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The effect of internal control quality on executive compensation

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## Table of contents

1. Abstract	Page 3
2. Introduction	Page 4
3. Theoretical framework	Page 6
3.1 Introduction to internal controls	Page 6
3.2 Introduction to executive compensation	Page 6
3.3 Review of related empirical studies	Page 7
3.4 Review of supporting theories	Page 9
4. Hypotheses development	Page 12
4.1. Hypothesis 1	Page 12
4.2. Hypothesis 2	Page 13
5. Sample selection	Page 15
5.1. Data	Page 15
5.2. Sample selection	Page 15
6. Research design	Page 17
6.1. Hypothesis 1	Page 17
6.2. Hypothesis 2	Page 18
7. Empirical results	Page 20
8. Conclusion and discussion	Page 25
9. References	Page 26
10. Appendices	Page 29
10.1. Appendix A: Descriptive statistics sample selection process	Page 29
10.2. Appendix B: Variable descriptions first hypothesis	Page 30
10.3. Appendix C: Variable descriptions second hypothesis	Page 33

## **1. Abstract**

This study is about the effect of internal control quality on executive compensation. There are two parts to this study, which both include the internal control quality of a firm and the executive compensation. The sample includes the years 2004-2021 and examines a total of 1,630 different firms and 24,419 different executives. On this sample, multiple regressions are performed. The findings present an economically significant positive correlation between the internal control quality and the executive compensation. This indicates that the executive compensation increases when the internal control quality improves. A similar result is found for the effect of a change in internal control quality on executive compensation. These results were not necessarily expected, but however, could stem from multiple changes in executive compensation, for instance in the performance-based pay over the years, or in reputation-driven compensation.

## 2. Introduction

As stated above, this research investigates the effect of the internal control quality on executive compensation. The manipulation of the executive compensation by executives is often seen as a result of the internal control system of a firm (Brown & Lim, 2012). This makes the combination of the subjects of internal controls and executive compensation interesting (Merchant, 1982).

The research question is therefore following:

### *Does internal control quality affect executive compensation?*

There is a lot of research conducted on this topic in the previous years, for instance, the study of Paletta and Alimehmeti (2018). However, in this research, the sample period is from 2002 till 2010, which makes the research relatively dated. Therefore, a new study on this subject could find new insights, making it a contribution to literature.

To further elaborate on the contribution of this study, the changes in executive compensation over the last fifteen years are especially relevant. As concluded by Devers et al. (2007), the compensation package for executives can change quite fast, making it a relevant subject to study over different time periods. Moreover, as explained by Edmans et al. (2017), the changes in executive compensation over the years have made it economically significant to research it again. Presented by Edmans et al. (2017) are the biggest changes over the past years in executive compensation, which include the following: there is more focus on performance-based pay, the use of stock options are reduced, there is an increased amount of scrutiny about executive compensation, there is an increase in the amount of disclosure, and there is more shareholder activism detected within firms. These aspects could significantly impact and change the results of previous studies. For instance, the increased scrutiny surrounding executive compensation could lead to a decrease in certain types of compensation, such as salary, since this is quite an easily detectable type of compensation. This example could impact on the previous studies on internal controls and executive compensation quite severely. Thus, it is relevant and a contribution to the existing literature to research this subject now once again with an updated sample period.

Besides the similar research on this topic, which is previously conducted, the research on this topic is not yet complete. For instance, Henry et al. (2011) solely studied the incentivization of implementing an effective internal control system in relation to executive compensation. The other research close to this subject, for example, specifically focuses on CFO compensation (Hoitash et al., 2012), or on mechanisms such as the agency problem combined with internal controls and executive compensation (Coughlan & Schmidt, 1985).

Another interesting part of this study is the studied impact of internal controls on executive compensation over time. Multiple researchers have shown the initial impact of internal controls on executive compensation but were not able to give a definitive answer on the change in this relationship over a longer period (Battaglia et al., 2016).

This results in this topic being both a gap in academic literature and in creating tension. The tension is created since the manipulation of the executive compensation by management is a

significant issue (Lazear, 2000) and because of the interest in this topic lately. The gap emphasizes the changes made in executive compensation over the last 15 years, as explained by Edmans et al. (2017) and Devers et al. (2007).

### **3. Theoretical framework**

#### **3.1. Introduction to internal controls**

The importance of internal controls is often the subject of research (Hermanson & Smith, 2012), which makes it essential to define it and to explain the use of these internal controls.

Per definition of Spira & Page (2003), internal controls are the processes that are used in a firm that ensure the integrity of financial reporting and regulatory compliance. These processes include mechanisms, rules and procedures that ensure the integrity and timeliness of financial and accounting information, highlight accountability, and detect and prevent fraud.

A probable reason for the amount of research conducted is the consequences of ineffective internal controls. One of the consequences is for firms with ineffective internal controls that rely on erroneous internal management reports when forming guidance. The guidance by management in these firms is less accurate, which makes the firm inefficient (Feng et al., 2009).

According to Feng et al. (2015), the consequences of ineffective internal controls on operations are also economically significant. In this paper, the authors conclude that firms with inventory-related material weaknesses have systematically lower inventory turnover ratios and are more likely to report inventory impairments than firms with effective internal controls for financial reporting. The authors distinguish between several types of weaknesses in internal controls and the related consequences with these weaknesses.

However, internal control systems do not only affect the guidance by management and the financial reporting of a firm. According to Brown & Lim (2012), executive compensation is also a factor influenced by the internal controls of a firm. In their research, they highlight the accounting scandals such as Enron and WorldCom. These scandals were typified by low financial reporting quality and disproportionate pay-for-performance. These situations were, among other factors, a result of ineffective internal controls in these firms.

Earlier studies regarding the subject of internal controls show that firms reporting material weaknesses in internal control have inferior accruals (Ashbaugh-Skaife et al., 2008), which are driven by disclosures that relate to overall company-level controls (Doyle et al., 2007). Moreover, Bedard (2006) discovered that the firms that report material weaknesses in internal controls have lower earnings quality than firms that reported relatively fewer material weaknesses reported in their internal controls. In addition to this, Chan et al. (2005) concludes that the firms with the reported material weaknesses in internal controls have lower earnings-returns coefficients.

#### **3.2. Introduction to executive compensation**

To give a clear view of executive compensation, it is vital to start off with the defining of executive compensation. Executive compensation refers to the total salary, benefits and bonuses a firm gives an executive in a firm for the work they conduct (Hoitash et al., 2012). Therefore, executive compensation also includes the stock options, stock, and performance shares that are offered to an executive because of the position they fill within the firm.

Some of these parts of compensation are based on the performance of an executive, which is used as an incentive for this executive. Gjesdal (1981) concludes that earnings-based performance measures are often used to motivate and reward executives. However, because executives are aware of the impact of their actions on earnings, they can manipulate this measure to increase their compensation.

