Master Thesis

The short-term impact of the COVID-19 pandemic on CEO compensation

Name: Van Oers, Jonathan
Student ID number: 448991
Study program: Accounting & Control
Supervisor: Dr. J. Zhang
Second assessor: Dr. M.H.R. Erkens

Abstract

The outbreak of the SARS-CoV-19 (COVID-19) virus during March 2020 heavily affected the global economy, putting the future of many firms at risk. Consequently, many firms are struggling how to compensate their CEO, since the pandemic was accompanied by many uncertainties regarding potential government restrictions. This research examines the impact of the COVID-19 virus on the level and composition of CEO compensation for American public listed firms. Using several OLS regression models, I find evidence that COVID-19 positively affects the level of CEO compensation for firms with increased revenues during the COVID-19 period. Consistent with prior literature, this result supports the existence of a "risk premium" for firms facing systematic market risks. However, firms which faced a negative sales development during the corona period do not report this increase. Furthermore, conflicting with prior literature I do not find evidence suggesting that the quality of corporate governance moderates this effect. Finally, contrary to what is suggested by prior literature, firms did not adjust the composition of the compensation package during the pandemic. This research provides a first exploration of the consequences of the COVID-19 virus for the CEO's compensation level and structure.

List of contents

1. Introduction

"Few periods in our nation's history have been more challenging or difficult than the one we are in now." (Biden, 2021). This sentence was part of the speech of President of the United States Joe Biden during his inauguration on January 20, 2021. By referring to the global outbreak of the SARS-CoV-2 (COVID-19) virus, Biden stresses the impact and the consequences of the current pandemic. Despite years of economic and health prosperity, the whole world is facing a huge challenge to overcome and defeat this highly contagious virus. Unfortunately, the year 2020 will globally be known as the start of the worldwide COVID-19 pandemic.

The outbreak of the virus in March 2020 brought the global economy in disarray, with the future of many firms at risk (Boot et al., 2020). For example, the aviation industry is heavily affected by the pandemic, caused by the travel restrictions between many countries (Nicola et al., 2020). As a result, many firms are struggling on how to compensate their executives (Truxal, 2020). Mazur, Dang & Vega (2021) show several measures S&P1500 firms implement to adjust executive compensation. Their research shows that many firms cut bonuses and reduce compensation for their senior executives. This reduction of management compensation seems obvious, since Shen, Fu, Pan, Yu & Chen (2020) show that COVID-19 has a negative impact on the performance of firms. However, and most surprisingly, some firms (e.g., Gulfport Energy) chose not to adjust or even increase the salaries for senior executives during the first outbreak of the COVID-19 virus in March 2020 (Mazur et al., 2020). The increase could be driven by the challenges the company and its executives are facing during these hard and uncertain period. Yet, actual drivers and developments of executive compensation in the COVID-19 period are still unknown in scientific literature.

Financial compensation of CEOs in relation to the performance of a company and the control of shareholders has been an ongoing debate in accounting research during the past decades. Due to the financial crisis in 2007, the effect of changes in firm performance on CEO compensation became a widely discussed topic in the accounting literature. Although firm performance declined due to the financial crisis, Yang, Dolar & Mo (2014) and Vemala, Nguyen, Nguyen & Kommassani (2014) find that the level of CEO compensation increased after the financial crisis relative to the pre-crisis period. This development seems contradictory to a decrease in firm performance. However, the increase in CEO compensation can be explained by an increase of financial distress risk of firms caused by the deteriorated economic climate (Chang, Hayes & Hillegeist, 2015). In addition, Vemala et al. (2014) show that not only the level of compensation, but also the structure changed after the financial crisis, with equity compensation becoming more prominent relative to cash-based compensation. As stock-based compensation is mainly long-term orientated and ultimately dependent on firm performance, the change implies that firms try to align the interests of their executives with the interests of the shareholders and the long-term focus of the firm. Thereby, increasing the level of stock compensation relative to the level of cash compensation could indicate the preference of a financial buffer during economic distress (Mehran & Tracy, 2016).

These researches focusing on the financial crisis seem to be suddenly quite relevant, due to the global outbreak of the COVID-19 virus. Several countries are forced to implement lockdowns, putting the economic developments in reverse. Factories were compelled to close and people were expected to work from home. These measures led to a drop of 6.8% in China's gross domestic product (GDP) in the first quarter of 2020 compared to previous year (Shen et al., 2020). Not only China, but the entire world suffered from COVID-19 restrictions. Considering the United States, the Standard & Poor's (S&P) 500 index fell by 34% and exchanges in Brazil, Japan and Italy decreased by more than 30% (Ding, Levine, Lin & Xie, 2020).

This paper contributes to the existing literature by examining the first effects of the outbreak of the coronavirus on the compensation of CEOs in the United States. Since the topic is quite recent, current literature is limited with regard to the topic of COVID-19 in relation to CEO compensation. Therefore, this topic is scientifically relevant, as many companies are affected by the COVID-19 pandemic and struggle with compensating the executives for their services (Truxal, 2020). Moreover, this research tries to provide an answer to the question whether firms have learned from the financial crisis in 2008 in adjusting the CEO compensation correspondingly with the change in firm performance and the economic uncertainties. The focus of this research will be on the level of cash-based, stock-based and total compensation. These measures for CEO compensation are in line with previous research on this topic (e.g., Veliyath & Bishop, 1995; Karim, Lee & Suh, 2018). In summary, the following research question will be assessed:

Does the COVID-19 crisis impact the level and the composition of the compensation of CEOs for U.S. public firms?

In order to answer the abovementioned research question, multiple univariate and multivariate analyses will be performed. I collect data on CEO compensation, CEO characteristics, firm performance and board characteristics from several data sources, i.e. Execucomp, as part of the Compustat database, and Yahoo Finance. To assess the effect of the COVID-19 crisis on the level and composition of CEO compensation, this thesis examines three different hypotheses. First, I examine whether the COVID-19 pandemic affects the level of CEO compensation. I examine the impact of the pandemic by dividing the sample into two groups. One group consists of firms which faced a decline in sales during the COVID-19 outbreak. The other group of firms experienced an increase in sales during the COVID-19 period. Prior research suggests that CEOs should be compensated for facing higher systematic market risks (Miller, Wiseman & Gomez, 2002). Since market risks have likely increased during COVID-19, I expect COVID-19 to have a positive effect on the level of CEO compensation. Consistent with my hypothesis, I find a significant and positive effect of COVID-19 on the level of CEO compensation for firms which experienced an increase of revenue during COVID-19. However, I do not find evidence that firms, which are economically affected by the COVID-19 pandemic, increased the CEO's payments. Moreover, I hypothesize that the quality of corporate governance moderates the effect of COVID-19 virus on CEO compensation. I expect that this moderating effect is present, because Morse, Nanda & Seru (2011) show that CEOs try to use their power over the board to adjust the performance contracts in order to increase the level of CEO

compensation. However, based on three different proxies for the quality of corporate governance, I cannot validate the second hypothesis that the quality of corporate governance moderates the effect between COVID-19 and CEO compensation. Finally, prior research suggests that firms should limit cash outflows during recessions in order to increase their liquidity (Mehran & Tracy, 2016). Based on the unknown effects and duration of the COVID-19 pandemic, I expect firms to create a financial buffer to be prepared for economic shocks. (Mehran & Tracy, 2016). Therefore, the third hypothesis states that firms will adjust the composition of CEO compensation by increasing the level of stock compensation relative to cash compensation. By using a multivariate analysis, I do not find support for this statement for the full sample of firms. However, by only using a group of firms with a positive development of sales during COVID-19 period, my results suggest a positive effect of COVID-19 on the relative amount of stock-based compensation.

