TALLINN UNIVERSITY OF TECHNOLOGY
School of Business and Governance
Department of Economics and Finance

Dmitri Birjukov

FIRM PERFORMANCE AND CEO COMPENSATION STRUCTURE: EVIDENCE FROM THE FINANCIAL INDUSTRY

Master's thesis

Program: Finance and Accounting, specialization: Finance

Supervisor: Laivi Laidroo, PhD

Tallinn 2019

Tallinn 2019

I hereby declare that I have compiled the paper independently
and all works, important standpoints and data by other authors
has been properly referenced and the same paper
has not been previously presented for grading.
The document length is 15826 words from the introduction to the end of conclusion.

Dmitri Birjukov ……
(signature, date)
Student code: 176685TARM
Student e-mail address: dmitri.birjukov@outlook.com

Supervisor: Associate Professor Laivi Laidroo
The paper conforms to requirements in force

……
(signature, date)

Chairman of the Defence Committee:
Permitted to the defence

……
(name, signature, date)

TABLE OF CONTENTS

ABSTRACT

The aim of this thesis is to determine the association between firm performance and CEO compensation structure in financial firms. This paper contributes to the existing literature by incorporating two features that separate it from previous studies. First, it focuses on the financial sector, which is often excluded from samples in other studies. Second, it uses not the monetary level of compensation components, but their share out of total CEO compensation as independent variables. This study employs ROA, ROE, and TSR as the measures of performance. The CEO compensation and financial data comes from the Thomson Reuters Eikon database and covers 814 US and European firms in the period of 2003-2017 with a total of 4985 CEO-years. Wilcoxon rank sum test, panel fixed effects regression models and quantile regression are used to test the hypotheses.

Similarly to the previous studies, the results vary depending on the used performance measure. The results suggest that firms that include the annual bonus and equity-based compensation in their CEO's compensation structure generally outperform firms who omit these components. In addition, an increase in the share of salary has a negative association and bonus a positive association with accounting measures of performance (ROA and ROE). These results are in line with the agency theory on which most of the previous literature rely. However, contrary to that theory, the share of the salary is positively associated, and the share of bonus is negatively associated with TSR. Besides, the percentage of equity-based compensation is not associated with any performance measures. Finally, the hypothesis that high-performing firms exhibit a more positive association between compensation and performance is rejected.

Keywords: performance, CEO compensation, financial sector, banks, agency theory, incentives

INTRODUCTION

Businesses are an essential part of a well-functioning society. On the one hand, they are a source of income and utility for immediate stakeholders: owners, employees, suppliers, etc. They are also crucial for creating wealth and improving quality of life on a national level through taxes, GDP growth, and innovation. For any firm, good performance is required to sustain its activities in the long term. It is, therefore, not surprising that scholars have studied various factors affecting the performance of companies. Previous studies have covered, amongst others, employee involvement, industry concentration, and growth, board structure as well as strategic factors.

In recent decades, partly because of the rapid growth of CEO compensation levels, researchers have turned their attention to the topic of optimal contracting and relationship between compensation and performance. Although numerous studies have been conducted, the results are diverse. Depending on the samples and methods used, some researchers find that an increase in CEO compensation is associated with improved firm performance, while other studies do not find this association to be statistically significant.

Research related to CEO compensation and firm performance with the focus on banking or financial industry was mainly done in the 1990s and early 2000s. In recent years, however, when studying the financial sector, researchers have been more concentrated on the association between compensation and risk-taking, especially in the context of pre- and post-financial crisis. Nevertheless, the link between CEO compensation and performance of financial firms (firms operating in the financial sector) is still worth examining. The level of CEO compensations in the financial industry is one of the highest. Consequently, shareholders of these companies require a good understanding of the relationship between compensation components and firm performance.

The aim of the thesis is to determine the association between firm performance and CEO compensation structure in financial firms. To achieve the objective the paper attempts to answer the following research questions:

- What kind of CEO compensation components are used in financial firms and to what extent?
- Is there a statistically significant difference in the performance of firms who pay their CEO's specific compensation components (e.g., bonus, restricted stocks, etc.) and those who do not?
- Is an increase in any of the compensation component's share of the total compensation associated with an increase in a firm's performance?
- Is the association (i.e., the magnitude or direction) different for firms with high and low performance?

The following hypotheses are also tested:
H1: The performance of firms paying their CEO's cash-based and equity-based incentive compensation differs statistically significantly from the performance of firms who do not pay these compensation components.
H2: Greater usage of cash- and equity-based incentive compensation is positively associated with firm performance measures.
H3: The association between compensation components and firm performance measures is more positive for high-performing firms.

The study employs the data from Thomson Reuters Eikon database. The sample consists of financial firms headquartered in Europe and the USA. All the firms which published the required information in the period 2003-2017 were included. The final sample contains 814 firms with a total of 4985 CEO-years. The methods used in this study include Wilcoxon rank sum test, panel regression models and quantile regression.

The thesis consists of three chapters. The first chapter discusses the theoretical background of the topic necessary to conduct the research. It consists of four sections. The first section describes the conventional measures of the performance of financial institutions. The second section reviews the main components of CEO compensation. The third section discusses the theoretical approaches which describe the association between CEO pay and firm performance. The last section of the first chapter gives an overview of the previous empirical literature.

The second chapter consists of three sections. The first section presents the data employed in this study. The second section describes the variables used in estimations and their notation and presents the basic descriptive statistics of all the variables employed. The third and final section provides an overview of the methods used.

The third and final chapter consists of five sections. The first one examines the usage of different compensation components in firms. The sections 2-4 present the results of Wilcoxon rank sum test, panel models and quantile regression models accordingly. The fifth and final section summarizes the results of all methods.

1. PERFORMANCE AND CEO COMPENSATION

1.1. Performance of financial institutions

One possible definition of performance is the following: "execution (of command etc.) ... action resembling a public exhibition." (The concise ... 1982: 762). Thus, the term does not refer to some specific subject but rather depends on the context in which it is applied. Like athletic fields where multiple performance dimensions can be highlighted – strength, speed or endurance, various performance types can be distinguished in corporations: financial performance, corporate social performance, productivity, risk performance, etc. The focus of this thesis is on financial performance. European Central Bank defines bank performance as the „ ... capacity to generate sustainable profitability“ (Beyond ... 2010: 8). Therefore, formally it would not be correct to use the terms „performance“ and „profitability“ interchangeably as is done in most of the empirical literature.

A financial institution is a firm that „ ... collects funds from the public to place in financial assets such as stocks, bonds, money market instruments, bank deposits or loans.“ (Downes, Goodman 1991: 145). The most common financial institutions, also known as financial intermediaries, are banks, building societies, hire-purchase companies, insurance companies, savings banks, and investment trusts (Bannock, Manser 1995: 105). Banks have a significant social and economic role. As many contemporary banks offer a wide variety of financial services that include asset management, insurance, etc., by investigating banks one gets a fair representation of the financial industry. Considering these factors, further discussion in this section is based on studies of banks, and it is assumed that banks and other financial services firms have the same measures of performance.

There are many ways to categorize performance measures. For example, some studies differentiate between “soft” (e.g., innovation, learning or customer satisfaction) and “hard” (e.g., market share, assets, revenues) indicators (Masadeh *et al.* 2015). Depending on the type of data used, one can distinguish between accounting (e.g., return on assets, return on equity) and market measures (e.g.,

total shareholder return, price to earnings ratio). When the required data is not available, it is possible to assess subjective measures in contrast to the objective (Dess, Robinson 1984).

The measures of bank performance can also be categorized into the following three groups: traditional, economic and market-based (Beyond … 2010). Figure 1 gives an overview of all these indicators.

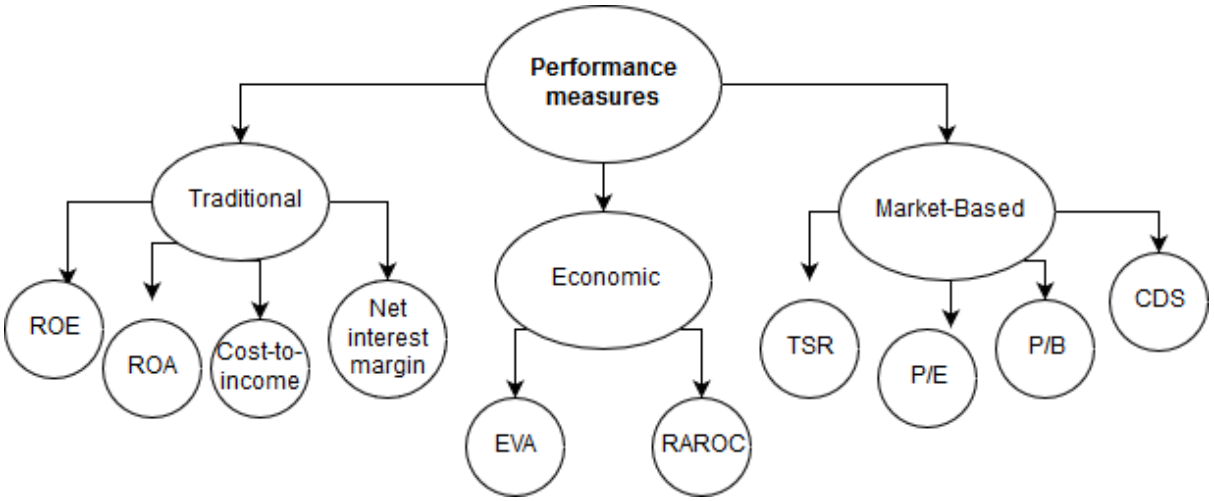


Figure 1. Common bank performance measures
Source: Beyond ... 2010; elaborated by the author.

The most common way to evaluate bank performance is using financial ratios of which the most popular is return on equity (ROE) and return on assets (ROA) (Vasilev, Mrsik 2017). Using these measures alone provides only a quick snapshot of the banks' current „health". To get a fuller evaluation of the performance, it is advised to complement ROE and ROA with such indicators as risk returns, funding capacity, cost of equity, own funds quality and others. (Beyond ... 2010)

Another financial ratio which can be considered as a traditional performance measure is net interest margin. Usually, it is defined as net interest income divided by interest-generating assets (Nguyen 2012: 2432). Thus, it indicates the efficiency of the bank's intermediation function (Beyond … 2010). Net interest margin can also be considered a reflection of the efficiency of the whole banking industry. For example, the high rates can signify the lack of competition in the market. (Sensama, Ghosh 2004)

The cost-to-income ratio (CIR) also expresses the efficiency and productivity of a bank. It is calculated by dividing operating costs by operating income. (Beyond … 2010) Burger and Moormann (2009) argue that if one considers productivity as a process of transforming inputs into

outputs, then CIR is not suitable to be a measure of productivity. CIR is influenced by the price level which a bank can achieve. Therefore the productivity in terms of quantity is distorted. Instead, adjusting the CIR by eliminating the price components on both sides of the formula and applying some other adjustments is advised. (*Ibid*)

The second group of performance measures can be described as economic. In contrast to traditional metrics, economic measures are based on the concepts of economic profit and opportunity cost of equity (Kimball 1998). Baer *et al.* (2011) have surveyed 11 largest banks in North-America, Europe, and Asia-Pacific region. Their study showed that the vast majority of respondents to some extent use the economic indicators. There are two commonly used measures in this category. The first one is economic value added (EVA). The EVA was created by (and is a registered trademark of) Stern Stewart & Co. The most intuitive and well-known formula to calculate EVA is the following (Kramer and Peters 2001):

$$EVA_t = NOPAT_t - (k_t \times C_{t-1}) \tag{1}$$

where
EVA – economic value added,
NOPAT – net operating profit after taxes,
k – the cost of capital,
C – book value of capital,
t – year.

If EVA is positive, then shareholders' value is increased. Otherwise, it is decreased. The use of the cost of capital sets EVA aside from the more traditional measures as ROE and ROA. Focusing on traditional performance measures encourages management to take actions that are aimed at increasing the average profitability. The EVA, on the other hand, promotes the behavior of the management that is more likely correlated with wealth creation. (Fogelberg, Griffith 2000)

RAROC or *risk-adjusted return on capital* is the second economic measure widely used by banks. It can be understood as a ratio of expected profit to economic capital. The general formula for RAROC calculation is presented below (Klaassen, van Eeghen 2015):

$$RAROC = \frac{Revenues - operating\ costs - expected\ loss}{Risk\ based\ required\ capital} \tag{2}$$

The expected loss is calculated based on the bank's long term default and recovery rates of a loan portfolio, while risk-based required capital reflects the capital necessary to cover potential losses at a certain probability and remain solvent (*Ibid*). One of the advantages of RAROC is its flexibility (Baer *et al. 2011*). For example, it is possible to calculate all the components (revenues, operating costs, and expected loss) not only at the firm level but also for business units, branches, etc. This allows making more informed decisions about resource allocations.

Finally, there are market-based performance measures. This group of metrics incorporates in their formulae some market-based variable. For example, if the financial ratio includes a company's price of a share, then the result will to some degree reflect the market's perceptions and expectations about the company's future performance. Listed below are examples of market-based performance measures used by banks (Beyond … 2010):

- TSR – total shareholder return. It is a ratio of the sum of dividends and price change over the starting price of the stock (Nicola *et al.* 2016).
- P/E – price-to-earnings ratio. It is generally calculated by dividing the share price by earnings per share. The P/E ratio is used heavily by financial analysts to make investing decisions.
- P/B – price-to-book ratio. It is a ratio of the share price over the company's book value per share. This measure is also widely used (along with P/E ratio) as an instrument to compare companies and perform valuations based on benchmark method (Cheng, McNamara 2000).
- CDS – credit default swap. It is a variation of derivatives that banks use to reduce credit risk. Essentially, it is an agreement whereby the credit risk shifts from the bank to the seller of CDS (Funso *et al.* 2012). Concerning performance, the cost of such agreement may be of interest.

A market-based performance measure widely employed in the empirical literature is Tobin's Q ratio. The commonly known way to calculate this ratio is by dividing the company's market value of assets by the cost of replacement of assets (Tobin 1969). However, in practice, many researchers estimate this indicator using the book value of assets in the denominator, since it is hard to estimate the replacement cost. Some researchers advocate Tobin's Q over accounting performance measures because it avoids such problems as the inability to consider differences in systematic risk, tax laws, accounting conventions regarding R&D and advertising, etc. (Wernerfelt, Montgomery 1988)

In conclusion, although there are many possible ways to estimate firm performance, in practice the vast majority of researchers use two traditional measures – ROE and ROA. To a lesser degree, some market-based performance measures (usually TSR or Tobin's Q) are employed as well. This can be explained with the availability of data, the simplicity of calculation, and the desire of researchers to get comparable results.

1.2. CEO compensation structure

Generally, firms' executives can receive up to five main compensation components and some additional remuneration alternatives which can be considered secondary (Edmans *et al.* 2017). The main compensation components are salary, annual bonus, payouts from long-term incentive plans (LTIPs), restricted option grants and restricted stock. Secondary remuneration benefits include (*Ibid*): perks, defined-benefit pension plans and severance payments upon departure.

Almost all CEO compensation packages include base salary. Usually, in setting the level of salary, firms utilize a benchmark, which typically comes from industry surveys (Baker *et al.* 1988). In these surveys the salary level is usually separated by percentile (25th, 50th, 75th, etc.), whereas salaries below the 50th percentile are considered "below market" and those in the range of 50-75th percentile are described as "competitive" (Murphy 1999).

Like salary, annual bonuses are also widely used in most corporations. While salary can be thought of as a strictly fixed component, bonuses are more flexible, because they might depend on the outcome of the executive. Usually, firms establish certain conditions which dictate when and how much a CEO is paid. Those conditions often include such criteria as performance threshold, performance standard, target bonus, bonus cap and pay-performance relation (*Ibid*). An example of how these items determine the annual bonus is demonstrated in figure 2. No bonus is paid unless the performance threshold is reached. Once the performance threshold is achieved, the pay-performance relation will describe how much the bonus increases with each improvement of performance. Target bonus corresponds to the performance standard. Bonus cap sets a limit for the maximum amount of bonus.

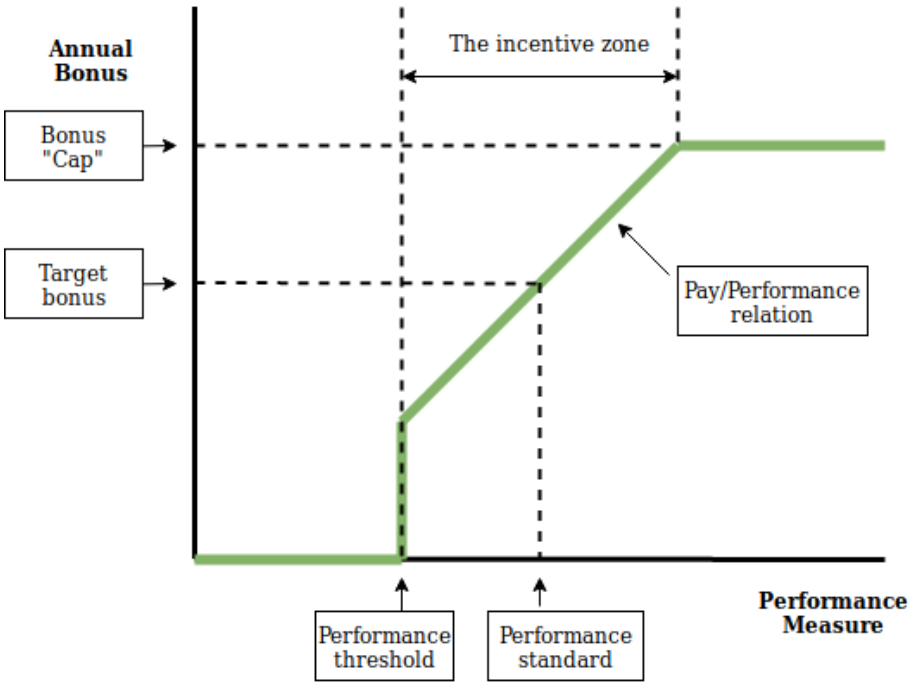


Figure 2. Determination of annual bonus
Source: Murphy 1999.

Long-term incentive plans are similar to annual bonuses. However, in case of bonuses, the payout depends on performance standard and threshold which are reviewed every year, while the LTIPs are constructed so that the award depends on the rolling-average cumulative performance of three or five years (*Ibid*). The dynamics of how the final award from the LTIP is determined is similar to the one shown in figure 2.