Furthermore, the earnings do not fully reflect the long-term consequences of recent implications, decisions, and actions (Graham et al., 2005). This occurs for instance because of the time and frequency when the earnings are reported, which is mostly annually or quarterly, making these reports potentially not sufficient to capture the long-term consequences of decisions and actions that take multiple years to unfold. Another reason that earnings possibly do not fully reflect the long-term consequences of recent actions is that there could be externalities associated with this action that are not directly shown in earnings. The fact that earnings do not fully reflect the long-term consequences of recent implications, decisions, and actions could impact this study by making it less reliable. However, neither analysts nor researchers can be sure of the future, which makes this decrease in reliability normal for this study.

Luckily, it is concluded by Dechow et al. (1994) that CEOs are kept away from events like the restructuring of the firm and above the line losses (Gaver & Gaver, 1998).

### **3.3. Review of related empirical studies**

There are many studies related to this study that are both interesting and helpful. For instance, the study of Lin et al. (2014) emphasizes the CEO characteristics that make CEOs strive for stronger internal control systems. Here a sample of Taiwanese listed firms is constructed based on several indicators and aspects of the firm, such as data availability. It is concluded that CEO age and CEO tenure positively influence the quality of the internal control system. For CEO ownership and CEO duality, this influence is negative. Surprisingly enough, CEO education has no significant effect on the internal control system quality. The findings do, however, imply that there are certain CEO characteristics that influence the quality of the internal control system. This paper is significant in this study, since it gives a clearer insight into the pattern of executives.

One more paper that is interesting for this study is the paper of Abd Aziz et al. (2015). In this research, the literature on the use of integrity systems, internal control systems, and leadership practices in enhancing the accountability of public sector organizations are summarized and reviewed. The authors find that there are three main factors that are critical in promoting good governance in reducing corruption, one of which is an efficient and effective internal control system. The interesting aspect of this paper is found in the separation of the efficient and effective internal control system and the leadership practices. The authors clearly state that this is a necessary boundary that needs to be made to be able to draw accurate conclusions without loss of information. The significance for this study is the relationship that is implied between the leadership and the internal control system, which implicates that there is some correlation there. This might be due to the possible manipulation of earnings and executive compensation by leadership figures.

To further elaborate on manipulation of executive compensation, the paper of Faulkender et al. (2010) is alluring. The authors of this paper give an overview of the existing research on executive compensation and propose improvements to corporate processes. In this paper, the authors state very clearly that the interests of executives, shareholders, and the broader public should be aligned for a firm to have relatively good corporate governance and no inclination to manipulate executive compensation.

Other authors that examined the manipulation of executive compensation by management are Axelson & Baliga (2008). This pair investigated the impact of liquidity constraints on the design and manipulation of executive compensation schemes. A result that is acquired is that illiquidity can distort the incentives captured in the compensation packages, which may lead to manipulation of the compensation by executives. Furthermore, the authors examine the distinctive features of compensation schemes and how to mitigate the potential risks of these compensation schemes. One of the risks they found that is helpful in this study, is that longer vesting periods and stronger claw back provisions can reduce the potential for the manipulation of executive earnings. Here the vesting period is the period that an employee works for a firm before receiving the full amount of equity-based compensation. The claw back provision refers to a clause of the contract between employee and employer, which allows the employer to reclaim all or some of the employee's compensation that has already been paid out. This makes it easier for an employer to hold an employee accountable for their actions, should they for instance be unethical. However, the cost of providing incentives to executives does increase in countering the risk of manipulation of executive compensation. The significance for this study is found in this paper in the examining of the compensation schemes, which are incredibly useful in determining the factors that might influence the reliability of the executive compensation numbers in this study.

The subject of manipulation of executive compensation is related to the amount of board control, or so Boyd (1994) states. In the research of this subject, the author investigates the relationship between board control and CEO compensation. This study was motivated by the question of which boards of directors should control executive pay. Concluded from this could be that the board of directors play a vital role in determining CEO compensation, since they are responsible for monitoring and controlling the CEO. Furthermore, Boyd found that this is not the only aspect that has impact on the CEO compensation. Both firm size, CEO ownership, and multiple other factors also have a stake in the choosing of the compensation package. What is most important for this study in the paper of Boyd (1994) is the distinct need for effective board control in determining CEO compensation. It is also shown that other factors should be considered in the choosing of the CEO compensation level and CEO compensation package.

To circle back to the combined subject of internal controls and executive compensation, the paper of Fernandez & Arrondo (2005) is interesting to look at. In their research, they use alternative internal controls as substitute for the board of directors in corporate governance. The reason behind this testing is because it was common to let the board of directors be the ultimate decision-making committee in corporations. With this research, they explored



whether the use of alternative internal controls could bring a relative advantage to the decision-making process of a firm. On this subject, it is concluded that alternative controls can supplement or substitute the board of directors on certain occasions, such as the determining of the executive compensation. For this study about the effect of internal controls on executive compensation, the study of Fernandez & Arrondo (2005) can be used as background information in the determining of the structure of the compensation package and as background information in the capturing of the use of the internal control system of a firm.

A study that also has a more controversial way of thinking about internal controls and executive compensation, is the paper written by the researchers Finkelstein & Hambrick (1989). These authors argue that political processes such as lobbying also heavily influence CEO compensation. The paper shows both the market forces as the political processes involved in determining the CEO compensation level and the CEO compensation package and finds a relationship between these aspects. Therefore, the authors suggest that CEO compensation is not solely determined by market forces, such as performance, but a more general and nuanced view of these factors is vital in understanding the levels of CEO compensation in large companies. This is exactly what makes the paper of Finkelstein & Hambrick (1985) related to this study. The effect of a single factor is often distributed in a variety of factors itself, which cannot be determined without having a nuanced understanding of the underlying movements internal and external to a firm.

The last pair of researchers that show a different side of the relationship between internal controls and executive compensation are Sjarief and Weli (2016). The researchers focused on the relationship between internal control disclosure, executive compensation, and the timeliness of financial reporting. The sample captured Indonesian listed firms and concluded that better internal control disclosure is positively associated with the timeliness of financial reporting. Moreover, the authors find that with better timeliness of financial reporting, higher levels of executive compensation are collected. With these results, there is concluded that companies with better internal control disclosure are more likely to prioritize timely financial reporting and that executive compensation may influence this timeliness of reporting.

### **3.4. Review of supporting theories**

There are many useful theories for this study to elaborate on, starting with the study of Hoitash et al. (2012). Here the authors empirically test a conceptual model that examines the effects of CFO fiduciary duties on executive compensation. The hypothesis of the authors is focused on the CFO responsibility for the quality of financial reporting and internal control systems. To find their results, the authors analyze the relationship between the existence of material weaknesses in internal controls (ICMW) and CFO compensation. The conclusions that are drawn from the performed tests are that firms with a weaker internal control system usually have lower CFO compensation than firms with a stronger internal control system. This makes it a useful theory, since its implications are for the given sample period from 2004 till 2007, making the sample period more than 15 years ago. So even though the theory of this paper is useful, the paper itself is quite dated and the implications might not be applicable for a more recent period.

The same problem arises with the paper of Brown & Lim (2012), which uses the same sample period as Hoitash et al. (2012). This is a paper that looks for the impact of internal control deficiencies on the relationship between earnings and executive compensation. The results are that executive compensation is less sensitive to earnings when there are internal control deficiencies present. This is a logical conclusion since the use of earnings for the gain of the management declines when there are internal control deficiencies present.

