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Abstract

This paper investigates the impact of CEO compensation, including total compensation, variable pay, and base salary, on key firm performance indicators such as Return on Assets (ROA) and Return on Sales (ROS). Despite numerous studies on the relationship between CEO compensation and firm performance in various countries, the research on Norwegian firms remains limited. Therefore, to contribute to the knowledge in this field, our analysis uses a dataset comprising 85 Norwegian companies listed on the Oslo Stock Exchange (OSE) from 2015 to 2022.

The ordinary least squares (OLS) regression analysis results provide compelling evidence of a positive and statistically significant relationship between CEO variable pay, encompassing both short-term and long-term incentives, and firm performance. However, our analysis did not identify any empirical support for the influence of CEO total compensation or CEO base salary on firm performance. Moreover, our findings suggest that factors such as firm size, age, and leverage affect firm performance, depending on the specific measure of performance being used. The consistent negative and highly significant relationship between firm age and ROS is particularly noteworthy, indicating lower performance for older firms. This result calls for additional investigations to understand better the underlying factors contributing to this relationship and draw more conclusive insights.

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Completing this thesis has required a tremendous amount of time and has presented its fair share of challenges. However, it has also been an exciting and inspiring experience. Besides, as Benjamin Franklin wisely said, "An investment in knowledge pays the best interest."

Table of contents

Abstract **0**

Acknowledgments **1**

1.0 Introduction **1**

1.1 Background and motivation *2*

2.0 Theoretical Framework **4**

2.1 Agency Theory *4*

2.2 Managerial Power Theory *6*

2.3 Tournament Theory *6*

2.4 Research propositions *7*

3.0 Literature Review **9**

4.0 Methodology **12**

4.1 Development of hypothesis *12*

4.2 Methodology used in Previous Research *12*

4.2.1 OLS Multiple Regression 12

4.2.2 Fixed- and Random Effects model 13

4.2.3 Problem of Endogeneity 14

4.3 Research Method *15*

4.4 Measurement of Variables *16*

4.4.1 Firm Performance – Dependent Variable 16

4.4.2 CEO compensation – Independent Variable 17

4.4.3 Control Variables 18

4.4.4 Robustness Tests 21

5.0 Data collection **21**

6.0 Empirical Results **24**

6.1 Descriptive results *24*

6.2 Results from the regression analysis and robustness tests *25*

6.3 Hypothesis 1 .... *25*

6.3.1 CEO total pay has a positive impact on firm performance 25

6.3.2 Robustness checks 27

6.4 Hypothesis 2 .... *29*

6.4.1 CEO variable pay has a positive impact on firm performance 29

6.4.2 Robustness checks 31

6.5 Hypothesis 3 .... *33*

6.5.1 CEO base salary has a positive impact on firm performance 33

6.5.2 Robustness checks 35

7.0 Conclusion 38

8.0 Recommended Further Studies 39

References 41

Appendix A 49

Correlation Matrix *49*

Appendix B 50

Data Transformation *50*

Appendix C 52

Outliers in return data *52*

Appendix D 54

Regressions *54*

Appendix E 59

Residual plots *59*

Appendix F 71

Descriptive statistics *71*

Appendix G 72

Firms Present......72

Appendix H 74

Exchange rates......74

1.0 Introduction

This paper investigates the impact of CEO compensation on firm performance between 2015 and 2022, focusing on Norwegian companies listed on Oslo Stock Exchange (OSE). There is limited research on this topic using data from Norwegian companies, unlike the many studies conducted using companies from other countries such as USA and UK. Existing research on this topic has yielded inconclusive results. While some studies have found a positive relationship between CEO compensation and firm performance, others fail to establish a significant relationship or even suggest a negative one.

Rapidly changing market dynamics, technological advancements, globalization, and evolving customer demands have all contributed to more competitive and complex business structures. The CEO plays a vital role in guiding firms to adapt, innovate and navigate through these complexities. Additionally, the CEO makes critical decisions that drive a firm's overall success and growth. One crucial aspect that has attracted much attention is CEO compensation and its potential impact on firm performance.

The relationship between CEO compensation and firm success has long been a subject of interest and debate among practitioners, scholars, shareholders, and other stakeholders. CEO compensation packages, which often include salary, bonuses, stock options, and equity grants, are designed to align the interests of CEOs with those of shareholders, encouraging strategies and actions that boost firm value. However, the extent to which CEO compensation drives firm performance remains a topic of investigation.

The primary goal of this research is to investigate the relationship between CEO compensation and firm performance, measured as ROA and ROS. By doing so, it seeks to contribute to the existing literature on corporate governance, executive compensation, and organizational performance. Specifically, the study aims to address the following research question: *How does CEO compensation affect the performance of Norwegian firms from 2015 to 2022?*

Incorporating Norwegian companies into our research adds a unique and noteworthy dimension. Unlike other countries, Norwegian firms have not been extensively examined in similar research, thus enabling us to expand the geographical and contextual scope of existing research in this field. Moreover, it lets us gain insights into the distinctive Norwegian business landscape.

Understanding the impact of CEO compensation on firm performance could be important for several reasons. It deepens our understanding of corporate governance mechanisms and has ramifications for shareholders, boards of directors, executives, and other stakeholders. Furthermore, studying this relationship becomes particularly relevant in light of recent debates about income inequality, concerns about excessive executive pay, and the overall effectiveness of executive compensation practices.

This research seeks to make several contributions to existing literature. Firstly, it aims to analyze the relationship between CEO pay and firm performance comprehensively. The objective is to provide empirical evidence to support and advance theoretical frameworks such as agency, managerial power, and tournament theories. Secondly, it seeks to uncover nuances and contextual variations in this relationship by exploring potential control variables, such as firm size, age, and leverage. Finally, this study’s findings aim to provide practical implications for boards of directors and compensation committees in designing effective and performance-based CEO compensation packages.

1.1 Background and motivation

The relationship between CEO compensation and firm performance is a topic of significant interest and importance in corporate governance, executive pay practices, and shareholder value. This section aims to provide a compelling rationale for why this relationship is worth studying.

Corporate governance is essential for ensuring efficient business operations and protecting shareholders' interests. CEO compensation is a critical mechanism within the corporate governance framework for aligning CEOs' incentives with shareholders' goals and objectives. By investigating the relationship between CEO compensation and firm performance, this study contributes to the understanding of how governance mechanisms influence organizational outcomes.

Apple Inc. and its former CEO, Steve Jobs, are a well-known example that illustrates the potential benefits of aligning CEO compensation with long-term company performance. When Jobs returned to Apple in 1997, the company was struggling, and he took on the role of interim CEO with a symbolic annual salary of $1 (Tibken, 2011). However, he was granted numerous stock options, which he later exchanged for restricted stocks. Under Jobs' leadership, Apple experienced a remarkable turnaround, introducing revolutionary products such as the iPod, iPhone, and iPad. Consequently, the company's stock price rose dramatically, and Jobs' stock options became extremely valuable. This example illustrates how CEO compensation tied to long-term company performance can incentivize CEOs to generate positive results by aligning their interests with the organization’s long-term success and the goals of shareholders and other stakeholders (McClenahen, 2005).

In contrast, the case of Lehman Brothers and its CEO Richard Fuld serves as a cautionary tale of misaligned CEO compensation. Fuld received substantial compensation, including large bonuses tied to short-term performance metrics. However, the company's excessive risk-taking and exposure to subprime mortgages ultimately led to its bankruptcy. Critics argue that the misaligned incentives, where Fuld had a strong incentive to take excessive risks to maximize short-term profits, played a role in the firm's downfall (Williams, 2010). This case emphasizes the importance of carefully designing compensation packages to align CEOs' interests with the organization's long-term goals.

In addition, we find our study particularly relevant given the intensive scrutiny and public debate surrounding compensation practices in recent years. Several examples of excessive CEO compensation packages have raised concerns regarding income inequality, fairness, and aligning CEO incentives with long-term shareholder value creation. Given these controversies, it seems worthwhile to investigate the link between CEO compensation and firm performance to evaluate current compensation practices' effectiveness and influence.

Finally, our research might hold implications for both scholars and practitioners. By focusing on Norwegian companies, which have received limited attention in this study area, we aim to uncover new perspectives, refine existing theories, and contribute to this field's growing body of knowledge. Practitioners, such as boards of directors and compensation committees, can benefit from a deeper understanding of the relationship between CEO compensation and firm performance. Our study seeks to identify critical factors that influence this connection, enabling practitioners to make more informed decisions when developing effective compensation strategies.

The following sections of this paper will provide an overview of the theoretical framework, a review of existing literature, and a description of the methodology employed to investigate the research question. Through a critical analysis of previous research and our empirical investigation, we seek to enhance the understanding of CEO compensation and its impact on firm performance.

2.0 Theoretical Framework

Our study draws upon three main theoretical frameworks: Agency Theory, Managerial Power Theory, and Tournament Theory. Each of these theories provides a unique perspective and aims to provide a theoretical rational for examining the relationship between CEO compensation and firm performance.

2.1 Agency Theory

Agency theory offers a framework to analyze the relationship between shareholders (principals) and CEOs (agents). According to Jensen and Meckling (1976), conflicts of interest may arise due to corporations' separation of ownership and control. CEOs, acting as agents, may prioritize their interests at the expense of shareholders. In this context, CEO compensation could be essential to address the misalignment between principals and agents.

Compensation contracts should incentivize CEOs to act in the firm's best interests to ensure that CEOs' interests align with those of shareholders. This entails a combination of salary, bonuses, stock, and stock options, emphasizing performance-based components (Jensen & Murphy, 1990). By tying CEO compensation to firm performance metrics, such as profitability or shareholder returns, CEOs are motivated to make decisions and engage in actions that maximize the firm's overall performance (Jensen & Murphy, 1990).

Conflicts between principals and agents may arise due to various factors, including disparities in desired actions, challenges in monitoring the agent's activities, variation in risk preferences, and diverging time horizons (Eisenhardt, 1989; Hill & Jones, 1992; Guilding et al., 2005). Risk-averse managers often prefer fixed cash compensation to minimize personal risk (Jensen & Meckling, 1976; Amihud & Lev, 1981). Shareholders having the ability to diversify their portfolios, on the other hand, seek to align manager compensation with firm performance in order to maximize shareholder value (Holmstrom, 1979; Harris & Raviv, 1979; Grossman & Hart, 1983).

To mitigate these conflicts, suggested measures include enhancing monitoring mechanisms and strengthening director oversight of managerial actions (Donaldson & Davis, 1991). Moreover, ownership structures that align managers' interests with those of shareholders, such as stock ownership or equity-based compensation, can help address agency problems (Jensen & Meckling, 1976). Incentive schemes that tie managerial compensation to firm performance have proven effective in aligning the interests of managers and shareholders (Donaldson & Davis, 1991; Jensen & Murphy, 1990).

By embracing the principles of agency theory and adopting appropriate governance mechanisms and compensation structures, firms can mitigate agency problems, align the interests of managers and shareholders, and ultimately improve firm performance (Eisenhardt, 1989; Hill & Jones, 1992; Guilding et al., 2005). Thus, based on the principles of agency theory and previous research findings, aligning CEO compensation with shareholder interest is expected to favor firm performance.

2.2 Managerial Power Theory

The Managerial Power theory recognizes the agency problem between shareholders and management. CEOs and their management teams hold considerable influence over the board, which can lead to suboptimal negotiation outcomes regarding executive compensation. In many cases, executives exploit their power to secure higher pay, resulting in compensation that does not align with firm performance (Bebchuk, Fried & Walker, 2002). This power imbalance allows managers to shape their compensation packages and manipulate corporate governance to their advantage. They can obtain higher pay beyond what a board, whose primary goal is to maximize shareholder value and who have access to the necessary time and information, would typically approve (Bebchuk & Fried, 2004). According to Bebchuk and Fried (2004), there has been a growing divergence between CEO pay and actual performance. This misalignment of incentives focuses on short-term gains rather than long-term value creation, potentially harming firm performance.

Finkelstein and Hambrick's (1989) paper investigates the link between CEO compensation and market and political processes. They argue that CEO power, status, and visibility in the media play a significant role when determining CEO compensation. This phenomenon is partly driven by the fact that boards of directors are influenced by external pressure rather than internal firm performance. Other research examines the relationship between corporate governance, CEO compensation, and firm performance. Core et al. (1999) find that CEO pay is negatively related to board independence and outside director ownership. They argue that CEOs significantly influence their compensation packages, highlighting a lack of oversight and constraints on executive pay by outside directors.

2.3 Tournament Theory

According to the Tournament Theory, CEO/executive compensation can be structured as a tournament in which executives compete for higher positions and rewards. This competitive structure will likely motivate executives to make strategic decisions, allocate resources, and innovate to maximize firm performance (Lazear and Rosen, 1981). In other words, CEOs motivated by higher compensation tend to work harder and perform better.

Additionally, the Tournament Theory proposes that lower-ranked employees in the firm should also be encouraged to work harder to attain better compensation packages as rewards (Lazear and Rosen, 1981; Rosen, 1986). The theory suggests that performance is fostered at all organizational levels by offering high rewards to those at the top of the ladder (Main et al., 1993; Conyon et al., 2001). Hence, this compensation structure encourages a competitive environment throughout the firm, driving CEOs and employees to put in more effort and accomplish better results to receive higher pay.

In line with the principle of a tournament system, research on executive compensation demonstrates that CEOs and executive directors who have received higher compensation in the past, based on their relative performance within the firm, are more likely to perform better in the future (Lazear & Rosen, 1981). Besides, the actual managerial talents of these executives contributed to their future performance as well (Hendry & Kiel, 2004).

Consequently, based on the principles of Tournament Theory and previous research findings, there is reason to believe that CEO compensation structured as a tournament, with rewards linked to relative performance, positively influences firm performance.

2.4 Research propositions

To guide the empirical analysis, the following research propositions are formulated based on the theoretical frameworks discussed above:

Table 1: Summary of the theoretical framework and its propositions

	Theoretical Framework	**Research Proposition (Hypothesis)**	**Reason behind Proposition**
Proposition 1	Agency Theory	Performance-based CEO compensation, such as bonuses and stock options, will positively influence firm performance.	Performance-based compensation aligns CEO incentives with shareholder interest, motivating them to improve firm performance.
Proposition 2	Managerial Power Theory	CEO compensation influenced by managerial power will negatively influence firm performance.	Managerial power can lead to compensation packages that prioritize personal gain over firm performance, resulting in a negative impact on the firm.
Proposition 3	Tournament Theory	CEO compensation structured as a tournament will positively influence firm performance	A competitive compensation structure motivates CEOs to work harder and adopts performance at all levels within the firm.

These theories offer diverse perspectives on the incentives and mechanisms by which CEO compensation influences CEO behavior and affects firm outcomes. We will evaluate how CEO compensation practices align with these theoretical frameworks and their impact on firm performance by conducting comprehensive data analysis and statistical modeling.