A stock option gives its holder the right to purchase the underlying stock at a prespecified price at a certain period. Usually, stock options cannot be exercised immediately. For example, it can be set up so that 25% of the option can be exercised in each of the following four years (Hall, Murphy 2003). In theory, option contracts can be designed with various exercise horizons and prices. For example, instead of being fixed, exercise price could be indexed to some metric reflecting movements in an industry or market in general. Mostly, however, firms use the same practices – maturity date in ten years, and the exercise price is the fair market price as of the date when the option is granted. (Murphy 1999)

Another executive compensation option is to grant the firm's equity or stock. There are two variants of this compensation method. The more classical one is to give the stock as is, without any restrictions. More popular nowadays, however, is the approach when certain restrictions are

set upon the stock. The restriction is usually the fact that employee cannot claim and trade the stock for a certain period after it was granted. (Damodaran 2005)

The level of pay of CEOs has changed substantially in the last decades. For example, in 2011 the average CEO of an S&P 500 firm earned six times more compared to the average CEO pay in 1980 (Edmans *et al.* 2017). Also, the average ratio of CEO pay over the compensation of an average employee has risen significantly. For example, in 1989 this indicator constituted 59-to-1, whereas in 2016 the ratio was already 271-to-1 (Mishel, Schieder 2017). The increase in the total level of CEO pay has primarily been due to an increased usage of stock options. For example, in the period from 1936 to 1950, the CEO compensation structure was mainly composed of salaries and bonuses, while during the 1980s stock options have become the most critical component of the compensation structure (Frydman, Jenter 2010).

It is important to note that the increase in total CEO pay mentioned above represents the cost to shareholders, not to CEOs. Due to restrictions of options trading/hedging CEOs value stock options considerably less, and therefore discounts have to be applied (Hall, Murphy 2002). Depending on the exposure to the stock price, compensation components have various discount rates, which means that changes in compensation composition may change the perceived value to executives even if the cost to shareholders remains the same (Edmans *et al.* 2017).

1.3. Theoretical views on the compensation-performance relationship

The most popular theory that the majority of papers rely on when examining the relationship between executive compensation and firm performance is agency theory. The agency relationship is one of the oldest modes of social interaction (Ross 1973). Agency theory examines the problems that occur as a consequence of the separation of management and owners of a firm and looks for solutions to resolve these problems (Panda, Leepsa 2017). Jensen and Meckling defined the agency relationship as “a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent” (Jensen, Meckling 1976: 164).

According to Jensen and Meckling (*Ibid*), there are at least two negative consequences for shareholders that result from the conflict between them and the manager of a firm. First, is the

tendency of managers to spend increasingly more resources on non-monetary perquisites as their share of ownership decreases. When a manager owns 100 percent of the company's stock, he will increase his utility, which will involve a mix of both monetary and non-monetary benefits. However, as his share of stock declines, he will increase the spending on non-pecuniary aspects because he will bare only a fraction of the cost (*Ibid*: 167). Second, is the fact that as the manager's share of ownership drops, he loses the incentive to exercise effort and creativity in order to improve the firm's performance as his claim of the outcome is reduced.

Academics have come up with various "remedies" to the agency problem. For example, a firm could increase the level of debt or include more outside directors to the board. (Panda, Leepsa 2017) In the context of this thesis, however, the most relevant measure for reducing the agency problem is constructing efficient compensation contracts. It is assumed that connecting the CEO pay to firm performance reduces agency costs, producing the outcome closer to optimal. Jensen and Murphy (1990a) were among the first to investigate this pay-performance relationship, commonly known as pay-performance sensitivity. They found that 1000$ increase in shareholders' wealth is associated with an average CEO wealth increase of 3.25$. They argued this association, although statistically significant, was too weak to align the interests of managers and shareholders.

The discussion in Baker et al. (1988) may explain the low pay-performance sensitivity. They argue that throughout organizational hierarchy managers are reluctant to give poor evaluations, penalize or fire their subordinates. This phenomenon could also apply to CEO-shareholder relationships. The authors also point out that promotions may play a role as an incentive to improve performance, but only in young firms with the potential for significant growth (*Ibid*). In the case of CEO, however, there is no room for promotion.

In addition to the reluctance of managers to give poor evaluations to employees, there are some other explanations to why firms do not link pay to performance, mainly coming from psychologists and behaviorists. For example, some argue that chasing extrinsic rewards may reduce motivation by diminishing the intrinsic interest of an employee (Deci 1972; Kohn 1988). Another line of argument is that differentiating workers based on performance may make some employees "feel badly" if co-workers receive bigger bonuses, which in turn will decrease the morale and productivity (Baker *et al.* 1988).

In their article, Jensen and Murphy (1990b), suggest three corporate policies that should be followed by investors or board of directors in order to increase the pay-performance sensitivity and create adequate incentives for CEOs and executives to increase the wealth of shareholders. First, they suggest that boards should require that CEOs become substantial owners of the company's outstanding stock. Second, cash-based compensation components (salaries, bonuses) should be designed in a way which would give large rewards to well-performing CEOs and significant penalties to CEOs with poor performance. Lastly, the threat of dismissal should become real for poor performing executives. Ever since Jensen and Murphy (*Ibid*) argued that equity-based compensation is one of the most effective ways to create incentives for executives, much empirical research has been dedicated to investigating whether it is true.

Many alternative theoretical frameworks criticize agency theory as being too simplistic or unable to reflect reality adequately. One of those frameworks is the managerial power theory. According to this theory, compensation contracts can be seen not as incentive generating or interest aligning instrument, but rather, as a rent-extracting tool for CEOs. Managerial power theory states that CEOs use their power to justify a higher level of pay and arrange compensation in a way, which is not necessarily optimal for incentive creation (Frydman, Jenter 2010).

There are at least four common practices that CEOs employ to extract rents, and which can be explained by managerial power theory (Bebchuk, Fried 2003):

- Power-pay relationships. The CEO compensation will be higher in firms where the Board of Directors is weak.
- Compensation consultants. Since the HR department which hires compensation consultants reports to the CEO, the consultants have the incentive to provide advice that favors the CEO. That is why compensation consultants would often justify the high pay of the CEO, rather than optimize it.
- Stealth compensation. Many firms employ certain compensation practices (e.g., pension plans, deferred compensation, post-retirement perquisites, and consulting contracts) which "camouflage" the actual amount paid to the CEO. Thus the degree of pay-performance sensitivity is distorted as well.
- Gratuitous goodbye payments. Firms would often award their leaving CEOs with benefits that are not required by the contract. Many times this is the case even if the CEO is leaving due to poor performance.

Behavioral agency theory (BAT) takes the model of "classical" agency theory (CAT) as a starting point. However, behavioral agency theorists argue that CAT is far too simplistic and, therefore, make several changes in assumptions and the main focus of the theory (Pepper, Gore 2012). The main problem that BAT places in the center of the theory is not the aligning of interests between agent and principal as does the CAT. Instead, it focuses on motivation. BAT acknowledges improvement of executives' performance as shareholders' one of the most critical tasks. However, there are a lot of contributing factors which affect the overall motivation level of the agent, whereas extrinsic (i.e., incentives) and intrinsic motivation is only a part of the whole process. Other important factors affecting motivation include for example loss/risk aversion, time discounting by the agent, inequity aversion, etc. (*Ibid*) With respect to incentives and aligning the interests between agents and principals Pepper and Gore (2012: 1062) state that tying compensation and performance as close as possible is not desirable. First, it will cause work dissatisfaction and a decrease in intrinsic motivation. Second, creating too much incentive may cause a situation of inequity among other top management executives, and thus will lower the level of efficiency of the whole management team.

There are other theoretical approaches, though not as popular as agency theory, still applicable to compensation research. The human capital theory states that shareholders may compensate executives not only for their output – performance but for inputs such as skills. (Harris, Helfat 1997; Combs, Skill 2003) Harris and Helfat (1997) argue that firms will have to pay higher initial compensations to new CEOs coming from other firms or industries to make up for their loss of value because they forgo firm-specific or industry-specific skills and knowledge. Marginal productivity theory is one of the oldest as its ideas originate from classical and neoclassical economic theories. If it is assumed that the owner of the firm and manager is the same, then his compensation equals to marginal revenue product of the firm. If the assumption is relaxed, then the compensation will be in the range between an executive's minimal acceptable pay and firm's profits depending in no small degree on the firm size (Gomez-Mejia et al. 2010). Another theory that gained some popularity is tournament theory. According to this theory, under certain conditions, such as risk-neutrality, the pay schemes could be explained not only by the output of executives but also by their rank in the organization (Lazear, Rosen 1981; Eriksson 1999). The tournament theory places CEO as a winner of a corporate race, and in this way, his compensation can be seen as a trophy, rather than a proportionate award for effort and outcomes (Aguinis *et al.* 2018).

In conclusion, the most established theory in the field of CEO compensation and the one that is followed the most in the empirical literature is the agency theory. According to this theory, the interests of CEOs and shareholders are best aligned in firms that (1) grant their CEOs substantial amount of equity-based compensation and (2) use appropriately cash-based incentive compensation by rewarding high performance and punishing low performance. Based on these assumptions the following two hypotheses are proposed:

Hypothesis 1: The performance of firms paying their CEO's cash-based and equity-based incentive compensation differs statistically significantly from the performance of firms who do not pay these compensation components.

Hypothesis 2: Greater usage of cash- and equity-based incentive compensation is positively associated with firm performance measures.

The behavioral agency theory states that besides extrinsic rewards (compensation), there are many other sources of motivation for executives. It is possible to imagine that excellent firm performance is a confirmation of the CEO's skills, knowledge, and effort. Thus, high performance in itself can be a form of intrinsic motivation. Therefore, high performing firms can encourage CEOs to improve the performance further by providing both the intrinsic and extrinsic rewards in higher amount compared to low performing firms. Consequently, the following hypothesis is proposed:

Hypothesis 3: The association between compensation components and firm performance measures is more positive for high-performing firms.

1.4. Review of previous empirical studies

There are many ways of categorizing the previous empirical research related to firm performance and CEO compensation. First, one could divide papers into groups based on a sample investigated. For example, there are many studies focusing solely on US companies (e.g., Cooper *et al* 2010; Yang *et al* 2014; Mehran 1995) while others examine European countries such as the UK, Portugal, and Italy (e.g., Balafas, Florackis 2014; Alves *et al.* 2016; Nicola *et al.* 2016). Some papers have explored Asian countries as well (e.g., Firth *et al.* 2006; Kato *et al.* 2007). Also, it is possible to distinguish research papers based on the industries that they look into. Few studies have explored the banking/financial sector exclusively (e.g., John, Qian 2003; Chan *et al.* 2014). The vast majority of scholars study all sectors jointly (e.g., Unite *et al.* 2008; Hou *et al.* 2014; Elayan *et al*

2003), while some papers intentionally exclude the financial sector arguing that financial firms possess significantly different characteristics (e.g., Frye 2004; Leon Li, Yang, Yu 2015).

In this paper, the previous literature is separated into two groups based on the methodological approach: pay-performance studies and performance-pay studies. Pay-performance studies investigate performance as a determinant of the executive compensation level and structure. Performance-pay studies examine whether CEO or executive compensation can explain variance in the performance of firms. The majority of scholars study the effect of one variable on another without considering their possible interrelatedness. Indeed, compensation can affect performance because a higher level of pay can motivate CEOs to improve firm performance. At the same time, however, performance can impact compensation because shareholders and directors can decide to reward the CEO for past performance. Few authors have considered the possible endogenous association between the two variables. Admouni (2016) examined the possible endogenous association between CEO pay and firm performance in the context of French firms. By applying simultaneous equation-system, she found there is indeed endogeneity between these variables when CEO compensation is measured by its variable part and performance is measured by Tobin's Q. Her results suggest that both factors have a negative impact on each other. Smirnova and Zavertiaeva (2017) employed a two-stage least square method to test the effect of two variables simultaneously. They find that the bonus component is interrelated with ROA.

Table 1 presents a summary of the findings of papers examining the pay-performance association. Table 1 shows that the research on the pay-performance association focuses on various firms in the period from 1992 and up to 2015. Only John and Qian (2003) explicitly examined banks. They found a positive association between shareholders' wealth and total CEO compensation. Most of the authors set the total level of compensation as a dependent variable. However, some papers split the total compensation into fixed and variable or cash and stock compensation. Most of the papers used ROA and stock returns as independent variables. Generally, it seems that the association between pay and performance indeed exists in Eastern countries; however, as the results show this association depends on the ownership status of the firm. For example, Firth *et al.* (2006) find a positive association only for those firms whose major shareholder is not a state bureaucratic agency. The results of Kato *et al.* (2007), who investigate Korean firms, suggest that the relationship between compensation and performance depends on whether the firm is Chaebol (a conglomerate). Similarly, Unite *et al.* (2008) studying companies in the Philippines, show that the association between CEO total pay and firm performance does not hold for companies that are

affiliated with a family corporate group. The results of papers exploring samples in other countries vary substantially. Only a few studies have found some support for the positive association between compensation and performance (John, Qian 2003; Yang *et al*. 2014; Alves *et al.* 2016).

Table 1. Summary of previous research on the pay-performance relationships

Paper	**Sample info**	**Dependent variable**	**Independent variable**	**Association found**
John, Qian(2003)	US banks; 1992-2000	total pay	shareholders' wealth	+
Firth *et al.* (2006)	Chinese non-financial firms; 1998-2000	total pay	operating margin	+-
Kato *et al.* (2007)	Korean publicly traded; all sectors; 1998-2001	cash comp.	stock returns	+-
		cash comp.	ROA	0
Unite *et al.* (2008)	Philippines; all sectors; 2001-2003	total pay	market cap, stock returns	+-
		total pay	ROA	0
Cooper *et al* (2010)	USA; all sectors; 1994-2008	Incentive compensation	abnormal return	-
Yang*et al.* (2014)	USA; all sectors; 1992-2011	cash, stock, total compensation	ROA	+
		cash, stock, total compensation	stock return	0
Nicola *et al.* (2016)	Italy; all sectors; 2008-2014	fixed, variable, total pay	TSR	0
Raithatha, Komera (2016)	India; non-financial; 2002-2012	total pay	ROE	+
		total pay	Tobin's Q	0
Alves *et al.* (2016)	Portugal; all sectors; 2002-2011	total pay	TSR	+
Kirsten, du Toit (2018)	South Africa; Consumer goods and services sector; 2006-2015	total pay	share price	-
		total pay	ROE, EPS, sales	0

Source: author's elaborations

Notes:

"+" - positive association; "-" - negative association; "+-" - mixed results; "0" - no association

Table 2 summarizes the results of papers researching performance-pay association. Table 2 shows that most of the papers have studied US companies, while only a few have researched samples from other parts of the world. The most common dependent variables were ROA, Tobin's Q, ROE,

and TSR. Only Chan *et al.* (2014) investigated banks and showed that the effect of incentive pay on performance varies based on different performance levels.

Table 2. Summary of results of previous literature studying the performance-pay relationship

Paper	**Sample info**	**Dependent variable**	**Independent variable**	**Association found**
Leonard (1990)	USA; all sectors; 1981-1986	ROE	total pay; share of equity-based pay	0
Mehran (1995)	USA; manufacturing firms 1981-1985	ROA; Tobin's Q	share of equity-based pay	+
Elayan *et al.* (2003)	New Zealand; all sectors; 1998-1998	Tobin's Q	total pay	+
		TSR; ROA	total pay	0
Frye (2004)	USA; excluded transportation, utility and financial firms; compared the early and late 1990s	Tobin's Q	equity-based pay	+
		ROA	equity-based pay	-
Matolcsy, Wright (2011)	Australia; all sectors 1999-2005	ROA; ROE; MVE	equity-based pay	+-
Balafas, Florackis (2014)	UK; all sectors; 1998-2010	ROA	cash pay	+
		ROA	incentive pay	-
		ROCE	total pay	-
Hou *et al.* (2014)	USA; all sectors; 1998-2005	TSR	incentive pay	+-
Chan *et al.* (2014)	USA; banks; 1993-2005	ROA	incentive pay	+-
Leon Li *et al.* (2015)	USA; non-financial firms; 1993-2005	ROE; Tobin's Q	equity-based pay	+-

Source: author's elaborations

Notes:

"+" - positive association; "-" - negative association; "+-" - mixed results; "0" - no association

CEO compensation improves the performance of banks with a high level of performance. Although Leon Li, Yang, Yu (2015) excluded financial firms from their sample, they employed a similar methodology to Chan *et al.* (2014) and got similar results. Other papers (except Leonard 1990) show a statistically significant association between at least one firm performance measure and some executive compensation component. However, the results vary with regard to what kind of performance measure and compensation components were used.

In conclusion, there is no consensus on the significance or direction of the performance-pay association. Results differ to a great degree depending on the sample of firms and the choice of dependent and independent variables.

2. DATA AND METHODOLOGY

2.1. Data

Data originates from the Thomson Reuters Eikon database. The sample contains firms headquartered in the USA and Europe. The CEO compensation information has been hand-collected for the period of 2003-2017 from all the firms filtered as banks and diversified financials in the Global Industry Classification Standard (GICS). Out of 2030 companies presented in the industry, the necessary data for all variables were available for 814 companies (40%). The final sample is an unbalanced panel containing 4985 CEO-years.

In Eikon, there are two possible ways to view the information on compensation: standardized and "as reported" view. The advantage of "as reported" view is that it gives a more detailed overview of all the remuneration articles. In contrast, standardized view aggregates all compensation items into six possible categories: salary, bonus, long-term incentive plan (LTIP), restricted stock, other annual compensation, and all other compensation. The standardized view provides better comparability between companies and, therefore, the author collected the data using this view. Unfortunately, in the standardized version, both stock options and equity holdings are aggregated in the same category of restricted stock, which means it will not be possible to investigate these components separately. Since both compensation components are equity-based, the author will refer to them collectively as equity-based compensation (EBC) in the rest of this paper.

The process of collecting the data differed for US and EU companies. In US firms it was usually explicitly stated which officer served as the CEO. In European firms, however, the equivalent title varied depending on the country. Unless the CEO was indicated, officers in the following positions have been accepted and added to the sample:

- chairman of the management board,
- the sole member of the management board,
- general manager,
- chairman of the governing board.

There are 26 countries present in the sample. Table 3 presents the distribution of observations between countries throughout the whole period of 2003-2017.