Another paper that is similar to the two papers above is the paper of Paletta & Alimehmeti (2018). This paper elaborates on the relationship between internal control quality and executive compensation after the implementation of the Sarbanes-Oxley Act (SOX). It specifically investigates the effect of the mandated disclosure of internal control weaknesses on the executive compensation. The authors imply that the newly mandated disclosure could lead to greater accountability for executives, which also results in the interests of executives being more like the interests of the shareholders of the firm.

The three papers listed above are especially interesting for this research paper, since the subject is quite similar to the subject of this study. The conclusions that are drawn are all in support of the hypothesis of this study, as stated in the introduction.

The paper of Henry et al. (2011) builds on the papers which are elaborated on above, by investigating the effectiveness of internal control systems and their relationship with executive compensation. Though only a small sample, consisting of 270 firms, is used, the authors can draw conclusions on a few aspects. The most important findings are that the stronger the internal control system in a firm is, the higher the level of executive compensation. This can be explained by the executives creating stronger internal control systems with the goal of protecting their financial interests. In conclusion, this paper slightly builds on the earlier papers by considering the effectiveness of the internal control system, though this is still quite similar to this study.

The research of Shon & Weiss (2009) then shows the same results as the paper of Henry et al. (2011). This paper, once again, examines the effectiveness of the internal control system in a firm with the new SOX Section 404 mandate and the relationship of this system to executive compensation. The result is, as mentioned, the same as in the other papers on this subject, namely that the compensation increases when firm performance increases. This is in line with the expectation of this study and the logical explanation that executives are rewarded with more compensation if the performance of a firm improves or is above certain benchmark standards. Besides this conclusion, the authors state the importance of CEO ownership and other corporate governance policies and practices.

To broaden the perspective of this subject, Hajiha & Bazaz (2016) studied the impact of internal control weaknesses on executive compensation in Iran. The sample they used is from 2009 to 2013, which makes this study a bit more relevant for the time frame we are currently in. The results show the same results as the studies that are conducted for US firms: the less weaknesses of the internal control system a firm discloses, the higher the executive

compensation. This means that there is a negative relation found in Iran between the ICMWs and the executive compensation.

In conclusion, all the papers that are mentioned in this sector show the same result. This result is that executive compensation tends to be lower when the internal controls of a firm are better, since then there is less opportunity for the manipulation of earnings by management. These papers are therefore all supporting of the hypothesis of this study, which makes them useful.

## 4. Hypotheses Development

### 4.1. Hypothesis 1

In this research, I will build on the study of Brown & Lim (2012), Hoitash et al. (2012), and Paletta & Alimehmeti (2018), who all study a similar subject. However, the difference is that I will not solely use the disclosure of ICMW under Section 404 of the Sarbanes-Oxley Act (SOX 404) to proxy for the actual impact of an internal control problem (Audit Analytics, 2022). This indicates that the higher the value of ICMW's, the lower the quality of internal controls in a firm. Moreover, this study includes more recent data to report the changes in executive compensation and its relation to the internal control system of a firm.

For the dependent variable, I will use the total reported executive compensation from the ExecuComp database (ExecuComp, 2022). This dependent variable is contingent on the level of executive compensation, which includes all kinds of compensation, such as salary, bonuses, and stock awards. According to Frydman & Jenter (2010), in researching executive compensation, the inclusion of demographic control variables is of the utmost importance to emphasize the effect of these factors on both the making of an internal control system and the decision on executive compensation packages.

In accordance with the paper of Paletta & Alimehmeti (2018), there are many ways in which internal controls can affect executive compensation. One of those reasons is based on the paper of Edmans et al. (2017), which focuses on performance-based pay. Internal controls could influence this part of executive compensation by the target setting the firm uses in the internal control system when determining the compensation level. Another way of impacting the executive compensation by internal controls is by the monitoring of management or transactions (Michelon et al., 2015). This can be an indicator of the effectiveness of the internal control system. For instance, when there is more monitoring, there is less opportunity for the manipulation of earnings by executives. Therefore, the expectation would be that the executive compensation is negatively correlated with internal controls.

A third example of how internal controls can impact compensation is in the assessment and management of risks (Power, 2004). As Power (2004) explains, using risk management to influence executive compensation is commonly used. For instance, when an executive needs approval from the directory board to acquire a large(r) compensation package or when there is a general stop in increasing the compensation package as formulated by the board of directors.

As said, the research question examines the effect of internal controls on executive compensation. Consequently, the hypotheses that I will analyze in this study are the following:

***Hypothesis 1: The quality of the internal control system has a positive association to the total executive compensation.***

The expectation is that internal controls do affect executive compensation, since the manipulation of executive compensation can be influenced by implementing certain internal controls, such as reporting quality (Faulkender et al., 2010). The expectation is that the higher the amount of internal control weaknesses, and thus the lower the quality of internal controls,

the higher the executive compensation will be. This expectation is confirmed by previous research, such as the study of Merchant (1982).

## **4.2. Hypothesis 2**

The second part of this study is based on the question of whether a change in the internal control quality inspires a change in executive compensation over a period of time. This part of the hypothesis is to check whether the executive compensation is being changed over a year as a result of a change in internal control quality between two years.

This longitudinal part of this study potentially helps explain the changes of influence over time and helps with the establishment of the reliability of the causal relationships between the dependent and independent variable. Moreover, longitudinal studies can help regulators in making more informed decisions about the regulations regarding executive compensation (Tosi Jr & Gomez-Mejia, 1994). For companies, this longitudinal study on the effect of internal controls on executive compensation can also be helpful. For instance, it can increase transparency and accountability in the making of the compensation package (Kaptein, 2010). This results in the showing of consistency in executive compensation by companies to their stakeholders. A longitudinal study may also be effective in the analyzing of certain practices or policies. This kind of study can determine whether the performed practices and policies are efficient and of high enough quality for the firm. For instance, the effect of internal controls on executive compensation over time can show the effectiveness of the firm in attracting and retaining talent Chambers et al. (1998).

In this part of the study, the independent variable is the change in internal controls between two years. The dependent variable is the change in executive compensation in between the same two years. This way it can be researched whether a change in internal controls inspires a change in executive compensation, thus checking the causal relationship that is potentially found in the first hypothesis.

In conclusion, the adding of a longitudinal study is both effective for companies and regulators and contributes to the current literature. The hypothesis following this conclusion is stated below.

***Hypothesis 2: A change in the quality of internal controls is positively associated with a change in executive compensation.***

The expectation with this hypothesis is that the change in internal control quality is negatively correlated with the change in executive compensation. This means that the more positively the quality of internal controls changes between two years, the lower the executive compensation will be in the second year. The expectation is therefore in line with the expectation of the first hypothesis. From this hypothesis, two conclusions are expected to be drawn, the first one being whether the internal control quality changes over a year time.