3.0 Literature Review

The empirical literature on the effect of pay on performance is mixed. Research by Hall & Liebman (1998) on firm performance and CEO compensation reveals a strong correlation between the two. Notably, the study emphasizes the importance of stock and stock options as components of executive compensation. According to the findings, stock and stock options align executive incentives with firm performance, making them valuable tools for driving positive results. One can design effective and performance-driven CEO compensation contracts by acknowledging the impact of these components. Zhou (2000) conducted a study similar to Hall & Liebman (1998), expect for the Canadian market. His findings concluded that CEO compensation increases with size and firm performance. However, his study also revealed that CEOs in specific industries, such as the utility industry, have lower executive pay, and so is the correlation with performance. (Zhou, 2000).

Zoghlami (2020) investigated the influence of CEO compensation on the performance of French-listed firms. The study focused on a sample of 155 firms from 2009 to 2018. This study’s findings suggest that higher executive gross compensation positively affects the firms' economic and financial performance. However, an adverse effect was observed on stock market performance, particularly within sectors. The study emphasizes the importance of corporate governance and regulation in optimizing executive compensation for improved firm performance. It should be noted that the study acknowledges limitations related to the sample and use of gross compensation and suggests further research to explore the impact of different compensation components (Zoghlami, 2020).

Elsayed and Elbardon (2018) also investigated the correlation between executive compensation and firm performance in FTSE 350 companies from 2010 to 2014. Their findings suggest a positive and significant link between executive pay and performance. They linked their analysis to agency and tournament theories, arguing that their findings supported both. Furthermore, they stressed the vital role of remuneration committees in designing compensation packages that motivate CEOs and enhance performance. However, they did acknowledge the study's shortcomings, the most significant ones being survivorship bias and the potential consequences of company reorganization (Elsayed and Elbardon, 2018)

Spoor (2020) analyzed the relationship between CEO compensation and firm performance in Dutch-listed firms from 2016 to 2018. The findings revealed a considerable and positive impact of both short- and long-term incentive pay on firm performance. However, some previously identified significant effects disappeared when considering industry classification. In particular, manufacturing and other services sectors saw a positive and significant effect. Accounting-based firm performance was found to have a positive and significant effect, whereas market-based performance did not exhibit a statistically significant and consistent positive effect. Overall, the findings highlight the importance of considering multiple factors when explaining the relationship between CEO compensation and firm performance. For instance, firm size, a compensation committee, and concentrated ownership were all identified as factors associated with CEO variable compensation (Spoor, 2020).

A research body also finds a negative link between executive compensation and firm performance. For instance, Basu, Hwang, Mitsudome, and Wintrop (2007) investigated executive compensation and emphasized the importance of the robust corporate governance mechanism in Japanese firms. They found that Keiretsu firms, characterized by network-based relationships, have lower executive pay, indicating effective management monitoring. Finally, this study reveals a negative relationship between governance-predicted compensation and subsequent accounting performance. This indicates that firms with weaker governance structures face agency problems, overpaid CEOs, and worse overall performance (Basu et al., 2007).

Another example is a study done by Cooper, Gulen, and Rau (2014). They found that high executive pay in the form of long-term incentives is negatively associated with future performance. They argue that the negative relationship stems from CEOs who accept such pay tend to be overconfident and engage in value-destroying activities, eventually leading to lower operating performance and stock returns. Ultimately, the study underscores that offering CEOs long-term incentive compensation plans without considering managerial biases and style is unlikely to maximize shareholder value (Cooper et al., 2014).

In addition to studies reporting positive and negative relationships, some studies have failed to find any significant association between CEO pay and firm performance. Jeppson, Smith, and Stone (2009) did not discover a clear and statistically significant relationship between CEO compensation and firm performance when examining firms from various industries in the United States. While they did observe some correlations between specific compensation elements and certain firm performance measures, the findings were not consistently robust. The regression results revealed only a significant relationship between a firm's total revenue and specific components of CEO compensation, including overall CEO compensation. Nonetheless, this relationship does not directly reflect firm performance, but rather that larger firms, as measured by total revenue, tend to provide higher remuneration packages to their CEOs (Jeppson et al., 2009).

Nulla and Phil (2013) also examined the relationship between CEO pay and firm performance among firms listed on TSXK/S&P and NYSE. Their sample consisted of 240 firms observed from 2005 to 2010. Their findings did not reveal a consistently significant relationship between CEO base salary, annual bonus, total compensation (base salary plus annual bonus), and firm performance. Moreover, the few significant relationships that they identified were relatively weak. Consequently, the study's overall conclusion was no direct association between CEO compensation and firm performance, as measured by Return on assets (ROA) (Nulla & Phil, 2013).

Lastly, Weenders (2019) did not find a clear and statistically significant relationship between CEO pay and firm performance for Dutch Listed firms from 2014 to 2017. The impact of CEO compensation on firm performance appears to vary depending on how performance is measured, the inclusion of control variables, and the specific CEO pay variables used in the models. Moreover, the study revealed that corporate governance variables such as CEO tenure, an audit committee, independent directors on the board, and gender diversity in the supervisory board do not significantly impact the correlation between CEO compensation and firm performance (Weenders, 2019).

4.0 Methodology

4.1 Development of hypothesis

Drawing upon prior research and the research propositions outlined in section 2.4, we have formulated the following three hypotheses to investigate the relationship between CEO compensation and firm performance:

Hypothesis 1: CEO total pay has a positive impact on firm performance.
Hypothesis 2: CEO variable pay has a positive impact on firm performance.
Hypothesis 3: CEO base salary has a positive impact on firm performance.

These hypotheses are based on the foundational principle of agency theory and tournament theory, which provide valuable insights into the dynamics of CEO compensation and its potential impact on organizational outcomes.

4.2 Methodology used in Previous Research

4.2.1 OLS Multiple Regression

The method employed in this study is OLS multiple linear regression. There are several things to check for when conducting an OLS multiple regression method. Firstly, the dependent and independent variables should be measured on a metric scale. Fortunately, in this study, all variables possess metric properties, eliminating that concern. Secondly, we need an adequate sample size to maintain enough power. It has been argued that multiple regression typically needs a minimum of 50 observations, preferably 100, to maintain sufficient power (Hair et al., 2013). We have gathered comprehensive data from 85 Norwegian Companies listed on the Oslo Stock Exchange (OSE), and throughout our sample period, we have collected 655 firm observations. In other words, the size of our sample appears to be sufficient.

A critical drawback of multiple regression analysis is the significant impact of potential multicollinearity, which can significantly limit the interpretation of the results (Hair et al., 2013). In addition, we need to check for other assumptions, such as homoscedasticity, linearity, and normality. The table below summarizes the assumptions underlying OLS regression and the corresponding methods we employed to assess these assumptions.

Table 2: Overview of some of OLS assumptions

Assumption	**Method(s)**	**Appendix**
No substantial multicollinearity	Correlation matrix	Appendix A
Homoscedasticity	Breusch-Pagan test	Using heteroscedasticity robust standard errors
Normality	Histogram and Q-Q plots	Appendix B
Linearity	Residual plots	Appendix E

If necessary, we will adjust to meet the assumptions required for multiple regression analysis. This may include transforming data with logarithms or deleting outliers shown in appendix C.

4.2.2 Fixed- and Random Effects model

Fixed and random effects models are commonly used in regression analysis, as demonstrated by several scholars such as Liang et al. (2015), Fernandes (2008), Hou et al. (2017), and Jaiswall & Bhattacharyya (2016). These models are particularly suitable for studies that analyze panel data, which involves data from multiple units observed over multiple periods (Mátyás & Sevestre, 2008).

The fixed effects model is appropriate when the entities in the sample represent the entire population being studied. For instance, we can use a fixed effects model if we have data on all the stocks traded on a particular exchange. In this approach, we include individual-specific intercepts (represented by dummy variables) for each entity in the analysis. These intercepts capture the unique characteristics of each entity that are constant over time. (Brooks, 2019). The fixed effects model offers the advantage of accommodating correlation between omitted and independent variables. However, a limitation of this model is that it restricts the inclusion of time-invariant independent variables in the model (Bell et al., 2018; Mátyás & Sevestre, 2008)

On the other hand, the random effects model is appropriate when the entities within the sample can be thought of as randomly selected (Brooks, 2019). It assumes that the entity-specific effects are random and uncorrelated with the explanatory variables. Instead of including individual-specific intercepts, it uses a composite error term to account for the entity-specific effects. This approach requires fewer parameters to be estimated, resulting in improved estimation efficiency and more degrees of freedom. However, it assumes that the composite error term is uncorrelated with the explanatory variables. If there is a correlation, the estimates may be biased and inconsistent (Brooks, 2019).

To determine whether the random effects model is valid, we can use the Hausman test, which examines the assumption that the error term is uncorrelated with the explanatory variables. If the Hausman test indicates that this assumption holds, then a random effect model can be employed; if not, a fixed effects model is preferable (Brooks, 2019).

4.2.3 Problem of Endogeneity

One significant concern that could limit this research's findings and interpretation is the issue of endogeneity, especially reversed causality. Much previous research has investigated the relationship between CEO compensation and firm performance from both directions. Meaning several researchers have investigated how CEO compensation affects firm performance, known as the incentive/motivation hypothesis, but also how firm performance affects CEO compensation, known as the reward hypothesis (Buck et al., 2008). It is essential to acknowledge this bidirectional relationship, as failing to do so could considerably limit the interpretation of the results.

Several scholars have addressed the issue with reversed causality. One example is Carter et al. (2016), which emphasized the chance of endogeneity between CEO compensation and firm performance. They highlighted the possibility that performance might determine compensation, which can create a correlation with the error term, as high-performance levels can lead to high levels of compensation. To address this concern, Carter er alt. (2016) incorporated lead variables and used the dependent variable firm performance for the period (t+1) and the independent variable CEO compensation for the period (t). Other researchers, such as Sun et al. (2009) and Balafas and Florackis (2014), have also used lead variables to tackle the same issue.

To conclude, the problem of reversed causality is essential and requires attention in this study. We have adopted a slightly different approach using lagged variables instead of lead variables. In addition to the primary analysis, we will conduct a robustness test incorporating a one-year lag using CEO compensation from the period (t-1) and firm performance data from the current period (t). The additional analysis aims to mitigate the issues related to reverse causality and improve the reliability of the study's results.

4.3 Research Method

As mentioned, we have used the multiple regression analysis approach to examine the connection between CEO compensation and firm performance and estimated our model using Ordinary Least Squares (OLS). We will use a standard model that is commonly used as a source of inspiration in prior research studies, such as Wenders (2019), Firth et al. (1996), Carter et al. (2016), and Hampsink (2020). These studies have served as valuable references in exploring the impact of CEO compensation on firm performance or vice versa.

The following model is used:

$$PERF_{i,t} = \beta_0 + \beta_1 COMP_{i,t} + \beta_2 CONTR_{i,t} + \varepsilon_{i,t}$$

Where:

- $PERF_{i,t}$ is the firm performance for firm i in year t, which will be measured as either ROE, ROA, ROS.
- $COMP_{i,t}$ CEO compensation for firm i in year t will be measured as base salary, variable pay or total compensation.
- $CONTR_{i,t}$ are control variables for firm i in year t, such as firm age, firm size, or leverage. We have also included industry– and time dummies in our model.
- $\varepsilon_{i,t}$ is the measurement error term. This represents the overall variation that remains unexplained by the variables included in the model for firm i in year t.

4.4 Measurement of Variables

4.4.1 Firm Performance – Dependent Variable

In our study, the dependent variable is firm performance. The measurement of firm performance can be categorized into two primary types: accounting-based and market-based measurements (Weenders, 2019). A dominant approach in measuring firm performance is trough accounting-based measurements, as evidenced by studies such as Spoor (2020), Weenders (2019), and Hampsink (2020). Therefore, to facilitate comparability of results, we will use three widely used accounting-based measurements: Return on equity (ROE), Return on Assets (ROA), and Return on Sales (ROS).

Table 3: Measurements of the dependent variable – Firm performance

Measure	Formula	References
ROE	$\frac{EBIT}{Equity}$	(Hampsink, 2020)
ROA	$\frac{EBIT}{Total\ assets}$	(Carter et al., 2016; Smirnova & Zavertiaeva, 2017; Hampsink, 2020)
ROS	$\frac{EBIT}{Revenue}$	(Duffhues & Kabir, 2008; Weenders, 2019)

4.4.2 CEO compensation – Independent Variable

Larcker and Tayan (2015) emphasize the importance of a well-designed CEO compensation package to attract and retain executives with the necessary traits for success and align their interests with the company's goals. Even though CEO remuneration packages vary among companies and industries, they typically consist of four key components: base salary, short-term incentives (annual bonuses), long-term incentives (e.g., cash, stock options, restricted stock), and other benefits (Murphy, 1999; Weenders, 2019). The research body on executive compensation employs various approaches to measuring compensation. Some researchers have focused solely on cash compensation, including base salary and annual cash bonuses (e.g., Basu et al., 2007). Others have concentrated on stock options as the primary measure (e.g., Sun et al., 2009; Hanlon et al., 2003). In the study conducted by Duffhues & Kabir (2008), they included total compensation and cash compensation.

To assess the impact of CEO compensation, we will analyze total pay, variable pay and base salary individually in our study. Total pay includes base salary, short-term bonuses, long-term bonuses, and other benefits. This approach is consistent with Smirnova & Zavertiaeva, 2017, Carter et al. (2016), Weenders (2019) and Jaiswall & Bhattacharyya (2016). Variable pay specifically refers to annual bonuses (STIP) and long-term incentive pay (LTIP), which can be provided in the form of cash or commonly offered as stock (Weeders, 2019). The CEO pay measures have been transformed using the natural logarithm to address potential issues related to endogeneity and fulfill the normality assumptions required for regression analysis. Additionally, as a means to enhance the robustness of the analysis, variable pay and base salary will also be expressed as percentages of the total compensation. For a more comprehensive discussion on robustness tests, please refer to section 4.4.4.

Table 4: Measurements of independent variable – CEO compensation

Measure	**Anticipated influence (+/-)**	**Explanation**	**References**
Total Pay (ln_total_pay)	+	Natural logarithm of CEOs total compensation (base salary, variable pay, and other benefits)	(Smirnova & Zavertiaeva, 2017; Jaiswall & Bhattacharyya 2016; Weenders, 2019; Carter et al., 2016)
Variable Pay (ln_VP)	+	Natural logarithm of CEOs variable pay (short- and long-incentive pay)	(Smirnova & Zavertiaeva, 2017; Weenders, 2019; Hampsink, 2020)
Base Salary (ln_BS)	+	Natural logarithm of CEOs base salary	(Smirnova & Zavertiaeva, 2017 Weenders, 2019 Hampsink, 2020)

4.4.3 Control Variables

We have incorporated control variables in our study to account for the fact that CEO compensation does not solely affect firm performance, as other significant factors are at play. First, we have used firm size as a control variable as it is reasonable to assume that larger firms will tend to have more resources and money available, which can lead to higher CEO compensation. By including firm size as a control variable, we can isolate the impact of CEO compensation on firm performance while accounting for any potential interference from firm size. Several other studies have done this as well but have had different ways of measuring firm sizes, such as using market capitalization (Ozkan, 2011), total sales (Fernandes, 2008), or total assets (Hampsink, 2020). However, we will follow Van der Laan et al. (2010) and Weenders (2019) and calculate the firm size using the natural logarithm of the total number of employees. In addition, we will use total assets and total sales as a robustness test.