This research contributes to the current literature that firms provide their CEOs with a compensation premium during the COVID-19 pandemic. This development is likely driven by an increase in systematic market risks due to the still unknown consequences of COVID-19 (Miller et al., 2002). In addition, general drivers of CEO compensation identified in this research, e.g., the size of the firm and tenure of the CEO, are in line with previous research. Firm performance is also identified as driver of CEO pay, which could solve the ongoing debate whether firm performance affects the level of CEO pay. Moreover, the results suggest a switch of the sensitivity of CEO pay towards stock-based firm performance. This implies that the importance of stock-based firm performance seems to increase for composing the CEO compensation.

In the following sections, more in-depth literature will be discussed and the main results of this thesis will be presented. Section 2 provides an extensive overview of the COVID-19 pandemic and its consequences. In addition, I introduce the hypotheses and discuss the underlying relevant literature. Section 3 introduces the dataset. In this section, I elaborate on the sample selection process and the methods that will be used to assess the main effects of COVID-19 on the level and composition of CEO compensation. Furthermore, the descriptive statistics will be revealed and examined using univariate analyses. Eventually, the final sections, i.e. section 4, 5 and 6, disclose the results and discussion on the conducted research. Thereby, limitations and recommendations for further research will be provided.

2. Literature review

2.1 Setting

2.1.1. COVID-19

On 11th March, 2020 the World Health Organization (WHO) characterized the outbreak of the coronavirus as a pandemic (Ghebreyesus, 2020). This statement stressed the magnitude of the virus and the importance of sufficient management by governments and society. Following this statement and prompted by ever increasing infections and patients in hospitals, governments introduced strict restrictions, including prohibitions to travel, orders to stay at home and closures of non-essential businesses (American Journal of Medical Care, 2020). After the Great

Recession of 2008, the world was once again facing a great danger to the worldwide economic system.

When using an index of U.S. economic activity, developed by Brave, Butters & Kelley (2019), Li & Sheng (2020) show that a new recession in the United States can be identified starting March 2020: the COVID-19 crisis. Several researchers analysed and predicted the total impact of the virus on the GDP of the United States, with forecasts of declines fluctuating between 3% and 10% on an annual basis (Maliszewska, Mattoo & Van der Mensbrugghe, 2020). According to the U.S. Bureau of Economic Analysis the GDP of the U.S. dropped 3.5% in 2020 compared to 2019. This trend corresponds with current research, which found a negative impact of the COVID-19 pandemic on the firm performance (Hu & Zhang, 2021; Shen et al., 2020). However, not all firms got affected equally by the COVID-19 pandemic. Bloom, Fletcher & Yeh (2021) assessed the impact of the COVID-19 virus on a sample of 2,500 small American businesses. They conclude that more than 40% of the companies in the sample did not face negative consequences from the virus outbreak, while some companies even reported a positive impact. These differences are mainly dependent on the type of industry. Hu & Zhang (2021) find that service industries, such as airlines, restaurants and tourism companies, have suffered from the COVID-19 pandemic by a decline in customers in accordance with a demand shock. Moreover, according to Naseri (2021) the retail sector is also part of the worst-hit industries by the coronavirus. However, several industries (e.g., online stores) even benefited from the crisis following increasing demands (Sharma & Jhamb, 2020). This can be explained by the restrictions to stay home and the closures of non-essential businesses, which encouraged the need for online shopping.

In contrast to the demand shock which was the main driver of the great recession, the COVID-19 crisis is mainly driven by an health shock, which has characteristics of both demand and supply shocks (Cochrane, 2020). The supply shock is mainly generated by companies forced by government restrictions to close factories. These forced closures, in conjunction with additional restrictions (e.g., travel restrictions), disrupted entire supply chains. Therefore, the disrupted production and allocation processes within firms led to a decline in supply. On the other hand, the uncertain situation regarding potential job losses and economic setbacks led consumers and firms to delay their investments and purchases, which caused the demand shock. Another important difference is the perception of management failure. During the financial crisis in 2008, the CEOs and managers were accused of causing the financial distress by making wrong strategic decisions and taking too much risk. In contrast to the financial crisis, CEOs are, during the current crisis, not blamed of causing the economic distress, since COVID-19 is considered to be an outside force. Consequently, the costs of the economic breakdown are borne by employees, shareholders and other stakeholders (Batish et al., 2020). These insights can cause firms to behave different as the capabilities of the CEO have less influence on the performance of the firm during the COVID-19 crisis.

2.1.2. The impact of COVID-19 on CEO compensation
The current crisis has already influenced the business practices in many ways. Meyer, Prescott & Sheng (2021) argue that firms are getting more and more pessimistic about the duration of

the coronavirus. This trend is also recognized by Altig et al. (2020), who conducted a survey during March 2020. They observe that almost 85% of the firms in their sample expect their sales to decline in 2020 with an average decrease of 16%. This designates that the future is very uncertain with unreliable forecasts as a result. In addition to this uncertainty, firms have lowered wages, anticipated on further wage cuts and expect lower selling prices in the near future (Meyer et al., 2021). Cajner et al. (2020) support this development, as they find evidence that firms are more likely to cut wages and jobs during the first months of the pandemic. They show that the wage cuts were even larger than during the Great Recession. Besides that, Cajner et al. (2020) observe that employment declines were concentrated among lower-wage workers and smaller businesses (<50 employees) However, literature suggests a link between the level of CEO compensation and salaries of lower level employees within a company (e.g., Heneman & Cohen, 1988; Wade, O'Reilly, & Pollock, 2016). For example, Wade et al. (2016) show that over- or underpayment of the CEO relative to several characteristics (e.g., education level, firm performance and firm tenure) influences the salaries of employees throughout the organisation in the same direction. This indicates that CEOs will likely have faced a decrease in their compensation in line with a higher probability of wage cuts in the first months of the pandemic, as predicted by Cajner et al. (2020).

This research will focus on the impact of the outbreak of the COVID-19 virus on CEO renumeration. Executive compensation packages are designed in line with three objectives: attraction of new executives, retention of current executives and incentivize executives to reach certain goals (Armstrong, Ittner & Larcker, 2012). However, current literature is mixed about the determinants of the CEO's compensation. Deckop (1988), who examines the determinants of CEO compensation, shows a positive relation between the performance of the firm, as measured by the profit relative to the sales, and the level of CEO compensation. In addition, Deckop (1988) suggests that the previous job position of the CEO is a main driver of compensation. Namely, CEOs recruited from outside the firm seem to earn higher compensation relative to internally promoted CEOs. This research does not find evidence supporting a relation between the size of the firm and the level of CEO compensation. However, other researchers, for instance Ghosh (2006), Nourayi & Mintz (2008) and Ozkan (2011), find a positive relation between the size of the firm and the level of CEO compensation. These mixed insights from previous research also seem to hold for the relation between firm performance and CEO compensation. Deckop (1988) and Jensen & Murphy (1990) find evidence for a relation between firm performance and the level of CEO compensation. Though, Jeppson, Smith & Stone (2009) do not find this relation, while using several measures for firm performance (e.g., total revenue, change in net income and change in shareholder return). Finally, the relation between CEO compensation and individual characteristics of the CEO, such as age, tenure and educational backround, is low or not identified (Deckop, 1988; Jalbert, Furumo & Jalbert, 2011; Ozkan, 2011).

As previously discussed, the outbreak of the COVID-19 virus started a new recession in the United States. During the previous recession in 2008, several researchers analyzed the impact of the recession on the CEO compensation. Yang et al. (2014) and Vemala et al. (2014) find that the relation between CEO compensation and firm performance changed after the financial

crisis compared to the pre-crisis period, followed by relatively higher compensation of executives whereas firm performance declined. This development suggests that executives are not efficiently punished for bad firm performance, possibly due to inefficient incentive contracts (Yang et al., 2014). Another explanation for an increase of CEO compensation during or after a recession includes a premium for higher distress risk. This threat occurs when a firm is no longer able to pay its financial obligations (Chang et al., 2016). Chang et al. (2016) find evidence that firms facing higher financial distress risks, reward their CEOs with higher compensation relative to equally performing firms facing lower risks. Similar results are found by Miller et al. (2002), who show that CEOs of firms facing higher systematic market risks may receive additional risk premiums resulting in relatively higher total compensation. These premiums are provided to compensate managers for potential loss of income when the firm becomes financially distressed (Miller et al., 2002). This loss of income is mainly caused by reputational damage, which negatively affects the CEO's future income, and the loss of value of equity-based holdings, such as stocks and stock options (Chang et al., 2016). The current recession causes uncertainties for firms about the impact of the COVID-19 crisis and the corresponding future cashflows, which increases the financial distress risk of firms. Based on these insights it is therefore expected that firms affected by the COVID-19 pandemic, might increase CEO compensation relative to the firm's performance. However, the actual impact of the COVID-19 recession on the CEO compensation is still unknown in the current literature.