The change in internal control quality is the independent variable in this hypothesis, which is constructed by taking the ICMW's of the first year and comparing that with the ICMW's of the second year to see if there are any changes. The higher this variable, the more improvement the firm has made in their internal control quality over a year time. The

dependent variable, which is the change in executive compensation, will be constructed by comparing the executive compensation of the first year to the executive compensation of the second year. For this variable, a higher number means that there is a higher compensation measured in the second year than in the first year.

The expectation of this hypothesis is reasonable based on prior research. For instance, the study of Hoitash et al. (2012) states that the monitoring and financial reporting may become more effective over time. Another example is found in the study of Paletta & Alimehmeti (2018), where the increase in effective financial reporting leads to transparent and more accurate financial reporting. This in turn might result in the making of more reasonable executive compensation packages. However, there may not be any effect to be found that is different from the effect found in the main hypothesis.

## **5. Sample selection**

### **5.1. Data**

The data used for this study is found in a variety of databases. The executive compensation, which is the dependent variable for the main hypothesis, is extracted from the ExecuComp database (ExecuComp, 2022). Executive compensation here is defined as the remuneration packages specifically designed for executive-level employees of a firm. This includes all benefits, including salary and other incentives, such as stock compensation (Chhaochharia & Grinstein, 2009). Other variables that are created based on the ExecuComp database are the control variables for executive compensation, such as executive gender and age.

For the internal controls, there are five important components in the control framework. These are the control environment, risk assessment, control activities, information, and communication (Rae et al., 2017). For this study, I used the SOX 404 Internal Controls, which is part of the Audit Analytics database (Audit Analytics, 2022). From SOX 404 the most important independent variable (ICMW) is extracted, among other factors including the effectiveness of the internal control system of a firm.

The third and last database used for this study is the merged CRSP Compustat database (Compustat CRSP, 2022). With the data from this database, multiple moderating, independent, and control variables are constructed. An example of a moderating variable constructed with this database is firm size, which could influence both the internal controls and the executive compensation as well. The control variables include the firm's performance, age of the executive, and the net turnover of a firm in the given year. The industry fixed effects and the year fixed effects are also constructed via the merged CRSP Compustat database.

### **5.2. Sample selection**

The sample period is from 2004 till 2021, since this research builds on the research of Brown & Lim (2012), whose sample period was from January 2004 to December 2006. Therefore, this study will assess the results of earlier studies, such as the study of Brown & Lim (2012) and expand the existing literature by enlarging the sample period. The last available year in data, namely 2022, is not included in this sample since there are significantly less observations included in the data in this year compared to the other years in this sample.

One of the advantages of enlarging the sample period is being able to check the changing impact of internal controls on executive compensation since the implementation of the SOX 404 mandate of 2002. There is expected to be an increase in the effect of internal controls on executive compensation in the following years, as described by Brown & Lim (2012), Hoitash et al. (2012), and Paletta & Alimehmeti (2018). This is expected, because of the major changes the SOX 404 mandate of 2002 enforced, which are mostly captured in the mandatory publication of material weaknesses in a firm's internal controls.

Another alteration to earlier studies is the research of all executives, instead of singling out the CEOs or CFOs of firms (Brown & Lim, 2012). The analyzing of all executives in this study generates a more comprehensive and nuanced understanding of the executive compensation, especially in relation to the internal controls of a firm and other organizational

factors. This comprehensiveness results from the different view and responsibilities of each executive, which therefore provides an increased understanding of a firms' leadership dynamics and decision-making processes. The nuance is captured in the interconnectedness, which expands when researching all executives, since it helps capture the interdependencies in the leadership of the firm.

For this sample period I have identified 124,987 observations. The sample captures the information of 1,630 firms and a total of 24,419 different executives. These numbers are after the handling of missing values, duplicates in the database, and outliers. The duplicates are managed by removing these observations from the sample. The next step includes the addressing of the missing values. These missing values are replaced by the median of the variable of the year of the observation. The outliers are controlled for by Winsorizing the constructed variables of each hypothesis of this study.

In table 1, as presented below, a more detailed version of the sample selection process is shown. In Appendix A, additional descriptive statistics of the sample selection process are displayed.

**Table 1. Sample selection process hypothesis 1**

<b>Database</b>	<b>Number of observations</b>	<b>Number of companies</b>	<b>Number of executives</b>
CRSP / Compustat	106,533	12,372	0
ExecuComp	200,355	3,044	42,271
Audit Analytics (SOX 404)	129,933	3,632	0
<b>Merged databases</b>	<b>259,705</b>	<b>1,636</b>	<b>24,627</b>
- After handling duplicates	125,972	1,632	24,568
- After handling missing values	125,972	1,632	24,568
- After handling outliers	125,972	1,632	24,568
- After scaling	124,987	1,630	24,419
<b>Sample subset</b>	<b>124,987</b>	<b>1,630</b>	<b>24,419</b>

*Note.* This table is a more detailed description of the sample selection than given in the text. In the first column the databases that are used are shown and how they develop into the merged database where there is controlled for multiple occurrences, such as missing values. In the second column the number of observations at each stage is presented. The third and fourth column explain the same but for the number of firms and executives.

The sample selection process for the second hypothesis is similar to the sample selection process of the first hypothesis, which is presented above. There are 115,955 observations, which includes 1,598 firms and 23,147 executives in the sample for the second hypothesis. These samples exclude any negative reported parts of the compensation, which is likely to have been compensated with compensation that was not reported or is not available in the data (Jongjaroenkampl & Laux, 2017). A more detailed description of the sample for the hypotheses is displayed in Appendix A.



## 6. Research design

### 6.1. Hypothesis 1

For the methodology of this hypothesis, I will exercise a linear regression, as shown below.

$$\begin{aligned} ExecuComp = & \beta_0 + \beta_1 * ICMW + \beta_2 * Size + \beta_3 * CC + \beta_4 * BD + \beta_5 * CEO + \beta_6 * CFO + \beta_7 * ROA \\ & + \beta_8 * Age + \beta_9 * Gender + \beta_{10} * Ownership + \beta_{11} * AuditFees + \beta_{12} * Sales + \beta_{13} \\ & * Equity + \gamma Year + \gamma Industry + \varepsilon \end{aligned}$$

Here the total executive compensation, the dependent variable, is all compensation of executives in the sample period. The internal control quality is measured in the amount of ICMW's, which means that the quality of internal controls is higher when this independent variable is lower. In all three regressions, I will control for the years with negative earnings of executives, since previous research shows that executives are compensated differently in these years (Matsunaga & Park, 2001). The expectation is that when ICMW's reported, that the executive compensation increases since there is more opportunity for the manipulation of executive compensation present. There is expected to be a positive association between the dependent and the independent variable.

In all the regressions in this study, the variables Size, CC, BD, CEO and CFO are the moderating variables. These variables are expected to influence the relationship between the independent and dependent variable, by making the relationship either stronger or weaker. For instance, the relationship between internal control quality and executive compensation might be stronger when the executive is part of the compensation committee (CC) or on the board of directors (BD). The control variables of this regression include the ROA, Age, Gender, Ownership, AuditFees, Sales, and Equity variables. These variables are not expected to have a direct effect on the relationship between the dependent and independent variable but do have a potential direct effect on the dependent variable. For example, the ROA of a firm possibly influences the executive compensation, since there is a higher amount of compensation available when the firm's performance increases. The year fixed effects and industry fixed effects help in mitigating the potential bias by industry- and time-varying aspects. By including these fixed effects, the accuracy and reliability of the regression model improves.

