* (.015)	-.199* (.017)
Number of observations	122	122	122
R-squared	.308	.321	.308

The table shows the outcomes of the three baseline models (Eq.1,2 and 3) when additionally controlling for government ownership stake. Equation (1) regresses continuously compounded stock returns on Total STI (%), Total LTI (%), and control variables. Equation (2) regresses continuously compounded stock returns on Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) and control variables. Equation (3) regresses continuously compounded stock returns on Total STI (%), Deferred compensation (%), Other forms of LTI (%), and control variables. The control variables are the same in each model and include Total Assets as a proxy for size, and Leverage ratio as a control for bank leverage, and the percentage government owned common shares as a control for government ownership. The first row for each variable indicates the standardized coefficient beta, and in the second row in brackets the p-values are presented.
*. The coefficient is significant at level 0.05.

The *Government ownership* variable contributes significantly to the relation between compensation structure and performance. The regression coefficients range from -.198 in model (1) to -.201 in model (3). Thus, banks with more government ownership perform worse than banks with a smaller government stake. This result is in line with the hypothesis of Short (1979) that government owned banks are not profit oriented. Additionally, the inclusion of the government stake variable increases the explanatory power of all three models by adding 3.5 to 3.7 percentage points to R-squared. Overall, the significance of all compensation variables is reduced by the addition of this variable, implying that this might not be the best perspective to look at government ownership. Government ownership affected mostly larger banks that were deemed relevant to the banking system. Table 19 summarizes the regression results for large and small banks.

Table 19. Government Ownership in Small and Large Banks: OLS regression of Continuously compounded stock returns on compensation structure variables and control variables in the Management Board sample

OLS regression of continuously compounded stock returns on compensation structure variables, controlling for size, leverage and government ownership for Small vs. Large Banks in the Management Board sample						
	Small Banks			**Large Banks**		
Model	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
Total STI (%)	.280*		.283*	.167		.182
	(.018)		(.019)	(.143)		(.127)
Total LTI (%)	.551*			.206		
	(.000)			(.234)		
Cash-based STI (%)		.310*			.116	
		(.009)			(.398)	
Share-based STI (%)		.082			.065	
		(.465)			(.697)	
Cash-based LTI (%)		.605*			.130	
		(.000)			(.472)	
Share-based LTI (%)		.090			.148	
		(.432)			(.316)	
Deferred compensation (%)			.505*			.141
			(.000)			(.401)
Other forms of LTI (%)			.244*			.131
			(.034)			(.254)
Total Assets	-.353*	-.311*	-.350*	-.241	-.244	-.235
	(.010)	(.018)	(.012)	(.140)	(.157)	(.154)
Leverage ratio	.152	.155	.153	.441*	.441*	.442*
	(.221)	(.198)	(.222)	(.000)	(.000)	(.000)
Government ownership (%)	.203	.216	.204	-.323*	-.325*	-.325*
	(.088)	(.053)	(.090)	(.004)	(.005)	(.004)
Number of observations	58	58	58	64	64	64
R-squared	.371	.478	.371	.414	.413	.416

The table shows the outcomes of the three baseline models (Eq.1,2 and 3) for small vs. large banks, respectively, additionally controlling for government ownership stake. The threshold for the sample split is €50 billion of Total Assets. Equation (1) regresses continuously compounded stock returns on Total STI (%), Total LTI (%), and control variables. Equation (2) regresses continuously compounded stock returns on Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) and control variables. Equation (3) regresses continuously compounded stock returns on Total STI (%), Deferred compensation (%), Other forms of LTI (%), and control variables. The control variables are the same in each model and include Total Assets as a proxy for size, and Leverage ratio as a control for bank leverage, and the percentage government owned common shares as a control for government ownership. The first row for each variable indicates the standardized coefficient beta, and in the second row in brackets the p-values are presented.
*. The coefficient is significant at level 0.05.

Splitting the sample into two reveals a couple of interesting results. All significance values for small banks have improved and are smaller than in the model without it. Leverage ratio and government ownership are not significant in this regression. The R-squares for the small bank sample increased between 3.7 and 4.1 percentage points. The explanatory power of the large bank sample increased 9 percentage points across all three regression models. Government ownership has a significant negative relation to performance ranging between -.323 and -.325. In contrast to the small bank sample, in the large bank sample the significance values for all compensation variables are worse than before. Actually, none of the compensation variables is significant after the inclusion of government ownership. This result further strengthens the point that the design of compensation schemes is not associated with performance for large banking institutions. Despite the political discussions about how to better align CEO incentives with performance, little to nothing seems to have changed even in banks that are partially owned by the government.

6.7. Robustness Check

To check the robustness of my prior results and to ensure model validity, I present 2 sets of regressions for each of the three regression models with alternative performance measures as depended variables. Instead of continuously compounded stock returns, I use return on average risk-weighted assets and return on average equity. The results of those regressions are presented in table 20.