Because of different impacts of the COVID-19 virus across industries, I will split the sample into two groups: firms negatively affected by the virus and firms positively or not affected by the virus. As described above, firms facing higher distress risks reward their CEOs with higher compensation in relation to the firm performance (Chang et al., 2016; Miller et al., 2002). However, during the current pandemic firms negatively affected by the virus have already made large wage cuts (Cajner et al., 2020). Based on these mixed insights, the following is hypothesised:

H1a: The COVID-19 crisis does not affect the level of total CEO compensation for firms negatively affected by the COVID-19 outbreak.

In contrast, several firms have not been exposed to negative effects or have even seen their revenue increase during the pandemic, despite disruptions in supply chains and restrictions from governments (Bloom et al., 2021). It is questionable whether this growth is strengthen by the actions of the CEO, as the COVID-19 virus is seen as an outside force (Batish et al., 2020). To control for the lack of information on the CEO's performance, firms could compare their performance with the performance of their peers. This method is suggested by Gong, Li & Shin (2011), who argue that using relative peer performance captures the influence of common risks on the overall firm performance. Farmer, Archbold & Alexandrou (2013) also support this method and add that optimal incentive contracts should exclude factors which are outside of the control of the CEO. These factors can therefore be controlled for by using relative peer performance. Because of the uncertainty regarding the duration of the COVID-19 virus and the increase of risks associated with the virus, I expect the level of compensation to increase relative to the pre-corona period.

H1b: The COVID-19 crisis increases the level of total CEO compensation for firms that have been minimally or positively affected by the COVID-19 outbreak.

2.2 Corporate governance

Besides of the capabilities of the CEO, the health of the firm and the firm's financial performance, the characteristics and quality of corporate governance seem to have a large influence on the level of CEO compensation (Core, Holthausen & Larcker, 1998). Corporate governance refers to the mechanism of rules, practices and processes that are used to manage and control a firm (L'Huillier, 2014). An important mechanism to control for the behavior of managers is the board of directors. The characteristics of the board are often used to assess the quality of corporate governance of the firm (e.g., Core et al., 1998; Morse et al., 2011). In this view, the power of the CEO within the board of directors is positively influencing the CEO's compensation level, for example by reshaping performance contracts by moving them towards the better performing measures (Morse et al., 2011). The power of the CEO is measured by a combination of CEO tenure, the composition of the board and the personal influence of the CEO over the board. The research of Morse et al. (2011) shows that the manipulation of compensation measures is negatively affecting the performance of the company and is limited to firms with weak corporate governance environments (Morse et al., 2011). In addition to the research of Morse et al. (2011), Hill & Phan (1991) and Ozkan (2011) show that the level of CEO pay becomes less related to the firm performance as CEO tenure increases. This could indicate that CEOs' influence over the board and the compensation level increases with the tenure of the CEO. This increasing influence has two reasons. First, in many firms it is the CEO's task to nominate or they have large influence in nominating new board members (Chhaochharia & Grinstein, 2009). As a consequence, CEOs might be able to change the composition of the board by replacing members with new directors in favour of the CEOs preferences (Finkelstein & Hambrick, 1989). In addition, new directors may feel obligated to support the CEO, because of their nomination (Chhaochharia & Grinstein, 2009). Second, CEOs might be able to increase their control over internal compensation systems, which can be used to hide relevant information that would have negatively affected the CEO's compensation level (Hill and Phan, 2003). However, consistent with the research of Ozkan (2011), tenure influences on the CEO renumeration could also be unrelated to corporate governance. For example, Ozkan (2011) states that CEOs with longer tenure will likely have larger shares of stock ownership following stock awards and options from previous years. In addition, information asymmetry related to the qualities of the CEO decreases with tenure, which could potentially be a driver of the level of compensation (Hermalin & Weisbach, 1998; Zheng, 2010).

Evidence about the effect of the composition of the board, which is also used by Morse et al. (2011) to measure the power of the CEO, on CEO compensation is diversified. Benkraiem, Hamrouni, Lakhal & Toumi (2017) and Core et al. (1999), for example, find that the fraction of independent outside directors is negatively correlated with the level of CEO pay. This relation can be partly explained by the often close link between the salaries of executives and the compensation of the CEO (Boyd, 1994). For example, the CEO will be more willing to

accept a payment increase of directors when, in return, the CEO's own payment is positively adjusted and vice versa. Newman & Mozes (1999) partly support this finding, as they find that an higher portion of insiders is favorable for the CEO's preferences. However, in line with the research of Daily, Johnson, Ellstrand & Dalton (1998), they do not find evidence that the composition of the board influences the level of CEO compensation. Moreover, Ntim, et al. (2019) observe a moderating effect of the corporate governance structure on the relation between CEO renumeration and firm performance. By using measures related to the corporate governance quality of the board (e.g., size of the board and relative amount of independent directors), they find that the quality of the board increases the sensitivity of CEO compensation towards the performance of the firm. This implies that CEOs try to make use of their power over the board to increase their compensation irrespectively of a significant improvement of the performance of the firm. I expect this phenomenon to be existent during the current pandemic since the economic environment changed rapidly. Therefore, CEOs could have used their power over the board to delay or cancel compensation cuts or they could have even tried to convince the board to increase their compensation level due to the current challenges the CEO and the firm is facing. Because of the uncertainty whether CEO compensation is influenced by the corporate governance factor of tenure or by the increased abilities of the CEO, I proxy for corporate governance only by board characteristics. Therefore, hypothesis two is stated as follows:

H2: The positive association between the COVID-19 crisis and the level of CEO compensation weakens with the quality level of corporate governance.

2.3 Components of CEO compensation
In general, the compensation of CEOs consists of a portion to reward past performance and a portion to stimulate future performance (Brookman, Chang & Rennie, 2007). Cash compensation is used as a way to reward past performance and includes salary and bonuses (Frydman & Jenter, 2010; Jensen & Murphy, 1990). Stock compensation, on the other hand, is often used to incentivize managers to take actions benefiting the interests of stakeholders and the future firm performance (Jensen & Meckling, 1976). Stock compensation mainly consists of compensation from long-term incentive plans (LTIP), restricted option grants and restricted stock grants (Frydman & Jenter, 2010). The base salary and restricted stock grants is usually a fixed amount, which is based on the compensation level of comparable firms in a comparable industry and the size of the company. Bonuses are based on annual bonus plans, which reflect the performance of the CEO and the company in a single year. Long-term incentive plans are similar to bonus plans, but usually based on the cumulative performance of multiple years. Stock option grants consists of the right to exercise a stock at a specific price for a pre-specified term (Murphy, 1999). This research will assess the differences between the two main components of CEO compensation: cash- and stock-based compensation.