Table 3. Distribution of observations between countries

-	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
AT			1	1	1	1	2	2	1	1	1	3	3	4	2	**23**
BE				1	1	1		2	2			1	1	3	3	**15**
BG								1	1	1	2	1	1	1		**8**
CH					5	7	10	10	7	8	17	17	28	30	9	**148**
CY							1							1	1	**3**
DE			4	2	6	7	5	8	10	10	11	9	13	11	8	**104**
DK			1	1	2	1	3	5	7	10	13	16	13	10	6	**88**
ES									1	1	1	1	1	2	2	**9**
FI					1					1	2	2	2			**8**
FO					1		1	1	1	1		1	1			**7**
FR			2	3	1	12	10	8	12	13	2	5	5	9	11	**93**
GB		2	7	8	10	13	21	26	31	34	41	41	37	37	33	**341**
GR														1		**1**
IE			1	1	1		1	1	1	1	1	2	3	2	3	**18**
IM							1	2	1	1	1	1				**7**
IS															2	**2**
IT		1	2	2	4	4	6	6	4	6	4	7	5	6	6	**63**
LI										1						**1**
MT				1	1											**2**
NL				1	1	1	3	3	3	2		3	2	4	4	**27**
NO				2	4	6	6	9	13	13	6	18	20	12	3	**112**
PL			1	3	3	4	6	7	11	10	14	16	19	25	22	**141**
PT								1		1				1	2	**5**
SE			1	3	4	3	2	3	5	5	5	8	11	14	11	**75**
SI					1	2	1		1	1	1	1				**8**
US	142	161	174	192	212	254	261	274	291	291	321	343	244	265	251	**3676**
Total	**142**	**164**	**194**	**221**	**259**	**316**	**340**	**369**	**403**	**412**	**443**	**496**	**409**	**438**	**379**	**4985**

Source: author's calculations

As can be seen from table 3, the sample is dominated by the presence of US companies. One of the possible explanations (in addition to a more mature capital market) is that US firms apply the same accounting and reporting principles. As a robustness check, all estimations performed and presented in chapter 3 are replicated using the sample consisting of US firms only (see Appendices 4-13). The focus on US firms does not change the main conclusions and decisions regarding the proposed hypotheses.

Firms in the sample can be categorized into six sub-sectors. Figure 3 presents all observations distributed between the sectors.

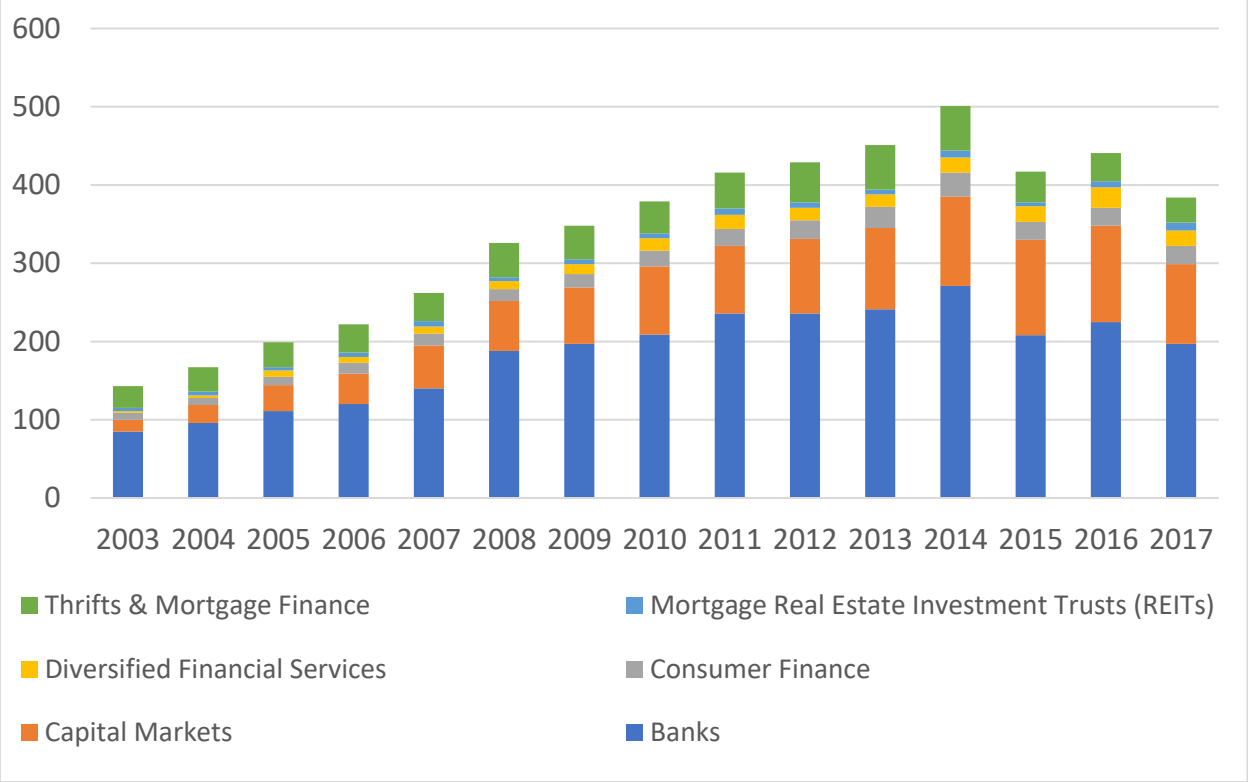


Figure 3. Distribution of observations between sub-industries

Source: author's elaborations

Figure 3 shows that in each year banks form the most significant part of the sample. Firms belonging to the capital markets sector are the second largest group, while other categories constitute a smaller fraction of the sample. Overall, it can be said that the number of financial institutions on which it is possible to obtain the CEO compensation details (in Eikon Database) has risen significantly in recent years.

2.2. Variables used in estimations

The dependent variables are three proxies of firm performance. Two accounting-based and one market-based performance measures are employed. The first accounting measure of performance is a return on assets (ROA). Expressed as a percentage, it is a ratio of income after taxes for the fiscal period over average total assets. The second accounting-based performance measure is a

return on equity (ROE). In this study, the ROE for common shareholders is employed. It is defined as income available to common shareholders divided by the same period average common equity. Lastly, the total shareholder return (TSR) is used as a market-based performance measure. TSR is calculated as a 52-week return that includes price change and dividends paid.

The group of compensation-related explanatory indicators includes six variables, each representing the CEO compensation component available in Eikon database. Previous studies that researched performance-pay association mostly used the level of compensation (whether the total value of CEO pay or the value of a certain compensation component) as a variable (e.g., Chan *et al.* 2014; Hou *et al.* 2014; Balafas, Florackis 2014). Some studies used the share of equity-based compensation out of total pay as an explanatory variable (Leonard 1990; Mehran 1995; Leon Li, Yang, Yu 2015). However, it seems thus far the academic literature has not considered the association between the share of different components out of total CEO pay with firm performance. Since the aim of this study is focused on examining the compensation structure, all compensation variables are defined as the percentage of total compensation and not the monetary level of pay. The notation of variables is as follows: SALARY, BONUS, LTIP, EBC, OAC, AOC. SALARY refers to the share of the salary of total compensation. BONUS signifies the percentage of an annual bonus out of total compensation. LTIP means the share of the long-term incentive plan paid in a given year. EBC is the percentage of the compensation that is equity-based. Variable OAC refers to the share of other annual compensation, and AOC stands for the percentage of all other compensation. In many studies, a variable describing the sum of all cash-based incentive components is utilized. Similarly, the author adds another independent variable – CASHINC, which is defined as a sum of bonus and LTIP over the total compensation.

The final set of explanatory indicators employed in the study cover the firm size, equity ratio, productivity, and a set of dummy variables. The main argument for the association between firm size and performance is that larger firms can realize the benefits of economies of scale. For instance, larger banks can spread their fixed costs over a greater number of assets, which reduces the average cost (Regehr, Sengupta 2016). Another advantage of a larger bank is broader possibilities of diversification, which in turn reduces risk level (Menicucci, Paolucci 2015). Firm size is noted in estimations as SIZE, and it is measured as the natural logarithm of total assets of the company.

Equity ratio reflects the capital adequacy of a firm. The early theory suggested that an inverse relationship between this factor and the firm's profitability should be expected. Arguably, the higher the ratio, the lower are after-tax profits of a bank, due to the reduced tax shield effect. Also, a higher capital ratio reduces the risk on equity, and, therefore, lowers the required return on equity. (Berger 1995) This variable is widely used in empirical literature. It is noted as EA and is calculated as firms' total equity percentage of total assets.

The proxy for firm productivity (PROD) is added as a control variable. Financial institutions, which can increase the output while decreasing the amount of labor required, or at least keeping it constant will have a competitive advantage (Alexiou, Sofoklis 2009). The PROD variable is defined as the ratio of total assets over a total number of employees.

Finally, dummy variables CM, CF, DFS, REIT and TMF representing different sectors are defined, where CM is capital markets, CF is consumer finance, DFS stands for diversified financial services, REIT means mortgage real estate investment trusts and TMF is thrifts and mortgage finance. If a firm does not pertain to any of the sectors mentioned above, then it is a bank. Appendix 1 provides an overview of the variables employed in estimations.

In this study, all the performance variables are taken as of one year forward compared to all other variables. This technique is widely used by scholars to avoid potential endogeneity problems. In table 4 the descriptive statistics of the employed variables are presented.

Table 4. Descriptive statistics of the variables used in estimations

Variable	Mean	Median	Std.dev	Min	Max	CV
ROA	2,10	0,92	7,76	-70,74	75,29	3,70
ROE	8,17	8,50	14,97	-97,02	95,99	1,83
TSR	7,98	6,25	34,12	-98,75	196,84	4,28
SALARY	52,53	52,79	29,44	0	100	0,56
BONUS	14,43	4,49	19,40	0	100	1,34
EBC	3,28	0	12,34	0	100	3,76
LTIP	11,07	0	19,08	0	100	1,72
OAC	0,76	0	5,28	0	70,19	6,98
AOC	17,93	10,86	20,42	0	100	1,14
CASHINC	15,18	5,61	20,15	0	100	1,33
EA	22,22	11,06	24,48	0,14	99,98	1,10
SIZE	21,14	20,87	2,37	13,42	28,90	0,11
PROD	15,06	15,06	1,32	10,37	21,29	0,09

Source: author's calculations

From descriptive statistics in table 4, it can be observed that the mean and the median of the SALARY variable are almost precisely the same. In case of the other compensation variables, however, the median is substantially lower compared to the mean. Consequently, it can be suggested that the distribution of the share of the salary of the total compensation is more symmetric compared to the other compensation variables, which instead have a distribution skewed to the right. This will be further explored in section 3.1.

Looking at the minimum and maximum values of the performance indicators, the presence of extreme observations that can potentially impact the estimations can be assumed given the mean and standard deviation statistics. The frequency distribution plots of the performance variables are presented in Appendix 3. Making his judgment based on the visual examination of the distributions, the author considers as extreme all values, which are distanced from the mean by more than four times the standard deviation. Consequently, in all further estimations with ROA as the dependent variable, the author excludes observations if the ROA is higher than 33.14 percent or less than -28.94 percent. Similarly, in estimations with ROE as dependent variable observations are eliminated if ROE is greater than 68.05 percent or less than -51.17 percent. Analogically, in estimations with TSR as a dependent variable, all observations with TSR value above 144.46 percent and below -128.5 percent are excluded.

The correlations between the variables are demonstrated in Appendix 3. In the next section, the empirical methodology is presented.

2.3. Methodology

2.3.1. Wilcoxon rank sum test

One of the possible ways to test H1 is to conduct a test, which compares the means of independent samples. The most popular solution for this situation would be the Student's test (also known as t-test). However, one of the fundamental requirements of the t-test is that the variables under investigation follow a normal distribution. Shapiro-Wilk's normality test showed that none of the performance variables follow a normal distribution. Therefore, a non-parametric test shall be applied.

A popular non-parametric alternative to t-test is Wilcoxon rank sum test (also known as Mann-Whitney test). The performance of companies who use a particular compensation component is compared against the performance of firms who do not use it. In this thesis, it is assumed that a firm is using a compensation component if this component's share of total compensation is greater than zero.

Three sets of tests will be performed - one for each performance measure. Each set shall contain seven tests - one for each compensation variable. The test will estimate whether the location shift of distributions of variables differs from zero (Wilcoxon ... 2019). The author employs "wilcox.test" function from stats package (*Ibid)* in R statistical software.

2.3.2. Panel regression models

Due to the panel structure of the dataset, it would be preferable to employ fixed (FE) or random (RE) effects models instead of pooled ordinary least squares models. Advantages of panel techniques include (Brooks 2008):

- ability to deal with a broader and more complex spectrum of problems,
- ability to get insights from shorter time-series data (which otherwise would not be possible due to the reduced number of degrees of freedom),
- reduced impact of omitted variables bias.

An increase in the share of one compensation component will naturally lead to a decrease in the share of other compensation components; thus, as demonstrated in Appendix 3, the compensation variables are negatively correlated. To escape potential problems when fitting and interpreting models the author includes in estimations one compensation variable at a time.

Initially, the random effects (RE) models were estimated. There are a couple of advantages of RE models over FE. First, in general, RE models produce more efficient estimations. Second, RE models are more suitable when groups of the sample are a random selection of the population, which characterizes the current dataset rather well. (*Ibid*) Although, when modelling ROA and ROE as dependent variables the Breusch-Pagan test confirmed that the random effects estimates are preferred to a pooled model, the Hausman test showed that estimates are not consistent. Also, the null hypothesis was accepted in the Breusch-Pagan test when TSR had been modelled. Therefore, for all the three dependent variables, the fixed effects models were chosen. This means that it is not possible to include the sector dummies into models since they are not varying across

time. Robust standard errors were used in all models because the Wald test suggested the presence of heteroskedasticity. The general fixed effects model employed in this thesis is the following:

$$y_{i(t+1)} = \alpha + \beta X_{it} + \rho t + \mu_i + \upsilon_{it} \quad (3)$$

where
$y_{i(t+1)}$ – independent variable at a moment t+1; It includes one of the following: ROA, ROE, TSR
α – a constant
β – a vector of parameters of the X_{it} variables to be estimated
X_{it} – a vector of independent variables; It includes one of the compensation variables (SALARY, BONUS, LTIP, CASHINC, EBC, OAC, AOC) and control variables (SIZE, EA, PROD).
ρt – fixed time effect. Added to the model by dummifying t variable.
μ_i – fixed individual firm effect
υ_{it} – random disturbance term

All the estimations are done using econometric software Gretl.

2.3.3. Quantile regression

Traditional OLS models estimate conditional means of the dependent variable in response to explanatory variables. However, considering averages may give a too narrow understanding of the behavior of the relationship in focus. At different levels of its distribution, the dependent variable may behave differently in response to the independent variables. A quantile regression (QR) approach can help to resolve this issue. Essentially, instead of conditional means, a QR model estimates conditional quantiles by employing the least absolute deviations method. Quantile regression approach has several advantages when compared to classical regression. For example, QR relaxes normality and homoscedasticity assumptions, which limit the use of OLS methods. Also, quantile regression results are more robust in the presence of outliers. (Hao, Naiman 2007)

QR models are estimated using the pooled data for the whole period of 2003-2017. The general model for quantile regression used in this paper can be described as follows:

$$y_{it+1} = X_{it} \cdot \beta_\theta + u_{\theta i} \quad (5)$$

where
y_{it+1} – performance (ROA, ROE or TSR) of firm i at a year t+1.
X_i – vector of independent variables of firm i at a year t. Includes one of the compensation variables
(SALARY, BONUS, LTIP, CASHINC, EBC, OAC, AOC) and control variables

(SIZE, EA, PROD, sector dummies and year dummies)
β_θ – is a vector of parameters of X_{it} estimated for the θth quantile.
θ – a value between 0 and 1 characterizing the quantile.
$u_{\theta it}$ – error term

The β_θ parameter can be estimated by minimizing the following expression (Koenker 2015):

$$min\left[\sum_{i:y_i>X_i\beta_\theta}\theta\times\left|y_{i(t+1)}-X_{it}\cdot\beta_\theta\right|+\sum_{i:y_i<X_i\beta_\theta}(1-\theta)\times\left|y_{i(t+1)}-X_{it}\cdot\beta_\theta\right|\right] \quad (5)$$

In practice, the parameters are estimated using linear programming algorithms.

This paper considers the 0.1th and 0.2th quantiles of performance indicators as low performance and the 0.8th and 0.9th quantiles as high performance. This approach is identical to the one employed in Chan *et al* (2014). Therefore, the coefficients estimated at these quantiles are presented and compared against one another. The equality of slopes estimated at different quantiles is tested using the Wald test. As a reference, coefficients of estimated pooled OLS models of the same specification are presented as well.

In this study, the standard errors in QR models are estimated using the bootstrap method with 500 replications. This method is advised as opposed to calculating asymptotic standard errors because it does not assume that errors are independent and identically distributed - an assumption that often does not hold (Hao, Naiman 2007). The estimations are done in the R statistical software using the "quantreg" (Koenker *et al.* 2018) package.

3. EMPIRICAL RESULTS

3.1. CEO compensation at financial institutions

The descriptive statistics of compensation indicators showed that the median and mean were somewhat different. Therefore, in figure 4, the author investigates the frequency distributions of the four main compensation variables: SALARY, BONUS, EBC, and LTIP.

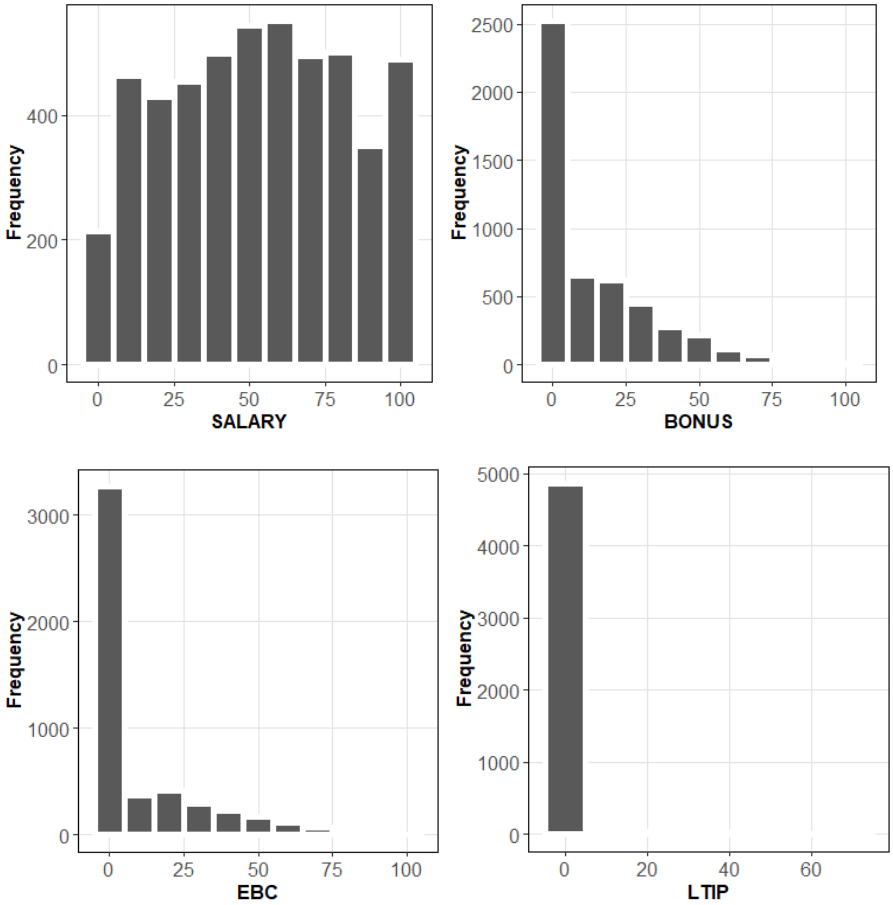


Figure 4. Frequency distribution of the primary compensation variables
Source: author's calculations
Notes:
EBC – equity-based compensation, LTIP – long-term incentive plan

Figure 4 shows that the distribution of the share of salary is much more symmetrical compared to the other compensation variables and the shape of its distribution is closer to be uniform rather than a normal "bell" curve. Consequently, for each level of share of salary out of total compensation, there are many firms in which CEOs receive that percentage of their pay from salary. In contrast, in the case of bonus, equity-based compensation (EBC) and long-term incentive plan (LTIP), with each increase in the level of these variables, fewer CEOs receive compensation in that form. Also, as can be seen in figure 4 the majority of firms do not use bonuses, equity-based compensation and long-term incentive plans at all.