Table 20. Robustness check: OLS regression of return on average risk-weighted assets and ROAE on compensation structure variables and control variables in the Management Board sample

OLS regression of return on average risk-weighted assets and ROAE on compensation structure variables and bank characteristics variables in the Management Board sample						
	Return on Risk-weighted Assets			**ROAE**		
Model	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
Total STI (%)	.193*		.207*	.210*		.218*
	(.025)		(.017)	(.003)		(.003)
Total LTI (%)	.348*			.278*		
	(.003)			(.005)		

Cash-based STI (%)		.175* (.047)			.183* (.013)	
Share-based STI (%)		.061 (.498)			.083 (.270)	
Cash-based LTI (%)		.302* (.004)			.183* (.038)	
Share-based LTI (%)		.241* (.038)			.232* (.018)	
Deferred compensation (%)			.363* (.004)			.272* (.009)
Other forms of LTI (%)			.216* (.019)			.153* (.049)
Total Assets	-.257* (.027)	-.340* (.010)	-.348* (.008)	-.157 (.106)	-.212 (.056)	-.212 (.055)
Leverage ratio	.266* (.002)	.261* (.002)	.261* (.002)	.542* (.000)	.539* (.000)	.540* (.000)
Number of observations	121	116	116	127	122	122
R-squared	.219	.238	.238	.431	.435	.436

The table shows a robustness check for the three baseline models (Eq.1,2 and 3), using return on average risk-weighted assets and ROAE as dependent variables instead of continuously compounded stock returns. In Equation (1) the respective dependent variable is regressed on Total STI (%), Total LTI (%), and control variables. In Equation (2) the respective dependent variable is regressed on Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) and control variables. In Equation (3) the respective dependent variable is regressed on Total STI (%), Deferred compensation (%), Other forms of LTI (%), and control variables. The control variables are the same in each model and include Total Assets as a proxy for size, and Leverage ratio as a control for bank leverage. The first row for each variable indicates the standardized coefficient beta, and in the second row in brackets the p-values are presented.
*. The coefficient is significant at level 0.05.

The coefficients as well as the significance levels are comparable to what was observed in the baseline analysis.[68] In general, the effect of long-term incentives contributing more to performance in terms of continuously compounded stock returns is evident also in the case of the new dependent variables. *Total LTI* in model (1) exhibits higher and significant positive relationship with return on average risk-weighted assets and ROAE than *Total STI*. Long-term cash-based incentives seem to contribute more to performance than long-term share-based incentives in both model specifications as well. *Deferred compensation* in equation (3) is

[68] This is true for the Management Board, the CEOs, and the Key Management sample.

again the variable exhibiting the strongest contribution to performance. Thus, the specific performance measure choice does not influence the analysis in a material way.

It is interesting to note that all long-term compensation variable coefficients are higher when performance is measured with return on average risk-weighted assets than with ROAE. Exactly the opposite effect is evident for short-term compensation components, namely all short-term pay coefficients are higher in the case of ROAE than in the case of return on average risk-weighted assets. The coefficients of long-term variables are even higher in the case of continuously compounded stock returns in the baseline analysis than the coefficients in the case of return on average risk-weighted assets. Similarly, the coefficients of the short-term variables from the baseline model are lower than those in the return on average risk-weighted assets specification. This means that generally long-term compensation components contribute most to performance in terms of continuously compounded stock returns, moderately to performance in terms of return on average risk-weighted assets, and the least to performance in terms of ROAE. On the contrary, short-term remuneration components contribute most to performance in terms of ROAE, moderately to performance in terms of return on average risk-weighted assets, and the least to performance in terms of continuously compounded stock returns.[69] The effect that long-term incentive components have the strongest association with stock market performance than with operating performance in terms of ROAE, while exactly the opposite effect is evident in the case of short-term incentive components, might have important implication for remuneration policy design. In particular, although my findings do not allow any statements about the causal relationship of compensation structure and performance, it might be interesting to consider the optimal mixture of short- and long-term components, in order to increase both stock market and operating performance. This question might be relevant for future research.

Turning to the control variables, *Total Assets* is only significant when performance is measured with return on average risk-weighted assets. Leverage is significant in both model specifications, with considerably higher standardized coefficients in the case of ROAE. This result might be attributed to the fact that I measure leverage with the debt-to-equity ratio, which contains an equity measure in its denominator, as ROAE does.

[69] Of course, the effect that on the whole long-term incentive components contribute more to explaining performance than short-term incentives, regardless of the performance measure, remains untouched.

Overall, I find that all previously reported results remain valid in all three models regardless of the performance measure choice. Therefore my findings on the relationship between compensation structure and performance are robust to model specifications with different performance variables.