2.3.1 Stock compensation
Over the past decades the level of stock-based compensation compared to cash-based compensation is increasing (Frydman & Jenter, 2010). This effect is driven by the characteristic

of stock-based compensation. In fact, stock-based compensation is commonly seen as a powerful mechanism for reducing the agency conflicts between the interests of managers and shareholders of a firm. Stock-based compensation is directly linked to firm performance (Bebchuk & Fried, 2003). Therefore, managers performing poor will be punished via their compensation, because the stock price will drop and vice versa. Compensating executives by granting stock options will therefore create incentives for managers to take actions benefiting the interests of stakeholders and the firm (Jensen & Meckling, 1976). However, this reasoning is questionable. An investor often spreads its risks by taking part in a diversified portfolio, whereas a manager's risk is concentrated on a single stock. Therefore, the risk exposure for a manager is greater than the risk experienced by a diversified shareholder (Larcker, Omarzabal, Tayan & Taylor, 2014). Because of this difference, managers are more conservative towards new investments as they have more at stake in case of a loss than the average investor. However, providing CEOs with stock options can also lead to excessive risk taking. Deutsch, Keil & Laamanen (2010), Dong, Wang & Xie (2010) and Ju, Leland & Senbet (2003) state that including stock options in the compensation package of executives potentially lead to managers choosing to increase risk taking in order to try to enlarge the share price. Similar results have been found by Sanders and Hambrick (2007), who add that providing a sufficient amount of stock options also controls for the risk-adverse nature of CEOs' behavior. Benmelech, Kandel & Veronesi (2010) stress a different downside of stock-based compensation. They show that stock-based compensation provides managers with incentives to misreport the true performance of the firm and even increases the risk to engage in fraudulent activities in order to increase the share prices. To conclude, offering stock-based compensation decreases the agency costs between managers and shareholders of the firm, which incentivizes the manager to act in the best interest of the firm. Nevertheless, it can lead to a reduction of performance in the long term and increases the risk of managers engaging in fraudulent behavior.

2.3.2 Cash compensation
Contrary to the stock-based component, cash-based compensation has less power to influence the CEO's future performance. Though, there are some benefits of cash- over stock-based compensation. For instance, cash compensation is a more reliable mechanism to reward the performance of the CEO (Jensen & Murphy, 2010). Because of the sometimes unpredictable nature of the stock market, the actual compensation from stock options is slightly beyond control of the CEO. In contrast, optimal cash compensation contracts can be used to directly reward the effort and performance of the CEO (Jensen & Murphy, 2010). This way CEOs are encouraged to perform well, since they feel that they are in control of the pay they will receive. However, several researches are devoted to test the efficiency of performance contracts, which led to contradictory insights. Osei-Bonsu & Lutta (2016) and Shaw & Zhang (2010), for example, do not find a clear relation between CEO cash compensation and corporate performance, suggesting that the amount of cash compensation is not strictly linked to the performance of the firm. Yet, other researches expect CEO cash compensation to co-vary with the firm performance (Jensen & Murphy, 1990). Based on these mixed insights, the impact of the drop in firm performance, as result of the COVID-19 crisis, on the level of cash compensation is yet unclear.

When focusing on results of prior recessions, several researchers concluded that cash compensation decreased after the 2008 financial crisis, while equity compensation increased (Gabaix et al., 2014; Sonenshine, Larson & Cauvel, 2016; Vemala et al., 2014). This relative decrease of cash compensation during a recession can be explained by firms trying to limit cash outflows during recessions. This way a firm creates a financial buffer that can be accessed when the firm faces financial distress (Mehran & Tracy, 2016). In combination with the uncertainties about the consequences and duration of the COVID-19 pandemic, I expect firms to increase their financial buffer during the COVID-19 outbreak.

To conclude, stock-based compensation can be used to align the interests of the CEO with those of the firm and its shareholders. In addition, because of the uncertain situation with regard to the COVID-19 pandemic, CEOs can be prone to take less risks. To control for this trend, I expect firms to increase the level of stock option compensation, because stock options can increase risk taking within firms (Sanders & Hambrick, 2007). When focusing on the liquidity of the firm, I expect firms to limit cash outflows, leading to a decrease of cash-based compensation. Based on these insights the following and third hypothesis will be tested:

H3: Stock-based compensation increases relative to cash-based compensation during the COVID-19 pandemic.

3. Data and methodology

3.1 Sample and data selection
The research is conducted using archival data of US public firms listed on the S&P 1500 index. Data for the period 2016-2020 is obtained from several databases available from Wharton Research Data Services (WRDS). CEO compensation data is obtained from the Compustat database of executive compensation (Execucomp). Data on the company financials (e.g., company annual earnings and ROA) are derived from the Compustat database. From BoardEx, I gather data of characteristics of the board, such as the size of the board and the number of independent directors. Finally, I get information about peer companies from the ISS incentive lab database. I merged the data of the different databases based on the central index key (CIK) number, as used as firm identification number by the Securities and Exchange Commission (SEC) and the ticker of the company. After merging the data, I deleted observations with missing values or inappropriate values for any of the variables used. For instance, I excluded observations with negative values for CEO tenure. The final sample data with the variable descriptions and the source of the data is shown in table A.1.

3.2 Regression models
In order to examine the impact of the COVID-19 pandemic on the level and composition of CEO compensation, I compose ordinary least squares (OLS) regressions.

In hypothesis 1 the impact of the coronavirus on the level of CEO compensation is examined. The sample data consists of a control group, including data from the fiscal years (FY) 2016-2018, and a treatment group, consisting of data from fiscal year 2020. Data of fiscal year 2019

is excluded from the dataset due to potential reliability issues. Because of the different impacts of the COVID-19 virus across firms, I split the treatment group into two groups based on the relative sales growth between fiscal year 2018 and fiscal year 2020. One group consists of firms with a positive or zero growth of sales, whereas the other group includes firms with negative sales growth in the period 2018-2020. To investigate hypothesis 1 I use the following model:

$$LNTotalCompensation_{it} = \beta_0 + \beta_1 COVID19_{it} + \beta_2 CEOChair_{it} + \beta_3 BoardSize_{it} + \beta_4 \%InsidersBoard_{it} + \beta_5 ROA_{it} + \beta_6 ROAPeer_{it} + \beta_7 MarketReturn_{it} + \beta_8 LNTotalAssets_{it} + \beta_9 CEOTenure_{it} + \beta_{10} CEOAge_{it} + \sum \beta_f Industry + \varepsilon_{it} \qquad (1)$$

The dependent variable is $LNCompensation_{it}$, which represents the CEOs total compensation for firm i in year t. I control for outliers in this variable by using the natural logarithm of compensation. $Covid19_{it}$ is a dummy variable, which takes the value 1 when the observation represents the fiscal year 2020 and 0 otherwise. The variable $BoardSize_{it}$ proxies for the size of the board of directors of the firm. $CEOChairman_{it}$ is included as dummy variable, which takes the value 1 if the CEO is the chairman of the board and 0 when the CEO is not the chairman of the board. $\%InsidersBoard_{it}$ returns the relative amount of dependent directors on the board. The variable is computed by dividing the amount of dependent board members by the total number of board members. These three variables, i.e. $BoardSize_{it}$, $CEOChairman_{it}$ and $\%InsidersBoard_{it}$, proxy for the quality of corporate governance within a firm. The firm performance is controlled for by the accounting measure ROA_{it}, which represents the return on assets for firm i in year t. I expect this firm performance to be positively related to the level of CEO compensation, corresponding with the research of Deckop (1988) and Jensen & Murphy (1990). Consistently, to control for the performance of a group of peer companies, I include the variable $PeerROA_{it}$. This measure is expected to express coefficients in the opposite direction to the ROA_{it}, as also observed in previous research by Archbold & Alexandrou (2013). $MarketReturn_{it}$ is used as proxy for the stock-based performance of the firm. It is measured by the return on the stock price for firm i in year t. $LNTotalAssets_{it}$ is reflecting the natural logarithm of total assets, which measures the size of the company. I control for the size of the company, because Gabaix et al. (2014) and Sigler (2011) show a positive relation between the size of a company and the amount of total compensation for CEOs. $CEOAge_{it}$ is a continuous variable which returns the age of the CEO. In addition, Sigler (2011) also finds a positive relation between the tenure of a CEO and the total compensation. Therefore, the variable $CEOTenure_{it}$ controls for the tenure of the CEO at the firm. Lastly, I included industry fixed effects to capture systematic differences between industries. The coefficient of interest is β_1, which reflects the difference in CEO compensation between the affected year and pre COVID-19 period. In line with hypothesis 1a, I expect β_1 to be low and insignificant for the sample of firms with a negative development of sales during the corona period. However, when focusing on the group of observations with positive sales development during the pandemic, I expect β_1 to be positive and significant. This would imply an increase in total CEO compensation due to the COVID-19 virus.