By inspecting the variables in all three regressions, there are variables that are not comparable. Therefore, all variables that are not in percentages and have no values of zero are made into a natural logarithm. All variables that are not measured in percentages and do have values of zero are normalized to values between zero and one by min-max scaling, since making these variables into a natural logarithm results in there being infinite values. However, the variable Age is not to be scaled (Brown & Lim, 2012), thus being the only variable that is not scaled besides from the binary variables. Supplementary variable descriptions of this regression are presented in Appendix B.

The descriptive statistics of the sample for hypothesis 1 are presented below.

**Table 2. Descriptive statistics hypothesis 1**

Variable	N	Mean	Std. Dev.	Min.	Pctl. 25	Pctl. 75	Max.
ExecuComp	124,987	7.64	0.91	6.00	6.96	8.23	9.33

ICMW	124,987	0.00	0.03	0.00	0.00	0.00	1.00
Size	124,987	4.21	1.03	0.66	1.54	5.11	17.59
CC	124,987	0.00	0.01	0.00	0.00	0.00	1.00
BD	124,987	0.30	0.46	0.00	0.00	1.00	1.00
CEO	124,987	0.18	0.39	0.00	0.00	0.00	1.00
CFO	124,987	0.17	0.38	0.00	0.00	0.00	1.00
ROA	124,987	0.53	0.23	0.00	0.40	0.67	1.00
Age	124,987	53.71	7.30	25.00	49.00	58.00	99.00
Gender	124,987	0.10	0.30	0.00	0.00	0.00	1.00
Ownership	124,987	0.45	0.52	0.01	0.05	0.78	2.02
AuditFees	124,987	7.76	0.97	6.19	7.00	8.46	9.68
Sales	124,987	7.64	1.50	5.15	6.48	8.74	10.52
Equity	124,987	7.14	1.51	4.31	6.06	8.31	9.94

*Note.* The descriptive statistics for hypothesis 1. The descriptions of the variables can be found in the variable descriptions in the appendix. The second column of this table represents the number of observations. The third column represents the mean of each variable. Column number four describes the standard deviation of each variable. The fifth and eighth column show the minimum and maximum amounts that were found in the sample and the sixth and seventh column represent the lowest and highest quarter of the data.

## 6.2. Hypothesis 2

For the methodology of this hypothesis, I will exercise a linear regression, as shown below.

$$\Delta ExecuComp = \beta_0 + \beta_1 * \Delta ICMW + \beta_2 * \Delta Size + \beta_3 * \Delta CC + \beta_4 * \Delta BD + \beta_5 * \Delta CEO + \beta_6 * \Delta CFO + \beta_7 * \Delta ROA + \beta_8 * \Delta Ownership + \beta_9 * \Delta AuditFees + \beta_{10} * \Delta Sales + \beta_{11} * \Delta Equity + \gamma Year + \gamma Industry + \varepsilon$$

For this hypothesis, some changes to the sample had to be made. As explained with the introducing of the hypothesis, the second hypothesis has a longitudinal approach. In this case, this means that there is a beginning and an ending year for each observation. For all variables, except for ICMW, the value of the second year is subtracted from the value of the first year. The variable change in ICMW is constructed the other way around since this is more useful for the interpretation. The quality of internal controls is therefore positive when there is an increase in quality, and negative otherwise. Here the difference in total executive compensation ( $\Delta ExecuComp$ ) is the change in all compensation of executives from the first year to the second year. The compensation may include salary, bonuses, and other incentives for executives. The age and gender of the executives is not subjected to this change and is not to be included in the regression, since these variables are predictable.

The expectation is that when there is a decrease in internal control quality between years, that the executive compensation increases since there is more opportunity for the manipulation of executive compensation present. Therefore, a negative association between the dependent and the independent variable is expected to be found.

As described in hypothesis 1, all variables that are not in percentages or years are either normalized or made into a natural logarithm. The variables for this hypothesis are similar to hypothesis 1 in terms of being either a moderating or control variable. Supplementary variable descriptions of this regression are presented in Appendix C.

The descriptive statistics of the sample of hypothesis 2 are presented below.

**Table 3. Descriptive statistics hypothesis 2**

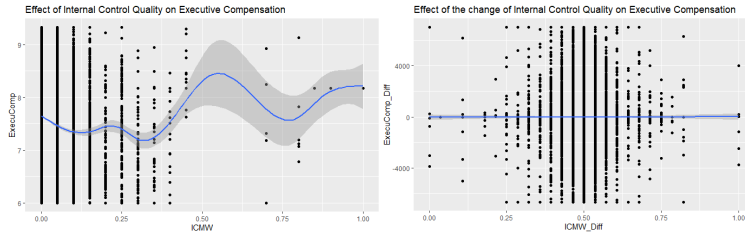
<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Pctl. 25</b>	<b>Pctl. 75</b>	<b>Max.</b>
ΔExecuComp	115,955	0.49	0.11	0.00	0.24	0.67	1.00
ΔICMW	115,955	0.05	0.02	0.00	0.50	0.50	1.00
ΔSize	115,955	0.06	0.24	0.00	0.01	0.08	0.13
ΔCC	115,955	0.00	0.01	-1.00	0.00	0.00	1.00
ΔBD	115,955	0.00	0.09	-1.00	0.00	0.00	1.00
ΔCEO	115,955	0.00	0.16	-1.00	0.00	0.00	1.00
ΔCFO	115,955	0.00	0.19	-1.00	0.00	0.00	1.00
ΔROA	115,955	0.51	0.22	0.00	0.43	0.59	1.00
ΔOwnership	115,955	-0.03	0.20	-0.66	0.00	0.02	0.32
ΔAuditFees	115,955	0.46	0.22	0.00	0.37	0.53	1.00
ΔSales	115,955	0.34	0.21	0.00	0.26	0.36	1.00
ΔEquity	115,955	0.41	0.20	0.00	0.35	0.43	1.00

*Note.* The descriptive statistics for hypothesis 2. The descriptions of the variables can be found in the variable descriptions in the appendix. The second column of this table represents the number of observations. The third column represents the mean of each variable. Column number four describes the standard deviation of each variable. The fifth and eighth column show the minimum and maximum amounts that were found in the sample and the sixth and seventh column represent the lowest and highest quarter of the data.

## 7. Empirical results

To further investigate the first hypothesis, the scatter plot below shows the dependent variable on the y-axis and the independent variable on the x-axis.

**Figure 1. Scatter plots of the dependent and independent variables**



**Note.** This is the plot that shows the relationship between the dependent variable (Y) and the independent variable (X) for all hypotheses, starting with hypothesis 1 on the left side and ending with hypothesis 3 on the right side.