Figure 5 displays the changes of an average CEO compensation structure in the period 2003-2017.

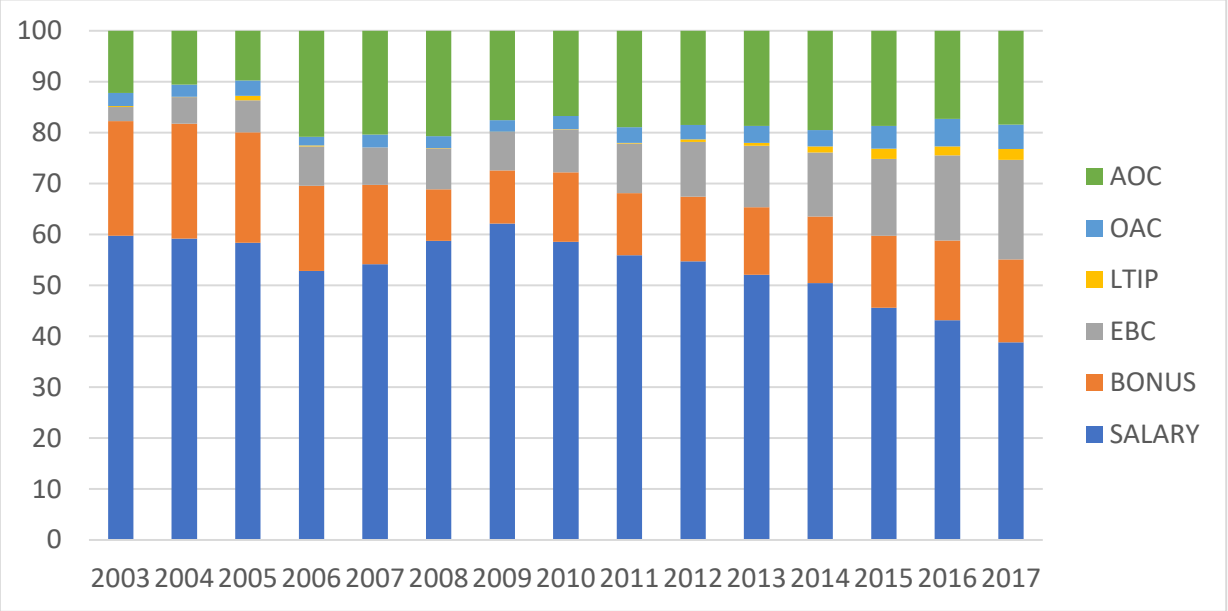


Figure 5. Changes in CEO compensation structure in the period 2003-2017
Source: author's calculations
Notes:
EBC – equity-based compensation, LTIP – long-term incentive plan, OAC – other annual compensation, AOC – all other compensation

Figure 5 demonstrates a clear trend in CEO compensation structure: the decrease of the share of salaries. The pattern is most apparent starting from 2009 when the salary of an average CEO constituted over 60 percent of his total compensation, while at the end of the period the share of salary was less than 40 percent. As can be seen in figure 5, the decline of the role of salary is mainly caused by the rise of the share of equity-based compensation (EBC). The percentage of equity-based compensation has increased from 8 percent in 2009 to 20 percent in 2017. The proportion of bonuses was highest in the pre-crisis period. The decline of the share of bonuses

during the financial crisis can be explained by poor performance and financial distress. In the post-crisis period, the percentage of bonuses remained stable varying from 12 to 16 percent. It seems that financial institutions have just started to explore the possibilities of long-term incentive plans. Figure 5 provides some signs that the share of this component might be in a rising trend: in 2012 the share of LTIP constituted only 0.5 percent which increased up to 2.1 percent in 2017.

According to figure 5, thus far the salary remains the most critical compensation component. This result is contradictory to those of Frydman and Saks (2010), who analyzed the compensation of executives of large S&P 500 firms, and Tian and Yang (2014) who looked into the US financial institutions. Both papers show that equity and option compensation constitutes a more significant part of total compensation than salary. One of the reasons for this difference can be the fact that the sample of this study includes European firms. The figure presented in Appendix 4 demonstrates that although the proportion of equity compensation in US firms is somewhat larger when compared to the whole sample, the average CEO compensation structure in the US is similar to the one shown in figure 4. On the other hand, however, to some extent, this can be explained by the fact that in this study the standardized compensation data was used. Some compensation articles could be incorrectly categorized into the ”other” compensation components. Another possible explanation for this result is that the percentage of equity-based compensation can be understated in Eikon because this information was not fully reported. Nevertheless, the overall trend of changes in CEO compensation structure is similar to the papers mentioned above. However, it should also be taken into account that the increasing share of equity-based compensation could be partially explained if one assumes that the quality of compensation data in Eikon has increased over the years.

The decreasing role of salary with a parallel increase of the share of bonuses and EBC is justified by the agency theory, as it states that the latter components better align the interests of CEO and shareholders. The next sections of this chapter investigate if these changes are justified in practice.

3.2. Performance differences between compensation item users and non-users

This section presents the results of the Wilcoxon rank sum test, which has been employed to compare the performance of firms who use certain compensation components and those who do not. In table 5 the results of testing the difference in ROA of firms are shown.

Table 5. ROA differences across compensation item users and non-users

Sample	N (users)	N (non-users)	User ROA average	Non-user ROA average	W statistic	p-value
SALARY	4805	109	1,93	2,90	228940	0,0245 *
BONUS	2686	2228	2,43	1,37	3554600	0,0000 **
EBC	1838	3076	1,90	1,97	3083800	0,0000 **
LTIP	152	4762	3,38	1,90	359730	0,8992
CASHINC	2737	2177	2,41	1,37	3520000	0,0000 **
OAC	972	3942	2,75	1,75	2040700	0,0016 **
AOC	4012	902	1,87	2,32	1736100	0,0567

Source: author's calculations
Notes:
* and ** - significant at 5 and 1 percent level respectively

As shown in table 5 there is a statistically significant difference in ROA between firms who use and do not use the following compensation items: salary, bonus, equity-based compensation, cash-incentive compensation, and other annual compensation. Based on the results of the test and calculated average ROA of compensation item users and non-users, it can be suggested that firms which do not compensate their CEO's with salary or equity-based compensation perform better in terms of ROA. At the same time, it seems that firms who use bonuses, cash-based incentive compensation schemes (combined bonus and long-term incentive plan) and other annual compensation demonstrate higher ROA compared to firms that do not use these compensation components. Appendix 5 shows that the results in the context of US firms are similar. The only exception is that when looking at US firms only, the firms that use equity-based compensation perform on average better than firms that do not use this component. The results of the same test comparing the ROE of firms are demonstrated in table 6.

Table 6. ROE differences across compensation item users and non-users

Sample	N (users)	N (non-users)	User ROE average	Non-user ROE average	W statistic	p-value
SALARY	4806	106	8,34	8,13	262600	0,5853
BONUS	2693	2219	10,51	5,69	3733500	0,0000 **
EBC	1833	3079	9,01	7,93	3006700	0,0001 **
LTIP	152	4760	9,96	8,28	393470	0,0654
CASHINC	2744	2168	10,41	5,69	3707600	0,0000 **
OAC	974	3938	9,09	8,14	2034200	0,0033 **
AOC	4006	906	8,51	7,53	1916400	0,0084 **

Source: author's calculations
Notes:
* and ** - significant at 5 and 1 percent level respectively

The results show that there is no statistically significant difference in ROE between firms who use and do not use salary and long-term incentive plan. However, table 6 suggests that in the case of all other compensation components, firms that use them generally show higher ROE than firms that do not. As demonstrated in Appendix 6, the results are very similar if the sample is limited to US firms. The same test was applied to compare the TSR of firms. The results are presented in table 7.

Table 7. TSR differences across compensation item users and non-users

Sample	N (users)	N (non-users)	User TSR average	Non-user TSR average	W statistic	p-value
SALARY	4849	113	7,24	6,79	272440	0,9190
BONUS	2717	2245	7,25	7,20	3072600	0,6498
EBC	1846	3116	8,72	6,35	3006200	0,0076 **
LTIP	152	4810	7,34	7,23	367680	0,9029
CASHINC	2768	2194	7,30	7,15	3065800	0,5585
OAC	988	3974	8,09	7,02	1997300	0,3973
AOC	4042	920	7,43	6,39	1906200	0,2321

Source: author's calculations
Notes:
* and ** - significant at 5 and 1 percent level respectively

Table 7 shows that only in the case of equity-based compensation the null hypothesis is rejected. Moreover, the average total shareholder return of companies using this compensation component is higher compared to those that do not employ it. This suggests that companies using equity-based compensation to pay their CEOs, generally perform better in terms of TSR than companies not using this compensation component. Again, Appendix 7 shows that results stay the same if the data is restricted to US firms.

3.3. Results of panel models

The current section presents the results of panel models. Although the time dummies were included in all models, their coefficients are not presented here due to space limitations. The complete reports of all panel estimations are available using the link in the references (Birjukov 2019a). The estimates of fixed effects models with ROA as the dependent variable are displayed in table 8.

The estimates of models 1a, 2a and 5a show that the share of salary, bonus, and cash-incentive compensation have a statistically significant association with ROA. As expected an increase in the

share of salary is negatively associated with ROA: an increase in the share of salary by one percentage point is associated with an average decrease in ROA by 0.02 percent. On the contrary, the share of bonus and cash-incentive compensation are positively associated with ROA: a one percentage point increase in these compensation components is associated with an average increase in ROA by 0.04 percent.

Table 8. Fixed effects estimates with ROA as the dependent variable

-	1a	2a	3a	4a	5a	6a	7a
Intercept	25,614 ** (7,672)	21,973 ** (7,774)	23,650 ** (7,808)	23,558 ** 7,940	22,319 ** 7,757	23,478 ** 7,935	23,441 ** (7,931)
SALARY	-0,024 ** (0,007)	-	-	-	-	-	-
BONUS	-	0,038 ** (0,008)	-	-	-	-	-
EBC	-	-	0,004 (0,007)	-	-	-	-
LTIP	-	-	-	0,020 (0,017)	-	-	-
CASH-INC	-	-	-	-	0,038 ** (0,008)	-	-
OAC	-	-	-	-	-	-0,011 (0,008)	-
AOC	-	-	-	-	-	-	-0,002 (0,005)
SIZE	−1,057 ** (0,365)	-0,995 ** (0,366)	-1,035 ** (0,368)	-1,031 ** (0,374)	-1,013 ** (0,365)	-1,025 ** (0,374)	-1,024 ** (0,374)
PROD	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
EA	-0,001 (0,023)	0,000 (0,023)	0,001 (0,023)	0,001 (0,023)	0,000 (0,023)	0,002 (0,023)	0,002 (0,023)
N	4914	4914	4914	4914	4914	4914	4914
within R-squared	0,042	0,048	0,032	0,033	0,049	0,033	0,032
F-statistic (p-value)	43,760 ** (0,000)	83,245 ** (0,000)	60,143 ** (0,000)	59,906 ** (0,000)	46,602 ** (0,000)	78,000 ** (0,000)	67,591 ** (0,000)

Source: author's calculations

Notes:

1. robust standard errors in parentheses
2. * and ** indicate significance at 5 percent and 1 percent level respectively.

The share of equity-based compensation, long-term incentive plan, as well as other annual compensation and all other compensation, do not show statistically significant association with ROA. Appendix 8 suggests that the associations are identical when looking at US firms only.

Interestingly, the size of the financial institution is negatively associated with the return on assets. A 1 percent increase in firm size is associated with ca 1 percent decrease in ROA. Although the

general assumption in the academic literature is that the bank size is positively related to profitability, the notion that the association might be inverse is not novel. Some studies support the argument that small firms have economies of scale and scope while large firms have a diseconomy (Pasiouras, Kosmidou 2007; Kosmidou *et al.* 2006). Possible explanations for this phenomenon include, for example, increased costs required to manage larger firms, burden of an increased bureaucracy and agency costs (Menicucci, Paolucci 2015). Other explanatory variables (productivity and equity to assets ratio) were not found to be statistically significant.

Table 9. Fixed effects estimates with ROE as the dependent variable

-	1b	2b	3b	4b	5b	6b	7b
Intercept	74,218 ** (13,417)	62,358 ** (13,432)	67,918 ** (13,735)	66,954 ** (13,759)	63,492 ** (13,441)	67,176 ** (13,729)	66,305 (13,704)
SALARY	-0,083 ** (0,014)	-	-	-	-	-	-
BONUS	-	0,112 ** (0,015)	-	-	-	-	-
EBC	-	-	0,017 (0,013)	-	-	-	-
LTIP	-	-	-	0,022 (0,038)	-	-	-
CASH-INC	-	-	-	-	0,108 ** (0,015)	-	-
OAC	-	-	-	-	-	-0,042 (0,023)	-
AOC	-	-	-	-	-	-	0,012 (0,013)
SIZE	-2,600 ** (0,636)	-2,404 ** (0,635)	-2,547 ** (0,650)	-2,500 ** (0,651)	-2,457 ** (0,636)	-2,502 ** (0,650)	-2,473 ** (0,649)
PROD	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
EA	-0,124 ** (0,039)	-0,120 ** (0,039)	-0,118 ** (0,039)	-0,118 ** (0,039)	-0,122 ** (0,039)	-0,118 ** (0,039)	-0,117 ** (0,039)
N	4912	4912	4912	4912	4912	4912	4912
within R-squared	0,098	0,102	0,079	0,079	0,102	0,080	0,079
F-statistic (p-value)	395,564 ** (0,000)	18,324 ** (0,000)	168,067 ** (0,000)	108,452 ** (0,000)	18,220 ** (0,000)	38,455 ** (0,000)	109,790 ** (0,000)

Source: author's calculations

Notes:

1. robust standard errors in parentheses.
2. * and ** indicate significance at 5 percent and 1 percent level respectively.

The results of FE estimations with ROE as the dependent variable are introduced in table 9. As can be seen in table 9, the results are very similar to those in table 8. Estimates of models 1b, 2b and 5b show that ROE is statistically significantly associated with the share of salary, bonus and

cash-incentive compensation out of total CEO pay. Similar to results in the context of ROA, the share of salary is negatively associated with ROE: an increase in the share of salary by one percentage point is associated with an average decrease in ROE by 0.08 percent. At the same time, one percentage point increase in the share of bonus and cash-incentive compensation is associated with an average increase in ROA by 0.11 percent. Once again, the coefficients of the share of equity-based compensation, long-term incentive plan, as well as other annual compensation and all other compensation are statistically insignificant, suggesting that there is no association between these compensation components and ROE. Appendix 9 shows that results do not change if the sample is restricted to US firms.

As is the case with ROA, the size of financial institutions is also negatively associated with ROE. However, as can be seen in table 9, the equity ratio also reached statistical significance, and it is negatively associated with ROE. This is not unexpected if one considers the reduced tax-shield effect and lowered required return on equity, as discussed in the previous chapter. Also, since the highly capitalized firms can be considered less risky, it is not unusual to expect lower profitability following the risk-return assumption (Menicucci, Paolucci 2015).

Finally, table 10 presents the FE estimates with TSR as the dependent variable. The results presented in table 10 are unexpected with regard to the behavior of compensation variables. Surprisingly, the estimates of the model 1c suggest that the share of salary out of total compensation is statistically significant and it is positively associated with total shareholder return. At the same time, all other variables have a negative sign. A 1 percentage point increase in the share of salary is associated with an average increase of TSR by ca 0.13 percent. An increase of the same order in the share of bonus is associated with an average decrease of TSR by 0.07 percent, and the same increase of all cash-based incentive compensation (bonus and LTIP combined) is associated with a decrease of TSR by 0.09 percent. In contrast to models 4a and 4b with ROA and ROE as dependent variables, the estimates of model 4c suggest that the share of the long-term incentive plan is statistically significantly negatively associated with TSR. A 1 percentage point increase in the share of the long-term incentive plan is associated with a decrease in TSR by 0.2 percent.

Table 10. Fixed effects estimates with TSR as the dependent variable

-	1c	2c	3c	4c	5c	6c	7c
Intercept	236,202 ** (32,577)	250,948 ** (32,419)	245,258 ** (32,064)	246,289 ** (32,238)	250,765 ** (32,427)	248,424 ** (31,971)	248,721 ** (32,054)
SALARY	0,129 ** (0,029)	-	-	-	-	-	-
BONUS	-	-0,073 * (0,034)	-	-	-	-	-
EBC	-	-	-0,044 (0,036)	-	-	-	-
LTIP	-	-	-	-0,204 * (0,101)	-	-	-
CASH-INC	-	-	-	-	-0,088 ** (0,033)	-	-
OAC	-	-	-	-	-	-0,119 ** (0,043)	-
AOC	-	-	-	-	-	-	-0,017 (0,036)
SIZE	-10,957 ** (1,549)	-11,199 ** (1,549)	-11,006 ** (1,534)	-11,052 ** (1,542)	-11,171 ** (1,551)	-11,134 ** (1,529)	-11,168 ** (1,534)
PROD	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
EA	-0,259 ** (0,086)	-0,269 ** (0,086)	-0,268 ** (0,085)	-0,267 ** (0,086)	-0,267 ** (0,086)	-0,271 ** (0,085)	-0,271 ** (0,086)
N	4962	4962	4962	4962	4962	4962	4962
within R-squared	0,268	0,265	0,265	0,265	0,266	0,265	0,264
F-statistic (p-value)	2,816 ** (0,000)	2,778 ** (0,000)	2,699 ** (0,000)	2,610 ** (0,000)	2,763 ** (0,000)	5,483 ** (0,000)	2,681 (0,000)

Source: author's calculations

Notes:

1. robust standard errors in parentheses
2. * and ** indicate significance at 5 percent and 1 percent level respectively

As in previous models, the equity-based compensation seems to have no role in explaining the performance variance. Surprisingly, the share of other annual compensation out of total compensation has a statistically significant negative association with TSR, and its magnitude is comparatively large. A 1 percentage point increase in other annual compensation is associated with an average decrease of TSR by 0.12 percent. As shown in Appendix 10, if the sample is restricted to US firms, then the long-term incentive plan component is not statistically significant. Concerning the other main compensation components, the results stay the same.