The OLS model of the second hypothesis, model 2, is comparable to the model of the first hypothesis. However, I iteratively include one interaction effect of COVID-19 with a variable related to characteristics of the board (e.g., $BoardSize_{it} * COVID19_{it}$) to test a possible moderating effect of the quality of corporate governance on the relation between COVID-19 and the level of CEO compensation. Thus, this model will be performed three times with three different interaction effects. The other variables are identical to the variables of the first hypothesis. Consistent with the second hypothesis, I expect the coefficients of the interaction terms, indicated by β_{10}, β_{11} and β_{12}, to be significant and positive.

$$LNTotalCompensation_{it} = \beta_0 + \beta_1 COVID19_{it} + \beta_2 CEOChair_{it} + \beta_3 BoardSize_{it} + \beta_4 \%InsidersBoard_{it} + \beta_5 ROA_{it} + \beta_6 ROAPeer_{it} + \beta_7 MarketReturn_{it} + \beta_8 LNTotalAssets_{it} + \beta_9 CEOTenure_{it} + \beta_{10} CEOAge_{it} + \beta_{13} CEOChairman_{it} * COVID19_{it} + \beta_{12} BoardSize_{it} * COVID19_{it} + \beta_{13} \%InsidersBoard_{it} * COVID19_{it} + \sum \beta_f Industry + \varepsilon_{it}$$
$$(2)$$

In order to test the third hypothesis, a similar OLS regression model will be used. First, compensation is divided into either cash-based compensation or stock-based compensation. This way the model can provide insights in the separate effects of the Covid-19 pandemic on both components of CEO compensation. Additionally, consistent with Karim et al. (2018) who focus on the relation between corporate social responsibility and the CEO compensation structure, I use the proportion of equity-based compensation on the total compensation as dependent variable. Therefore the following model is used:

$$Composition(stock/total)_{it} = \beta_0 + \beta_1 COVID19_{it} + \beta_2 CEOChair_{it} + \beta_3 BoardSize_{it} + \beta_4 \%InsidersBoard_{it} + \beta_5 ROA_{it} + \beta_6 ROAPeer_{it} + \beta_7 MarketReturn_{it} + \beta_8 LNTotalAssets_{it} + \beta_9 CEOTenure_{it} + \beta_{10} CEOAge_{it} + \sum \beta_f Industry + \varepsilon_{it}$$
$$(3)$$

$Composition(stock/total)_{it}$ in equation (3) represents the proportion of stock-based compensation as part of CEO's total compensation. The proportion of cash-based compensation is highly negatively correlated with stock proportion. Therefore, the proportion of cash-based compensation can be assessed by subtracting the proportion of stock-based compensation from 1. The other variables are comparable to the variables of regression model (1). In line with the third hypothesis, I expect β_1, reflecting the influence of COVID-19 on the relative level of stock-based compensation, to be positive.

3.3 Variable description
As described in the OLS models above, the dependent variable of the first two hypotheses is the level of CEO compensation, which shows the CEO's total compensation for firm i in year t. The total compensation includes salary, bonus, grant date fair value of restricted option grants, restricted stock grants, bonus from long term incentive plan and other payouts in accordance with the research of Brookman et al. (2007), Chhaochharia & Grinstein (2009), Core et al. (1999), Frydman & Jenter (2010), Murphy (1999), Vemala et al. (2014) and Yang et al. (2014). This data is directly available from the Execucomp database. I measure the value of the stock

options using the fair value at date of grant, which is already included as part of the Execucomp database. This approach is consistent with previous research, such as Xian & Chen (2011) and Yang et al. (2014).

The dependent variable of the third hypothesis is the composition of CEO compensation, which is measured as the proportion of stock-based compensation as part of the CEO's total compensation. This measurement is in accordance with the research of Karim et al. (2018), who focusses on the relation between corporate social responsibility and the CEO compensation structure. Stock-based compensation consists of stock option grants and stock grants, whereas cash compensation is calculated as the sum of salary and bonuses (Karim et al., 2018; Murphy, 1999; Frydman & Jenter, 2010). The measurements of the components of the CEO compensation are in line with those of the first hypothesis. The proportion of cash-based compensation is highly negatively correlated with the proportion of stock-based compensation. Therefore, the proportion of cash-based compensation can be assessed by subtracting the proportion of stock-based compensation from 1.

The main independent variable is COVID-19, which is included as a dummy variable in this research. The variable takes the value 1 when the observation represents the fiscal year 2020 and 0 otherwise. The years 2016-2018 are used as a control period, to examine the level of CEO compensation in the period of the COVID-19 crisis. Compensation for the year 2019 is possibly affected by the pandemic, as compensation is usually determined after the end of the fiscal year. As previously described, the COVID-19 outbreak started in March 2020 in the United States (Ghebreyesus, 2020). Therefore, firms with fiscal year 2019 ending around or after March 2020 are potentially biasing the control period, since it is unsure whether the COVID-19 outbreak already affected the firm and its performance in fiscal year 2019. Because of this potential bias, the year 2019 will not be included in this research. However, I include robustness tests on a sample including fiscal year 2019 to check whether the observed effects could also be identified in a larger sample. As the global outbreak of the COVID-19 virus happened during 2020, the year 2020 is used as measure for the COVID-19 crisis.

For the second hypothesis, interaction terms between COVID-19 and corporate governance proxies are included to test whether a moderating effect exists for the relation between COVID-19 and CEO compensation. Corporate governance reflects the quality and effectivity of the rules, practices and processes that are used to manage and control the company (L'Huillier, 2014). As aforementioned in hypothesis 2, I expect CEOs of firms with weak corporate governance to use their power to increase or minimize the decrease of their annual compensation. In line with the research of Morse et al. (2011), who assess the power of CEOs over boards, I combine three components to proxy for the quality of corporate governance in board of directors. The first measure is whether the CEO is also the chairman of the board, also referred to as CEO duality. Yermack (1996) suggests that CEO duality increases the chance of agency conflicts, which consequently decreases the quality of the board. In addition to this measure, I include *%insider*, which reflects the composition of the board. It is measured as the fraction of inside, dependent, directors relative to total board members. I classify a board member as insider, if the director is an employee of the firm. Bebchuk & Fried (2003) argue

that firms with a higher fraction of inside directors on the board are more likely to support the CEO during board meetings. This is prompted by the power of CEO's in the nomination process of board members. Therefore, fighting the CEO's pay arrangement would decrease the chances of a director to be nominated into the board (Bebchuk & Fried, 2003). The third measure is the size of the board of directors, measured by the total number of board members. The size is expected to be negatively related to the quality of corporate governance of a firm, as larger boards become less effective and are more prone to the CEO's influence (Jensen, 1993). I chose to include the corporate governance variables separately into my models, as combining the measures would lead to a variable which was mostly reflecting just one underlying variable.

Control variables
Besides of the dependent variable and the main independent variable, I included several control variables into this research. Prior research regarding the topic of CEO compensation often assessed the impact of firm performance on the CEO compensation. However, actual evidence about the effect of firm performance on the level of CEO compensation is mixed. For instance, Deckop (1988) and Jensen & Murphy (1990) show a relation between firm performance and the level of CEO compensation, whereas Jeppson et al. (2009) do not support this finding. Prior literature, about the level of CEO compensation, often uses firm performance as independent variable. This makes me include firm performance as control variable in this research. I measure the performance of the firm by using the return on assets (ROA). Because this proxy reflects the net income relative to the total amount of assets, it is not related to the size of the company. This measure is consistent with previous research of Yang et al. (2014), Chhaochharia & Grinstein (2009), Core et al. (1999) and Osei-Bonsu & Lutta (2016).