Moreover, we have incorporated firm age as a second control variable. In order to address the normality assumption, we have measured firm age by taking the natural logarithm of the number of years since the firm was established (Hempkins, 2020; Van der Laan et al., 2010; Fernández et al., 2019).

Leverage is the third control variable in our model. Numerous studies conducted in the past have suggested that leverage can play an essential role in addressing the problems between agents and principals, as outlined in the agency theory. In this study, we calculated leverage using long-term debt and the book value of total assets.

Lastly, we have incorporated control variables that pertain to dummy variables in our analysis. The use of time dummies and industry dummies aligns with several previous studies, including Weenders (2019), Hempkins (2020), and Smirnova and Zavertiaeva (2017). Specifically, year and industry dummies account for the effects of specific years and different industries. In our analysis, we consider data from 2015 to 2022, and our year dummies will control for time-specific effects, such as the impact of significant events like the COVID-19 pandemic, which may influence the period 2020-2022. Further, the industry dummies will control different industry effects. Including industry dummies is necessary to ensure that our analysis captures the unique characteristics and variations among industries that may influence the results. In this study, we have based the industry dummies on Global Industry Classification Standard (GICS). A more comprehensive discussion on this matter will be presented in the data section of this paper.

Table 5: Measurements of control variables

Measure	**Anticipated influence (+/-)**	**Explanation**	**References**
Firm size (ln_firm_size)	+	Natural logarithm of firm size, measured by the number of employees	(Van der Laan et al., 2010, Weenders, 2019)
Firm age (in_firm_age)	+	Natural logarithm of firm age, measured by years since the establishment	(Hempkins, 2020; Van der Laan et al., 2010; Fernández et al., 2019)
Leverage	-	$\frac{Long\ term\ debt}{Book\ value\ of\ total\ assets}$	(Spoor, 2020; Weenders, 2019; Sun et al., 2009)
Industry Dummies		Control for the different industries, based on GICS	(Smirnova & Zavertiaeva, 2017; Weenders 2019; Spoor, 2020)
Year Dummies		Control for the years 2015-2022	(Smirnova & Zavertiaeva, 2017, Weenders, 2019, Hempkins, 2020)

4.4.4 Robustness Tests

To ensure the robustness of the OLS regression results, several robustness tests will be conducted to account for potential measurement variations that could influence the findings.

First, alternative firm performance measures will be employed to replace the existing measurements. ROE (Return on Equity) will replace ROA (Return on Assets) as an additional accounting-based performance metric. Moreover, variable pay and base salary will be presented as a percentage of the total compensation, in line with previous studies (Hempkins, 2020; Mehran, 1995).

In addition, we will use two different measures of firm size than initially used. Instead of using the natural logarithm of the number of employees, we will use the natural logarithm of total assets and sales. This adjustment aims to account for differences in measurement and ensure a more comprehensive evaluation of firm size.

Lastly, to account for any potential impact of past CEO compensation on current firm performance and mitigate issues related to endogeneity, we will regress the CEO compensation in year t-1 for the firm performance in year t. These additional checks are consistent with prior research studies by Hempkins (2020) and Spoor (2020).

5.0 Data collection

5.1 Data Description

This study investigates how CEO compensation affects firm performance using data from Norwegian companies listed on Oslo Stock Exchange (OSE) from 2015 to 2022. We collected most of our data using Wharton Research Data Services (WRDS). The prestigious Wharton School at the University of Pennsylvania provides this comprehensive online platform. WRDS is a gateway to extensive financial, accounting, banking, economics, management, and marketing data collection. The data collected from this database includes data on our dependent variables, ROE, ROA, and ROS, as well as the control variables, such as firm size, age, and leverage. Furthermore, this is supplemented by CEO compensation data obtained from the respective companies' annual reports. The latter has also been used to fill in were WRDS had missing values.

5.1.1 Sample Size

Initially, the dataset included 164 Norwegian companies that are listed on OSE. However, after data cleaning and adjustments, the sample size was reduced to 85 companies. The main reason for the reduction in sample size is that several companies have been listed on the OSE after 2015 and do not have available annual reports covering considerable parts of the sample period. Also, to ensure data completeness, we removed companies with several missing variables that were considered necessary for our analysis. However, some companies still do not have data for all years, and our final dataset consisted of approximately 600 firm-year observations when using $return_t - CEO_t$ relationship and approximately 500 observations using $return_t - CEO_{t-1}$ relationship.

Table 6: Collection of sample size

Initial Sample	Companies listed on OSE	Excluded firms
164	Exclusion of companies that have missing or unfeasible data for the period of 2015-2022	70
94	Exclusion of companies that do not have CEO compensation data and/or no available annual reports	9
85	**Final Sample Size**	

5.2 Industry Classification

As mentioned in the representation of our research model, we have used industry dummies to control for industry-specific effects. The industry classification used in our study was sourced from WRDS, which uses the Global Industry

Classification Standard (GICS) to categorize each company's industry. The GICS classification system, developed by MSCI and S&P Dow Jones, encompasses 11 sectors at the top level, which are further divided into 25 industry groups, 74 industries, and 163 sub-industries (MSCI, 2023). When controlling for industry, it is essential to have sufficient observations. However, this study's sample size does not fill all the GICS classification categories. Therefore, we have simplified it by creating five new categories based on the classification system. The table below represents the 11 sectors GICS provided and our simplified classifications.

Table 7: Industry classification provided by GICS and reclassification.

Original Classification			New Classification		After	
	Nr. of Firms	**Nr. of Firm Observations**	**Name**	**Index**	**Nr. of Firms**	**Nr. of Observations**
Communication	3	24	Financial and communication	IND_1	12	92
Financials	9	68				
Industrial	21	168	Industrial, Utilities, Materials, and Real Estate	IND_2	29	232
Utilities	1	8				
Materials	5	40				
Real Estate	2	16				
Consumer Discretionary	4	32	Consumer	IND_3	10	80
Consumer Staples	6	48				
Energy	19	139	Energy	IND_4	19	139
Health Care	6	43	Other	IND_5	15	112
Information Technology	9	69				
Total observations	85	655			85	655

6.0 Empirical Results

6.1 Descriptive results

In this section, we present the descriptive statistics for the variables employed in the OLS regression analysis based on our dataset of 655 firm observations from 81 Norwegian companies listed on the Oslo Stock Exchange (OSE).

Regarding the dependent variables (ROA, ROS, and ROE), as shown in Appendix F, Table F1, the mean values are 5.3%, 11.6%, and 16.8%, respectively. The corresponding medians are 5%, 8.1%, 15.1%. The differences between the mean and median indicate a right-skewed distribution for the variables ROA, ROS, and ROE. This suggests that most observations have relatively lower values, while a few companies have significantly higher values.

Further, the independent variables comprise measures of CEO compensation. Table F1 reveals that, from our collected data spanning from 2015 to 2022, the average base salary for a CEO of a Norwegian listed firm is about 4 million NOK. CEOs receive an average of 1 million NOK in other benefits, including car expenses, insurance coverage, and mobile phone subscriptions. CEOs earn an average of 3 million NOK in variable pay, which encompasses short- and long-term compensation. Consequently, the average total compensation for a CEO is 8 million NOK. It is worth noting that the data for all CEO pay variables also exhibits a right-skewness. To address the skewness and non-normal distribution, a natural logarithm transformation will be applied to all three measures of CEO compensation. For a visual representation of the distributions before and after the transformation, please refer to Appendix B. The data reveals that the lowest observed values for other benefits, base salary, variable pay, and total pay are all zero. In contrast, the highest observed values are exceptionally high, reaching 52, 48, 81, and 86 million NOK, respectively. This indicates a significant disparity in CEO compensation within the dataset.

Moving on to the control variables, we consider the number of employees as a measure of firm size in this study. The data shows that the average number of employees is 3228, with a median of 791, and the company with the fewest and most employees in our dataset has 2 and 37661 employees, respectively. Regarding alternative measures of firm size, we consider total assets and total sales. The mean value of total assets amounts to 57906 million NOK, with a median of 3033 million NOK. Similarly, total sales have a mean value of 12160 million NOK and a median value of 1760 million NOK. In all three cases, there is substantial right-skewness as the mean significantly surpasses the median. To address this non-normality and skewness, a natural logarithm transformation will be applied to all three measures of firm size, and a visual comparison of the distributions before and after the transformation can be found in Appendix B. Finally, concerning leverage, the sampled Norwegian listed firms exhibit a mean book leverage of 1.088 and a median of 0.429 over the period from 2015 to 2022.

6.2 Results from the regression analysis and robustness tests

The following section describes and analyzes the results of the OLS regression analysis. The results of hypotheses 1 through 3, presented in section 3.4, are described separately in sections 6.3 through 6.5. In the tabulated results, the impact of CEO compensation on firm performance, ROA, and ROS, will be presented. Moreover, only the benchmark model and the full model will be displayed. In addition, year and industry dummies are included in all models to account for industry- and time-specific economic influences on firm performance.

Furthermore, besides the regular analyses, a robustness test has been conducted to improve the validity and reliability of the OLS regression results. The results of the robustness tests are incorporated into the respective subsections that present the finding for each hypothesis and are tabulated in Appendix D.

6.3 Hypothesis 1

6.3.1 CEO total pay has a positive impact on firm performance

The first hypothesis predicts that higher levels of CEO total pay (i.e., base salary, other benefits, and variable compensation) will have a positive impact on firm performance, as indicated by improved Return on Asset (ROA) and Return on Sales (ROS) during the same period.

Table 8 presents the results of the OLS regression analysis examining the relationship between CEO total compensation (ln_total_pay) and firm performance indicators, specifically ROA and ROS. The first model is the benchmark model, which accounts for the effects of control variables on ROA and ROS. The results for ROA as a dependent variable are presented first, followed by the results for ROS.

The first control variables introduced are the natural logarithm of the firm's age (ln_firm_age), representing the number of years since establishment, along with the natural logarithm of the number of employees (ln_firm_size) and leverage (Leverage). In expectation, a firm's age would positively impact firm performance. However, our study reveals a negative and nonsignificant relationship (b=--.005, t=-1.440) between the age of Norwegian listed firms and ROA. Moreover, we expected that the number of employees would positively impact firm performance. As Table 8 shows, firm size has a significantly positive effect on ROA at a 1% significance level (b=.009***, t=4.188), implying that firms with a larger workforce tend to achieve higher ROA. The last control variable, Leverage, is negative and highly significant at a 1% level (b=-.001***, t=-2.661). This suggests that highly leveraged firms tend to have lower performance in terms of ROA.

Model 2 adds the measure of CEO total compensation (ln_total_pay). According to Table 8, total compensation has no significant effect on ROA. All control variables stay consistent.

Table 8 reveals interesting findings when ROA is replaced with ROS. Notably, the significance level of the control variable firm age increased from no significance to 1%, indicating a more pronounced effect of older firms on ROS. Specifically, the coefficient for firm age demonstrates a considerable negative impact (b=-.032***, t= -3.190) on ROS, emphasizing the adverse effect of firm age on sales performance. In contrast to the results for ROA, no evidence was found for the impact of firm size on ROS. The same stands for leverage, which was highly significant for ROA but lost its significance when examining ROS.

Moving forward to Model 2, the measure of CEO total compensation (ln_total_pay) is added to the analysis. The results display a positive and significant relationship at the 5% level (b=.031**, t=2.170) between total compensation and ROS. They indicate that an increase in total compensation results in higher ROS.

These findings suggest no link between a higher CEO total compensation and improved firm performance in terms of ROA. However, there is a significant positive relationship with ROS. Additionally, including the CEO total compensation variable in the full model did change the model's explanatory power, adjusted R^2, from 8.50% to 8.60 % and from 14.70% to 15.10%, for ROA and ROS, respectively.

Table 8: CEO total pay (i.e., base salary, other benefits, and variable compensation) impact on Return on Assets (ROA) and Return on Sales (ROS).

	ROA		ROS	
Model	1	2	1	2
Constant	0.009	-0.034	0.482***	0.253**
	(0.543)	(0.979)	(8.068)	(2.079)
ln_total_pay		0.006		0.031**
		(-1.380)		(2.170)
ln_firm_age	-0.005	-0.005	-0.032***	-0.035***
	(-1.440)	(-1.572)	(-3.190)	(-3.427)
ln_firm_size	0.009***	0.008***	-0.009	-0.014**
	(4.188)	-3.686	(-1.323)	(-2.035)
Leverage	-0.001***	-0.001***	0.001	0.001
	(-2.661)	(-2.598)	(0.482)	(-0.562)
Year Dummies	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES
Adj. R2	8.50%	8.60%	14.70%	15.10%
F-statistics	8.540***	8.087***	9.411***	9.029***
N	655	655	655	655

*Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time variance and industry effects. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

6.3.2 Robustness checks

In addition to the analysis presented in Table 8, we conducted additional robustness tests to enhance the validity and reliability of our findings.

In the first robustness test, we replaced the firm performance variable Return on Asset (ROA) with Return on Equity (ROE). Table D1 in Appendix D shows that when ROE replaces ROA, the results still do not show any significant effect of CEO total compensation on firm performance. Furthermore, the variables controlling for firm age remain nonsignificant. The control variable for firm size, on the other hand, remains positive and significant but decreases to a 5% level in the full model (b=.023***, t=2.268). The result for leverage shows a decrease in the significance level. While leverage was negative and significant at det 1% level for ROA, it remains negative and significantly impacts firm performance when using ROE but at the 10% level (b=-.017*, t=-1.831). Given this, using the different performance measurements of ROE, similar to ROA, does not support hypothesis 1.

The second robustness test replaces the control variable for firm size, previously measured by the natural logarithm of the number of employees, with the natural logarithm of total assets and total sales. The results of this test are shown in Appendix D, Table D2, and Table D3. The impact of CEO total compensation stays robust and insignificant when using both total sales on ROA and ROS. Total pay stays robust and insignificant on ROS when using total assets but changes to positive and significant at the 5% level (b=.009**, t=2.241) on ROA. The control variable, firm age, continues to display an insignificant relationship with ROA when using assets but changes to negative and significant at the 1% level (b=-.009***, t=-2.580) when using total sales. When ROS is, the dependent variable firm age stays constant as negative and highly significant at the 1% level. Leverage displays the same results as shown in Table 8 above, being negative and significant for ROA, while there is no evidence of an effect on ROS. The adjusted R^2 decreases for ROA when using total assets and increases when using total sales. For ROS, the adjusted R^2 increases when using total sales and even more when using total assets.