3.4. Results of quantile regression

Considering that the main focus of this thesis is on compensation structure and taking into account space limitations, this section presents only coefficients of the compensation variables. The full reports of quantile regression, tests of slope equality and OLS estimations can be accessed at Birjukov (2019b). Table 11 displays the results of quantile regression with ROA as a dependent variable.

Table 11. Quantile regression estimates with ROA as the dependent variable

Variable	Coefficients					Test of slope equality (F-statistics)	
	Q10	Q20	OLS	Q80	Q90	Q10 vs Q90	Q20 vs Q80
SALARY	-0,011 ** (0.002)	-0,008 ** (0.001)	-0,029 ** (0,006)	-0,003 ** (0.001)	-0,004 ** (0.001)	15,24 ** (0,000)	42,03 ** (0,000)
BONUS	0,016 ** (0,002)	0,010 ** (0,001)	0,052 ** (0,009)	0,011 ** (0,002)	0,016 ** (0,003)	0,00 (0,946)	0,04 (0,829)
LTIP	-0,013 ** (0,004)	-0,009 ** (0,003)	0,016 (0,020)	0,008 (0,009)	0,003 (0,005)	3,98 * (0,046)	25,60 ** (0,000)
CASHINC	0,012 ** (0,002)	0,009 ** (0,001)	0,050 ** (0,009)	0,011 ** (0,002)	0,013 ** (0,003)	0,17 (0,681)	1,96 (0,16)
EBC	0,013 ** (0,001)	0,006 ** (0,001)	0,004 (0,008)	-0,004 ** (0,001)	-0,002 (0,001)	53,78 ** (0,000)	92,95 ** (0,000)
OAC	-0,019 ** (0,006)	-0,008 ** (0,003)	-0,005 (0,010)	0,006 ** (0,002)	0,005 (0,003)	13,77 ** (0,000)	28,20 ** (0,000)
AOC	0,006 ** (0,002)	0,004 ** (0,001)	0,005 (0,006)	-0,001 (0,001)	-0,001 (0,001)	13,25 ** (0,000)	26,87 ** (0,000)

Source: author's calculations

Notes:

1. * and ** indicate significance at 5 percent and 1 percent level respectively
2. In parentheses: standard errors in columns 2-5 and p-values in the last two columns
3. "Q10", "Q20", "Q80", "Q90" - estimates at 0.1th, 0.2th, 0.8th and 0.9th quantiles

The results presented in table 11 suggest that high- and low-performing (in terms of ROA) firms have different direction or magnitude of the association between ROA and the following compensation components: salary, long-term incentive plan, equity-based compensation, and other annual compensation and all other compensation.

The coefficients of the share of such components as salary, long-term incentive plan, and other annual compensation are lower at the 0.1th and the 0.2th quantiles compared to the 0.8th and 0.9th quantiles. This indicates that the increase in these compensation components is associated more positively (or less negatively) with ROA in case of firms which have high ROA, to begin with. At

the same time, the results show that an increase in the share of equity-based compensation and all other compensation is more favorable for firms who have a low ROA. The association between the share of bonus and ROA seems to be identical for both low- and high-performing firms. Appendix 11 shows that when the sample is restricted to US firms, the results differ substantially. Only in the case of the SALARY variable, the coefficients are statistically significantly different for high- and low-performing firms. The share of salary is associated more negatively with ROA if a firm is high-performing.

Table 12 presents estimates of similar models with ROE as the dependent variable.

Table 12. Quantile regression estimates with ROE as the dependent variable

Variable	Coefficients					Test of slope equality (F-statistics)	
	Q10	Q20	OLS	Q80	Q90	Q10 vs Q90	Q20 vs Q80
SALARY	-0,071 ** (0,011)	-0,047 ** (0,007)	-0,076 ** (0,012)	-0,045 ** (0,006)	-0,048 ** (0,008)	3,53 (0,060)	0,11 (0,742)
BONUS	0,137 ** (0,013)	0,095 ** (0,010)	0,146 ** (0,016)	0,097 ** (0,012)	0,121 ** (0,017)	0,92 (0,337)	0,01 (0,907)
LTIP	-0,175 ** (0,053)	-0,074 (0,046)	0,002 (0,048)	0,015 (0,034)	0,039 (0,050)	23,40 ** (0,000)	7,46 ** (0,006)
CASHINC	0,120 ** (0,014)	0,090 ** (0,010)	0,137 ** (0,016)	0,094 ** (0,012)	0,114 ** (0,016)	0,11 (0,746)	0,11 (0,738)
EBC	0,044 ** (0,011)	0,020 ** (0,007)	0,018 (0,015)	0,000 (0,009)	0,005 (0,013)	8,01 ** (0,005)	8,49 ** (0,004)
OAC	-0,083 (0,047)	-0,057 ** (0,015)	-0,041 * (0,018)	-0,009 (0,017)	-0,010 (0,023)	1,65 (0,200)	7,02 ** (0,008)
AOC	0,025 (0,014)	0,018 * (0,007)	0,009 (0,014)	0,011 (0,006)	-0,011 (0,008)	8,45 ** (0,004)	1,09 (0,296)

Source: author's calculations

Notes:

1. * and ** indicate significance at 5 percent and 1 percent level respectively
2. In parentheses: standard errors in columns 2-5 and p-values in the last two columns
3. "Q10", "Q20", "Q80", "Q90" - estimates at 0.1th, 0.2th, 0.8th and 0.9th quantiles

On the one hand, table 12 shows that the association between ROE and the share of such compensation items as salary, bonus, and combined cash-incentive compensation is the same for both low- and high-performing firms. On the other hand, it seems that in the case of long-term incentive plan and equity-based compensation the differences are present, and they are similar to the results shown in the context of ROA. In particular, it seems that an increase in the share of the long-term incentive plan is associated more negatively with ROE in the case of firms with low ROE. Also, table 12 shows that the share of equity-based compensation is once again associated

more positively with ROE in the case of low-performing firms. For other annual compensation and all other compensation components statistically significant difference in coefficients was found only for one pair of quantiles, and, therefore, it cannot be stated with certainty if the association between ROE and these compensation components is different for high- and low-performing firms. Once again, as demonstrated in Appendix 12, the results are quite different if the sample is restricted to US firms. Appendix 12 shows that in the US, the associations between compensation components and ROE are statistically significantly different for high- and low-performing firms only in the case of the share of salary.

The results of the quantile regression with TSR as a dependent variable are shown in table 13.

Table 13. Quantile regression estimates with TSR as dependent variable

Variable	Coefficients					Test of slope equality (F-statistics)	
	Q10	Q20	OLS	Q80	Q90	Q10 vs Q90	Q20 vs Q80
SALARY	-0,090 **	-0,063 **	-0,031	0,021	0,044	18,22 **	15,55 **
	(0,025)	(0,020)	(0,018)	(0,023)	(0,029)	(0,000)	(0,000)
BONUS	0,097 **	0,053 *	0,038	0,002	-0,072	25,99 **	3,55
	(0,030)	(0,024)	(0,024)	(0,035)	(0,049)	(0,000)	(0,060)
LTIP	-0,127	-0,194 *	-0,103	-0,032	-0,050	0,38	14,24 **
	(0,111)	(0,089)	(0,070)	(0,068)	(0,118)	(0,537)	(0,000)
CASHINC	0,074 *	0,043	0,027	-0,001	-0,074	21,64 **	2,89
	(0,030)	(0,027)	(0,023)	(0,032)	(0,045)	(0,000)	(0,089)
EBC	0,099 **	0,062 *	0,031	-0,016	-0,010	12,96 **	6,76 **
	(0,027)	(0,026)	(0,024)	(0,031)	(0,039)	(0,000)	(0,009)
OAC	-0,079	-0,020	-0,064 *	-0,040	-0,066	0,03	0,47
	(0,066)	(0,041)	(0,030)	(0,035)	(0,048)	(0,862)	(0,493)
AOC	0,012	0,031	0,028	0,008	0,005	0,04	0,69
	(0,031)	(0,023)	(0,024)	(0,027)	(0,035)	(0,840)	(0,405)

Source: author's calculations

Notes:

1. * and ** indicate significance at 5 percent and 1 percent level respectively
2. In parentheses: standard errors in columns 2-5 and p-values in the last two columns
3. "Q10", "Q20", "Q80", "Q90" - estimates at 0.1th, 0.2th, 0.8th and 0.9th quantiles

The estimates presented in table 13 suggest that the association between the share of salary and TSR is different depending on whether a firm's TSR is high or low. Judging by the signs of the coefficients, it seems that low-performing firms have a more negative association between TSR and the share of salary. The opposite result is found when looking at the share of equity-based compensation. The estimates suggest that low-performing firms display a more positive association between this compensation component and TSR. For other compensation components, the difference in the coefficients between low- and high-performing firms could not be confirmed

as the test of slope equality showed no statistically significant difference in the case of either one or both quantile pairs. Appendix 13 suggests that when looking into US firms only, the associations between compensation components and TSR are not statistically significantly different for firms with high and low performance.

3.5. Summary of results

Before proceeding to the summary of the results, it is essential to point out the impact that the limitations of the data may potentially impose on the results. Firstly, as has already been noted, the use of the standardized CEO compensation information may have caused the situation where some of the compensation components (e.g., long-term incentive plan and equity-based compensation) were categorized into the "other compensation" categories (OAC and AOC). This may lead to a situation when the associations between these compensation components and firm performance do not reflect the reality correctly. Secondly, the same problem arises if a company's report contains only partial information, leaving some compensation articles unpublished. Thus, these considerations must be kept in mind when interpreting the results.

The summary of the results of the Wilcoxon rank sum test is presented in table 14

Table 14. The summary of the Wilcoxon rank sum test

Variable	ROA	ROE	TSR
SALARY	-	0	0
BONUS	+	+	0
LTIP	0	0	0
CASHINC	+	+	0
EBC	-	+	+
OAC	+	+	0
AOC	0	+	0

Source: author's elaborations
Notes:

1. "+" - firms using the compensation component generally perform better
2. "-" - firms using the compensation component generally perform worse
3. "0" - firms using and not using the compensation component perform equally well

The results of the Wilcoxon rank sum test suggest that the performance of financial firms differs depending on which CEO compensation components are used. However, it seems that the selection of components differs across used performance metrics. According to the agency theory, the salary as a component is expected to have a negative association with a firm's performance, while incentive compensation components such as bonus, long-term incentive plan, and equity-based

compensation are associated with better performance. Nevertheless, firms that use salary perform worse only in terms of return on assets, while there seems to be no difference if performance is measured by return on equity or total shareholder return. This might be the case because the number of firms not using the salary is too small to identify a significant difference.

Concerning cash-incentive components (bonus, LTIP, and the sum of both), the results show that firms that use bonuses generally perform better when measured by ROA and ROE. The firms that use long-term incentive plans could not be confirmed to perform either better or worse. One of the possible explanations is that the number of firms using this component is too small. This partially explains the fact that in all estimations the share of the sum of LTIP and bonus displays the same results as the share of bonus independently. On the one hand, the inclusion of equity-based compensation into the CEO compensation structure seems to be associated with lower average ROA. On the other hand, if this component is present in the compensation structure, then an average firm performs better in terms of ROE and TSR. Lastly, it seems that other annual compensation and all other compensation components may play some role in the performance explanation. For example, an average firm performs better in terms of ROA and ROE if there is other annual compensation component present in the compensation structure, and in terms of ROE if all other compensation component is included. As stated previously, one of the explanations, why these components might display this behaviour, is because of standardization that resulted in some compensation articles being miscategorized. To conclude, it seems that firms which include cash- and equity-based incentive compensation in their CEO's compensation structure have a statistically significantly different performance compared to firms that do not employ these compensation articles. Therefore, the author considers the hypothesis 1 as confirmed.

Table 15 summarizes the results of fixed effects estimations.

Table 15. The summary of fixed effects estimations

Variable	ROA	ROE	TSR
SALARY	-	-	+
BONUS	+	+	-
LTIP	0	0	-
CASHINC	+	+	-
EBC	0	0	0
OAC	0	0	-
AOC	0	0	0

Source: author's elaborations

Notes:

1. "+" - increase in the share of compensation is positively associated with performance
2. "-" - increase in the share of compensation is negatively associated with performance
3. "0" - increase in the share of compensation is not associated with performance

An increase in the share of salary is negatively associated with ROA and ROE. This is the expected result since it is aligned with the agency theory. This result is difficult to compare with previous literature because when researching ROA and ROE, most of the previous studies do not consider the salary as a separate component but combine it with bonuses calling them collectively as cash compensation. On the other hand, the results show that the share of salary is positively associated with TSR. This is surprising considering both the agency theory and the fact that it had been previously shown that there is no difference in TSR between firms using and not using the salary component. Compared to previous research, Hou *et al.* (2014) and Nicola *et al.* (2016) found that the level of CEO salary is not associated with TSR. This suggests that it is not the level of salary but its share of the total compensation that is more important in terms of TSR.

When looking at cash-based incentive compensation, it appears that only bonus is positively associated with accounting measures of performance (ROA and ROE), while the long-term incentive plan (LTIP) component is not. As a comparison, Chan *et al.* (2014) found that on average the level of bonus is not associated with ROA. At the same time, both bonus and LTIP and their combination are negatively associated with TSR. Again, some previous studies indicate that there is no association between bonus and TSR (Hou *et al.* 2014; Nicola *et al.* 2016).

Previously this study showed that firms who use equity-based compensation in the CEO compensation structure, generally perform better in terms of ROE and TSR and worse when measured by ROA. However, the fixed effects estimates show that an increase in this component is not associated positively or negatively with performance, regardless of how it is measured. Although, this finding is similar to some of the previous studies (e.g., Leonard 1990; Leon Li *et*

al. 2015), the majority of previous research shows there is an association between equity-based compensation and performance, even though some suggest that it is positive (e.g., Yang *et al.* 2014; Mehran 1995) and others show that it is negative (e.g., Frye 2004; Balafas, Florackis 2014).

Thus, since the bonus was shown to be positively associated with two of the three performance measures while, equity compensation with none, hypothesis 2 can be only partially confirmed. Finally, an increase in other compensation components seems to have no association with performance.

Finally, Table 16 presents the summary of the quantile regression estimations.

Table 16. The summary of quantile regression

Variable	ROA	ROE	TSR
SALARY	+	0	+
BONUS	0	0	0
LTIP	+	+	0
CASHINC	0	0	0
EBC	-	-	-
OAC	+	0	0
AOC	-	0	0

Source: author's elaborations
Notes:

1. "+" - the association is more positive for high-performing firms
2. "-" - the association is more positive for low-performing firms
3. "0" - the association for high- and low-performing firms is the same

The "+" sign signifies that a result fits the hypothesis 3. Table 16 shows that in the case of the majority of compensation components the hypothesis 3 does not hold. The association between the share of salary and performance is indeed more positive for high-performing institutions. However, this relationship seems to hold only when performance is measured by ROA and TSR. Looking at the cash-incentive compensation components, it seems that for both firms with the good and poor performance the association between the share of bonus and performance is the same, regardless of what performance proxy is used. This result is different from Chan *et al.* (2014) who showed that the ROA of high-performing banks is improved one year after the bonus is paid. At the same time, the association between the share of long-term incentive plan and accounting measures of performance (ROA and ROE) is more positive for high-performing firms, while there is no difference when performance is measured by total shareholder return. Surprisingly, the association between the share of equity-based compensation and all performance measures is more

positive for firms with low performance. This finding contradicts the results of Leon Li *et al.* (2015), who showed that the share of equity compensation is positively associated with ROE for high-performing and negatively for low-performing firms. A possible explanation for this mismatch is that in the paper above the researchers excluded the financial sector, while this study focuses exclusively on financial institutions. Finally, there seems to be no particular pattern in how performance responds to the share of other compensation components (both other annual compensation and all other compensation) depending on the level of performance. Based on the summary of the results presented in table 16 and the fact that restricting the sample to US firms produces different results (as discussed in the previous section), the author concludes that the third hypothesis should be rejected.

To summarize, the compensation structure of CEOs of financial institutions to a certain degree is indeed associated with the firm's performance measured by ROA, ROE or TSR. A mere presence of certain components in the CEO compensation structure may be associated with higher or lower performance compared to the average firm that is not using that compensation item. However, it may be the case that further increase in the share of that compensation component does not bring additional benefit. It appears that the compensation component with the most potential to improve firm performance is the annual bonus. Additionally, the hypothesis that the association between compensation components and performance is more positive for high-performing firms has not been confirmed. Overall, it can be concluded that similarly to previous studies, the results depend substantially on a performance metric.

A notable finding of this study is that, although it seems the presence of equity compensation is beneficial to some of the performance measures, the evidence suggests that on average equity-based compensation is associated with neither improvement nor decrease in firm performance even though the agency theory and much previous research suggest the opposite. The explanation might be in that this paper considers financial institutions only and sets the percentage of compensation components out of total compensation as independent variables and not their absolute monetary level. As far as the author knows, these two factors have not been considered simultaneously in the previous literature. It is important to note that compensation variables display similar behavior when accounting performance is modeled using ROA and ROE, and different (or even the opposite) behavior when the market-based performance is modeled using TSR. Thus, the results of this paper suggest that there is a trade-off between accounting performance and market performance. The compensation structure that is positively associated with the accounting

performance might be associated negatively with the market-based performance. If shareholders or compensation committees aim to maximize the accounting performance, the emphasis should be put on increasing the share of bonuses. In contrast, if the aim is to increase market-based performance, then according to the results, the emphasis should be put on the share of salary, especially if the firm is performing well.