Gong et al. (2011) and Farmer et al. (2013) argue that firms should use relative peer performance indicators to capture the influence of market wide risks on the performance of the firm. Since the COVID-19 pandemic introduced a higher fraction of common risks faced by firms, I expect firms to focus more on the relative peer performance in determining the level of CEO compensation. Therefore, I include the median firm performance of a group of peers for each firm. By including the median ROA of the peer group instead of, for example, the average, I control for outliers in the peer group. Firm performance of the peer group is measured in line with the proxy of firm performance by using the ROA.

Additionally to the accounting-based firm performance, I also control for the market-based firm performance by using the yearly stock market return. This proxy is relevant as the compensation of CEOs largely consists of restricted stock option grants and restricted stock grants (Frydman & Jenter, 2010). Thereby, previous research included market-based performance as additional measure for firm performance (e.g., Yang et al., 2014; Chhaochharia & Grinstein, 2009; Core et al., 1999 and Vemala et al., 2014). According to Murphy (1999), the base salary and restricted stock grants are partly based on the size of the firm and the compensation level of comparable firms. Firm size is often used in prior research as explanatory variable or control variable. Ghosh (2006) and Nourayi & Mintz (2008), for instance, find a positive relation between the size of the firm and the level of CEO compensation. In this paper firm size is included as a control variable. Prior research uses several measures to control for the size of the firm. For

example, Mangel & Singh (1993) uses the market value of the company, which is measured by total shares outstanding times the share price. Another frequently used measure for the firm size is net sales (e.g., Boyd, 1992; Chang, Hayes & Hillegeist, 2016; Chhaochharia & Grinstein, 2009; Core et al., 1999; Mangel & Singh, 1993; Miller, Wiseman & Gomez-Mejia, 2002; Ozkan, 2011; Sonenshine et al., 2016). However, due to the negative impact of the outbreak of the COVID-19 virus on the sales in 2020 (Hu and Zhang, 2021; Shen et al., 2020), this measure is likely to be highly correlated with the variable of COVID-19 and the firm performance. Therefore, I use the book value of total assets as measure of firm size. This measure is in line with the research of Brookman et al. (2007), Shaw & Zhang (2010) and Vemala et al. (2014), who all study characteristics of CEO compensation.

The tenure of the CEO is included as control variable. Research finds evidence that CEO tenure is positively related to the level of CEO compensation (Chhaochharia and Grinstein, 2009; Core et al., 1998; Mangel and Singh, 1993). In addition, the research of Karim et al. (2018) shows a positive relation between the tenure of the CEO at the company and the relative amount of stock-based compensation. Tenure is measured as the period of the CEO working at the firm. As described in the literature review, I expect CEO compensation to increase with the tenure of the CEO, because the abilities of the CEO become better known when tenure increases. While tenure can also be linked to the quality of corporate governance, I choose to include it as separate variable as the variable is also related to the abilities of the CEO and the share of stock ownership (Hermalin & Weisbach, 1998; Ozkan, 2011; Zheng, 2010). I include the age of the CEO as control variable, which represents the age of the CEO. This variable is regularly included as control variable in previous research, for instance, Ozkan (2011). Lastly, I control for systematic differences between industries by using industry fixed effects. These fixed effects are based on the two-digit SIC codes, which are commonly used in prior research to control for systematic differences between industries.

3.4 Descriptive statistics
The descriptive statistics for the full sample are included in table 1. I control for outliers in the sample by using the natural logarithm of continuous variables. For example, I use *LNTotalcompensation* instead of the total compensation. In addition, I winsorize all numerical variables at the top and bottom one percent. Data from the pre COVID-19 period (FY 2016-2018) includes 3844 observations, whereas data from fiscal year 2020 consists of 160 observations. This difference is caused by a smaller data period and a high level of missing data due to the short time interval between the end of the fiscal year and this research. However, when focussing on the differences between the values of the variables in both years, I can conclude that the means of the variables are similar in the two periods. This is validated by using an independent t-test.

Noteworthy is the significant increase of *LNTotalcompensation* in fiscal year 2020 compared to previous years, which is significant based on a significance level of 5%. This increase could indicate a compensation premium for increased risks as a consequence of the COVID-19 pandemic, as described by Chang et al. (2016) and Miller et al. (2002). However, the main drivers of compensation will be further identified as part of the results section. The composition

of the compensation is skewed in the direction of stock compensation. As shown in table 1, the composition of compensation in fiscal year 2020 seems to be consistent with previous years, despite of a small increase of stock compensation compared to cash compensation. *CEOChair* indicates whether the CEO is also the chairperson of the board. Based on this dataset, about 30% of the CEOs is also the chairperson of the board.. *Boardsize* is used as a measure of the size of the board of directors. In congruence with previous research, I excluded observations with board size of less than four members (e.g., Yermack (1996). This results in a total board size between 4 and 15 board members in the sample, as described in table 1. The relative amount of dependent directors, as measured by *%insiders,* seems to remain constant between the two periods. Overall, the board of directors consists mainly of independent directors. The performance of the company is measured by *ROA*. This measure is controlled for the size of the company by subtracting the income by the total value of assets. The performance of firms does not seem to be changed in fiscal year 2020 compared to previous periods. This development also holds for the performance of peer companies as measured by *ROApeer. LNTotalAssets* and *CEOTenure,* which include respectively the size of the firm and the tenure of the CEO, do not show any remarkable developments. However, the age of the CEO, as measured by *CEOAge*, seems to have increased by almost one year in fiscal year 2020 compared to the pre COVID-19 period.

Table A.2, part of appendix A, shows the differences in the COVID-19 period between firms negatively affected and firms positively affected by the COVID-19 pandemic. This sample is divided based on the relative development of sales between the fiscal years 2018 and 2020. Remarkable is the difference in *LNTotalcompensation* between the two subsamples. Based on a 10 percent significance level, compensation is higher for the positively affected firms. This development suggests a positive relation between the performance of the firm and the level of compensation for the CEO. Moreover, based on the higher proportion of stock compensation relative to cash compensation in the positively affect group, it seems that well performing firms provide CEOs with relatively more stock compensation compared to firms performing worse. Finally, the ROA of firms positively affected by the COVID-19 pandemic is higher compared to the ROA of firms negatively affected by the virus. This corresponds with the different direction of sales growth between the two groups.

Table A.3 presents the correlation matrix of the variables included in this research. This table is included to test for potential multicollinearity of the sample. However, as presented in the table, the correlation coefficients between the variables are mostly insignificant and relatively low. The correlation between the composition of CEO compensation and total compensation is significant with a coefficient of 0.41. Though, these variables are not included in the same model, as the composition of CEO compensation is used as dependent variable in hypothesis 3. Noteworthy is also the significant positive correlation of 0.51 between the variables *Boardsize* and *LNTotalAssets*. This correlation suggests that the size of the company is positively related to the number of directors on the board. In addition, the size of the company, as measured by *LNTotalAssets* is positively correlated with the level of CEO compensation following the significant coefficient of 0.59. This coefficient suggests that larger firms compensate their CEO more relative to smaller firms. Besides of the informativeness of the significant correlations, it