Further, we addressed the potential endogeneity issue by changing the independent variable for total compensation to the total compensation for the previous year (ln_total_pay_t-1). In Appendix D, Table D4, total compensation is insignificant to ROA. On the other hand, total pay is positive and significant on ROS at the 5% level (b=.030**, t=2.035). However, these results contribute to the lack of reliable findings and confirm the conclusions drawn from the results in Table 8, which suggest no link between CEO's total compensation and firm performance.

Ultimately, these robustness tests and the overall findings support the conclusion that there is limited to no evidence indicating that higher levels of CEO total compensation result in higher firm performance for Norwegian listed firms.

6.4 Hypothesis 2

6.4.1 CEO variable pay has a positive impact on firm performance

The second hypothesis predicts that higher levels of CEO variable pay (i.e., short- and long-term incentives) would lead to higher firm performance in the same period, measured by Return on Assets and Return on Sales (ROA, ROS). An OLS regression analysis was conducted to test this hypothesis, as shown in Table 9. First, we will present the results using ROA as the dependent variable, followed by ROS.

Model 1 of Table 9 presents the benchmark model and shows the effect of different control variables on ROA. The control variables include the natural logarithm of the firm's age (ln_firm_age), the natural logarithm of the number of employees (ln_firm_size), and leverage (Leverage). As the table shows, firm size has a positive and highly significant impact on ROA at the 1% level (b=.009***, t=4.188), indicating that firms with a higher number of employees tend to have higher ROA. On the other hand, leverage has a negative and highly significant impact on ROA at the 1% level (b=-.001***, t=-2.661), indicating that firms with higher leverage tend to have lower ROA. However, firm age shows no significant relationship with ROA.

In model 2, the variable CEO variable pay (ln_VP) is introduced. The results reveal that CEO variable pay is positive and significant at 1% (b=.004***, t=4.664). This aligns with Weenders (2019), which found a positive and significant effect at the 1% level. The variable pay variable demonstrates a positive and statistically significant influence on firm performance, as measured by ROA. This suggests that increasing CEO variable pay is associated with improving firm performance. Firm size maintains its significance level at 1% (b=.006***, t=2.903). Leverage has a drop in significance from 1% to 5% (b=-.001**, t=-2.288). Furthermore, the adjusted R^2 increases from 8.50% in the benchmark model to 11.40% in the full model, indicating an improvement in explanatory power.

When ROA is replaced with ROS, as shown in Table 9, the significance of firm age increases from insignificant to significant at the 1% level (b=-.032***, t= -3.190), suggesting that older firms negatively impact return on sales. The control variable firm size and leverage also display a nonsignificant effect on ROS.

In Model 2, when CEO variable pay is included, the results indicate a significant and positive relationship between CEO variable pay and ROS at the 1% level (b=.014***, t=4.244). Hence, it suggests a positive association between the proportion of the CEO's variable pay and ROS. The coefficient indicates that a one-unit increase in the CEO's variable pay corresponds to a 0.014% increase in ROS. In model 2, firm size changes from no significance to negative and significant at the 5% level (b=-.017**, t=-2.489). When incorporating CEO variable pay into the model, the adjusted R^2 improves from 14.70% to 17.20%.

Overall, the findings indicate that CEO variable pay positively impacts firm performance. Despite variations in the control variables, the primary variable of interest (CEO variable pay) consistently demonstrates a positive and highly significant relationship with firm performance. Therefore, the results provide sufficient evidence to support hypothesis 2, which posits that CEO variable pay positively influences firm performance.

Table 9: CEO variable pay (i.e., short- and long-term incentives) impact on Return on Assets (ROA) and Return on Sales (ROS).

	ROA		ROS	
Model	1	2	1	2
Constant	0.009	-0.002	0.482***	0.452***
	(0.543)	(-0.117)	(8.068)	(7.700)
ln_VP		0.004***		0.014***
		(4.664)		(4.244)
ln_firm_age	-0.005	-0.004	-0.032***	-0.031***
	(-1.440)	(-1.409)	(-3.190)	(-3.234)
ln_firm_size	0.009***	0.006***	-0.009	-0.017**
	(4.188)	(2.903)	(-1.323)	(-2.489)
Leverage	-0.001***	-0.001**	0.001	0.002
	(-2.661)	(-2.288)	(0.482)	(0.737)
Year Dummies	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES
Adj. R2	8.50%	11.40%	14.70%	17.20%
F-statistics	8.540***	9.878***	9.411***	9.971***
N	655	655	655	655

*Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time variance and industry effects. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

6.4.2 Robustness checks

In addition to the analysis presented in Table 9, we conducted additional robustness tests to ensure our findings' validity and reliability.

First, we replaced the firm performance variable ROA with ROE. As shown in Table D1 in Appendix D, the results indicate evidence of an effect of CEO variable pay on firm performance when using ROE, as variable pay is positive and significant at the 1% level (b=.018***, t=3.684). Furthermore, the variables controlling for firm age remained insignificant. In contrast, the control variable for firm size consistently showed a positive and significant relationship but is now at the 10% level in the full model (b=.017***, t=1.705). The result for leverage is negative and significant at a 10% level (b=-.016*, t=1.809) when using ROE, in contrast to a 5% level when using ROA. Using ROE as a performance measure supports hypothesis 2.

Considering the substantial number of observations with zero values in variable pay, we introduced an additional variable, namely the ratio of variable pay to total pay (VP_TP_%). Other studies have excluded years with zero value in variable pay. However, we found retaining years with zero values necessary, as we believed this would strengthen the effect of variable pay on performance. The results, presented in Table D5, consistently demonstrate a positive and highly significant relationship between the ratio of variable pay to total pay and firm performance across all models. Specifically, the ratio of variable pay to total pay significantly impacts the 1% level on ROA (b=.080***, t=5.623) and ROS (b=.187***, t=4.176). This implies that a more significant proportion of variable pay in the total compensation package is associated with increased firm performance.

Furthermore, we conducted a robustness test by replacing the control variable for firm size with the natural logarithm of total assets (ln_total_assets) and total sales (ln_sales) instead of the number of employees. The results, shown in Appendix D, Table D2, and Table D3, show that CEOs' variable pay stays robust in almost all models at the 1% level, except for its effect on ROS when using total assets where the significance level decreases to 10% (b=.006*, t=1.748). The change in significance for variable pay when using total assets instead of the number of employees may be due to a higher correlation between total assets and ROS compared to the number of employees. The control variable, firm age, continues to exhibit no significant relationship with ROA when using total assets but changes to negative and significant at the 5% level (b=-.008**, t=-2.507) when using total sales. In contrast, firm age stays consistent at the 1% level on ROS. Similarly, leverage displays the same results as in Table 9 above, with a slight decrease in ROA from 1% to 5%. However, for ROS, leverage stays robust at insignificant.

To address potential endogeneity issues, we introduce control variables for CEO variable pay in the lagged periods (ln_VP_t-1). Detailed results are presented in Appendix D and Table D4. The inclusion of lagged variable pay demonstrates no change in significance, lagged variable pay is positive and highly significant at the 1% level for both ROA and ROS.

In conclusion, the consistently positive and significant results across the models presented in Table 9 and the robustness tests conducted and documented in Appendix D reinforce the conclusion that variable pay has a discernible influence on firm performance. These findings align with the principles of agency theory, which posits that optimizing contractual arrangements is essential to align the interests of managers and shareholders. Considering all aspects, including the adherence to agency theory and the overall positive, significant, and robust nature of the results, we confirm that hypothesis 2, which suggests a positive impact of CEO variable pay on firm performance, is supported by empirical evidence.

6.5 Hypothesis 3

6.5.1 CEO base salary has a positive impact on firm performance

The third hypothesis posits that an increase in CEO base salary would correspondingly enhance firm performance during the same period, as assessed by Return on Assets (ROA) and Return on Sales (ROS).

Table 10 presents the results of an OLS regression analysis to investigate the influence of CEO base salary (ln_BS) on firm performance. We first discuss the findings when using ROA as the dependent variable, followed by the results on ROS.

Model 1 in Table 10 presents the benchmark model, showcasing the effect of firm age (ln_firm_age), firm size (ln_firm_size), and leverage (Leverage) on ROA. It is anticipated that the firm's age will positively influence firm performance. Furthermore, an increase in the number of employees is generally expected to enhance firm performance, as measured by ROA. Contrary to our expectations, firm age shows a negative and nonsignificant relationship. Thus, the evidence again suggests no link between larger firms and higher performance, as assessed by ROA.

Conversely, the findings for firm size align with our expectations, with a larger number of employees associated with higher performance. Firm size yields a positive and statistically significant relationship at the 1% level (b = .009***, t = 4.188). Leverage produces results consistent with those observed for firm age, indicating a negative and highly significant relationship at the 1% level (b = -.001***, t = -2.661), implying that firms with higher leverage tend to exhibit lower performance.

In Model 2, we introduce the variable of CEO base salary (ln_BS). The base salary exhibits an insignificant negative effect. The significant levels of the control variables remain consistent—specifically, firm size and leverage exhibit significance at the 1% level. Moreover, Table 10 shows that the adjusted R^2 decreases slightly from 8.50% in the benchmark model to 8.40% in the whole model. In other words, the slight decrease in the adjusted R^2 suggests a weaker explanatory power when the CEO base salary variable is added to the model.

When substituting ROA with ROS in the analysis, as depicted in Table 10, the significance of the control variables changes noticeably. Specifically, firm age becomes significant at a 1% level, reinforcing the negative relationship between older firms and return on sales (b = -.032***, t = -3.190). However, neither firm size nor leverage exhibits significance, implying that they do not have a discernible effect on ROS. Moreover, the inclusion of ROS as the dependent variable improves the overall goodness of fit of the model, as indicated by the increased adjusted R^2 from 8.50% to 14.70%. This indicates that the control variables now account for a larger share of the variance in firm performance as measured by ROS.

In Model 2, where we include the CEO base salary (ln_BS), the base salary exhibits a positive and statistically significant relationship at the 5% level (b=.031**, t=2.485) between CEO's base salary and ROS. Moreover, including CEO's base salary in the full model increases the explanatory power slightly, as indicated by the adjusted R^2 from 14.70% in the benchmark model to 14.90% when the CEO's base salary is included. This demonstrates that including the CEO's base salary variable contributes to a slightly better understanding of the factors influencing firm performance, as captured by ROS.

The analysis reveals that the CEO base salary does not significantly impact firm performance when measured by ROA and is only at 5% when measured by ROS. Regarding ROS, firm age remained consistent, exhibiting negative statistical significance. Moreover, including the CEO base salary variable increased to adjusted R^2. On the other hand, when considering ROA, firm size and leverage demonstrated significant effects. Specifically, larger firms were found to positively impact ROA, whereas those with lower leverage displayed higher ROA. However, it is essential to emphasize that further analysis and a comprehensive understanding of the contextual factors are necessary to draw more definite interpretations from these findings.

Table 10: CEO base salary impact on Return on Assets (ROA) and Return on Sales (ROS)

	ROA		ROS	
Model	1	2	1	2
Constant	0.009	0.024	0.482***	0.265***
	(0.543)	(0.654)	(8.068)	(2.735)
ln_BS		-0.002		0.031**
		(-0.452)		(2.485)
ln_firm_age	-0.005	-0.004	-0.032***	-0.035***
	(-1.440)	(-1.344)	(-3.190)	(-3.376)
ln_firm_size	0.009***	0.009***	-0.009	-0.013*
	(4.188)	(4.165)	(-1.323)	(-1.920)
Leverage	-0.001***	-0.001***	0.001	0.001
	(-2.661)	(-2.669)	(0.482)	(0.518)
Year Dummies	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES
Adj. R2	8.50%	8.40%	14.70%	14.90%
F-statistics	8.540***	8.013***	9.411***	8.895***
N	655	655	655	655

*Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time variance and industry effects. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

6.5.2 Robustness checks

Furthermore, additional robustness tests were conducted to supplement the analysis presented in Table 10 to strengthen the validity and reliability of the findings. The results of these tests are discussed below.

The first robustness test involved using ROE as an alternative measure of firm performance instead of ROA. The results, presented in Appendix D, Table D1, confirm the consistency of the findings. There is still no evidence to suggest an effect of CEO base salary on firm performance. Additionally, the control variables- firm size increase in their significance to levels of 5%, while leverage decreases in significance from 1% to 10% when using ROE. Firm age still shows insignificance. Overall, the findings reinforce the conclusion that CEO base salary does not affect firm performance, regardless of whether ROA or ROE is measured. Hence, the results thus do not provide support for hypothesis 3.

In the subsequent robustness test, an additional variable for CEO base salary, the ratio of base salary to total pay (BS_TP_%), was introduced to stay consistent with the method used in the robustness test of hypothesis 2. The results presented in Table D5 consistently demonstrate a significant negative relationship between the base salary and total pay ratio across both models. Specifically, it exhibits a significant impact at the 1% level on ROA (b=-.060***, t=-3.855) and the 5% level for ROS (b=-.115**, t=-2.128). This suggests that firm performance is expected to decrease as the proportion of base salary increases in the total compensation package. In other words, base salary alone does not positively affect firm performance.

Furthermore, a higher proportion of variable pay is associated with higher firm performance, supporting the findings of hypothesis 2. Including the ratio of base salary to total pay strengthens the conclusion of hypothesis 2 and confirms the findings in section 6.4.1 that base salary alone is not an effective instinctive for CEOs to improve firm performance. Furthermore, the inclusion of the ratio of base salary to total pay leads to an increase in adjusted R^2 values for all models. When ROA is used as the dependent variable, adjusted R^2 increases from 8.50% to 10.40%, and ROS increases from 14.70% to 15.20%.

We introduce control variables for CEO base salary in the lagged period (ln_BS_t-1) to address potential endogeneity issues. Detailed results are presented in Appendix D and Table D4. Including lagged base salary demonstrates some changes. When using lagged base salary on ROS, the variable goes from significant at the 5% level to significant at the 1% level (b=.043***, t=2.667). While with ROA, the variable for base salary is consistent at insignificant. Consequently, there is some evidence indicating that base salary has a positive effect on ROS. However, when considering the insignificance of base salary on ROA, there is insufficient evidence to support hypothesis 3.

The final robustness test involves replacing the control variable for firm size, initially measured by the natural logarithm of the number of employees, with the natural logarithm of total assets and total sales. The test results are in Appendix D, Table D2, and Table D3. As shown in Table D2 and D3, the variable for CEO base salary remains robust in all models for ROS where there is no significance. Its effect on ROA changes from significant at 10% when using the number of employees to not significant when using total assets and sales. Hence, there is no evidence that base salary positively impacts firm performance.

Moreover, the control variable firm age continues to display an insignificant relationship with ROA, except when using total sales firm age is negative and significant at the 5% level (b=-.008**, t=-2.321). Firm age stays consistent on ROS. The result for leverage remains consistent with the results described earlier.

Overall, these additional robustness tests further validate the initial findings and enhance the understanding of the relationships between CEO base salary, firm performance, and control variables. The findings highlight the importance of variable pay in driving firm performance, consistent with findings in sections 6.4.1 and 6.4.2, and suggest that base salary alone may not effectively incentivize CEOs to improve firm performance. Moreover, the impact of firm age and leverage may vary depending on the performance measure employed.