7. Conclusion

This thesis analyzes the relation between the composition of executive pay and bank performance. My approach aims at decomposing managerial pay as precisely as possible in several short- and long-term components, whereby also accounting for the form of granting and the use of specific mechanisms of remunerating managers, such as deferred pay. I first decompose managerial compensation into two components, short-term incentives and long-term incentives in order to account for the term structure of compensation. Subsequently, I go further into detail by fragmenting long-term incentive in deferred compensation and other forms of long-term incentives. I also examine the form of granting compensation by dividing short- and long-term incentives in cash- and share-based components.

I find that total long-term incentives are significantly and positively related to stock market performance, and that they contribute to explaining performance more strongly than total short-term incentives do. This effect remains unchanged when splitting long-term incentives in cash- and share-base components, while at the same time there is no evidence that the results hold for cash- and equity-based short-term incentives. Deferred pay exhibits the strongest contribution to stock market performance as compared to total short-term incentives and other forms of long-term incentives. Overall, these findings hold for the whole management board, for CEOs, and for non-CEO board members, and are robust to model specifications with alternative operating performance measures. Interestingly, however, long-term incentives exhibit the strongest relationship to performance when performance is measured with continuously compounded stock returns, and the weakest association with performance when the performance measure is ROAE. Exactly the opposite is true for the relationship between short-term incentives and performance. When comparing the results between CEOs and non-CEO board members, although the general findings hold, all compensation variables are more strongly related to performance in the case of Key Managers than in the CEOs sample. While on the whole, my findings in the baseline analysis are confirmed in the case of small banks with total assets below €50 billion, large banks with above €50 billion in total assets exhibit a significant relationship to performance only in the case of total short-term incentives. Government ownership is negatively associated with performance in the Management Board sample. In the case of large banks, this relation is highly significant, whereas it is insignificant in small banks. In the former case, short-term incentives do not seem to relate to performance in the presence of a government stake.

Leverage has a strong and positive explanatory power for performance which is highly significant for large banks but insignificant for small banks.

With these findings my thesis expands the existing body of literature on compensation structure, risk-taking and performance in the banking industry in several ways. First, in contrast to most of the existing researches on compensation structure and performance, I use a non-U.S. data sample of 52 Eurozone banks during the period 2010 – 2014. To the best of my knowledge, this is the first study to examine the direct relationship between executive pay structure and bank performance in several countries outside the U.S.

Second, I supplement the existing scholarly works, mostly using data from the pre-crisis period or from the years during the 2008 U.S. crisis, by collecting the most recent available data during the last 5 years between 2010 and 2014 in the Eurozone.[70] Thus, another important contribution of this thesis is that it updates the most recent research in the stream of literature on compensation structure in the banking industry.

Third, my results have several theoretical and practical implications for executive pay design in banks. I find that performance is related more strongly to long-term incentive components than to short-term ones, whereby cash-based and debt-like compensation forms, such as deferred pay, seem to have the strongest contribution to performance, irrespective of the performance measure. This implies that equity-based compensation, believed to integrate managers in the ownership structure of a company and in doing so to align managerial interests with those of shareholders, should be treated with caution. Even designed to tie managerial incentives with long-term performance, it might not be as effective in inducing value creation, as cash-based or deferred compensation. The latter forms of remuneration might incentivize managers more effectively, because they pose lower compensation value destruction risk on executives, as the components are not directly related to share price volatility. Managerial wealth sensitivity to deferred cash compensation versus equity-based forms of compensation and the association with bank performance is an interesting topic for future research.

[70] Studies that use bank data from the pre-crisis years or the years during the crisis include Acrey, McCumber, and Nguyen (2011), Fahlenbrach and Stulz (2011), Balachandran, Kogut, and Harnal (2011), Hagendorff and Vallascas (2011), Chesney, Stromberg, and Wagner (2012), Bai and Elyasiani (2013), Bhagat and Bolton (2013), Jokivuolle, Keppo, and Yuan (2015), Cheng, Hong, and Scheinkman (2015), Van Bekkum (2015), Bennett, Güntay, and Unal (2015).

The finding that long-term incentives exhibit the strongest relationship with stock market performance, and the weakest relationship with operating performance, while exactly the opposite is true for short-term incentives, has significant implications for the compensation mix design between short- and long-term incentives. Bank remuneration committees should construct managerial pay systems in a way, optimizing the mix between short-and long-term compensation components to focus managerial interests on improving both operating and stock-market performance. Again, it will be interesting for future research to test this finding for another data sample, in order to provide validity of these results.