In the scatter plot of hypothesis 1, it is remarkable that there is no clear linear relation to be found. The linear relation would indicate that the lower the quality of the internal controls, the higher the executive compensation, which is also the expectation of this hypothesis. This relation is not seen in the first part of the graph. However, there is an increase in executive compensation when the internal control quality decreases (ICMW becomes higher). This is in line with the expectation of this hypothesis. The expectation is that the higher the ICMW, the higher the executive compensation since there is more opportunity for manipulation of executive compensation when the internal control quality is low (high ICMW).

For hypothesis 2, there is no clear relationship found between the dependent and the independent variable with this scatter plot.

Below the regression table for the regression model for hypothesis 1 is computed.

**Table 4. Regression analysis of hypothesis 1**

Variables	ExecuComp (DV)	
		Coefficient
Constant	3.96	(0.06)***
ICMW	-0.76	(0.06)***
Size	0.04	(0.00)***
CC	0.12	(0.13)**
BD	0.28	(0.00)***
CEO	0.63	(0.01)***
CFO	0.07	(0.00)***
ROA	0.05	(0.01)***
Age	0.00	(0.00)***
Gender	-0.09	

Ownership	(0.01)*** 0.05
AuditFees	(0.00)*** 0.19
Sales	(0.00)*** 0.23
Equity	(0.00)*** 0.05
Fixed effects	Year, Industry
<b>Observations</b>	124,987
<b>R2</b>	0.629
<b>Adjusted R2</b>	0.628
<b>Residual Std. Error</b>	0.557 (df = 124,635)
<b>F Statistic</b>	603.106*** (df = 351; 124,635)

*Note.* In this table the regression model of hypothesis 1 is presented. In the first column the variables names are displayed. The corresponding coefficients and the standard deviation of this estimate coefficient are shown in the second column. For this table \*\*\* significance is  $p < 0.01$ , \*\* significance is  $p < 0.05$ , and \* significance is  $p < 0.10$ .

Looking at the asterisks in the table above, there appears to be a significant relationship between ExecuComp and ICMW, since most of the p-values are below the conventional level. The coefficient of ICMW shows the change in ExecuComp when there is a one-unit change in ICMW, while holding the other variables constant.

In this regression table, the most significant result is the estimate of the independent variable, ICMW. According to this regression model, the executive compensation decreases with a factor of 0.76 when ICMW increases by one. The impact is therefore economically significant. Since the quality of internal controls decreases when there are more ICMW's reported by a firm, this indicates that the internal control quality and the executive compensation are positively correlated. When the internal control quality increases, the executive compensation increases accordingly. This result does not interface with the expected result of this hypothesis. The results are, however, significant, and therefore reliable. Moreover, this result is similar to the CEO panel data results of Paletta & Alimehmeti (2018) and the result of Hoitash et al. (2012).

The acquired result is possibly the change in executive compensation packages (Paletta & Alimehmeti, 2018). According to these authors, there are many cases where the executive is compensated as a result of successfully implementing and managing strong internal controls and thus improving risk management. Another explanation for the contradictory result is that the performance-based incentives part of the compensation package could be tied to the financial performance of a firm. This can lead to a decrease in risk of fraud and errors, for which an executive could be compensated when adding to the maintaining and improvement of this part of the internal control system. A third example of how internal control quality can be positively associated with executive compensation lies in the reputation of a company and its stakeholder confidence (Hoitash et al., 2012). For a firm, this is incredibly important for its performance, thus it could be that the executive is either compensated when it adds in improving the reputation or stakeholder confidence, or that the firm takes less risks when the stakeholder confidence is low, thus monitoring aspects such as executive compensation more closely.

Another notable aspect of this table is that the equity of a firm has almost no influence on the executive compensation. This would indicate that the executive compensation reported is not often based on that part of the performance of the firm. However, the firm performance measured in ROA does have an impact on the executive compensation. When the ROA increases the executive compensation increases. This does imply that the executive compensation is somewhat based upon the performance of the firm.

In the table the gender is also noteworthy. According to the regression model, an executive's compensation decreases when the executive is female. The age of the executive has no influence. The effect of the executive's age is not unexpected, but the effect of the executive's gender on the executive compensation is quite large, especially compared to the other control variables of this model.

The percentage of ownership of the firm by the executive also impacts on the executive compensation. Executive compensation increases when the said executive owns more of the firm. A plausible reason for this increase is the influence and responsibilities the executive takes on by acquiring this ownership.

Besides these effects on executive compensation, being CEO or CFO of the firm also affects the executive compensation. The expected impact is however different from the actual impact. Being CEO of the firm largely influences the executive compensation in a positive way, while being CFO of the firm has a smaller positive effect. This discrepancy could be because of the relatively bigger scope of responsibilities of the CEO. The same could be said for the executive being part of the board of directors. This causes an increase in executive compensation. The audit fees and sales inspire a significant positive change in executive compensation. What is notable is the negative effect of being on the compensation committee on the executive compensation. This could potentially be from the monitoring of the executive by the colleagues on the compensation committee.

The final part of this regression focuses on the year- and industry fixed effects. With these estimate coefficients, which are growing almost every single year, it implies that the executive compensation generally grows each year. There is no unexpected result looking at the growing GDP and inflation of the US (Paletta & Alihmemeti, 2018).

Below the regression table for the regression model for hypothesis 2 is computed.

**Table 5. Regression analysis of hypothesis 2**

<b><math>\Delta</math>ExecuComp (DV)</b>	
<b>Variables</b>	<b>Coefficient</b>
Constant	0.48 (0.03)***
$\Delta$ ICMW	0.01 (0.03)
$\Delta$ Size	0.01 (0.0)
$\Delta$ CC	-0.07 (0.05)
$\Delta$ BD	-0.04 (0.01)***
$\Delta$ CEO	0.06 (0.00)***

$\Delta$ CFO	0.01 (0.00)***
$\Delta$ ROA	0.00 (0.00)
$\Delta$ Ownership	0.01 (0.00)***
$\Delta$ AuditFees	0.00 (0.00)
$\Delta$ Sales	0.00 (0.00)
$\Delta$ Equity	0.00 (0.00)
Fixed effects	Year, Industry
<b>Observations</b>	115,955
<b>R2</b>	0.00
<b>Adjusted R2</b>	0.00
<b>Residual Std. Error</b>	0.217 (df = 115,609)
<b>F Statistic</b>	1.008*** (df = 345; 115,609)

*Note.* In this table the regression model of hypothesis 2 is presented. In the first column the variables names are displayed. The corresponding coefficients and the standard deviation of this estimate coefficient are shown in the second column. For this table \*\*\* significance is  $p < 0.01$ , \*\* significance is  $p < 0.05$ , and \* significance is  $p < 0.10$ .

In this regression table the independent variable,  $\Delta$ ICMW, is the most principal estimate coefficient to analyze. The estimate coefficient implies that when the reported ICMW's are one lower than the year before, thus making the quality of the internal control system improve, the executive compensation increases. This result is inaccurate when comparing it to the expected result. The increase in executive compensation when the internal control quality improves over a year is not in line with the expectation of this hypothesis. However, this is in line with the regression model of the first hypothesis.