7.0 Conclusion

This study examines the relationship between CEO compensation and firm performance in Norwegian companies listed on the Oslo Stock Exchange from 2015 to 2022 by conducting OLS regression and robustness tests. In order to analyze this relationship, we have formulated three distinct hypotheses. The first hypothesis states that total CEO compensation positively correlates with firm performance. The second hypothesis states that variable CEO compensation is positively associated with firm performance. According to the third and final hypothesis, a positive correlation exists between CEO base salary and firm performance.

The first hypothesis posits a positive correlation between CEO total compensation and firm performance. The results reveal no significant impact of total CEO compensation on Return on Assets (ROA). In contrast, results indicate a positive and significant relationship at the 5% level on Return on Sales (ROS), whit a 95% confidence interval ranging from 0.003 to 0.060. However, the robustness analyses reveal inconsistencies in these findings. Thus, there is not sufficient evidence to support the hypothesis that higher CEO total compensation leads to improved firm performance in publicly traded Norwegian companies.

The second hypothesis posits a positive correlation between CEO variable compensation and firm performance. The findings consistently demonstrate a positive and statistically significant impact of CEO variable pay on firm performance, as assessed by the Return on Assets (ROA) and Return on Sales (ROS) measures. The 95% confidence interval for ROA ranges from 0.003 to 0.007, while for ROS, it ranges from 0.008 to 0.019. Control variables, such as firm size, display a positive and statistically significant effect on ROA and ROS. Conversely, leverage exerts a negative and statistically significant effect on ROA. Furthermore, the influence of firm age on ROA is found to be statistically non-significant, while firm age exhibits a highly significant and negative effect on ROS. This finding aligns with previous research conducted by Loderer and Waelchli, which supports the notion that age negatively influences performance due to organizational rigidities or detrimental seniority rules. Nonetheless, additional investigation is required to draw conclusive insights. The robustness tests provide evidence to support the positive relationship between CEO variable pay and firm performance. These results align with agency theory, supporting the hypothesis that CEO variable pay positively influences firm performance.

The third hypothesis investigates the association between CEO base salary and firm performance. The findings reveal no statistically significant effect of CEO base salary on Return on Assets (ROA) but a weak and statistically significant positive relationship with Return on Sales (ROS). However, when subjecting the analysis to robustness tests, the previously observed significance of base salary on ROA becomes non-significant. The impact of control variables, namely firm age, firm size, and leverage, varies depending on the performance measure employed. Notably, when incorporating base salary as a component of total compensation, the results indicate a negative and highly significant effect on both performance measures. These results underscore the significance of the proportion of variable pay and suggest that base salary alone may not sufficiently incentivize CEOs to enhance firm performance.

In conclusion, we found no evidence that a higher base salary or total compensation enhances firm performance. Conversely, our findings indicate that variable pay positively affects the firm performance of Norwegian firms listed on the Oslo Stock Exchange. The results from this study remain robust and do support the agency theory.

8.0 Recommended Further Studies

The present study has yielded noteworthy findings concerning our thesis, thus paving the way for further investigation. A primary recommendation for future research pertains to the limitation of the study to Norwegian companies listed on Oslo Børs. Examining privately held firms would be valuable due to their distinct characteristics.

Furthermore, our study has identified a positive correlation between higher CEO variable pay and firm performance. However, we propose a more detailed analysis of the individual components of variable pay, as short-term and long-term incentives may exert differential effects on firm performance. The issue of excessive pay in the context of poor performance has recently gained attention, notably by Norges Bank Investment Management (NBIM), the world's largest sovereign wealth fund. NBIM expressed concerns about discrepancies between executive pay and firm performance, as its CEO, Nicolai Tangen, stated, "companies with pretty mediocre performance coming out with very big pay packages" (Milne, 2022). NBIM emphasizes the importance of remuneration aligned with long-term value creation and shareholder interests. Therefore, further research should explore potential disparities in short-term and long-term incentives and their relationship with Norwegian firms.

Lastly, a more thorough investigation into the influence of majority owners' geographical locations is necessary. The research done by Tosi and Greckhamer (2004) indicates that higher levels of individualism and tolerance for power imbalances are associated with higher CEO compensation. According to their hypothesis, companies in more individualistic societies may emphasize rewarding individual performance and hold CEOs more accountable for company success or failure. Consequently, despite the companies being Norwegian, CEO compensation may be influenced by the cultural background of the majority owners.

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Appendix A

Correlation Matrix

Table A1: Correlation Matrix

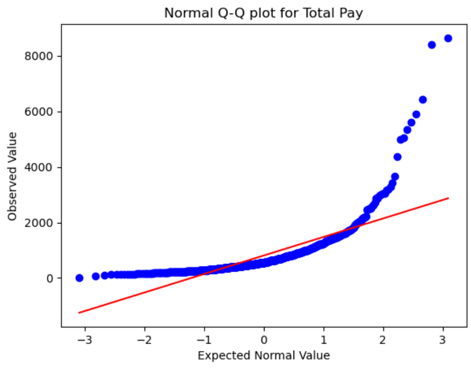
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
(1) ROE	1.000													
(2) ROA	0.593	1.000												
(3) ROS	0.323	0.561	1.000											
(4)Leverage	-0.186	-0.050	0.027	1.000										
(5) ln_firm_age	-0.012	0.058	-0.157	-0.046	1.000									
(6) ln_firm_size	0.115	0.201	-0.059	0.025	0.455	1.000								
(7) ln_total_assets	0.115	0.114	0.290	0.083	0.305	0.670	1.000							
(8) ln_sales	0.158	0.265	0.172	0.018	0.479	0.834	0.753	1.000						
(9) ln_BS	0.065	0.084	0.062	0.011	0.270	0.427	0.472	0.388	1.000					
(10) ln_VP	0.208	0.266	0.154	-0.056	0.114	0.302	0.292	0.293	0.382	1.000				
(11) ln_total_pay	0.105	0.153	0.075	-0.013	0.270	0.453	0.514	0.396	0.795	0.630	1.000			
(12) BS_TP_%	-0.130	-0.210	-0.093	0.033	-0.061	-0.241	-0.273	-0.205	-0.095	-0.731	-0.581	1.000		
(13) VP_TP_%	0.193	0.264	0.154	-0.048	0.041	0.209	0.246	0.203	0.257	0.831	0.602	-0.823	1.000	
(14) OB_TP_%	-0.114	-0.102	-0.109	0.017	0.036	0.029	0.020	-0.025	-0.144	-0.207	0.062	-0.207	-0.356	1.000

Appendix B

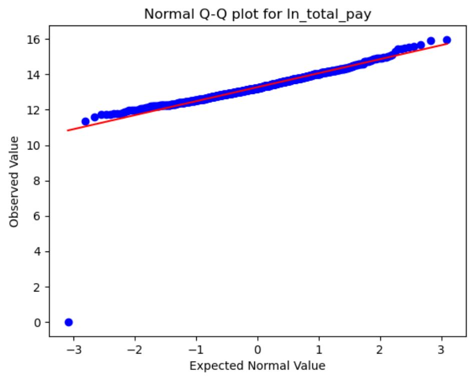
Data Transformation

Before | After

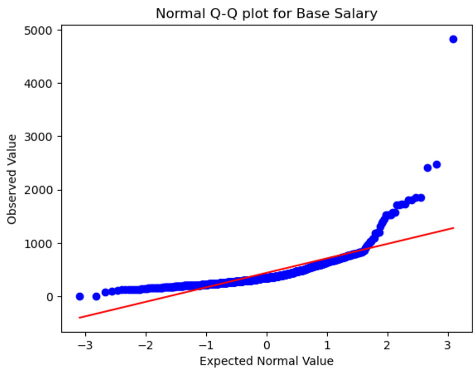
Graph B1:



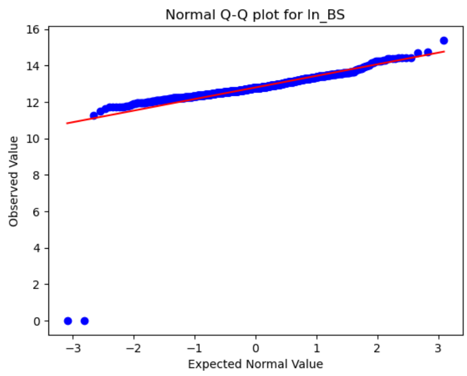
Graph B2:



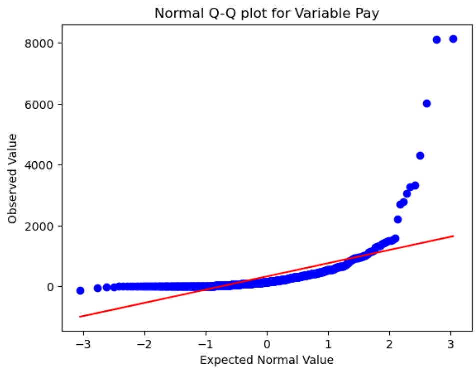
Graph B3:



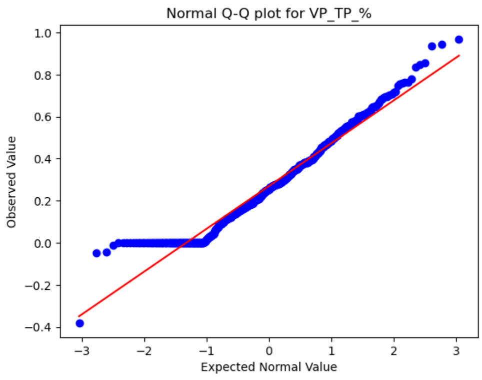
Graph B4:



Graph B5:

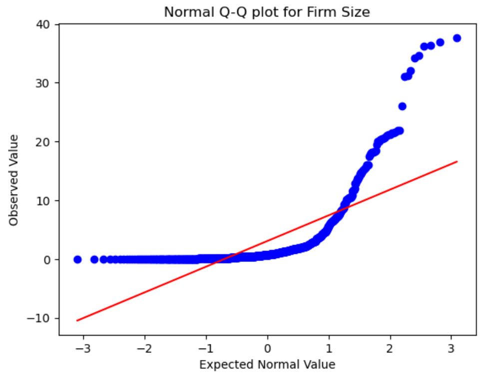


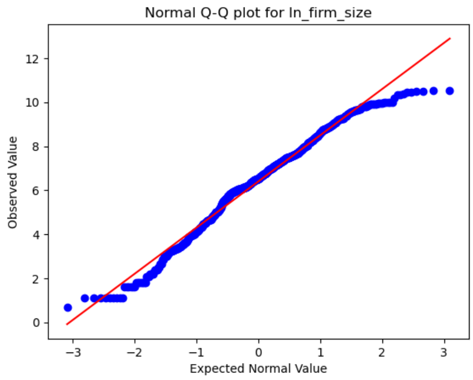
Graph B6:



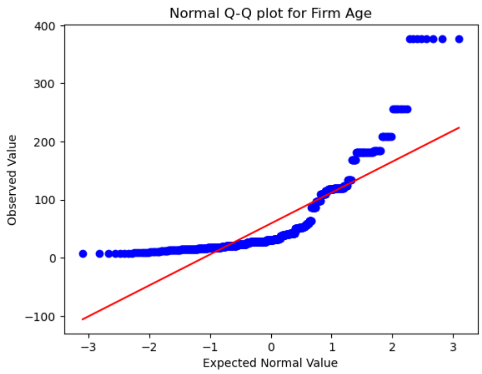
Graph B7:

Graph B8:



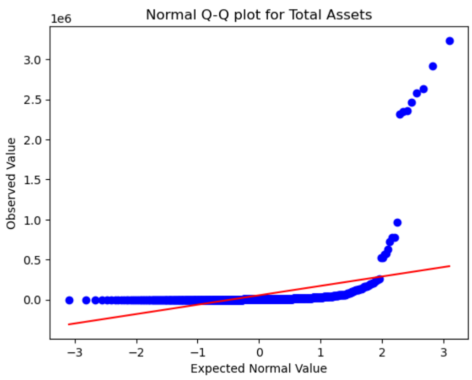


Graph B9:

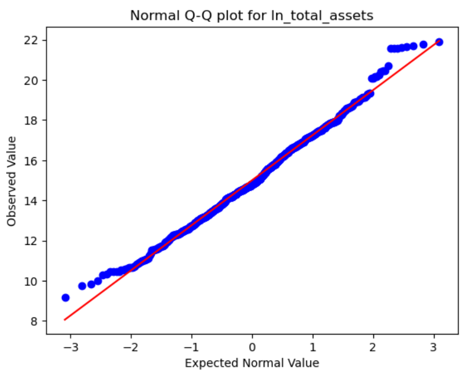


Graph B10:

Graph B11:



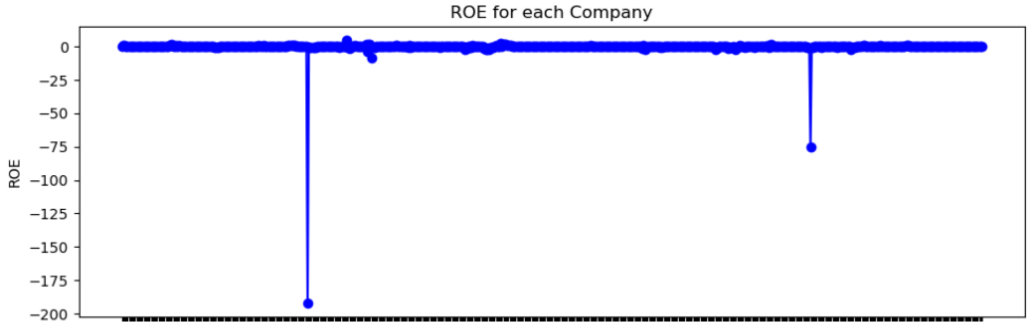
Graph B12:



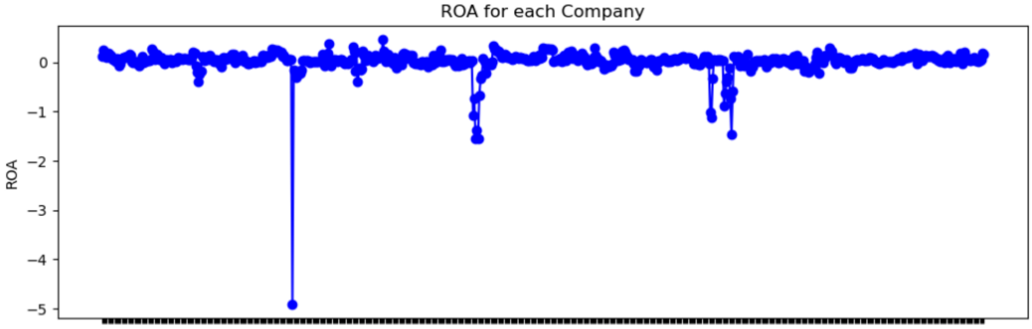
Appendix C

Outliers in return data

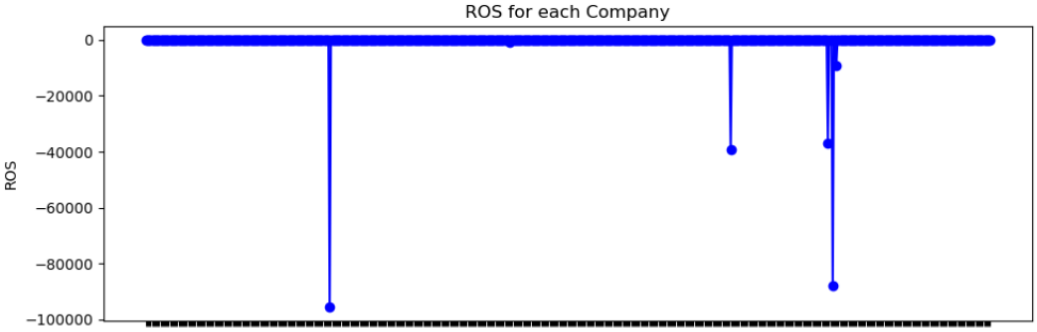
Graph C1: ROE for each company before any outliers are removed.