The results showing that non-CEO members' compensation structure relates stronger to performance than CEO pay composition, raises questions regarding the assumptions underlying compensation system design. It is commonly assumed that CEOs are the ones that determine the strategic direction for a firm and that they bear the general responsibility for strategic decisions. Therefore, they are remunerated in a manner emphasizing the link to long-term performance even more than in the case of their non-CEO colleagues. But are CEOs really the "people in charge" of a company? Does not the current CEO remuneration system overemphasize the importance of CEOs in management boards? Can it be that the other key managers are compensated in a more optimal way for inducing performance than CEOs are? All these questions are interesting to examine in future studies.

Finally, I would like to make a point pertaining to the "too-big-to-fail" banks, their remuneration committees, and policy makers in general. "Too-big-to-fail" banks operate globally with highly complex business models which especially during times of economic turbulence are difficult to oversee in order to guarantee the financial stability of the banking system that depends critically on their solvency. As a response to the financial crisis, several regulations have been implemented with the aim of limiting risk-taking in the banking industry including regulations of managerial compensation.[71] My results facilitate the interpretation that large banks' executives are rather short-term oriented and provide evidence that their compensation structure does not significantly relate to performance. These findings raise questions relative to the effectiveness of those regulations in particular for large, system-relevant banks. Although my analysis undoubtedly documents the strong relationship between

[71] An example for such regulations are the CRD IV, which came into effect in July 2013, and its predecessor CRD III adopted in 2010, which regulate, among others, compensation of bank executives. IMF (2014) discuss the CRD IV directive and present several of the requirements about the board of directors structure and functions, as well as about compensation policies. See Appendix A1.1. for more information on the requirements concerning compensation of bank executives under the CRD IV.

deferred pay and performance for all banks in general and for small banks in particular, the finding does not hold for mega banks. Therefore, the compensation policies and regulations, such as the CRD IV, promoting deferred pay, should probably be rethought with respect to their implementation in large banks. Probably the remuneration structure solution for these banks lies somewhere else. Last but not least, compensation policies should be further questioned in the case of the several large banks that received bail-out funds in recent years.[72] As stated above, I do not find any evidence that compensation structure contributes to performance in the presence of government ownership. At this point the following question should be posed: Are large government owned banks really not profit oriented, as Short (1979) hypothesizes, and is this the reason why their compensation structures do not seem to relate to performance, or are those compensations schemes simply inadequately designed to induce performance? In any case, I would be looking forward to seeing more research conducted in this field, validating, extending, or refuting my work on the relation between compensation structure and bank performance.

[72] Prominent cases of bank bailouts in the period 2010 – 2014 include Commerzbank AG in Germany, Dexia SA in Belgium, and Bankia SA in Spain.

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Appendix 1

A1.1. The Capital Requirements Directive (CRD) IV

The CRD IV applies to banks in the European Union. A list of the main regulations concerning compensation policies, as summarized by IMF (2014) is presented in the following.

- A cap on the ratio of variable to fix remuneration at 1:1 is applicable. After approval via super-majority voting by shareholders, the ratio could be raised to 2:1.
- Up to 25% of the variable pay may be exempt from the ratio requirement if paid in the form of long term instruments, deferred over several years with at least five years vesting period.
- 100% of the variable compensation is subject to bonus-malus and clawback clauses.
- At least 40% of the bonus for each executive must be deferred over several years. Up to 60% of the bonus must be deferred in the case of senior executives.
- Hedging strategies or insurance contracts that would undermine the risk-alignment effects of the pay package are forbidden.
- A complete and detailed disclosure of compensation policies is required by large and complex firms. The disclosure should contain information on the link between pay and performance, criteria for awarding shares and aggregate figures of remuneration. Some qualitative disclosure is required for smaller firms.

A1.2. Assumptions made when extracting the executive pay data from bank reports

Assumptions leading to the exclusion of banks from the SNL list

i. *The manager decides to waive the variable remuneration granted on his own discretion.*

When the manager waives on his own discretion the variable remuneration portion granted, then all other remuneration components (e.g. fixed compensation) that she receives are excluded from the calculations, i.e. the bank-year observation is excluded from the sample. This is because she might have waived the variable compensation in the current year *(t)* for ethical reasons, because of poor performance in the previous years *(t-1, t-2, t-3)*. However, it might be the case that in the current year *t* the bank is performing well again. In such cases considering a variable remuneration of 0 would distort the analysis, because the performance of the bank was not poor and the variable remuneration component has been actually appropriate.

ii. *Regulatory restrictions on variable pay due to a past bailout, still in place.*

When no variable remuneration is granted in year *t* as a result of regulatory restrictions due to a financial stabilization program, then the bank-year observation is excluded from the list for the following reason. The bank might have recovered, but the regulation might still be in place, thus performance might be increasing, but the variable payment might not be granted because of the restriction only and not due to unmet performance targets. If taken into account, such bank-year observation could distort the performance – compensation structure analysis.