What is also presented in this regression table is the positive impact of a change in being CEO or CFO on the change in executive compensation. The same is to be concluded for the change in ROA and Ownership. These results are, as shown in the prediction column, not unexpected. The negative impact of an increase in firm size over a year on the change in executive compensation is unexpected. The impact of the change in firm size on the change in executive compensation is however quite low, compared to the other coefficients of the regression table.

Another notable aspect is the not being significant of most variables. This indicates that there is no proven relationship between the dependent and independent variable.

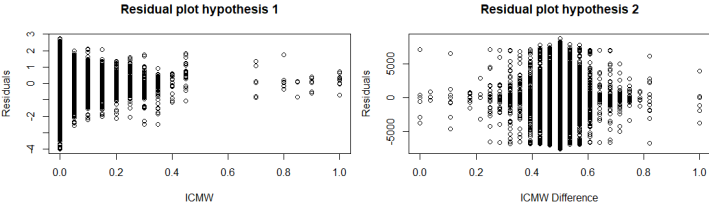
The final part of this regression focuses on the year- and industry fixed effects. With these estimate coefficients, which are growing almost every single year, it implies that the executive compensation generally grows each year. There is no unexpected result looking at the growing GDP and inflation of the US (Paletta & Alihmemeti, 2018).

The tables above detail the explanatory power of the performed regression model for each hypothesis. The adjusted R-squared of the model for hypothesis 1 is quite normal (0.63), which indicates that 62.80% of the variability in the dependent variable is accounted for by the independent variable. The high adjusted R-squared implies that the model has a good balance between the model fitness and model complexity. The residual standard error for all

models is relatively high, which indicates that the model's predictions are relatively far away from the actual data points. This makes the model less accurate and precise. However, the F-statistic is also high, which implies a strong relationship between the predictors and the outcome.

The R-squared of the second regression model is exceptionally low (0.00), which indicates that 0% of the variability in the dependent variable is accounted for by the independent variable. The adjusted R-squared of zero implies that the model has no balance between the model fitness and model complexity.

**Figure 2. Residual plots**



*Note.* In this figure the residuals of all hypotheses are shown. The first hypothesis is presented on the left side, subsequently followed by the second hypothesis.

In the residual plot for hypothesis 1 and 2, there is no clear pattern to be seen. The existence of no clear pattern leads to the conclusion that the models are a good fit. This conclusion is in line with the explanatory power table for these regression models.



## **8. Conclusion and discussion**

In this study, two hypotheses have been researched. The first hypothesis examines the impact of the internal control quality on the executive compensation. The conclusion of the regression is that the internal control quality and executive compensation are positively correlated. This could possibly be because of changes in compensation packages over the years or because of monitoring when there is low stakeholder confidence or a decrease in reputation. These results are found in other, more recent, studies.

The second hypothesis is focused on the effect of a change in internal control quality on the executive compensation. For this hypothesis, said change is the difference in ICMW's and executive compensation in a year. The results for this hypothesis are similar to the results of the first hypothesis for the independent variable. An increase in internal control quality over a year inspires an increase in executive compensation. This result is similar to the result of hypothesis 1. The significance of most variables makes this hypothesis, however, not reliable.

To summarize, though the hypotheses show different results than expected, the first model is quite reliable looking at the explanatory power of this model.

In conclusion, the internal control quality, and the change in internal control quality influence the executive compensation. There is a positive relationship found between the two. The same applies to the relationship between the potential manipulation of executive compensation and executive compensation, though this relation is relatively small.

One of the aspects of this research that can be improved is the detailing in the various aspects of compensation. However, the data does not comply with more than the data that I used in this research at the moment. This improvement is therefore only possible when more data becomes available on this topic. Another improvement point of this research is the internal control measures. In this research, the ICMW was chosen as the indicator for internal control quality, while the effectiveness of the internal control system is also available to use for these years.

Further research on this topic could focus more specifically on the impact of the structure of the compensation package, since this has not been done before, especially in this time period. The structure of the compensation package could give more insight into the effect of internal control quality on executive compensation. For these structures, more information is needed than the information that is currently available. Another angle to investigate is the levels of compensation and whether these various levels are impacted similar to each other by the internal control quality.

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## 10. Appendices

### 10.1. Appendix A: Descriptive statistics sample selection process

**Table 6. Extended descriptive statistics sample selection process of hypothesis 1**

Year	Number of observations	Number of companies	Number of executives
2004	3,453	590	3,453
2005	4,298	808	4,298
2006	5,242	925	5,242
2007	6,717	1,172	6,717
2008	6,850	1,206	6,850
2009	6,706	1,214	6,706
2010	6,714	1,227	6,714
2011	6,968	1,272	6,968
2012	7,081	1,290	7,081
2013	7,257	1,328	7,257
2014	7,478	1,370	7,478
2015	7,699	1,409	7,699
2016	7,751	1,428	7,751
2017	7,935	1,459	7,935
2018	8,152	1,513	8,152
2019	8,321	1,543	8,321
2020	8,190	1,529	8,190
2021	8,175	1,573	8,175

*Note.* In this table the number of observations, the number of companies and the number of executives is presented for each year.

**Table 7. Extended descriptive statistics sample selection process of hypothesis 2**

Year	Number of observations	Number of companies	Number of executives
2004	NA	NA	NA
2005	3,080	587	3,080
2006	4,572	804	4,572
2007	5,344	926	5,344
2008	6,666	1,171	6,666
2009	6,578	1,191	6,578
2010	6,643	1,210	6,643
2011	6,772	1,233	6,772
2012	6,943	1,264	6,943
2013	7,099	1,297	7,099
2014	7,279	1,331	7,279
2015	7,480	1,369	7,480
2016	7,576	1,396	7,576
2017	7,778	1,429	7,778
2018	7,876	1,459	7,876
2019	8,140	1,506	8,140
2020	8,089	1,509	8,089
2021	8,040	1,545	8,040

*Note.* In this table the number of observations, the number of companies and the number of executives is presented for each year. There are no observations for the first year since this year cannot be compared to a year before.

## 10.2. Appendix B: Variable descriptions first hypothesis

Table 8. Variable descriptions hypothesis 1

<b>Dependent variable</b>	<b>Variable description</b>	<b>References</b>
Executive Compensation (ExecuComp)	The natural logarithm of the total of executive compensation measured in 1000US dollars. Examples of compensation are salary, bonuses, and other incentives for executives	Brown & Lim (2012), ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
<b>Independent variable</b>	<b>Variable description</b>	<b>References</b>
Internal Control Quality (ICMW)	The number of weaknesses that are reported in the 10-filing of a firm in a year under the SOX 404 mandate. This means that the higher the value of this variable, the lower the quality of internal controls of a firm. This variable is normalized by min-max scaling, thus only having values between zero and one.	Audit Analytics (2022), Brown & Lim (2012), Hoitash et al. (2012).
<b>Moderating variables</b>	<b>Variable description</b>	<b>References</b>
Firm Size (Size)	The size of a firm, measured in the percentage of market share of the firm. The market share equals the shares outstanding of a firm in a year divided by the total market shares outstanding in a specific fiscal year within an industry.	Audit Analytics (2022), Brown & Lim (2012), Compustat CRSP (2022), Paletta & Alihmemeti (2018).
Compensation Committee (CC)	A binary variable that is 1 when an executive was interlocked with the compensation committee in a certain year and is otherwise equal to 0.	Boyd (1994), ExecuComp (2022).
Board of Directors (BD)	A binary variable that is 1 when an executive was on the board of directors in a certain year and is otherwise equal to 0.	Boyd (1994), ExecuComp (2022), Hoitash et al. (2012).
Executive is the CEO (CEO)	A binary variable that is 1 when an executive is the current CEO and zero otherwise.	ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).