The fact that the share of salary out of total compensation is positively associated with the total shareholder return is contrary to the agency theory described in chapter 1. In author's opinion, one of the possible explanations might be the fact that the salary might have a positive association with TSR only in short-term, as investors may falsely take the higher salary as a signal of the competence of a CEO, and thus, the higher TSR is not necessarily justified. Therefore, the author's suggestion for further analysis is to investigate if the changes in compensation structure can explain the long-term performance. For instance, a potential research question is whether a 3-year average compensation structure explains the performance in 5 years.

CONCLUSION

The rise of CEO pay levels and ambiguity in previous studies indicate that the topic of optimal CEO compensation contracts is still relevant for both researchers and shareholders of companies, especially in the context of the financial sector where CEO compensation levels are among the highest. This thesis aimed to determine the association between firm performance and CEO compensation structure in financial firms.

Previous research has shown that there are many ways to estimate performance. For example, there are traditional (ROE, ROA, cost-to-income, net interest margin), economic (EVA, RAROC) and market-based (Tobin's Q, TSR, P/E, P/B, CDS) indicators. The most popular compensation items used by public companies to compensate CEOs are base salary, bonus, long-term incentive plan, stock options, and restricted stock. Although in recent decades stock options and restricted stock have become the most significant components in compensation contracts, there is no consensus in the academic literature on the association between CEO compensation and firm performance. The results vary substantially depending on the performance indicators and sample used.

Many theoretical views explain the relationship between CEO compensation and firm performance. As in most of the previous literature, this paper relies on agency theory and behavioral agency theory in formulating three hypotheses:
H1: The performance of firms paying their CEO's cash-based and equity-based incentive compensation differs statistically significantly from the performance of firms who do not pay these compensation components.
H2: Greater usage of cash- and equity-based incentive compensation is positively associated with firm performance measures.
H3: The association between compensation components and firm performance measures is more positive for high-performing firms.

These hypotheses are tested using the CEO compensation and financial data taken from the Thomson Reuters Eikon database. The dataset is an unbalanced panel that includes 814 companies

headquartered in the United States and Europe with a total of 4985 CEO-years. The period covered is 2003-2017. Following the majority of studies in the field, the performance is measured by ROA, ROE, and TSR. One of the distinctive features of this paper is that the shares of CEO compensation components out of total compensation and not their total monetary levels are used as independent variables. Thus, this thesis investigates the associations between performance measures mentioned above and the following compensation components: salary, bonus, long-term incentive plan, equity-based compensation other annual compensation, and all other compensation. The data has some limitations, that must be considered when interpreting the results. First, since CEO compensation information had been standardized, it is possible that some of the compensation components were miscategorized. Second, in some observations, the percentage of compensation component out of total compensation could be zero, simply because the company may have not published the full information. Due to these reasons, the associations between firm performance and CEO compensation components can be distorted. Wilcoxon rank sum test, fixed effects regression models and quantile regression were employed to test the hypotheses.

The descriptive analysis of the data suggests that when measured by the frequency of usage, salary is the most widely used compensation article. Bonuses and equity-based compensation are used to a significantly lesser degree, while long-term incentive plans are practically not used at all. Also, some trends can be identified when looking at changes in the average CEO compensation structure in the period 2003-2017. The most important trend is that the share of salary is gradually declining. This decline is mainly caused by the increase in the share of equity-based compensation. Also, it seems that financial institutions have just started to explore the possibilities of a long-term incentive plan since its share of total compensation is slowly increasing.

Firms that do not use salary to compensate their CEOs outperform firms that use this component when measured by ROA. Companies that use bonuses outperform their peers that do not use this component when measured by both accounting measures (ROA and ROE). In addition, firms that use equity-based compensation (EBC) underperform firms that do not use EBC when measured by ROA and outperform when measured by ROE and TSR. Overall, it seems that the performance of firms that include bonus and equity-based compensation into CEO compensation does differ statistically significantly from firms that do not. Therefore, the first hypothesis is confirmed.

On the one hand, an increase in the share of bonus is positively associated with ROA and ROE. On the other hand, the associations between TSR and bonus and long-term incentive plan are

negative. Also, the equity-based compensation is shown to be associated with neither of the three performance measures. Consequently, in the author's opinion, the second hypothesis can be confirmed only partially.

Although the results of quantile regression indicate that indeed the association between compensation components and performance might be different depending on whether the firm's performance is high or low, the results vary substantially for different compensation components and performance measures. Therefore, the third hypothesis is rejected.

One of the findings that is not aligned with the agency theory is that the share of salary is positively (and comparatively strongly) associated with the total shareholder return. The author suggests that one of the possible reasons for this mismatch is the fact that this thesis considers only short-term (one year forward) performance. Therefore, the author's suggestion for future research is to investigate how well can CEO compensation structure explain the performance in the long term.

In conclusion, although financial institutions that include stock options or restricted stock into CEO compensation structure on average perform better than firms in which CEOs are not compensated with these components, an increase in the percentage of equity-based compensation is not associated with the performance improvement. Therefore, the current trend where the average share of equity-based compensation is increasing is not justified. Instead, the results suggest that a higher emphasis should be put on the share of bonuses.

KOKKUVÕTE

ETTEVÕTTE TULEMUSLIKKUS JA TEGEVJUHI TASUSTAMISE STRUKTUUR FINANTSSEKTORI KONTEKSTIS

Dmitri Birjukov

Viimastel aastakümnetel on seoses tegevjuhtide tasude kiire kasvuga läbi viidud palju uuringuid selgitamaks milline on seos tegevjuhi tasustamise ja ettevõtte tulemuslikkuse vahel. Tänini on paljude artiklite tulemused olnud väga erinevad ning leitud seos varieerub oluliselt sõltuvalt vaatluse all olevast valimist ja vaadeldavatest näitajatest.

Käesoleva magistritöö eesmärk on hinnata seost ettevõtte tulemuslikkuse ja tegevjuhi tasu struktuuri vahel finantsettevõtete kontekstis. Eesmärgi saavutamiseks otsitakse töö käigus vastuseid järgmistele uurimisküsimustele:

1. Milliseid tegevjuhi tasu komponente kasutatakse finantsettevõtetes ning millisel määral?
2. Kas tulemuslikkus nendes ettevõtetes, mis kasutavad oma tegevjuhte tasustamisel teatud tasukomponente, ning ettevõtetes, mis ei kasuta, on statistiliselt oluliselt erinev?
3. Kas mingi tasu komponendi osakaalu suurenemine on seotud ettevõtte tulemuslikkuse kasvuga?
4. Kas seos (ulatus ja suund) on erinev kõrge ja madala tulemuslikkusega ettevõtetes?

Töö käigus testitakse järgmisi hüpoteese:
H1: Tulemuslikkus ettevõtetes, mis maksavad oma tegevjuhtidele rahalist ja aktsiatel põhinevat kompensatsiooni, on statistiliselt oluliselt erinev ettevõtetest, mis ei maksa neid komponente.
H2: Nii rahalise kui ka aktsiapõhise kompensatsiooni osakaalu suurenemine on positiivselt seotud ettevõtte tulemuslikkusega.
H3: Seos kompensatsiooni komponentide ja ettevõtte tulemuslikkuse vahel on rohkem positiivne kõrge tulemuslikkusega ettevõtetes.

Esimeses peatükis käsitleti finantssektoris kõige kasutatumaid tulemuslikkuse mõõdikuid ja tüüpilisi tegevjuhi tasu komponente. Leiti, et kuigi finantsettevõtetes kasutatakse tulemuslikkuse

mõõtmiseks paljusid erinevaid indikaatoreid, on empiirilistes töödes kõige populaarsemateks ROA (varade tootlus), ROE (omakapitali tootlus) ja TSR (kogu aktsionäri tootlus). Selle põhjuseks on nende arvutamise lihtsus ja võrreldavus eelmiste uuringutega. Kõige kasutatavamad tasu komponendid on seevastu põhipalk, aastane boonus, pikaajalise fookusega tasu (*long-term incentive plan*), ettevõtte piiratud aktsiad ja aktsiaoptsioonid. Lisaks tehti ülevaade kõige olulisematest tasustamise ja tulemuslikkuse vahelist seost käsitletavatest teooriatest ning varasematest empiirilistest uuringutest. Kuigi tulemuslikkuse ja tasustamise vahelist seost käsitlevaid teooriad on palju (nt inimkapitali teooria, piirtootlikkuse teooria, turniiri teooria), püstitati käesoleva magistritöö hüpoteesid tuginedes agendi- ja käitumuslikule agenditeooriale. Ühtlasi selgus, et varasemate uuringute tulemused on varieerunud sõltuvalt kasutatavatest näitajatest ja vaadeldavast valimist. Mõned autorid on leidnud, et seos tulemuslikkuse ja tasustamise vahel on positiivne, teised, et seos on negatiivne ning mõned üksikud artiklid on näidanud, et seos puudub.

Teises peatükis esitati uuritavat andmestikku ja uurimismetoodikat. Töös kasutati andmeid, mis pärinevad Thomson Reuters Eikon andmebaasist. Valimis on esindatud 814 USA ja Euroopa finantssektoris tegelevat ettevõtet. Andmestikus on kokku 4985 vaatlust ning kaetud periood on 2003-2017. Sarnaselt varasematele uuringutele, kasutati tulemuslikkuse mõõdikutena ROAd, ROEd ja TSRi. Erinevalt teistest uuringutest, mis tüüpiliselt kasutavad sõltumatu muutujatena tasu komponentide rahalist väärtust, kasutati käesolevas töös sõltumatute muutujatena tasu komponentide osakaale kogu kompensatsioonist. Uuriti järgmisi tasu komponente: põhipalk, boonus, pikaajalise fookusega tasu, aktsiapõhine tasu, muu aastane tasu ning kõik muu tasu. Andmestikul on ka piirangud, mis võivad põhjustada valesid tulemusi. Esiteks, tegevjuhtide tasustamise info kogumisel kasutati standardiseeritud andmed, mis tähendab, et mõne vaatluse puhul on võimalik, et tasu komponendid olid kategoriseeritud valesti. Teiseks, mõne ettevõtte puhul ei pruugi raporteeritud kompensatsiooni informatsioon olla täielik. Hüpoteeside testimiseks kasutati Wilcoxon-i astak summa testi, fikseeritud efektidega regressiooni ja kvantiilregressiooni.

Kolmandas peatükis on välja toodud töö põhitulemused ning järeldused. Kasutamissageduse järgi on põhipalk kõige populaarsem kompensatsiooni komponent. Sellele järgnevad boonused ja aktsiapõhine tasu, mida kasutatakse oluliselt väiksemal määral. Pikaajalise fookusega tasu (*long-term incentive plan*) kasutamissagedus on väga madal. Uurides keskmise tegevjuhi tasu struktuuri dünaamikat aastail 2003-2017, selgub, et pärast finantskriisi on aktsiapõhise tasu osakaal suurenenud ning põhipalga olulisus vähenenud. Antud trend on kooskõlas agenditeooriaga.

Ettevõtetel, mis ei kasuta tegevjuhi tasustamiseks põhipalka, on üldiselt kõrgem ROA võrreldes ettevõtetega, mis seda kasutavad. Ettevõtetel, mis tasustavad tegevjuhte boonustega, on kõrgem tulemuslikkus mõõdetuna ROA ja ROEga. Lisaks on ettevõtetel, mis kasutavad aktsiapõhist tasu, keskmiselt madalam ROA. Teiselt poolt on neil kõrgem ROE ja TSR võrreldes ettevõtetega, mis aktsiapõhist tasu ei kasuta. Üldiselt võib öelda, et ettevõtetel, mis kasutavad boonust ja aktsiapõhist tasu tegevjuhtide tasustamiseks, on tulemuslikkus statistiliselt oluliselt erinev nendest ettevõtetest, mis neid komponente ei kasuta. Seega on esimene hüpotees vastu võetud.

Fikseeritud efektidega regressiooni tulemused näitasid, et boonuse osakaalu suurenemine on positiivselt seotud ROA ja ROE-ga. Samas on nii boonuse kui ka pikaajalise fookusega tasu osakaaludel negatiivne seos TSR-ga. Lisaks ei ole aktsiapõhine tasu statistiliselt oluliselt seotud ühegi tulemuslikkuse mõõdikuga. Seega võib autori arvates teist hüpoteesi pidada ainult osaliselt aktsepteerituks.

Kvantiilregressiooni tulemused viitavad sellele, et seos tasustamise ja tulemuslikkuse vahel võib tõepoolest olla erinev kõrge ja madala tulemuslikkusega ettevõtetes. Samas, seoste suunad varieeruvad olulisel määral sõltuvalt sellest, milline tulemuslikkuse mõõdik ja tasu komponent on vaatluse all. Järelikult on kolmas hüpotees tagasi lükatud.

Üks leidudest, mis ei ole kooskõlas agenditeooriaga on see, et TSR on positiivselt seotud põhipalga osakaaluga. Autori arvates on üks põhjustest see, et käesolev magistritöö keskendub tulemuslikkuse ja tasustamise vahelisele seosele lühiajalises perspektiivis. Turg võib võtta suure palga osakaalu kui signaali tegevjuhi kompetentsusest, mis omakorda avaldab positiivset survet aktsia hinnale. Seega on autori soovituseks uurida tasustamise struktuuri ja tulemuslikkuse seost pikaajalises perspektiivis.

Kokkuvõttes, kuigi finantsettevõtetel, mis kasutavad tegevjuhi tasustamiseks aktsiapõhist tasu, on tulemuslikkus keskmiselt kõrgem võrreldes finantsettevõtetega, mis seda ei kasuta, ei ole aktsiapõhise tasu osakaalu suurenemine seotud tulemuslikkuse kasvuga. Järelikult, ei ole käesoleva magistritöö tulemused kooskõlas praeguse trendiga mille raames kasvab tegevjuhtide aktsiapõhise tasu osakaal. Tulemused näitavad, et ettevõtted peaksid panema suurema rõhku boonustele.

LIST OF REFERENCES

Admouni, S. (2006). Endogeneity of the Relationship Between Managerial Compensation and Firm Value: Evidence from French Listed Firms. - I*nternational Review of Management and Business Research.* Vol. 5, No. 1, 130-245

Aguinis, H., Gomez-Mejia, L.R., Martin, G.,P., Joo, H. 2018. CEO pay is indeed decoupled from CEO performance: charting a path for the future. - *Management Research: Journal of the Iberoamerican Academy of Management*. Vol. 16, No. 1, 113-136

Alexiou, C., Sofoklis, V., (2009). Determinants of Bank Profitability: Evidence from the Greek Banking Sector. - *Economic Annals*. Vol. 54, No. 182, 93-118.

Alves, P., Couto, E.B., Francisco, P.M. (2016). Executive pay and performance in Portuguese listed companies. – *Research in International Business and Finance*. Vol. 37, 184-195.

Baer, T., Mehta, A., Samandari, H. (2011). The use of economic capital in performance management for banks: A perspective. – *McKinsey Working Papers on Risk*, No. 24. Accessible: https://pdfs.semanticscholar.org/86d6/c0fc635d9789c29a31ec14313c1db48c5452.pdf, 22 February 2019.

Baker, G.,P., Jensen, M.,C., Murphy, K.J. (1988). Compensation and Incentives: Practice vs Theory. - *The Journal of Finance.* Vol. 43. No. 3. 593-616

Balafas, N., Florackis, C. (2014). CEO compensation and future shareholder returns: Evidence from the London Stock Exchange. – *Journal of Empirical Finance*. Vol. 27, 97-115.

Bannock, G., Manser, W. (1999). *International dictionary of finance*. London: The Economist in association with Profile Books.

Bebchuk, L.A., Fried J.M. (2003). Executive Compensation as an Agency Problem. – Journal of Economic Perspectives. Vol. 17, No.3 71-92

Berger, A. (1995). The Relationship between Capital and Earnings in Banking. - *Journal of Money, Credit and Banking*. Vol. 27, No. 2, 432-456.

Berger, A.N., Demsetz, R., Strahan, P.E. (1999). The consolidation of the financial services industry: Causes, consequences, and implications for the future. – *Journal of Banking & Finance.* Vol. 23, Issues 2-4, 135-194.

Beyond ROE – How to Measure Bank Performance. (2010). European Central Bank. Accessible: https://www.ecb.europa.eu/pub/pdf/other/beyondroehowtomeasurebankperformance201009en.pdf, 19 February 2019.

Birjukov, D. (2019a) Complete reports of fixed effects estimations. Accessible: https://www.dropbox.com/s/2hvdlsxwmujk5xt/Panel_reports_FINAL.pdf?dl=0 , 16 April 2019

Birjukov, D. (2019b) Complete reports of quantile regression estimations. Accessible: https://www.dropbox.com/s/153x3hij5pyn20n/quantreg_report.pdf?dl=0 , 16 April 2019.

Brooks, C. (2008). *Introductory econometrics for finance. 6th ed.*, New York: Cambridge University Press.

Burger, A., Moormann, J. (2008). Productivity in banks: myths & truths of the Cost Income Ratio. – *Banks and Bank Systems*. Vol. 34, No.4 , 85-94.

Chan, M.L., Lin, C.M., Liang, H.Y., Chen, M.H. (2014). Does CEO Incentive Pay Improve Bank Performance? A Quantile Regression Analysis of U.S. Commercial Banks. – *Annals of Financial Economics*. Vol. 9, No. 2, 1440005.

Cheng, A., C., S., McNamara, R. (2000). The Valuation Accuracy of the Price-Earnings and Price-Book Benchmark Valuation Methods. - *Review of Quantitative Finance and Accounting.* Vol 15, No. 4, 349-370.

Combs, J.G., Maura, S.S. (2003). Managerialist and Human Capital Explanations for Key Executive Pay Premiums: A Contingency Perspective. – *The Academy of Management Journal.* Vol. 46, No. 1, 66-73

Cooper, M.J., Gulen, H., Rau, P.R. (2010). Performance for pay? The relation between CEO incentive compensation and future stock price performance. accessible: https://ssrn.com/abstract=1572085, 5 March 2019

Damodaran, A. (2005). Employee Stock Options (ESOPs) and Restricted Stock: Valuation Effects and Consequences, accessible: http://pages.stern.nyu.edu/~adamodar/pdfiles/papers/esops.pdf, 27 February 2019.

Deci, E. (1972). The effects of Contingent and Non-contingent Rewards and Controls on Intrinsic Motivation. - *Organizational Behaviour and Human Performance*. Vol. 8, No. 2, 217-229.

Dess, G.G., Robinson, R.B. (1984). Measuring Organizational Performance in the Absence of Objective Measures: The Case of the Privately-Held Firm and Conglomerate Business Unit. – *Strategic Management Journal*, Vol. 5, No. 3, 265-273.