General assumptions

i. *Consideration of executive directors only.*

When the executive committee consists not only of executive directors, but also of non-executive, only the executive are counted as management board members.

ii. Sum of CEO compensation in cases when there are two CEOs in a certain year.

There are banks where in a certain year there are two CEOs, because of position changes. In such cases the compensation is calculated in the remuneration report on a pro rata basis, so I build the sum of their compensation, acting as if there is one CEO only.

iii. Only remuneration granted, not necessarily paid out is considered.

For example, deferred variable remuneration *granted in previous years (t-1, t-2,…)*, part of which is *paid in the financial year in question (t)* according to the corresponding deferral schedule, are not classified as remuneration for year *t*, because these previously granted, but currently paid-out tranches pertain to the performance measurement in previous financial years. Although the payout in the current year *t* also depends on the achievement of certain minimum requirements ("gates"), the component grant is related to the performance of previous years. Moreover, sustainability check criteria for the payout of a deferred compensation tranche are normally criteria related to the basic financial health of the bank at a minimum level (e.g. a minimum level of the Tier 1 Capital Ratio) and are not so hardly achievable like the performance targets employed when granting the corresponding variable remuneration.

iv. Fees for being a member of a Board of Directors committee or attending committee meetings are not taken into account.

There are cases where next to being an executive management board member, the respective manager also sits on the Board of Directors, as termed by some banks. The Board of Directors may consist of several committees, such as executive committee (consisting of executive and non-executive directors), remuneration committee, etc. In such cases the executive management board member receives the so called fee for sitting on a certain Board of Directors committee, which is unrelated to the executive management function. Therefore, this payment as a board committee member is not considered as a part of the fixed pay. Only the remuneration for serving as an executive management board member (fixed salary, fringe benefits and variable components) is taken into account. The payments for attending board meetings are not considered for the same reason.

v. *Variable compensation of 0 when performance targets are not met and no variable remuneration is granted.*

When target performance criteria in year *t* are not met and thus there is no variable remuneration, then all variable components are taken into account in the calculations as being 0.

vi. *Shares and options are included in the database at fair value stated in the report.*

vii. *Grants under Share Bonus Plans are valued at market values, when fair value not mentioned.*

In cases where no value of shares granted has been stated in the remuneration report, but just the number of shares and the share price, then the value of share-based compensation is measured by multiplying the number of shares by their market price.

viii. *Severance pay is not taken into account.*

Termination benefits, such as severance pay, are not considered, because they are not based on performance, comprise mostly fix remuneration components and represent one-off payments.

A1.3. Tables

Table A1.3.1. Number of banks completely excluded from the initial SNL list of 111 banks in each year 2010 – 2014 and reasons for the corresponding compensation data unavailability.

	2010	*2011*	*2012*	*2013*	*2014*
No remuneration report / no remuneration information (in English) at all	24	22	19	20	25
No quantitative and/or qualitative disclosure of remuneration at all	8	10	8	6	6
No variable compensation in the remuneration policy	5	5	7	8	6
No disclosure of information about short- and long-term incentives	14	16	13	17	14
Only a total figure of remuneration provided	10	8	9	6	7
Disclosure of a highly aggregated figure including senior managers not in the executive management board	1	1	3	3	4
Exclusion due to assumptions made (described in Appendix A1.2.)	6	6	9	8	6
Total	**68**	**68**	**68**	**68**	**68**

The table presents the number of banks excluded in each year during the period 2010 – 2014 from the initial SNL list of 111 banks and the reasons for excluding them. The 68 banks excluded are the same in each year. However, the number of banks excluded for a particular reason is different in each year, because there are some cases, where a bank is omitted from the list in a certain year due to one of the mentioned reasons, in another year due to a different reason. This is because compensation disclosure policies generally change in the years 2010 – 2014 and thus even a single bank modifies its disclosure patterns throughout the sample period.

Table A1.3.2. List of banks with available compensation data for any of the 5 years between 2010 and 2014.