Executive is the CFO (CFO)	A binary variable that is 1 when an executive is the current CFO and zero otherwise.	ExecuComp (2022), Paletta & Alihmemeti (2018).
<b>Control variables</b>	<b>Variable description</b>	<b>References</b>
Firm Performance (ROA)	The performance of a firm in a certain year, captured by the ROA, which is a commonly used measure for firm performance. The ROA is computed by dividing net income in a year by the total assets of the same year. This variable is normalized by min-max scaling, thus only having values between zero and one.	Brown & Lim (2012), Compustat CRSP (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
Executive Age (Age)	The age of an executive, measured in years.	ExecuComp (2022), Paletta & Alihmemeti (2018).
Executive Gender (Gender)	A binary variable that is 1 when an executive has a female gender and 0 when an executive has a male gender.	ExecuComp (2022), Paletta & Alihmemeti (2018).
Executive Ownership (Ownership)	The ownership of an executive of the firm it works for, measured in the percentage of total shares of the firm said executive owns.	Brown & Lim (2012), ExecuComp (2022), Hoitash et al. (2012).
Audit Fees (AuditFees)	The natural logarithm of the amount of audit fees in a certain year, measured in 1000US dollars.	Audit Analytics (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
Net Turnover (Sales)	The natural logarithm of the total amount of revenue that comes from the sale of products and services. This is calculated by subtracting the allowances for doubtful accounts, returns, and discounts from the gross revenue. The variable is measured in 1000US dollars.	Brown & Lim (2012), Compustat CRSP (2022), Paletta & Alihmemeti (2018).
Stockholders' Equity (Equity)	The natural logarithm of the remaining interest in assets after subtracting the liabilities of a firm, measured in 1000US dollars.	Axelson & Baliga (2008), Compustat CRSP (2022).

<b>Fixed effects</b>	<b>Variable description</b>	<b>References</b>
Industry	The industry of a firm in the year of the observation.	Audit Analytics (2022), Brown & Lim (2012), Compustat CRSP (2022), ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
Year	The fiscal year of a specific observation.	Audit Analytics (2022), Brown & Lim (2012), Compustat CRSP (2022), ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).

**Note.** The variable descriptions of hypothesis 1, with the variable names and terms in the first column. The second column presents the descriptions of these variables and in column three the sources for these descriptions are shown.



### 10.3. Appendix C: Variable descriptions second hypothesis

Table 9. Variable descriptions hypothesis 2

<b>Dependent variable</b>	<b>Variable description</b>	<b>References</b>
The difference in Executive Compensation ( $\Delta$ ExecuComp)	The difference in executive compensation between the beginning year and the year after, including bonuses and stock/option awards measured in 1000US dollars. This variable is normalized by min-max scaling, thus only having values between zero and one.	Brown & Lim (2012), ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
<b>Independent variable</b>	<b>Variable description</b>	<b>References</b>
The difference in Internal Control Quality ( $\Delta$ ICMW)	The difference in the number of weaknesses that are reported in the 10-filing under the SOX 404 mandate between the beginning year and the year after. This variable is numerical. The quality of internal controls increases when this variable increases. This variable is normalized by min-max scaling, thus only having values between zero and one.	Audit Analytics (2022), Brown & Lim (2012), Hoitash et al. (2012).
<b>Moderating variables</b>	<b>Variable description</b>	<b>References</b>
The difference in Firm Size ( $\Delta$ Size)	The difference in the size of a firm over a year, measured in the market share of the firm. The market share equals the shares outstanding of a firm divided by the total market shares outstanding.	Audit Analytics (2022), Brown & Lim (2012), Compustat CRSP (2022), Paletta & Alihmemeti (2018).
The difference in Compensation Committee ( $\Delta$ CC)	The difference between two years in an executive being interlocked with the compensation committee.	Boyd (1994), ExecuComp (2022).
The difference in Board of Directors ( $\Delta$ BD)	The difference between two years in an executive being on the board of directors.	Boyd (1994), ExecuComp (2022), Hoitash et al. (2012).
The difference in Executive is the CEO ( $\Delta$ CEO)	The difference between two years in an executive being CEO.	ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).

The difference in Executive is the CFO ( $\Delta$ CFO)	The difference between two years in an executive being CFO.	ExecuComp (2022), Paletta & Alihmemeti (2018).
<b>Control variables</b>	<b>Variable description</b>	<b>References</b>
The difference in Firm Performance ( $\Delta$ ROA)	The difference in performance of a firm between two years, captured by the ROA, which is a commonly used measure for firm performance. The ROA is computed by dividing the average net income by the average total assets. This variable is normalized by min-max scaling, thus only having values between zero and one.	Brown & Lim (2012), Compustat CRSP (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
The difference in Executive Ownership ( $\Delta$ Ownership)	The difference in ownership of an executive of the firm it works for between two years, measured in the percentage of total shares of the firm said executive owns.	Brown & Lim (2012), ExecuComp (2022), Hoitash et al. (2012).
The difference in Audit Fees ( $\Delta$ AuditFees)	The difference in audit fees between two years, measured in 1000US dollars. This variable is normalized by min-max scaling, thus only having values between zero and one.	Audit Analytics (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
The difference in Net Turnover ( $\Delta$ Sales)	The difference in the total amount of revenue that comes from the sale of products and services between two years. This is calculated by subtracting the allowances for doubtful accounts, returns, and discounts from the gross revenue. The variable is measured in 1000US dollars. This variable is normalized by min-max scaling, thus only having values between zero and one.	Brown & Lim (2012), Compustat CRSP (2022), Paletta & Alihmemeti (2018).
The difference in Stockholders' Equity ( $\Delta$ Equity)	The difference between two years in the remaining interest in assets after subtracting the liabilities of a firm, measured in 1000US dollars. This variable is normalized by min-	Axelson & Baliga (2008), Compustat CRSP (2022).

max scaling, thus only having values between zero and one.

<b>Fixed effects</b>	<b>Variable description</b>	<b>References</b>
Industry	The industry of a firm in the year of the observation.	Audit Analytics (2022), Brown & Lim (2012), Compustat CRSP (2022), ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).
Year	The fiscal year of a specific observation.	Audit Analytics (2022), Brown & Lim (2012), Compustat CRSP (2022), ExecuComp (2022), Hoitash et al. (2012), Paletta & Alihmemeti (2018).

**Note.** The variable descriptions of hypothesis 2, with the variable names and terms in the first column. The second column presents the descriptions of these variables and in column three the sources for these descriptions are shown.