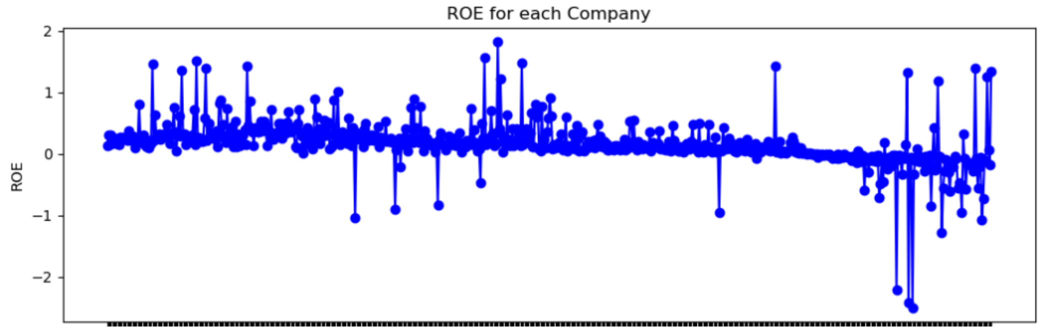
Graph C2: ROA for each company before any outliers are removed.



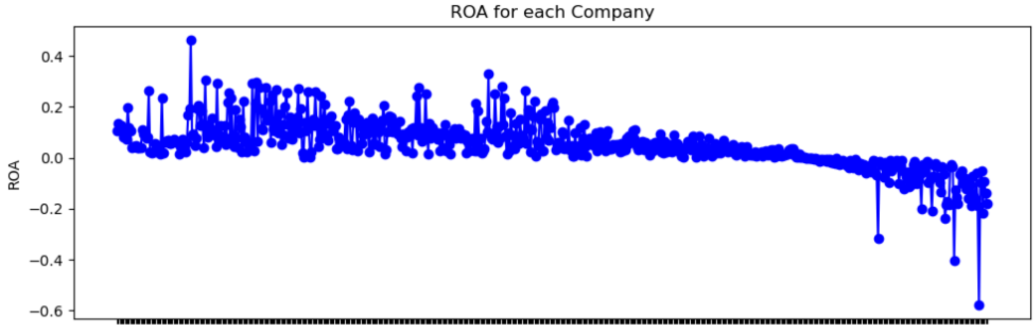
Graph C3: ROS for each company before any outliers are removed.



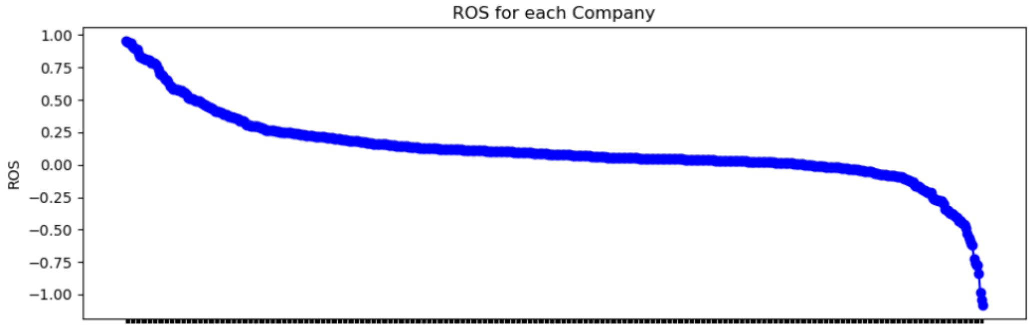
Graph C4: ROE for each company after outliers are removed.



Graph C5: ROA for each company after outliers are removed.



Graph C6: ROS for each company after outliers are removed.



Appendix D

Regressions

Table D1: Robustness test hypothesis 1, 2 and 3. Changing measure of return to Return on Equity (ROE).

	ROE			
Model	1	2	3	4
Constant	0.173***	0.007	0.133**	0.131
	(3.144)	(0.048)	(2.505)	(0.941)
ln_total_pay		0.023		
		(1.143)		
ln_VP			0.018***	
			(3.684)	
ln_BS				0.006
				(0.315)
ln_firm_age	-0.027	-0.029	-0.026	-0.028
	(-1.499)	(-1.635)	(-1.466)	(-1.563)
ln_firm_size	0.027***	0.023**	0.017*	0.026**
	(2.855)	(2.268)	(1.705)	(2.565)
Leverage	-0.017*	-0.017*	-0.016*	-0.017*
	(-1.825)	(-1.831)	(-1.809)	(-1.829)
Year Dummies	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES
Adj. R2	5.70%	5.80%	8.20%	5.60%
F-statistics	3.167***	3.073***	3.821***	3.023***
N	655	655	655	655

*CEO total pay (i.e. base salary, other benefits, and variable compensation), CEO variable pay (i.e. short- and long-term incentives) CEO base salary impact on ROE. Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time-variance effect and industry effect. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

Table D2: Robustness test hypothesis 1, 2 and 3. Changing the measurement of firm size with the natural logarithm of total assets.

	ROA				ROS			
Model	1	2	3	4	1	2	3	4
Constant	-0.025	-0.073*	0.002	0.033	-0.111	0.007	-0.087	0.004
	(-0.741)	(-1.738)	(0.057)	(0.782)	(-1.054)	(0.048)	(-0.813)	(0.026)
ln_total_pay		0.009**				-0.024		
		(2.241)				(-1.312)		
ln_VP			0.006***				0.006*	
			(6.262)				(1.748)	
ln_BS				0.001				-0.023
				(0.334)				(-1.063)
ln_firm_age	0.000	-0.001	0.000	-0.001	-0.065***	-0.063***	-0.065***	-0.063***
	(0.011)	(-0.303)	(0.005)	(-0.036)	(-6.240)	(-6.028)	(-6.304)	(-5.832)
ln_total_assets	0.005**	0.003	0.001	0.005**	0.038***	0.043***	0.034***	0.041***
	(2.226)	(1.322)	(0.569)	(2.138)	(6.062)	(5.855)	(5.114)	(5.993)
Leverage	-0.001**	-0.001**	-0.001**	-0.001**	-0.000	-0.000	0.000	-0.000
	(-2.557)	(-2.440)	(-2.087)	(-2.546)	(-0.167)	(-0.307)	(0.020)	(-0.223)
Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R2	6.60%	7.00%	10.30%	6.50%	20.10%	20.40%	20.50%	20.30%
F-statistics	7.822***	7.653***	9.929***	7.311***	14.180***	13.400***	13.720***	13.580***
N	655	655	655	655	655	655	655	655

*CEO total pay (i.e., base salary, other benefits, and variable compensation), CEO variable pay (i.e., short- and long-term incentives) and CEO base salary impact on Return on Assets (ROA) and Return on Sales (ROS). Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time-variance effect and industry effect. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

Table D3: Robustness test hypothesis 1, 2 and 3. Changing the measurement of firm size with the natural logarithm of total sales.

	ROA				ROS			
Model	1	2	3	4	1	2	3	4
Constant	-0.109***	-0.139***	-0.101***	-0.086**	0.125	0.105	0.141	0.125
	(-3.638)	(-3.403)	(-3.407)	(-2.016)	(1.274)	(0.766)	(1.434)	(0.964)
ln_total_pay		0.005				0.003		
		(1.179)				(0.228)		
ln_VP			0.004***				0.009***	
			(5.164)				(2.690)	
ln_BS				-0.004				0.000
				(-0.730)				(-0.002)
ln_firm_age	-0.009**	-0.009***	-0.008**	-0.008**	-0.064***	-0.065***	-0.064***	-0.064***
	(-2.469)	(-2.580)	(-2.507)	(-2.321)	(-5.963)	(-5.908)	(-5.986)	(-5.813)
ln_sales	0.012***	0.012***	0.010***	0.013***	0.026***	0.026***	0.022***	0.026***
	(5.654)	(5.380)	(4.618)	(5.641)	(4.051)	(3.856)	(3.181)	(3.929)
Leverage	-0.001***	-0.001***	-0.001**	-0.001***	0.001	0.001	0.001	0.001
	(-2.647)	(-2.586)	(-2.313)	(-2.676)	(0.233)	(0.240)	(0.412)	(0.233)
Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R2	11.10%	11.10%	13.50%	11.00%	16.90%	16.80%	17.90%	16.80%
F-statistics	9.409***	8.834***	10.170***	8.899***	10.060***	9.421***	10.200***	9.386***
N	655	655	655	655	655	655	655	655

*CEO total pay (i.e., base salary, other benefits, and variable compensation), CEO variable pay (i.e., short- and long-term incentives) and CEO base salary impact on Return on Assets (ROA) and Return on Sales (ROS). Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time-variance effect and industry effect. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

Table D4: Robustness test hypothesis 1, 2 and 3. Changing the measurement of CEO compensation to lagged period.

	ROA				ROS			
	1	2	3	4	1	2	3	4
Constant	0.008	-0.024	-0.002	-0.006	0.476***	0.261**	0.445***	0.182
	(0.487)	(-0.730)	(-0.094)	(-0.190)	(7.423)	(2.132)	(7.110)	(1.484)
ln_total_pay_t-1		0.005				0.030**		
		(1.142)				(2.035)		
ln_VP_t-1			0.005***				0.015***	
			(4.649)				(4.023)	
ln_BS_t-1				0.002				0.043***
				(0.538)				(2.667)
ln_firm_age	-0.007*	-0.007**	-0.006*	-0.007**	-0.039***	-0.042***	-0.037***	-0.044***
	(-1.950)	(-2.070)	(-1.866)	(-1.975)	(-3.981)	(-4.348)	(-4.011)	(-4.408)
ln_firm_size	0.009***	0.009****	0.007***	0.009***	-0.006	-0.011	-0.015**	-0.011
	(4.242)	(3.824)	(2.876)	(4.097)	(-0.828)	(-1.387)	(-2.030)	(-1.512)
Leverage	-0.001***	-0.001****	-0.001**	-0.001***	0.000	0.000	0.001	0.000
	(-2.698)	(-2.666)	(-2.334)	(-2.690)	(0.146)	(0.005)	(0.331)	(-1.164)
Year Dummies	YES	YES*	YES	YES	YES	YES	YES	YES
Industry Dummies	YES	YES*	YES	YES	YES	YES	YES	YES
Adj. R2	10.10%	10.10%	12.60%	9.90%	14.30%	14.90%	17.30%	15.40%
F-statistics	9.217***	8.478****	10.540***	8.533***	9.635***	9.035***	10.090***	8.913***
N	563	563	563	563	563	563	563	563

*Lagged CEO total pay (i.e., base salary, other benefits, and variable compensation), lagged CEO variable pay (i.e., short- and long-term incentives) and lagged CEO base salary impact on Return on Assets (ROA) and Return on Sales (ROS). Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time-variance effect and industry effect. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

Table D5: Robustness test hypothesis 1, 2 and 3. Changing the measurement of CEO variable pay and CEO base salary to percentage of total pay.

	ROA			ROS		
Model	1	2	3	1	2	3
Constant	0.0087	0.055***	-0.000	0.4821***	0.570***	0.460***
	(0.543)	(2.953)	(-0.021)	(8.068)	(8.353)	(7.731)
BS_TP_%		-0.060***			-0.115**	
		(-3.855)			(-2.128)	
VP_TP_%			0.080***			0.187***
			(5.623)			(4.176)
ln_firm_age	-0.0046	-0.004	-0.004	-0.0319***	-0.031***	-0.029***
	(-1.440)	(-1.314)	(-1.132)	(-3.190)	(-3.112)	(-2.986)
ln_firm_size	0.0087***	0.007***	0.007***	-0.0088	-0.012*	-0.013**
	(4.188)	(3.412)	(3.399)	(-1.323)	(-1.772)	(-2.031)
Leverage	-0.0011***	-0.001**	-0.001**	0.0012	0.001	0.002
	(-2.661)	(-2.523)	(-2.348)	(0.482)	(0.554)	(0.664)
Year Dummies	YES	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES	YES
Adj. R2	8.50%	10.20%	11.70%	14.70%	15.10%	16.50%
F-statistics	8.540***	8.667***	9.977***	9.411***	9.337***	9.961***
N	655	655	655	655	655	655

*Ratio of CEO variable pay to total pay (VP_TP_%) and ratio of CEO base salary to total pay (BS_TP_%) impact on Return on Assets (ROA) and Return on Sales (ROS). Note: this table reports the unstandardized coefficients. Year and industry dummies are included to control for the time-variance effect and industry effect. The t-statistics have been reported in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels.*

Appendix E

Residual plots

Table E1:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_firm\_age_{i,t} + \beta_2 \ln\_firm\_size_{i,t} + \beta_3 \text{Leverage}_{i,t} + \beta_4 dummies + \varepsilon_{i,t}$$

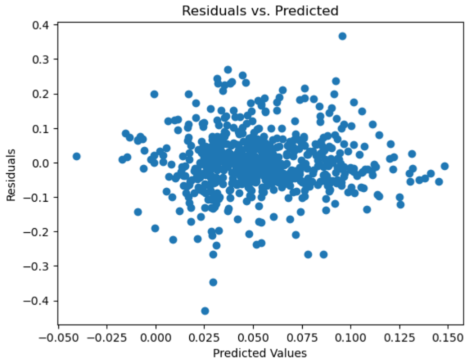


Table E2:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_total\_pay_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

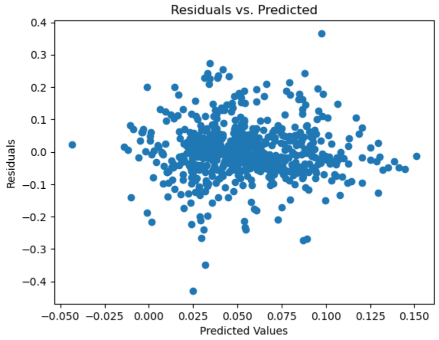


Table E3:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_VP_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