	Institution Name	Country Name	Ticker	Exchange
1	Aareal Bank AG	Germany	ARL	ETR
2	Ålandsbanken Abp	Finland	ALBAV	HEL
3	Banca Generali SpA	Italy	BGN	MIL
4	Banca IFIS SpA	Italy	IF	MIL
5	Banca popolare dell'Emilia Romagna SC	Italy	BPE	MIL
6	Banca Popolare di Milano Scarl	Italy	PMI	MIL
7	Banco Bilbao Vizcaya Argentaria, SA	Spain	BBVA	MAD
8	Banco BPI SA	Portugal	BPI	LIS
9	Banco Popular Español SA	Spain	POP	MAD
10	Banco Santander SA	Spain	SAN	MAD
11	Bank of Cyprus Public Company Limited	Cyprus	BOCY	CYP
12	Bank of Valletta Plc	Malta	BOV	MAL
13	Bankinter SA	Spain	BKT	MAD
14	BHF Kleinwort Benson Group SA	Belgium	BHFKB	BRU
15	BKS Bank AG	Austria	BKS	WBO
16	BNP Paribas SA	France	BNP	PAR
17	CaixaBank, SA	Spain	CABK	MAD
18	comdirect bank AG	Germany	COM	ETR
19	Commerzbank AG	Germany	CBK	ETR
20	Crédit Agricole SA	France	ACA	PAR
21	Credito Valtellinese Società Cooperativa	Italy	CVAL	MIL
22	DAB Bank AG	Germany	DRN	ETR
23	Deutsche Bank AG	Germany	DBK	ETR
24	Deutsche Postbank AG	Germany	DPB	ETR
25	Dexia SA	Belgium	DEXB	BRU
26	DVB Bank SE	Germany	DVB	FRA
27	Hellenic Bank Public Company Limited	Cyprus	HB	CYP
28	HSBC Bank Malta Plc	Malta	HSB	MAL
29	HSBC Trinkaus & Burkhardt AG	Germany	TUB	DEDSE
30	IKB Deutsche Industriebank AG	Germany	IKB	FRA
31	ING Groep N.V.	Netherlands	INGA	AMS
32	Intesa Sanpaolo SpA	Italy	ISP	MIL
33	KBC Group NV	Belgium	KBC	BRU
34	Lombard Bank Malta Plc	Malta	LOM	MAL

35	Mediobanca - Banca di Credito Finanziario SpA	Italy	MB	MIL
36	Natixis	France	KN	PAR
37	Oberbank AG	Austria	OBS	WBO
38	Oldenburgische Landesbank AG	Germany	OLB	FRA
39	Paris Orléans S.C.A.	France	PAOR	PAR
40	Société Générale SA	France	GLE	PAR
41	UniCredit SpA	Italy	UCG	MIL
42	Unione di Banche Italiane SCpA	Italy	UBI	MIL
43	Van Lanschot NV	Netherlands	LANS	AMS

The Table presents a list of the 43 banks for which compensation data is available for any of the 5 years between 2010 and 2014, their country, ticker and exchange listing abbreviation.

Table A1.3.3. Small vs. Large Banks: OLS regression of Continuously compounded stock returns on compensation structure and control variables in the CEO sample

OLS regression of continuously compounded stock returns on compensation structure variables and bank characteristics variables for Small vs. Large Banks in the CEO sample						
	Small Banks			**Large Banks**		
Model	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
Total STI (%)	.234		.254	.189		.150
	(.073)		(.057)	(.080)		(.214)
Total LTI (%)	.525*			.207		
	(.000)			(.167)		
Cash-based STI (%)		.251			.082	
		(.067)			(.482)	
Share-based STI (%)		-.002			.137	
		(.990)			(.351)	
Cash-based LTI (%)		.500*			.121	
		(.001)			(.457)	
Share-based LTI (%)		.167			.159	
		(.222)			(.225)	
Deferred compensation (%)			.455*			.246
			(.002)			(.133)
Other forms of LTI (%)			.308*			.095
			(.021)			(.416)
Total Assets	-.197	-.162	-.173	-.203	-.206	-.232
	(.165)	(.256)	(.230)	(.173)	(.193)	(.135)
Leverage ratio	.179	.189	.187	.393*	.393*	.391*
	(.194)	(.185)	(.178)	(.000)	(.000)	(.000)
Number of observations	45	45	45	79	79	79
R-squared	.368	.407	.380	.241	.245	.246

The table shows the outcomes of the three baseline models (Eq.1,2 and 3) for small vs. large banks, respectively. The threshold for the sample split is €50 billion of Total Assets. Equation (1) regresses continuously compounded stock returns on Total STI (%), Total LTI (%), and control variables. Equation (2) regresses continuously compounded stock returns on Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) and control variables. Equation (3) regresses continuously compounded stock returns on Total STI (%), Deferred compensation (%), Other forms of LTI (%), and control variables. The control variables are the same in each model and include Total Assets as a proxy for size, and Leverage ratio as a control for bank leverage. The first row for each variable indicates the standardized coefficient beta, and in the second row in brackets the p-values are presented.