Downes, J., Goodman, J.E. (1991). *Dictionary of finance and investment terms: over 3000 terms clearly defined and explained.* 3rd ed. New York: Barron's

Edmans, A., Gagaix, X., Jenter, D. (2017). Executive Compensation: a Survey of Theory and Evidence. - *NBER Working paper*. No.23596 accessible: https://www.nber.org/papers/w23596.pdf, 27 February 2019.

Elayan, F.A., Lau, J.S.C., Meyer, T.O. (2003). Executive Incentive Compensation Schemes and

Their Impact on Corporate Performance: Evidence from New Zealand Since Compensation Disclosure Requirements Became Effective. – *Studies in Economics and Finance*. Vol. 21, No. 1, 54-92.

Eriksson, T. (1999). Executive Compensation and Tournament Theory: Empirical Tests on Danish Data. – *Journal of Labour Economics.* Vol. 17, No. 2, 262-280.

Firth, M., Fung, P.M.Y., Rui, O.M. (2006). Corporate performance and CEO compensation in China. – *Journal of Corporate Finance*. Vol. 12, 693-714.

Fogelberg, L., Griffith, J.M. (2000). Control and bank performance. – *Journal of Financial and Strategic Decisions*. Vol. 13, No. 3, 63-69

Frydman, C, Jenter, D. (2010). CEO Compensation. – *Annual Reviews of Financial Economics.* Vol. 2, 75-102.

Frydman, C., Saks, R.,E. (2010). Executive Compensation: A new View from a Long-Term Perspective, 1936-2005. – *The review of Financial Studies.* Vol. 23, No. 5, 2099-2138.

Frye, M.B. (2004). Equity-based compensation for employees: firm performance and determinants. – *The Journal of Financial Research*. Vol. 27, No. 1, 31-54.

Funso, K., T., Kolade, A.,R., Ojo, O.,M. (2012). Credit Risk and Commercial Banks' Performance in Nigeria: a Panel Model Approach. - *Australian Journal of Business and Management Research.* Vol. 2, No. 2, 31-38.

Gomez-Mejia, L.R., Berrone, P., Franco-Santos, M. (2010) Compensation and organizational performance – Theory, research and practice. Armonk, NY: M. E. Sharpe.

Hall, B., J., Murphy K.,J. (2003). Stock options for undiversified executives - *Journal of Accounting and Economics.* Vol. 33, No. 1, 3-42.

Hall, B., J., Murphy K.,J. (2003). The Trouble with Stock Options. - *Journal of Economic Perspectives.* Vol. 17, No. 3, 49-70.

Hao, L., Naiman, D.Q. (2007). *Quantile Regression*. Thousand Oaks, CA: Sage Publications.

Harris, D., Helfat, C. (1997). Specificity of CEO Human Capital and Compensation. – *Strategic Management Journal.* Vol. 18. 895-920

Hou, W., Priem, R.L., Goranova, M. (2014). Does One Size Fit All? Investigating Pay-Future Performance Relationships Over the "Seasons" of CEO Tenure. - *Journal of Management*. Vol. 43, No. 3, 864-891.

Jensen, M.C., Meckling, W.H., (1976). The theory of the firm: Managerial Behaviour, Agency costs and ownership structure. – *Journal of Financial Economics.* Vol.3 No.4. 305-360.

John, K., Qian, Y. (2003). Incentive Features in CEO Compensation in the Banking Industry. – *Economic Policy Review.* Vol. 9, No. 1, 109-121.

Kato, T., Kim, W., Lee, J.H. (2007). Executive compensation, firm performance, and Chaebols in Korea: Evidence from new panel data. – *Pacific-Basin Finance Journal*. Vol. 15, 36-55.

Kimball, R.C., (1998). Economic Profit and Performance Management in Banks. – *New England Economic Review*. Jul-Aug, 35-53.

Kirsten, E., du Toit, E. (2018). The relationship between remuneration and financial performance for companies listed on the Johannesburg Stock Exchange. – *South African Journal of Economic and Management Sciences*. Vol. 21, No. 1, accessible: https://doi.org/10.4102/sajems.v21i1.2004, 06 March 2019.

Klaassen, P., van Eeghen, I. (2015). Analyzing bank performance – linking RoE, RoA and RAROC: U.S. commercial banks 1992-2014. – *The Journal of Financial Perspectives*, Vol. 3, No. 2.

Koenker, R. (2005). *Quantile Regression*. New York: Cambridge University Press.

Koenker, R. (2018). Package 'quantreg'. Accessible: https://cran.r-project.org/web/packages/quantreg/quantreg.pdf, 1 April 2019

Kohn, A. (1988). Incentives Can be Bad for Business. *Inc*. accessible: https://www.inc.com/magazine/19880101/3229.html, 1 March 2019.

Kramer, J.K., Peters, J.R. (2001). An Interindustry Analysis of Economic Value Added as a Proxy for market Value Added. – *Journal of Applied Finance.* – Vol. 11, No. 1, 41-49.

Lazear, E.P., Rosen, S. (1981). Rank-Order Tournaments as Optimum Labour Contracts. – *Journal of Political Economy.* Vol. 89, No. 5, 841-864.

Leon Li, M.Y., Yang, T.H., Yu, S.E. (2015). CEO Stock-Based Incentive Compensation and Firm Performance: A Quantile Regression Approach. – *Journal of International Financial Management & Accounting*. Vol. 26, No. 1, 39-71.

Leonard, J.S. (1990). Executive Pay and Firm Performance. – *Industrial and Labor Relations Review,* Vol. 43, No. 3, 13-29.

Masadeh, R., Tayeh, M., Al-Jarrah, I.M., Tarhini, A. (2015). Accounting vs Market-based Measures of Firm Performance Reated to Information Technology Investments. – *International Review of Social Sciences and Humanities.* Vol. 9, No. 1, 129-145.

Matolcsy, Z., Wright, A. (2011). CEO compensation structure and firm performance. – *Accounting and Finance*. Vol. 51, 745-763.

Mehran, H. (1995). Executive compensation structure, ownership, and firm performance. – *Journal of Financial Economics.* Vol. 38, 163-184.

Menicucci, E., Paolucci, G. (2015). The determinants of bank profitability: empirical evidence from European banking sector. - *Journal of Financial Reporting and Accounting*, Vol. 14, No. 1, 86-115.

Mishel, L., Schieder, J. (2017). CEO pay remains high relative to the pay of typical workers and high-wage earners. Economic Policy Institute, accesible: http://epi.org/130354, 27 February 2019.

Murphy, K.J. (1999). Executive Compensation. – *Handbook of Labour Economics.* Vol. 3, (Eds.) Ashenfelter, O.,C., Card, D., Part B, 2485-2563.

Nguyen, J. (2012). The relationship between net interest margin and noninterest income using a system estimation approach. – *Journal of Banking & Finance*. Vol. 36, No. 9, 2429-2437.

Nicola, C., Giuseppe, M., Martina, C., Giuseppe, S. (2016). Relationship between CEO pay and total shareholder return: an empirical analysis in the italian context. - *Corporate Ownership & Control.* Volume 13, No. 4, 182-187.

Nicola, C., Giuseppe, M., Martina, C., Giuseppe, S. (2016). Relationship between CEO pay and total shareholder return: an empirical analysis in the Italian context. – *Corporate Ownership & Control*. Vol. 13, No. 4, 182-187.

Pasiouras, F., Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign banks in the European Union. - *Research in International Business and Finance*, Vol. 21 No. 2, pp. 222-237.

Kosmidou, K., Pasiouras, F., Doumpos, M., Zopoutiidis, C. (2006). Assessing Performance Factors in the UK Banking Sector: A Multicriteria Methodology. - *Central European Journal of Operations Research*. Vol. 14, No. 1, 25-44.

Panda, B., Leepsa, N.M. (2017). Agency theory: Review of Theory and Evidence on Problems and Perspectives. - *Indian Journal of Corporate Governance.* Vol. 10, No. 1, 74-95.

Pepper, A., Gore, J. (2015). Behavioral Agency Theory: New Foundations for Theorizing About Executive Compensation. – *Journal of Management*. Vol. 41, No. 4, 1045-1068

Raithatha, M., Surenderrao, K. (2016). Executive compensation and firm performance: Evidence from Indian firms. – *IIMB Management Review*. Vol. 28, 160-169.

Regehr, K., Sengupta, R. (2016). Has the Relationship between Bank Size and Profitability Changed? - *Economic Review-Federal Reserve Bank of Kansas City.* 49-72.

Ross, S.A. (1973). The economic theory of agency: the principal's problem. - *The American Economic Review*. Vol.64, No.2 134-139

Sensama, R., Ghosh, S. (2004). Net Interest Margin: Does Ownership Matter?. – *Vikalpa: The Journal for Decision Makers.* Vol. 29, No. 1, 41-47.

Smirnova, A.S., Zavertiaeva, M.A. (2017). Which came first, CEO compensation or firm performance? The causality dilemma in European companies. - *Research in International Business and Finance*. Vol. 42, 658-673

The Concise Oxford Dictionary of Current English (1982). /Ed. J.B.Sykes. Bombay: Oxford

University Press.

Tian, G.Y., Yang, F. (2014). CEO incentive compensation in U.S. financial institutions. - *International Review of Financial Analysis.* Vol. 34, 64-75.

Tobin, J. (1969). A General Equilibrium Approach To Monetary Theory. - *Journal of Money, Credit and Banking.* Vol.1, No. 1, 15-29.

Unite, A.A., Sullivan, M.J., Brookman, J., Majadillas, M.A., Taningco, A. (2008). Executive pay and firm performance in the Philippines. - *Pacific-Basin Finance Journal.* Vol. 16, 606-623.

Vasilev, G., Mrsik, J. (2017). Changes in the Banks' Performances After the Crisis: A Comparative Study. – *Economic Development* No.3, 171-184.

Wernerfelt, B., Montgomery, C.,A. (1988). Tobin's q and the Importance of Focus in Firm Performance. - *The American Economic Review.* Vol. 78, No.1, 246-250.

Wilcoxon Rank Sum and Signed Rank Tests, accessible: https://www.rdocumentation.org/packages/stats/versions/3.5.2/topics/wilcox.test, 7 March 2019.

Yang, F., Dolar, B., Mo, L. (2014). CEO Compensation and Firm Performance: Did the 2007-2008 Financial Crisis Matter? - *Journal of Accounting and Finance.* Vol. 14, No. 1, 137-146.

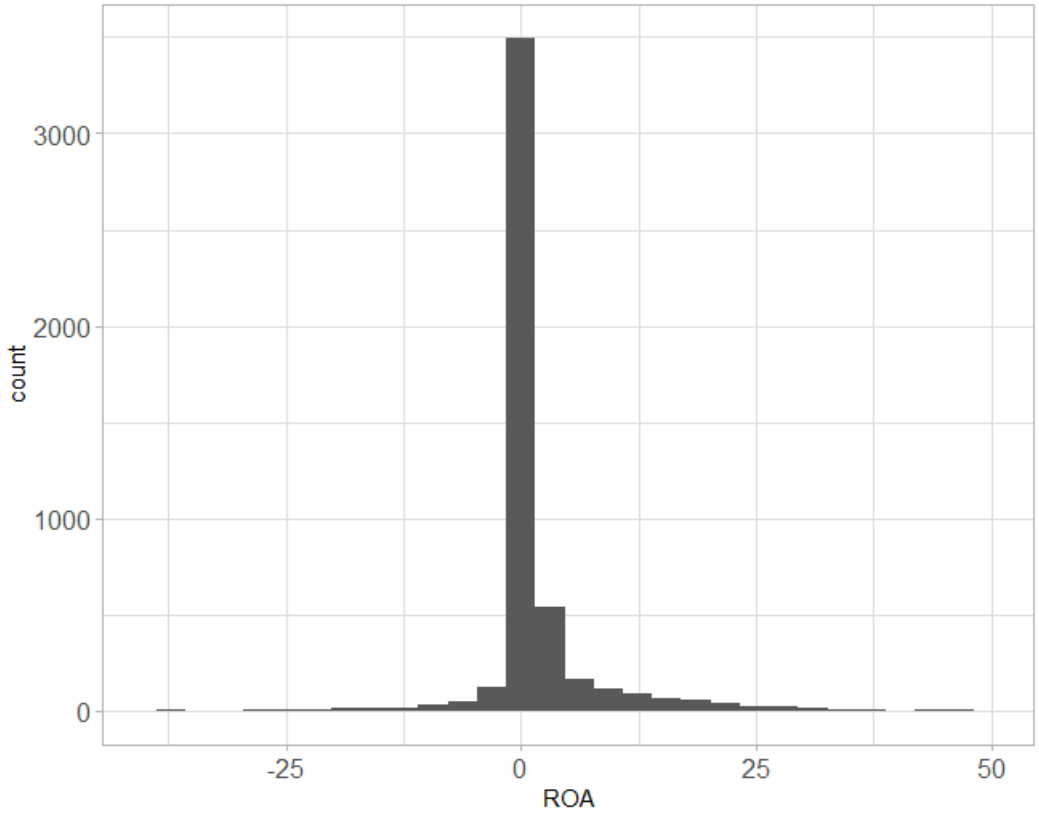
APPENDICES

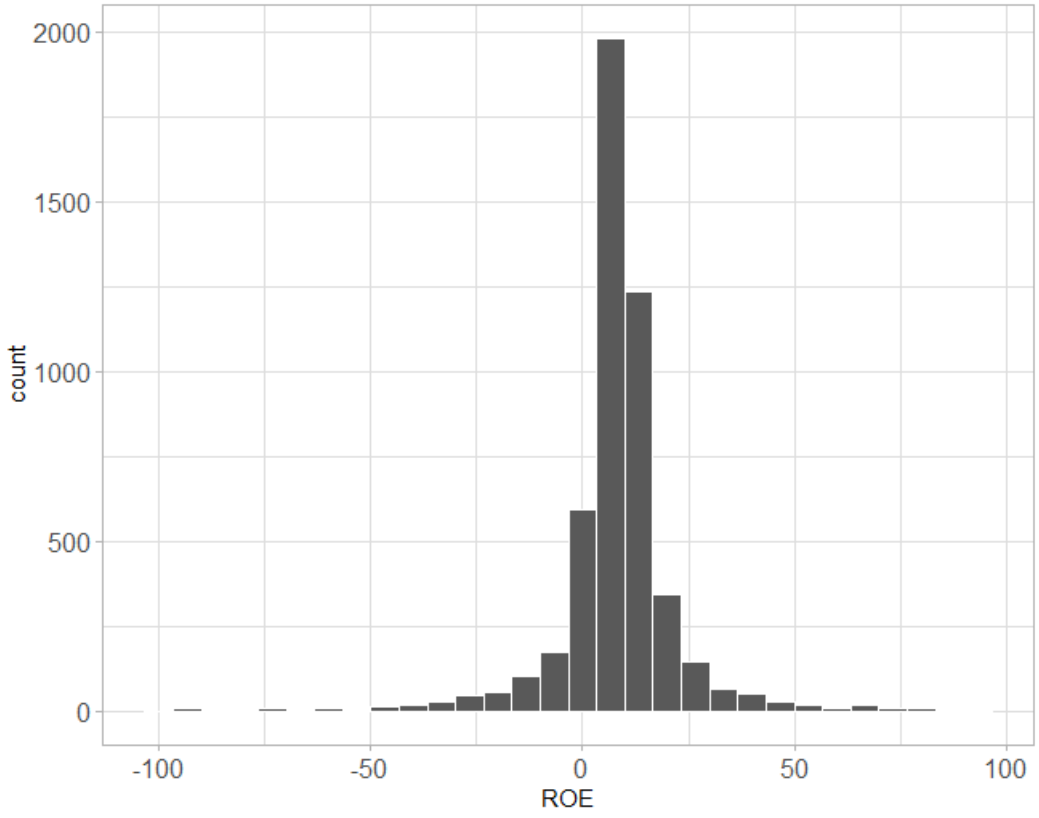
Appendix 1. Overview of variables used in estimations.

Variable/notation	Description
Dependent variables	
ROA	income after taxes divided by average total income
ROE	income to common shareholders divided by average common equity
TSR	52-week return that incorporates price change and dividends
Independent variables	
SALARY	salary percentage out of total compensation
BONUS	bonus percentage out of total compensation
LTIP	long-term incentive plan percentage out of total compensation
EBC	equity-based compensation percentage out of total compensation
CASHINC	sum of BONUS and LTIP
OAC	other annual compensation percentage out of total compensation
AOC	all other compensation percentage out of total compensation
Control variables	
SIZE	total assets
EA	total equity percentage out of total assets
PROD	total assets divided by total number of employees
CM, CF DFS, REIT, TMF	dummy variables representing sectors

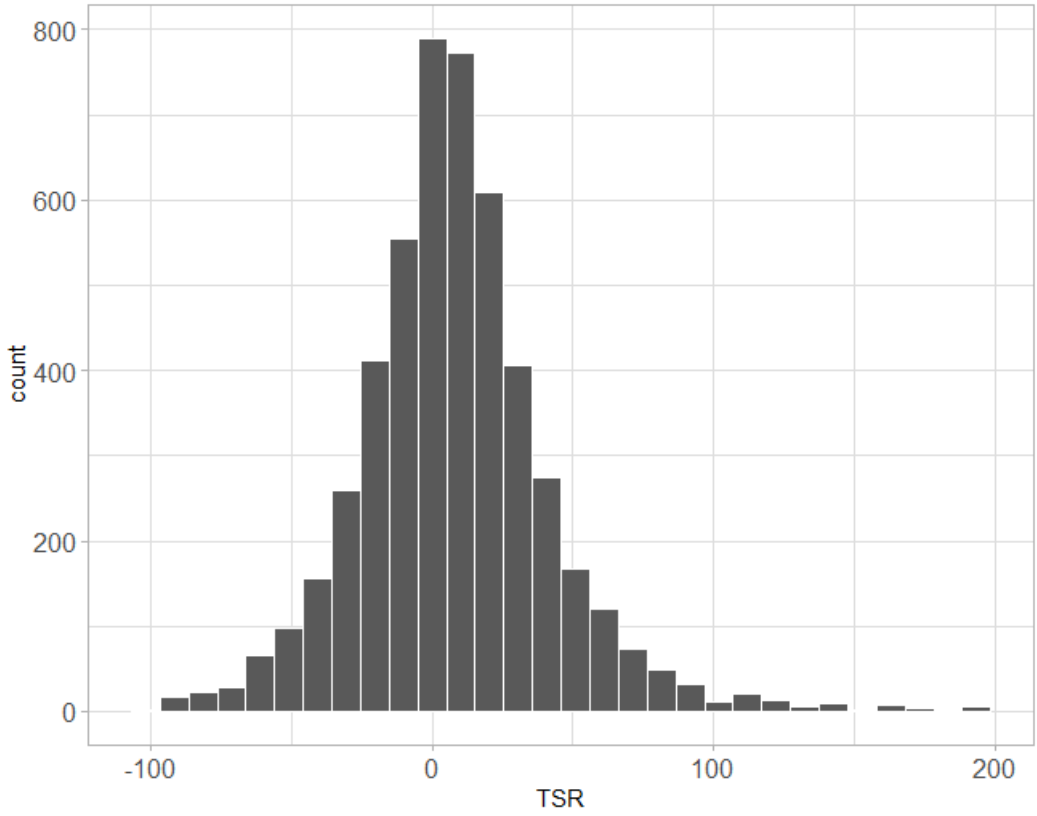
Source: author's elaborations.