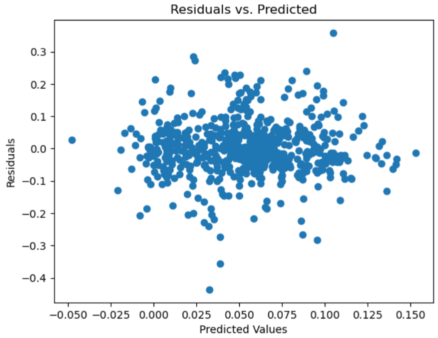


Table E4:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_BS_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

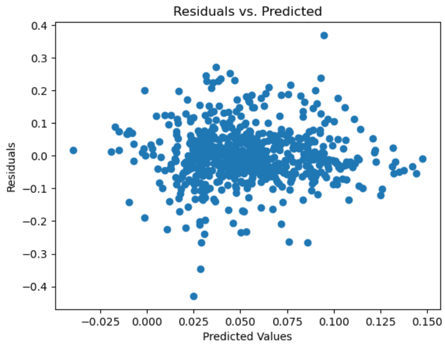


Table E5:

$$ROS = \beta_0 + \beta_1 \ln\_firm\_age_{i,t} + \beta_2 \ln\_firm\_size_{i,t} + \beta_3 \text{Leverage}_{i,t} + \beta_4 dummies + \varepsilon_{i,t}$$

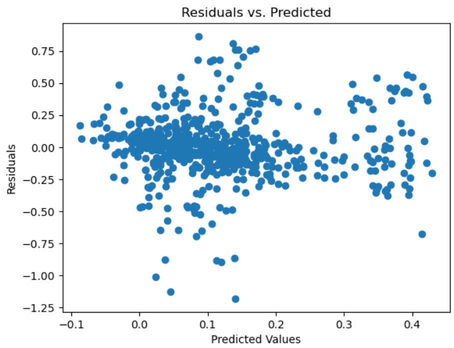


Table E6:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_total\_pay_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

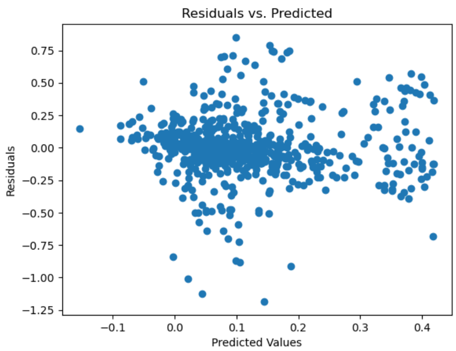


Table E7:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln \_VP_{i,t} + \beta_2 \ln \_firm\_age_{i,t} + \beta_3 \ln \_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

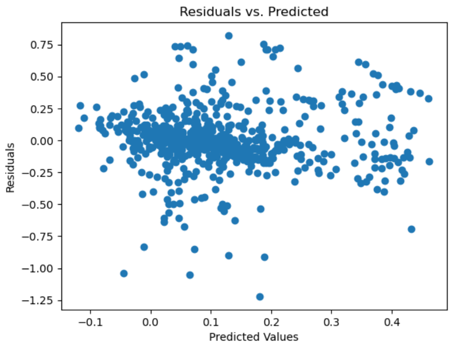


Table E8:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln \_BS_{i,t} + \beta_2 \ln \_firm\_age_{i,t} + \beta_3 \ln \_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

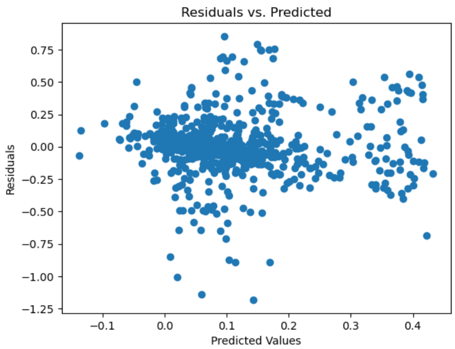


Table E9:

$$ROE = \beta_0 + \beta_1 \ln \_firm\_age_{i,t} + \beta_2 \ln \_firm\_size_{i,t} + \beta_3 \text{Leverage}_{i,t} + \beta_4 dummies + \varepsilon_{i,t}$$

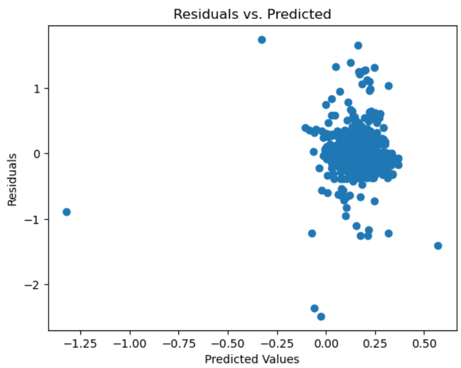


Table E10:

$$ROE_{i,t} = \beta_0 + \beta_1 \ln\_total\_pay_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

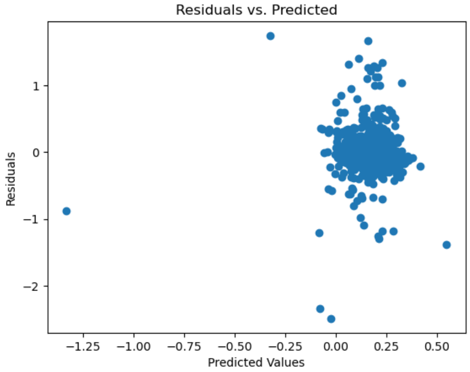


Table E11:

$$ROE_{i,t} = \beta_0 + \beta_1 \ln\_VP_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

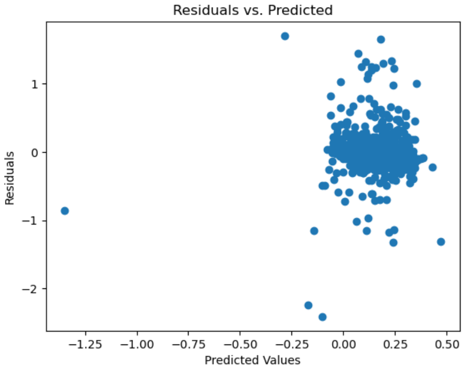


Table E12:

$$ROE_{i,t} = \beta_0 + \beta_1 \ln\_BS_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

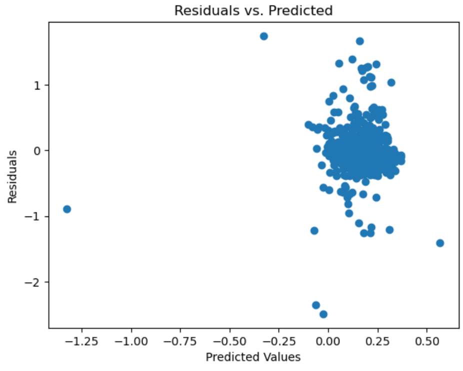


Table E13:

$$ROA_{i,t} = \beta_0 + \beta_1 \text{BS\_VP\_\%}_{i,t} + \beta_2 \ln\ \_firm\_age_{i,t} + \beta_3 \ln\ \_firm\_size_{i,t} + \ \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

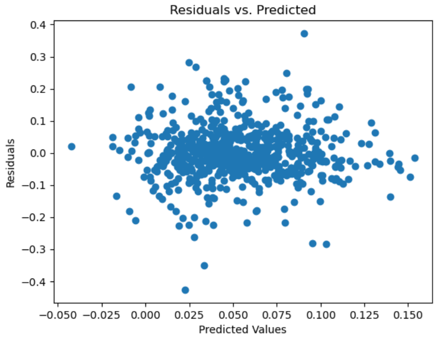


Table E14:

$$ROA_{i,t} = \beta_0 + \beta_1 \text{VP\_TP\_\%}_{i,t} + \beta_2 \ln\ \_firm\_age_{i,t} + \beta_3 \ln\ \_firm\_size_{i,t} + \ \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

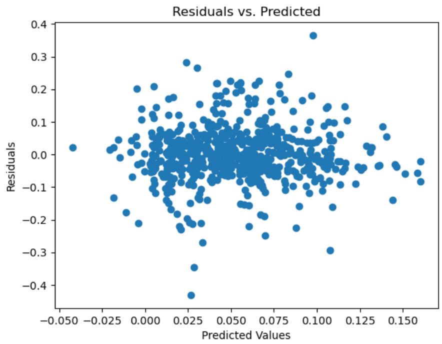


Table E15:

$$ROS_{i,t} = \beta_0 + \beta_1 \text{BS\_TP\_\%}_{i,t} + \beta_2 \ln\ \_firm\_age_{i,t} + \beta_3 \ln\ \_firm\_size_{i,t} + \ \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

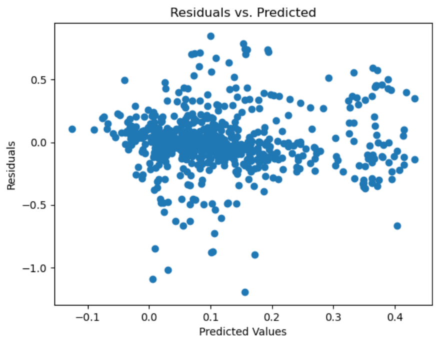


Table E16:

$$ROS_{i,t} = \beta_0 + \beta_1 \text{VP\_TP\_\%}_{i,t} + \beta_2 \ln\ \_firm\_age_{i,t} + \beta_3 \ln\ \_firm\_size_{i,t} + \ \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

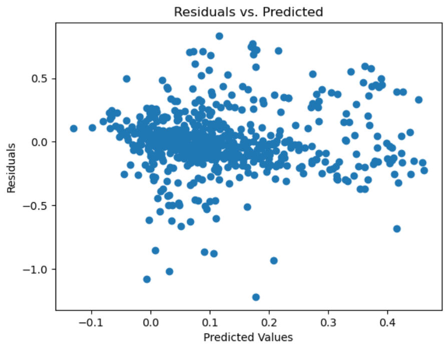


Table E17:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\ \_firm\_age_{i,t} + \beta_2 \ln\ \_total\_assets_{i,t} + \ \beta_3 \text{Leverage}_{i,t} + \beta_4 dummies + \varepsilon_{i,t}$$

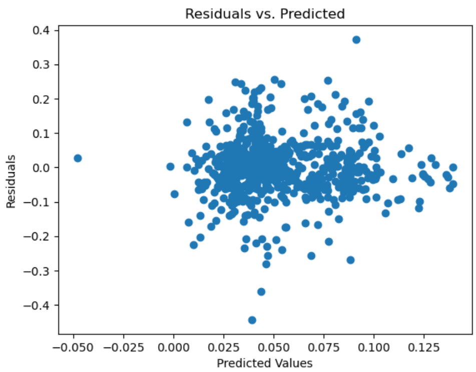


Table E18:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\ \text{\_total\_pay}_{i,t} + \beta_2 \ln\ \_firm\_age_{i,t} + \beta_3 \ln\ \_total\_assets_{i,t} + \ \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

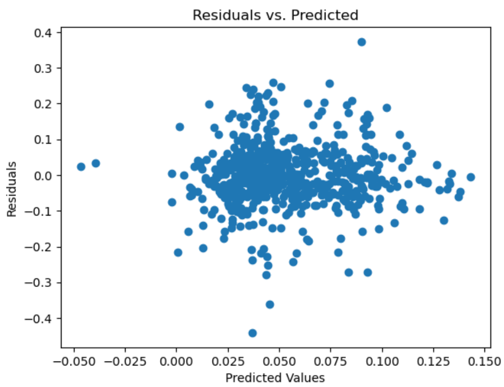


Table E19:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\text{VP}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_total\_assets_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

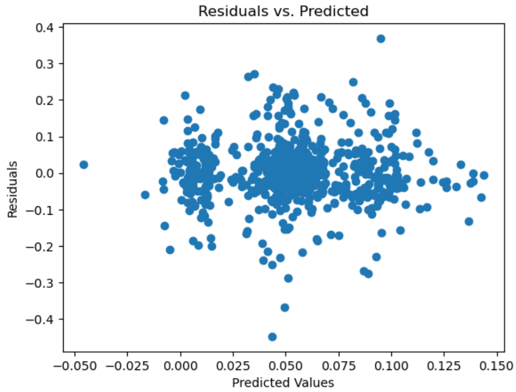


Table E20:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\text{BS}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_total\_assets_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

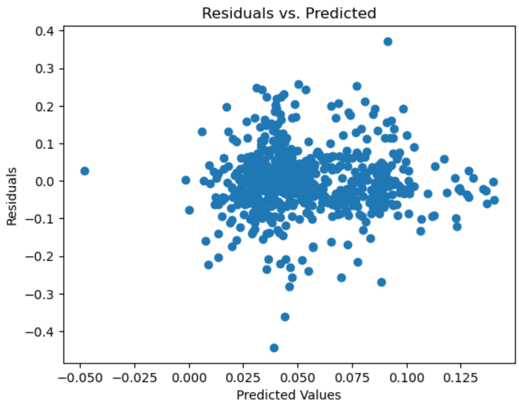


Table E21:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\text{total\_pay}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_total\_assets_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

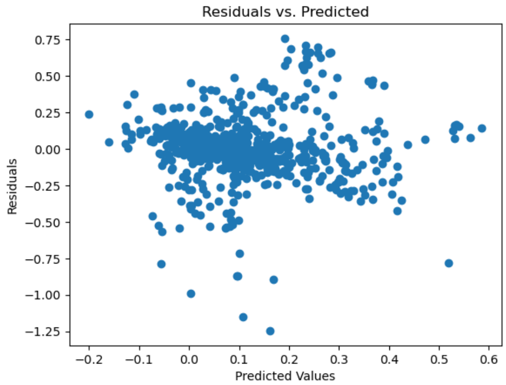


Table E22:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{VP}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_total\_assets_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

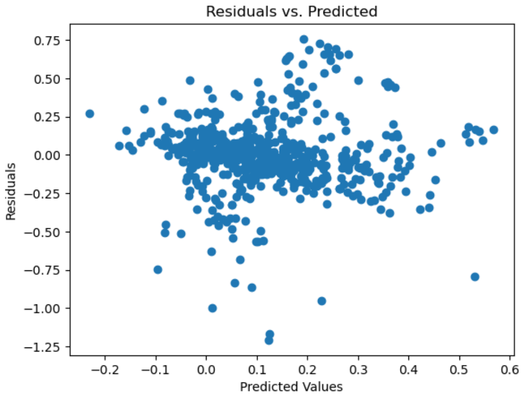


Table E23:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{BS}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_total\_assets_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

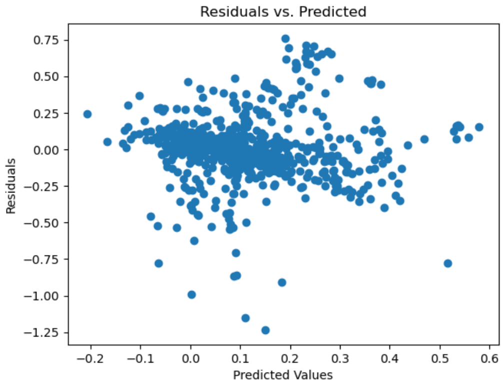


Table E24:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{total\_pay}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_sales_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