*. The coefficient is significant at level 0,05

Table A1.3.4. Small vs. Large Banks: OLS regression of Continuously compounded stock returns on compensation structure and control variables in the Key Management sample

OLS regression of continuously compounded stock returns on compensation structure variables and bank characteristics variables for Small vs. Large Banks in the Key Management sample						
	Small Banks			**Large Banks**		
Model	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
Total STI (%)	.250		.252	.192		.199
	(.072)		(.073)	(.113)		(.115)
Total LTI (%)	.462*			.294		
	(.003)			(.112)		
Cash-based STI (%)		.244			.066	
		(.077)			(.605)	
Share-based STI (%)		.161			.228	
		(.220)			(.150)	
Cash-based LTI (%)		.597*			.070	
		(.000)			(.706)	
Share-based LTI (%)		.038			.239	
		(.784)			(.120)	
Deferred compensation (%)			.425*			.235
			(.006)			(.186)
Other forms of LTI (%)			.218			.153
			(.117)			(.224)
Total Assets	-.313*	-.333*	-.313	-.240	-.223	-.238
	(.049)	(.028)	(.052)	(.171)	(.218)	(.180)
Leverage ratio	.140	.118	.142	.412*	.411*	.413*
	(.334)	(.392)	(.335)	(.000)	(.001)	(.001)
Number of observations	45	45	45	63	63	63
R-squared	.295	.440	.296	.302	.314	.303

The table shows the outcomes of the three baseline models (Eq.1,2 and 3) for small vs. large banks, respectively. The threshold for the sample split is €50 billion of Total Assets. Equation (1) regresses continuously compounded stock returns on Total STI (%), Total LTI (%), and control variables. Equation (2) regresses continuously compounded stock returns on Cash-based STI (%), Share-based STI (%), Cash-based LTI (%), Share-based LTI (%) and control variables. Equation (3) regresses continuously compounded stock returns on Total STI (%), Deferred compensation (%), Other forms of LTI (%), and control variables. The control variables are the same in each model and include Total Assets as a proxy for size, and Leverage ratio as a control for bank leverage. The first row for each variable indicates the standardized coefficient beta, and in the second row in brackets the p-values are presented.

*. The coefficient is significant at level 0,05

Appendix 2

Abstract

This thesis provides an empirical analysis of the relationship between executive compensation structure and performance in the banking industry. The aim is to decompose remuneration as precisely as possible in several short- and long-term components and examine their association with performance for a couple of model specifications and in several settings. For this purpose, I employ a unique "hand collected" data set of 52 Eurozone banks in the period 2010 – 2014. The list of my sample banks emerges from the SNL Financial database, which is also the source for all financial and stock market data that I use. I obtain my compensation data from the banks' annual reports, remuneration reports, corporate governance reports, and pillar 3 disclosure reports.

In my analysis, I first account for the term structure of remuneration by dividing executive pay in short- and long-term incentives. Subsequently, I fragment remuneration in cash- and share based short- and long-term incentives in order to reflect the form of granting compensation. In a further model specification, I differentiate between short-term incentives, and long-term incentives divided into deferred pay and other forms of long-term incentives in order to examine the use of debt-like remuneration mechanisms. I use continuously compounded stock returns as a measure of performance and provide additional robustness checks with two alternative performance measures - return on average risk-weighted assets and Return on Average Equity (ROAE). I control for bank size and leverage. For the main part, my analysis concentrates on the whole management board, but I also compare and contrast my results for CEO and non-CEO board members. I also examine the relationship between compensation structure and performance for large and small banks by using a threshold of €50 billion in total assets, and account for government ownership stakes.

I find that long-term incentives exhibit a positive and significant relationship with performance, much stronger than short-term incentives. Moreover, cash-based long-term pay components have a stronger relation to performance than long-term equity-based incentives. I do not find evidence for this effect in the case of short-term incentives. Deferred pay has the strongest relationship to performance as compared to all other compensation forms. My findings are valid for the whole management board, as well as for CEO and non-CEO board members, and are robust with respect to alternative measures. However, I find that long-term

incentives exhibit the strongest relationship to performance when the performance measure is continuously compounded stock returns, and the weakest association with performance when performance is measured with ROAE. Exactly the opposite holds for short-term incentives. Furthermore, the relationship between compensation structure variables and performance is stronger in the case of non-CEO members than in my CEOs sample. Splitting the Management Board sample in large and small banks, confirms my general findings in the case of small banks. Among large banks only short-term incentives are significantly related to performance. Government ownership is significantly negative related to performance in the whole management board, insignificant in small banks and highly significant in the presence of large banks. In the presence of a government stake, compensation structure does is not significant in the large bank sample.

My thesis has several theoretical and practical contributions. It is the first study in the banking literature that examines the direct relationship between executive pay and performance in several countries outside the U.S. By using the period 2010 – 2014 I update even the most recent scholarly findings, majorly focusing on the pre-crisis or crisis period. My results have various implications for the design of executive compensation schemes in the banking sector, for regulators, and policy makers.