Appendix 2. Frequency distributions of performance variables





Appendix 2 continued



Source: author's elaborations

Appendix 3. Correlations between the variables used in estimations

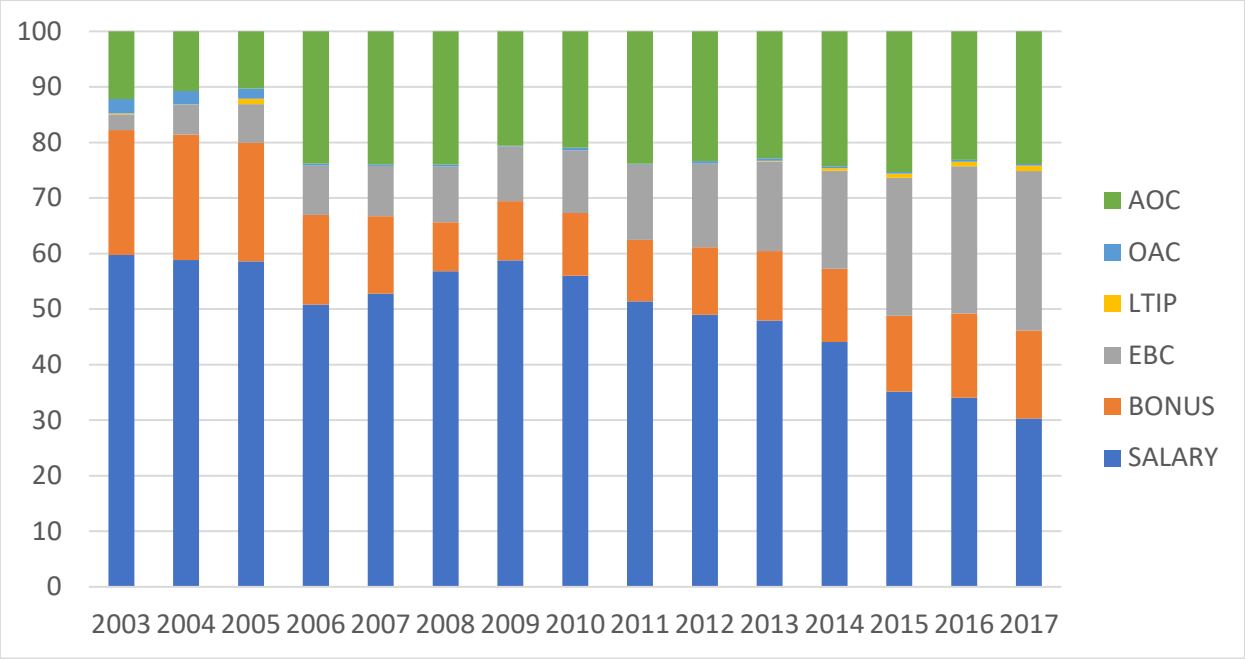
5% critical value (two-tailed) = 0.0278 for n = 4985

ROA	ROE	TSR	SALARY	BONUS	
1.0000	0.7476	0.0615	-0.1922	0.2538	ROA
	1.0000	0.0523	-0.2165	0.2688	ROE
		1.0000	-0.0214	0.0114	TSR
			1.0000	-0.4050	SALARY
				1.0000	BONUS

EBC	LTIP	CASHINC	OAC	AOC	
0.0267	0.0375	0.2542	0.0301	-0.0169	ROA
0.0360	0.0242	0.2651	0.0126	0.0094	ROE
0.0298	-0.0051	0.0096	-0.0134	0.0016	TSR
-0.5559	-0.1259	-0.4229	-0.1541	-0.4121	SALARY
-0.0300	0.0090	0.9650	-0.0977	-0.2810	BONUS
1.0000	-0.0504	-0.0421	-0.1277	-0.0138	EBC
	1.0000	0.2708	0.0424	-0.0641	LTIP
		1.0000	-0.0829	-0.2873	CASHINC
			1.0000	-0.1811	OAC
				1.0000	AOC

EA	SIZE	PROD	
0.2556	-0.0743	-0.1733	ROA
0.0276	0.0543	-0.0743	ROE
-0.0041	0.0408	0.0177	TSR
-0.0236	-0.3773	-0.0842	SALARY
0.1041	0.0885	-0.0353	BONUS
0.0052	0.2693	0.0548	EBC
0.0466	0.1494	0.0938	LTIP
0.1125	0.1243	-0.0094	CASHINC
0.0623	0.0834	0.0663	OAC
-0.1194	0.1194	0.0394	AOC
1.0000	-0.4328	-0.2763	EA
	1.0000	0.4774	SIZE
		1.0000	PROD

Appendix 4. The average CEO compensation structure in US firms



Source: author's calculations

Notes:

EBC – equity-based compensation, LTIP – long-term incentive plan, OAC – other annual compensation, AOC – all other compensation

Appendix 5. ROA differences across compensation item users and non-users in US firms

Sample	N (users)	N (non-users)	User ROA average	Non-user ROA average	W statistic	p-value
SALARY	3579	62	1,64	2,67	87020	0,0035 **
BONUS	2118	1523	2,00	1,18	1968500	0,0000 **
EBC	1791	1850	1,96	1,36	1905100	0,0000 **
LTIP	44	3597	1,54	1,66	72540	0,3414
CASHINC	2137	1504	2,00	1,17	1957500	0,0000 **
OAC	3419	222	1,79	1,65	404000	0,1066
AOC	3510	131	1,63	2,34	198040	0,0070 **

Source: author's calculations

Notes:

* and ** - significant at 5 and 1 percent level respectively

Appendix 6. ROE differences across compensation item users and non-users in US firms

Sample	N (users)	N (non-users)	User ROA average	Non-user ROA average	W statistic	p-value
SALARY	3575	61	8,28	9,47	100360	0.2861
BONUS	2123	1513	10,10	5,77	1991600	0,0000 **
EBC	1787	1849	9,09	7,53	1790400	0,0000 **
LTIP	44	3592	7,95	8,30	76740	0,7415
CASHINC	2142	1494	10,08	5,75	1980600	0,0000 **
OAC	223	3413	9,04	8,25	413060	0,0323 *
AOC	3507	129	8,32	7,78	229410	0,7841

Source: author's calculations

Notes:

* and ** - significant at 5 and 1 percent level respectively

Appendix 7. TSR differences across compensation item users and non-users in US firms

Sample	N (users)	N (non-users)	User ROA average	Non-user ROA average	W statistic	p-value
SALARY	3594	64	7,05	7,57	113600	0,8663
BONUS	2134	1524	6,92	7,24	1635600	0,7631
EBC	1797	1861	8,76	5,41	1772300	0,0017 **
LTIP	44	3614	8,76	7,03	84028	0,5163
CASHINC	2153	1505	6,95	7,21	1632900	0,6854
OAC	226	3432	6,08	7,12	383160	0,7623
AOC	3527	131	7,14	4,83	241280	0,3875

Source: author's calculations

Notes:

* and ** - significant at 5 and 1 percent level respectively

Appendix 8. Fixed effects estimates with ROA as dependent variable in the context of US firms

-	1a	2a	3a	4a	5a	6a	7a
Intercept	22,226 ** (8,561)	18,487 * (8,822)	20,648 * (8,705)	20,46 * (8,900)	18,695 * (8,805)	20,451 * (0,900)	20,544 * (8,861)
SALARY	-0,022 ** (0,008)	-	-	-	-	-	-
BONUS	-	0,034 ** (0,009)	-	-	-	-	-
EBC	-	-	0,003 (0,007)	-	-	-	-
LTIP	-	-	-	0,013 (0,013)	-	-	-
CASH-INC	-	-	-	-	0,034 ** (0,009)	-	-
OAC	-	-	-	-	-	-0,025 (0,029)	-
AOC	-	-	-	-	-	-	-0,004 (0,005)
SIZE	-0,926 * (0,411)	-0,841 * (0,416)	-0,912 * (0,411)	-0,902 * (0,421)	-0,851 * (0,415)	-0,900 * (0,421)	-0,904 * (0,419)
PROD	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
EA	0,004 (0,029)	0,004 (0,028)	0,006 (0,029)	0,006 (0,029)	0,004 (0,028)	0,007 (0,029)	0,006 (0,029)
N	3641	3641	3641	3641	3641	3641	3641
within R-squared	0,046	0,053	0,037	0,037	0,053	0,037	0,037
F-statistic (p-value)	53,11 ** (0,000)	41,24 ** (0,000)	28,33 ** (0,000)	22,16 ** (0,000)	33,54 ** (0,000)	15,90 ** (0,000)	20,49 ** (0,000)

Source: author's calculations

Notes:

1. robust standard errors in parentheses
2. * and ** indicate significance at 5 percent and 1 percent level respectively.

Appendix 9. Fixed effects estimates with ROE as dependent variable in the context of US firms

-	1b	2b	3b	4b	5b	6b	7b
Intercept	55,577 ** (13,610)	42,198 ** (13,540)	48,909 ** (13,884)	48,453 ** (13,957)	42,868 ** (13,499)	48,484 ** (13,973)	47,925 ** (13,906)
SALARY	-0,088 ** (0,019)	-	-	-	-	-	-
BONUS	-	0,107 ** (0,020)	-	-	-	-	-
EBC	-	-	0,007 (0,013)	-	-	-	-
LTIP	-	-	-	0,021 (0,033)	-	-	-
CASH-INC	-	-	-	-	0,104 ** (0,019)	-	-
OAC	-	-	-	-	-	-0,059 (0,086)	
AOC	-	-	-	-	-	-	0,011 (0,014)
SIZE	-1,762 ** (0,639)	-1,474 * (0,634)	-1,686 ** (0,651)	-1.663 * (0,655)	-1,504 * (0,643)	-1,659 * (0,655)	-1,644 * (0,653)
PROD	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
EA	-0,089 (0,050)	-0,086 (0,050)	-0,083 (0,050)	-0,083 (0,050)	-0,087 (0,050)	-0,082 (0,051)	-0,082 (0,050)
N	3636	3636	3636	3636	3636	3636	3636
within R-squared	0,121	0,121	0,101	0,101	0,121	0,101	0,101
F-statistic (p-value)	54,50 (0,000)	20,63 (0,000)	48,01 (0,000)	47,308 (0,000)	21,29 (0,000)	48,80 (0,000)	98,53 (0,000)

Source: author's calculations

Notes:

1. robust standard errors in parentheses
2. * and ** indicate significance at 5 percent and 1 percent level respectively.

Appendix 10. Fixed effects estimates with TSR as dependent variable in the context of US firms

-	1c	2c	3c	4c	5c	6c	7c
Intercept	277,883 ** (35,288)	294,802 ** (34,828)	283,710 ** (34,273)	288,149 ** (34,642)	294,088 ** (34,785)	288,398 ** (34,497)	288,309 ** (34,429)
SALARY	0,131 ** (0,040)						
BONUS		-0,108 * (0,044)					
EBC			-0,059 (0,037)				
LTIP				-0,010 (0,098)			
CASH-INC					-0,104 * (0,042)		
OAC						-0,079 (0,123)	
AOC							-0,003 (0,041)
SIZE	-12,942 ** (1,663)	-13,278 ** (1,661)	-12,844 ** (1,633)	-13,072 ** (1,651)	-13,246 ** (1,660)	-13,078 ** (1,645)	-13,078 ** (1,643)
PROD	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
EA	-0,377 ** (0,100)	-0,386 ** (0,100)	-0,385 ** (0,099)	-0,390 ** (0,100)	-0,386 ** (0,100)	-0,389 ** (0,100)	-0,390 ** (0,100)
N	3658	3658	3658	3658	3658	3658	3658
within R-squared	0,302	0,300	0,299	0,299	0,300	0,299	0,299
F-statistic (p-value)	1,73 ** (0,000)	1,77 ** (0,000)	1,74 ** (0,000)	1,75 ** (0,000)	1,76 ** (0,000)	1,76 ** (0,000)	1,758 ** (0,000)

Source: author's calculations

Notes:

1. robust standard errors in parentheses
2. * and ** indicate significance at 5 percent and 1 percent level respectively.

Appendix 11. Quantile regression estimates with ROA as dependent variable in the context of US firms

Variable	Coefficients					Test of slope equality (F-statistics)	
	Q10	Q20	OLS	Q80	Q90	Q10 vs Q90	Q20 vs Q80
SALARY	-0,003 * (0,001)	-0,003 ** (0,001)	-0,016 * (0,007)	-0,006 ** (0,000)	-0,006 ** (0,001)	8,59 ** (0,003)	11,70 ** (0,001)
BONUS	0,011 ** (0,002)	0,008 ** (0,001)	0,033 ** (0,011)	0,009 ** (0,001)	0,009 ** (0,002)	0,79 (0,375)	0,55 (0,458)
LTIP	-0,009 (0,008)	-0,006 (0,005)	-0,014 (0,012)	0,001 (0,003)	0,001 (0,004)	0,80 (0,371)	2,93 (0,087)
CASHINC	0,010 ** (0,002)	0,008 ** (0,001)	0,032 ** (0,011)	0,009 ** (0,001)	0,008 ** (0,002)	1,31 (0,253)	0,91 (0,340)
EBC	0,001 (0,002)	0,000 (0,001)	0,007 (0,009)	-0,001 (0,001)	0,001 (0,002)	0,00 (0,999)	1,12 (0,29)
OAC	-0,024 (0,052)	-0,014 (0,013)	-0,042 (0,038)	-0,003 (0,003)	-0,001 (0,005)	0,31 (0,578)	0,82 (0,36)
AOC	-0,002 (0,002)	0,000 (0,001)	-0,006 (0,007)	0,002 ** (0,001)	0,000 (0,001)	2,57 (0,109)	10,20 ** (0,001)

Source: author's calculations

Notes:

1. * and ** indicate significance at 5 percent and 1 percent level respectively
2. In parentheses: standard errors in columns 2-5 and p-values in the last two columns
3. "Q10", "Q20", "Q80", "Q90" - estimates at 0.1th, 0.2th, 0.8th and 0.9th quantiles

Appendix 12. Quantile regression estimates with ROE as dependent variable in the context of US firms

Variable	Coefficients					Test of slope equality (F-statistics)	
	Q10	Q20	OLS	Q80	Q90	Q10 vs Q90	Q20 vs Q80
SALARY	-0,031 * (0,014)	-0,024 ** (0,008)	-0,059 ** (0,017)	-0,054 ** (0,008)	-0,062 ** (0,010)	8,39 ** (0,004)	19,02 ** (0,000)
BONUS	0,090 ** (0,014)	0,074 ** (0,010)	0,113 ** (0,020)	0,075 ** (0,010)	0,091 ** (0,014)	0,019 (0,890)	0,016 (0,900)
LTIP	0,043 (0,098)	-0,004 (0,029)	-0,015 (0,039)	-0,008 (0,034)	-0,001 (0,066)	0,06 (0,809)	0,02 (0,88)
CASHINC	0,088 ** (0,015)	0,074 ** (0,010)	0,109 ** (0,020)	0,071 ** (0,010)	0,090 ** (0,014)	0,02 (0,898)	0,132 (0,717)
EBC	0,002 (0,016)	-0,004 (0,007)	0,008 (0,018)	-0,007 (0,010)	0,013 (0,016)	0,55 (0,458)	0,13 (0,723)
OAC	-0,109 (0,150)	-0,076 (0,096)	-0,108 (0,064)	-0,015 (0,031)	0,006 (0,055)	1,63 (0,202)	12,49 (0,000)
AOC	-0,015 (0,015)	-0,001 (0,008)	-0,009 (0,016)	0,013 * (0,006)	0,004 (0,010)	5,06 * (0,025)	3,24 (0,07)

Source: author's calculations

Notes:

1. * and ** indicate significance at 5 percent and 1 percent level respectively
2. In parentheses: standard errors in columns 2-5 and p-values in the last two columns
3. "Q10", "Q20", "Q80", "Q90" - estimates at 0.1th, 0.2th, 0.8th and 0.9th quantiles

Appendix 13. Quantile regression estimates with TSR as dependent variable in the context of US firms

Variable	Coefficients					Test of slope equality (F-statistics)	
	Q10	Q20	OLS	Q80	Q90	Q10 vs Q90	Q20 vs Q80
SALARY	0,018 (0,032)	0,053 * (0,026)	0,024 (0,024)	0,013 (0,035)	0,046 (0,041)	0,50 (0,479)	1,61 (0,204)
BONUS	0,02 (0,034)	-0,011 (0,032)	-0,009 (0,030)	-0,005 (0,048)	-0,064 (0,057)	2,58 (0,108)	0,032 (0,859)
LTIP	0,111 (0,235)	0,106 (0,133)	-0,003 (0,071)	0,012 (0,126)	0,042 (0,130)	0,06 (0,810)	0,59 (0,444)
CASHINC	0,026 (0,037)	-0,009 (0,033)	-0,009 (0,030)	-0,005 (0,044)	-0,058 (0,056)	2,46 (0,117)	0,013 (0,909)
EBC	0,043 (0,033)	-0,005 (0,030)	-0,016 (0,029)	-0,042 (0,040)	-0,024 (0,050)	1,95 (0,163)	1,13 (0,288)
OAC	-0,046 (0,111)	-0,108 (0,096)	-0,133 (0,075)	-0,082 (0,085)	-0,159 (0,100)	0,27 (0,603)	0,09 (0,759)
AOC	-0,058 (0,034)	-0,041 (0,025)	-0,002 (0,028)	0,017 (0,032)	0,003 (0,048)	3,80 (0,051)	3,58 (0,058)

Source: author's calculations

Notes:

1. * and ** indicate significance at 5 percent and 1 percent level respectively
2. In parentheses: standard errors in columns 2-5 and p-values in the last two columns
3. "Q10", "Q20", "Q80", "Q90" - estimates at 0.1th, 0.2th, 0.8th and 0.9th quantiles