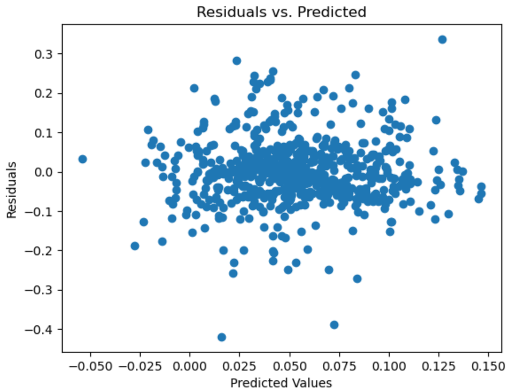


Table E25:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{VP}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_sales_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

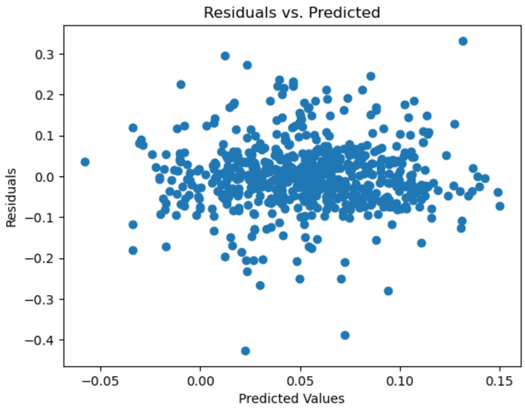


Table E26:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{BS}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_sales_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

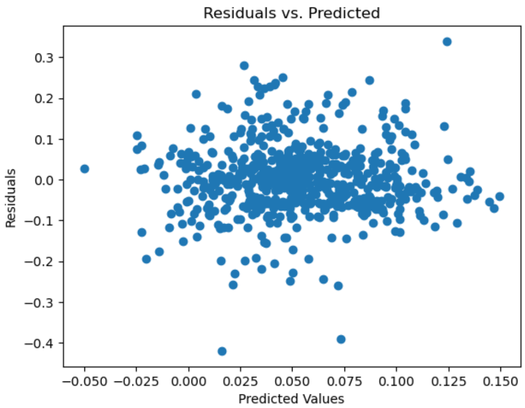


Table E27:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{total\_pay}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_sales_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

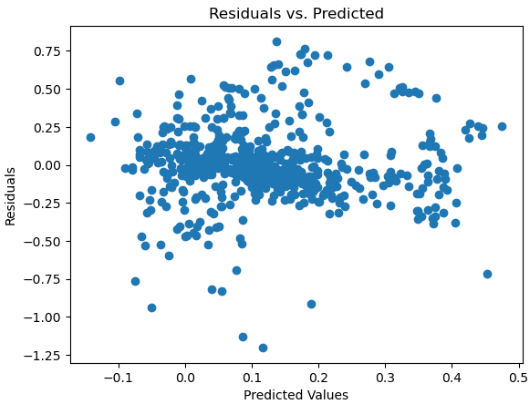


Table E28:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\text{VP}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_sales_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

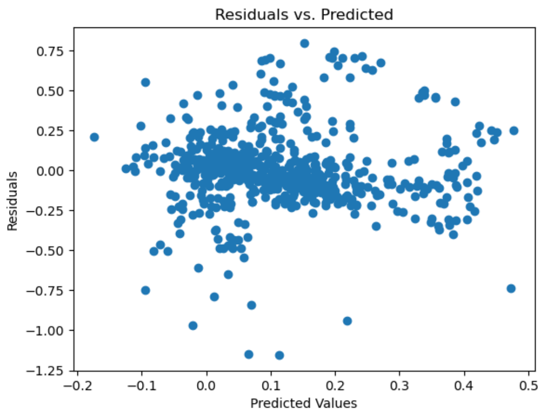


Table E29:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\text{VP}_{i,t} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_sales_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

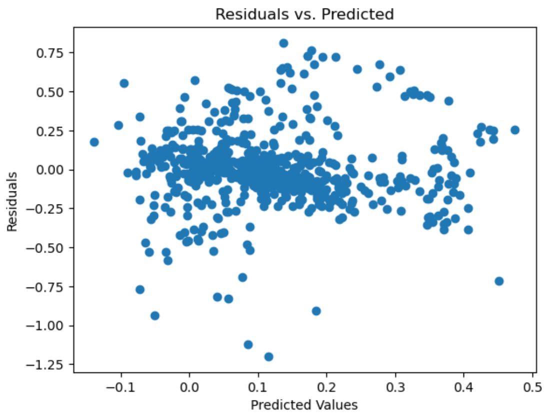


Table E30:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\text{total\_pay}_{i,t-1} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \text{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

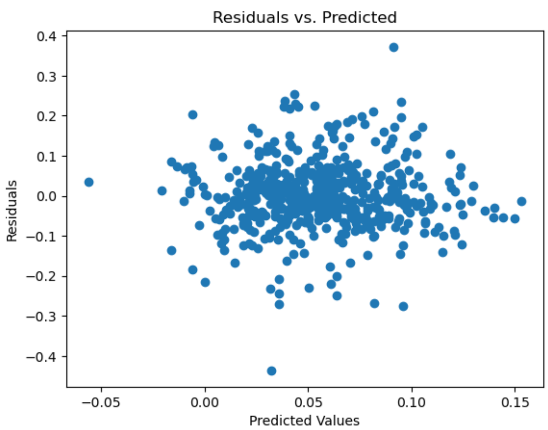


Table E31:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{VP}_{i,t-1} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

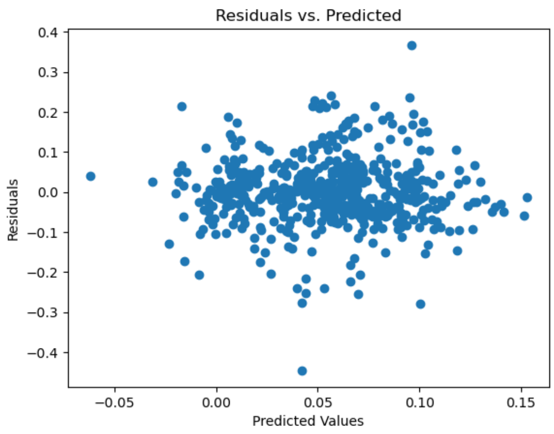


Table E32:

$$ROA_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{BS}_{i,t-1} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

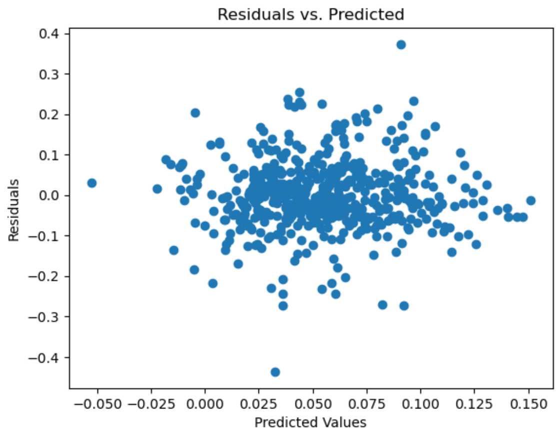


Table E33:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{total\_pay}_{i,t-1} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

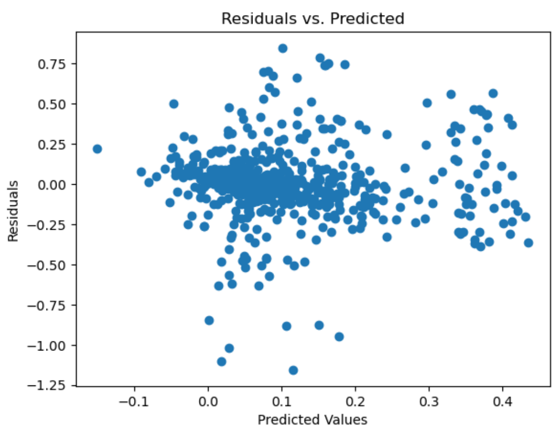


Table E34:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{VP}_{i,t-1} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_size_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$

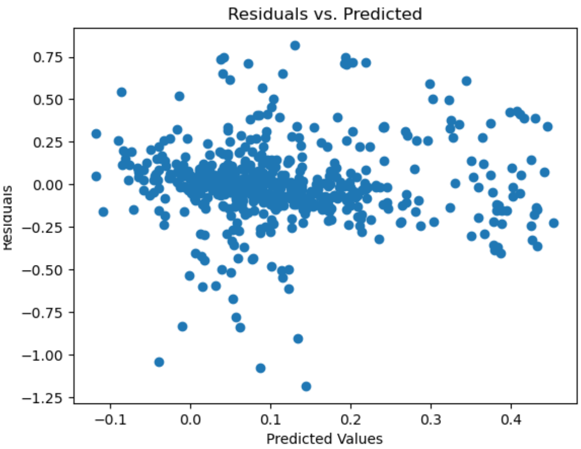
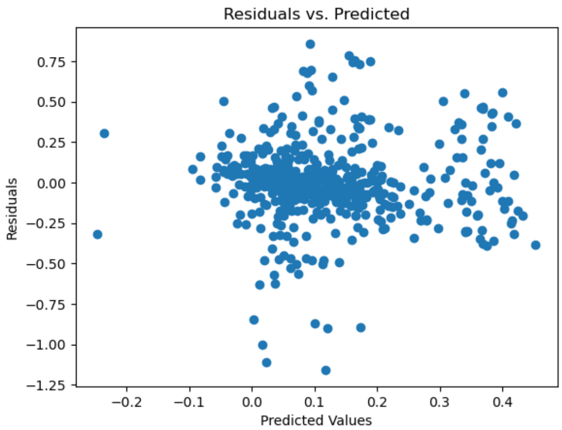


Table E35:

$$ROS_{i,t} = \beta_0 + \beta_1 \ln\_\mathrm{BS}_{i,t-1} + \beta_2 \ln\_firm\_age_{i,t} + \beta_3 \ln\_firm\_Size_{i,t} + \beta_4 \mathrm{Leverage}_{i,t} + \beta_5 dummies + \varepsilon_{i,t}$$



Appendix F

Descriptive statistics

Table F1: Descriptive statistics for the variables employed in the OLS regression analysis.

Variable	Unit	N	Median	Mean	Std.dev	Minimum	Maximim
Dependent Variables							
ROA	%	655	0.050	0.053	0.090	-0.404	0.463
ROS	%	655	0.081	0.116	0.265	-1.084	0.955
ROE	%	655	0.151	0.168	0.366	-2.512	1.822
Independent Variables							
Total Pay	MNOK	655	5	8	8	0	86
Variable Pay	MNOK	655	1	3	6	0	81
Base Salary	MNOK	655	3	4	3	0	48
Other Benefits	MNOK	655	0	1	2	0	52
VP_TP_%	%	655	0.210	0.237	0.213	-0.047	0.968
BS_TP_%	%	655	0.668	0.661	0.202	0.027	1.000
OB_TP_%	%	655	0.058	0.102	0.115	0.000	0.936
Control Variables							
No. of Employees		655	791	3 228	6 015	2	37 661
Firm Age		655	28	57	65	1	376
Leverage	%	655	0.429	1.088	4.313	-19.683	91.769
Total Assets	MNOK	655	3 033	57 906	298 952	19	3 236 431
Total Sales	MNOK	655	1 760	12 160	31 124	6	465 300

Appendix G

Firms Present

Table G1:

	2015	2016	2017	2018	2019	2020	2021	2022
ABG SUNDAL COLLIER HLDG ASA								
ABL GROUP ASA								
AF GRUPPEN ASA								
AKASTOR ASA								
AKER ASA								
AKER BP ASA								
AKER SOLUTIONS ASA								
AKVA GROUP ASA								
AMSC ASA								
ARCTICZYMES TECHNOLOGIES ASA								
AUSTEVOLL SEAFOOD ASA								
AXACTOR ASA								
B2HOLDING ASA								
BELSHIPS ASA								
BLUENORD ASA								
BORGESTAD ASA								
BORREGAARD ASA								
BOUVET ASA								
BYGGMA ASA								
CIRCIO HOLDING ASA								
CRAYON GROUP HOLDING ASA								
DNB BANK ASA								
DNO ASA								
DOF ASA								
EIDESVIK OFFSHORE ASA								
ELECTROMAGNETIC GEOSERV								
ELKEM ASA								
ENTRA ASA								
EQUINOR ASA								
EQVA ASA								
EUROPRIS ASA								
GC RIEBER SHIPPING ASA								
GOODTECH ASA								
GRIEG SEAFOOD AS								
GYLDENDAL ASA								
HAVILA SHIPPING ASA								
HEXAGON COMPOSITES ASA								
INTEROIL EXPLORATION AS								
ITERA ASA								
KID ASA								
KITRON ASA								
KONGSBERG GRUPPEN ASA								
LEROY SEAFOOD GROUP ASA								

	2015	2016	2017	2018	2019	2020	2021	2022
MEDISTIM ASA								
MORROW BANK ASA								
MOWI ASA								
MULTICONSULT ASA								
NAVAMEDIC ASA								
NEKKAR ASA								
NEL ASA								
NORDIC SEMICONDUCTOR								
NORSK HYDRO ASA								
NORWEGIAN AIR SHUTTLE ASA								
NRC GROUP ASA								
OCEANTEAM ASA								■
ODFJELL SE								
OLAV THON EIENDOMSSELSKAP								
ORKLA ASA								
OTELLO CORPORATION ASA							■	■
PANORO ENERGY ASA	■	■	■					
PARETO BANK ASA								
PGS ASA								
PHOTOCURE ASA								
POLARIS MEDIA ASA								
PROSAFE SE								
PROTECTOR FORSIKRING ASA								
Q-FREE ASA								
REACH SUBSEA ASA								
REC SILICON ASA					■			
SAGA PURE ASA	■			■				■
SALMAR ASA								
SATS ASA								
SCANA ASA								
SCATEC ASA								
SCHIBSTED ASA								
SOLSTAD OFFSHORE ASA								
STOREBRAND ASA								
STRONGPOINT ASA								
TELENOR ASA								
TGS ASA								
TOMRA SYSTEMS A/S								
VEIDEKKE A/S								
VISTIN PHARMA ASA								
VOW ASA								
YARA INTERNATIONAL ASA								
Total	81	81	81	81	84	85	82	80
Present in sample								
Not present in sample	■							

Appendix H

Exchange rates

Table H1: Exchange rates for USD and EUR in corresponding years.

Date	USD	EUR
2015	8.7986	9.6156
2016	8.6456	9.0865
2017	8.2411	9.851
2018	8.6911	9.9448
2019	8.8176	9.8807
2020	8.5375	10.5053
2021	8.8363	9.9888
2022	9.9066	10.5522