Zusammenfassung

Diese Masterarbeit beschäftigt sich mit einer empirischen Analyse des Zusammenhangs zwischen der Entlohnungsstruktur von Vorstandsmitgliedern und Performance im Bankensektor. Das Ziel der Arbeit ist es die Vergütungsstruktur so genau wie möglich in ihre Einzelteile zu zerlegen um den jeweiligen Beitrag der einzelnen Vergütungskomponenten quantifizieren zu können. Zu diesem Zweck erstellte ich eine Datenbank bestehend aus Banken aus der Eurozone in den Jahren 2010 – 2014. Die Quellen für diese Datenbank sind zum einen die SNL Finanzdatenbank für alle Finanz- und Kapitalmarktdaten, sowie Jahres-Gehalts-, Corporate Governance- und Pillar 3 Disclosure Berichte der jeweiligen Banken.

In meiner Analyse beschäftige ich mich zunächst mit der Zeitstruktur von Managervergütung. Anschließend beziehe ich die Form der Auszahlung mit hinein. In einer weiteren Modelspezifikation differenziere ich zwischen kurzfristig orientierter Vergütung, Deferred Pay, und sonstigen Formen langfristig orientierter Vergütung. Performance wird anhand von stetig aggregierten Aktienerträgen gemessen. Im Weiteren wird die Validität der Ergebnisse anhand von zwei alternativen Performance Maßen überprüft, diese sind die durchschnittliche risikoadjustierte Gesamtkapitalrendite und die durchschnittliche Eigenkapitalrendite. Als Kontrollvariablen dienen die Bilanzsumme und der Finanzierungshebel. Der Hauptteil meiner Arbeit beschäftigt sich mit der Vergütung des Vorstandes als Ganzes, im Folgenden vergleiche ich dann aber auch Vergütungsstruktur des Vorstandsvorsitzenden mit denen seiner Vorstandskollegen. Nachfolgend diskutiere ich Unterschiede zwischen Banken mit einer Bilanzsumme von über 50€ Mrd. (große Banken) und denen welche unter 50€ Mrd. Euro verfügen (kleine Banken). Zuletzt beziehe ich noch den Effekt von staatlichen Beteiligungen in die Arbeit hinein.

Ich zeige, dass langfristig orientierte Vergütungsstrukturen einen starken positiven Zusammenhang zu Performance haben, viel stärker als kurzfristig orientierte Vergütungsstrukturen. Darüber hinaus, kann ich zeigen, dass Aktienvergütung einen schwächeren Zusammenhang mit Performance aufzeigt als Cash-Vergütung. Das gilt allerdings nur für langfristig orientierte Vergütung. Im Vergleich zu allen anderen Vergütungsformen weist Deferred Pay den stärksten Zusammenhang mit Performance auf. Die Erkenntnisse gelten sowohl für die Vergütung des Gesamtvorstandes als auch für den Vorstandsvorsitzenden und seine Kollegen bei separater Betrachtung. Diese Erkenntnisse werden für alle drei Performancemaße betätigt, allerdings gibt es Unterschiede in der Stärke

der Zusammenhänge. Langfristig orientierte Vergütung weist den stärksten Zusammenhang bei stetig aggregierten Aktienerträgen auf und den schwächsten bei durchschnittlicher Eigenkapitalrendite. Das Gegenteil gilt für kurzfristig orientierte Vergütungsstrukturen. Weiters fällt auf, dass der Zusammenhang zwischen Vergütungsstruktur und Performance für die Vorstandsvorsitzenden am schwächsten ist. Bei Aufteilung des Datensatzes in große und kleine Banken werden zunächst alle Ergebnisse für kleine Banken bestätigt, hingegen sind bei großen Banken nur kurzfristig orientierte Vergütungsstrukturen mit Performance signifikant in Verbindung zu bringen. Bei zusätzlicher Betrachtung staatlicher Beteiligungen, fällt auf das diese negativ mit Performance verbunden ist. Bei kleinen Banken ist diese Variable nicht signifikant. Bei Großbanken führt die Hinzunahme dieser Variable dazu, dass nun keine der Vergütungsvariablen signifikant mit Performance in Verbindung gebracht werden kann.

Meine Arbeit liefert die folgenden theoretischen sowie auch für die Praxis relevanten Beiträge. Es ist die erste Studie in der Bankenliteratur, welche den direkten Zusammenhang zwischen Manager Vergütungsstrukturen und Performance außerhalb der Vereinigten Staaten betrachtet. Durch die Verwendung neuester Daten aus dem Zeitraum 2010 - 2014 ist es mir möglich die Forschung auf diesem Zeithorizont zu erweitern, da bisherige Forschungsarbeiten sich fast ausschließlich auf den Zeitraum vor der Bankenkrise von 2008 beschäftigen. Meine Ergebnisse haben weitreichende Implikationen für die Erstellung optimaler Entlohnungsstrukturen im Bankensektor, für Regulierungsbehörden und für politische Entscheidungsträger.

Lebenslauf

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Ausbildung

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