Table 1: Descriptive statistics full sample

	Pre COVID-19 (FY 2016-2018) N = 3,136					COVID-19 (FY 2020) N = 145					Differences
	Mean	Median	St. Dev.	Min	Max	Mean	Median	St. Dev.	Min	Max	Mean dif.
LNTotalcompensation	15.521	15.590	0.545	13.540	16.650	15.627	15.660	0.477	14.400	16.510	0.106**
Composition (stock/total)	0.737	0.806	0.224	0.000	1.000	0.754	0.831	0.240	0.000	1.000	0.017
CEOChair	0.332	0.000	0.471	0.000	1.000	0.269	0.000	0.445	0.000	1.000	-0.063
Boardsize	9.253	9.000	1.528	4.000	15.000	9.476	9.068	1.533	6.000	15.000	0.223*
%Insiders	0.163	0.125	0.095	0.063	0.889	0.168	0.125	0.102	0.077	0.625	0.005
ROA	0.055	0.051	0.061	-0.268	0.374	0.045	0.045	0.057	-0.142	0.188	-0.010*
ROApeer	0.050	0.053	0.046	-0.165	0.256	0.040	0.049	0.062	-0.164	0.258	-0.010**
MarketReturn	0.121	0.096	0.303	-0.687	2.063	0.041	0.049	0.289	-0.712	1.072	-0.080***
LNTotalAssets	21.903	21.990	0.983	18.710	23.730	21.962	21.990	0.953	18.940	23.710	0.059
CEOTenure	7.108	5.504	5.557	1.000	34.230	7.125	5.578	5.278	1.252	29.011	0.017
CEOAge	56.801	57.000	5.237	37.000	81.000	57.643	57.000	4.933	46.000	84.000	0.842*

This table presents the descriptive statistics of all variables included in the full sample. All continuous variables are winsorized at the 1% and 99% level. *, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively (based on two-samples t-test).

is important for the performance and reliance of the models to test whether correlations exist between the three measures for corporate governance. Based on table A.4, I cannot conclude that the coefficients of the correlations between the variables *Boardsize*, *CEOChair* and *%Independent* are low (i.e. close to zero), and in addition these correlations are also not significant. This implies that for each of the three regression models, in which the interaction term between *Covid19* and one of the corporate governance variables is included, I can control for all three measures of corporate governance.

4. Results

With regard to the descriptive statistics, explained in section 3.4, I can conclude, based on a significance level of 5%, that the total compensation of CEOs increased during the recent COVID-19 period compared to previous years. However, this inference is based on an univariate analysis. Therefore, the outcomes of the descriptive statistics should be interpreted with caution, as the results could be prone to biases from confounding factors. In this section I employ several multivariate analyses to investigated whether the hypotheses, stated in section 2, could be validated.

4.1 Results hypothesis 1 and 2

Within hypothesis 1 I test the impact of the COVID-19 virus on the level of CEO compensation. The first hypothesis is divided into two sub-hypotheses based on the effect of the COVID-19 pandemic on the firm performance: firms negatively and firms positively affected by the COVID-19 pandemic. Table 2 shows the results of the first and second regression model, explained in section 3.2. Column (1), (2), (3) and (4) show the regression results for the sample of negatively affected firms, controlling for no moderating effect, the moderating effect of *CEO chair*, the moderating effect of the *Boardsize* and the moderating effect of the relative amount of insiders on the board, respectively. In contrast, column (5)-(8) reflect the coefficients of the regression model used on the sample of firms which faced an increase in their revenues due to the COVID-19 pandemic. The columns reflect the regression models in the same order as with column (1)-(4) (e.g., the regression model used in column (6) controls for the possible moderating effect of CEO chair). To answer the first hypothesis, I start to focus on the results of the second hypothesis, represented in columns (2)-(4) and (6)-(8). As mentioned in section 2 of this paper, hypothesis 2 states that the quality of corporate governance negatively affects the relation between the COVID-19 pandemic and the level of CEO compensation. As shown in column (2), (3) and (4) of table 2, I do not find a moderating effect of one of the corporate governance measures for the effect between COVID-19 and the level of CEO compensation for firms which experienced a decline of sales during the COVID-19 pandemic. This inference is interpreted by the insignificant coefficients for the interaction effects of *CEOChair*COVID19, Boardsize*COVID19* and *%Insiders*COVID19*. The potential moderating effect is also not recognized when focusing on firms with a sales increase following the COVID-19 pandemic, as shown in column (6), (7) and (8). Therefore, I reject hypothesis 2.

Since I do not find evidence for the existence of a moderating effect, I focus on the results of column (1) and (4) in order to answer respectively hypothesis 1a and 1b. These columns show

the results of the regression models without taking into account the possible moderating effects of corporate governance. In addition, the R-squared of these two regressions is 43.9%, which is comparable to the R-squared of the regressions with moderating effects as shown in column (2)-(4) and (6)-(8). Therefore, I can conclude that the addition of an interaction term does not increase the explained variance in *LNTotalcompensation* by the model.

To test the potential effect of COVID-19 on CEO compensation, I focus on the coefficient related to the variable COVID19. Consistent with hypothesis 1a, I do not find any effect of COVID-19 on the level of CEO compensation for firms which experienced a drop in sales due to the pandemic. However based on a significance level of 1%, companies, which saw their revenue increase during the COVID-19 pandemic, significantly increased the total compensation of their CEOs with approximately 13.3%. However, caution should be made when interpreting these results. Namely, when assuming a moderating effect of the quality of corporate governance on the effect between COVID-19 and the level of CEO compensation, I do not find support for a positive impact of COVID-19 on the level of CEO compensation following insignificant coefficients for the variable *COVID19* in column (6), (7) and (8). To conclude, I accept hypothesis 1a as I observe no effect of COVID-19 on the level of CEO compensation for firms which experienced a drop in sales during the pandemic. In addition, based on the simple OLS model, expressed in column (5) of table 2, I accept hypothesis 1b.

To obtain a complete overview of the potential effects of COVID-19 on the level of CEO compensation, I additionally perform regression analyses on the entire dataset. The results of these models are shown in table B.1. Consistent with the results of hypothesis 1b, I observe a significant positive effect of the COVID-19 pandemic on CEO compensation. Column (1) of table B.1 suggests that, overall, the total compensation increased by approximately 10% during the COVID-19 period. Remarkable is the significant, positive, coefficient of *COVID19* in the second column, as this model is controlled for by the interaction effect of *CEOChair*COVID19*. However, consistent with the models reflected in table 2, including moderating variables of corporate governance measures, does not increase the explained variance of the dependent variable.

Additionally to the effects of COVID-19, I examine some of the coefficients of the control variables included in this research. In previous research, evidence was mixed on whether firm performance could explain part of the level of CEO compensation. In accordance with the research of Ghosh (2006), Nourayi & Mintz (2008) and Ozkan (2011), I do find a significant positive effect of firm performance on total compensation for all models. This implies that CEOs are being rewarded with higher compensation in case their firm is performing better. This positive effect is observed for both measures of firm performance: *ROA* and *MarketReturn.* However, I do not observe a reversed effect of the median performance of the peer group, which was expected by Gong et al. (2011) and Farmer et al. (2013). The insignificant coefficients of *ROAPeer* imply that the performance of peer firms is not being used or not efficiently being used in composing the compensation of CEOs. The size of the company, reflected by *LNTotalAssets*, is positively related to the level of CEO compensation,

Table 2: Results regression models

Dependent variable: LNTotalcompensation

	Firms negatively affected				Firms positively affected			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
COVID19	0.057	0.075	0.166	-0.024	0.133***	0.135**	0.108	0.137
	(1.081)	1.208	(0.512)	(-0.215)	(2.891)	(2.527)	(0.368)	(1.599)
CEOChair	0.016	0.017	0.016	0.016	0.015	0.015	0.015	0.015
	(0.931)	(0.997)	(0.927)	(0.907)	(0.862)	(0.864)	(0.864)	(0.863)
Boardsize	-0.002	-0.002	-0.002	-0.002	-0.001	-0.001	-0.001	-0.001
	(-0.345)	(-0.349)	(-0.292)	(-0.344)	(-0.188)	(-0.187)	(-0.197)	(-0.187)
%Insiders	-0.439***	-0.438***	-0.438***	-0.447***	-0.442***	-0.441***	-0.442***	-0.441***
	(-5.267)	(-5.256)	(-5.253)	(-5.327)	(-5.372)	(-5.369)	(-5.371)	(-5.252)
CEOChair* COVID19		-0.064				-0.008		
		(-0.553)				(-0.073)		
Boardsize* COVID19			-0.011				0.003	
			(-0.341)				(0.086)	
%Insiders* COVID19				0.507				-0.020
				(0.833)				(-0.049)
ROA	0.514***	0.515***	0.515***	0.513***	0.549***	0.548***	0.549***	0.549***
	(4.008)	(4.012)	(4.013)	(4.001)	(4.270)	(4.265)	(4.270)	(4.269)
ROApeer	0.226	0.229	0.225	0.227	0.253	0.253	0.252	0.253
	(1.302)	(1.315)	(1.292)	(1.306)	(1.457)	(1.456)	(1.452)	(1.457)
MarketReturn	0.125***	0.125***	0.125***	0.124***	0.130***	0.130***	0.130***	0.130***
	(4.972)	(4.977)	(4.972)	(4.944)	(5.194)	(5.192)	(5.185)	(5.193)
LNTotalAssets	0.370***	0.370***	0.370***	0.370***	0.369***	0.369***	0.369***	0.369***
	(37.919)	(37.887)	(37.904)	(37.911)	(37.927)	(37.906)	(37.920)	(37.920)
CEOTenure	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(3.237)	(3.237)	(3.231)	(3.250)	(3.357)	(3.357)	(3.353)	(3.354)
CEOAge	0.003*	0.003*	0.003*	0.003*	0.003**	0.003**	0.003**	0.003**
	(1.851)	(1.852)	(1.849)	(1.856)	(2.101)	(2.102)	(2.101)	(2.099)
Constant	7.233	7.236***	7.232***	7.235***	7.223***	7.223***	7.224***	7.223***
	(0.000)	(29.291)	(29.275)	(29.294)	(29.317)	(29.311)	(29.295)	(29.311)
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,054	3,054	3,054	3,054	3,073	3,073	3,073	3,073
Adjusted R^2	0.438	0.438	0.438	0.438	0.439	0.439	0.439	0.439

This table presents the results of the OLS regressions of the first and second hypothesis. Column (1) and (5) present the OLS output of model (1). Column (2), (3), (4), (6), (7) and (8) present the OLS regression results of model (2). Industry fixed effects, based on the two-digit SIC codes, are included to control for systematic differences between industries. All continuous variables are winsorized at the 1% and 99% level.

*, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively.

T-statistics are reported in parentheses.

which corresponds with the findings of Ghosh (2006) and Nourayi & Mintz (2008). This effect is consistent throughout the three different samples, and reflects an increase in CEO compensation of approximately 0.37%, when the firms total assets increase with 1%.

Although I do not find a moderating effect of corporate governance quality, I do observe a significant negative effect of the percentage of dependent directors on the board on the level of CEO compensation. This result is quite remarkable as previous research expects that the relative

amount of insiders on the board is positively associated with the level of CEO compensation (Benkraiem et al., 2017 and Core et al., 1999). Furthermore, the results suggest that CEO compensation increases with longer CEO tenure based on a significance level of 1%. Although, the effect is very small following an increase in total compensation of approximately 0.5% per extra year of tenure, it is consistent with my previous expectations and previous research. Together with the coefficient of age, significant at the 10% level, it seems that experience within the company is being reflected in the compensation level.

4.2 Results hypothesis 3

In addition to the level of compensation, this research examines the effects of the COVID-19 pandemic on the structure of the compensation package of the CEO. Following potential liquidity risks and the likelihood of preventative measures against agency problems, I expect firms to increase the stock-based compensation relative to their cash-based compensation.

Table 3 shows the regression output of model (3). Consistent with the first hypothesis, the results are divided into three different categories, based on the impact of the COVID-19 virus on the sales development. Column (1) represents the regression output of the group of firms that faced a sales decrease during the pandemic. Consistent with the first hypothesis, *COVID19,* is the variable of interest, as the coefficient of this dummy variable reflects the difference between the COVID period and the pre-COVID period. However, as shown in table 3, the coefficient of *COVID19* is insignificant. This suggests that the composition of the CEO compensation package has not changed due to COVID-19. In addition, this insignificant coefficient is also identified when focusing on the full sample data of firms, reflected in column (3). However, my results suggest a positive effect of COVID-19 on the relative amount of stock-based compensation for firms which experienced an increase in sales during the COVID-19 period, based on a significance level of 10%. Together with the results of the first hypothesis, this implies that firms performing well during the COVID-19 crisis increase the level of compensation for their CEOs by rewarding their CEOs with relatively more stock-based compensation. Based on the insignificant coefficients, I partly reject the third hypothesis. COVID-19 does not impact the value of stock related payments relative to cash related payments for CEOs. However, firms which are positively affected by the COVID-19 crisis relatively increase the level of stock-based compensation based on a significance level of 10%.

When looking at the included control variables, some striking results can be identified. First, corporate governance measures seem to relate to the composition of CEO pay packages. Namely, CEO duality and the relative amount of insiders both negatively affect the relative level of stock-based compensation. This implies that higher quality of corporate governance (i.e., higher percentage of independent directors on the board) is leading to relatively more stock-based compensation. Concluding, CEOs seem to try to use their power of the board to increase their salary and bonuses relative to their granted stocks and stock options. Finally, prior research suggested a strong link between the firm performance and the level of stock-based compensation. (Bebchuk & Fried, 2003). In line with prior research, I do observe this positive relation between the level of stock-based compensation and accounting-based firm performance. Though, based on the insignificant coefficients *MarketReturn,* I do not find this

Table 3: Results regression models hypothesis 3

Dependent variable: Composition (stock/total)

	Firms negatively affected	Firms positively affected	All firms
	(1)	(2)	(3)
COVID19	-0.016	0.040*	0.016
	(-0.588)	(1.670)	(0.909)
CEOChair	-0.018**	-0.015*	-0.017**
	(-2.027)	(-1.677)	(-1.970)
Boardsize	0.004	0.004	0.004
	(1.216)	(1.197)	(1.341)
%Insiders	-0.312***	-0.305***	-0.300***
	(-7.234)	(-7.206)	(-7.115)
ROA	0.142**	0.144**	0.143**
	(2.143)	(2.178)	(2.168)
ROApeer	-0.063	-0.046	-0.059
	(-0.698)	(-0.517)	(-0.675)
MarketReturn	0.015	0.015	0.015
	(1.123)	(1.139)	(1.154)
LNTotalAssets	0.058***	0.056***	0.057***
	(11.474)	(11.258)	(11.478)
CEOTenure	0.002***	0.002***	0.002***
	(2.760)	(2.814)	(2.823)
CEOAge	-0.002***	-0.003***	-0.003***
	(-2.953)	(-3.086)	(-3.093)
Constant	-0.390***	-0.349***	-0.369***
	(-3.045)	(-2.749)	(-2.915)
INDUSTRY FE	Yes	Yes	Yes
N	3,054	3,073	3,136
Adjusted R^2	0.120	0.119	0.224

This table presents the results of the OLS regressions of the third hypothesis. Industry fixed effects, based on the two-digit SIC codes, are included to control for systematic differences between industries. All continuous variables are winsorized at the 1% and 99% level.

*, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively.

T-statistics are reported in parentheses.

positive relation to be persistent for market-based firm performance. Because of this, I can conclude that, for this dataset, only accounting-based firm performance affects the composition of the CEO's compensation. The size of the firm is associated with a relatively higher amount of stock-based compensation. Based on the significant coefficients of *LNTotalAssets*, an increase of total assets by 1% is associated with an relative increase in stock-based compensation of approximately 0.057 percentage points. In line with the research of Karim et al. (2018), CEO tenure positively affects the relative amount of stock-based compensation. Moreover, the relative amount of stock-based pay decreases the age of the CEO.

4.3 Additional test: Pay-for-performance
This research mainly focuses on the impact of the COVID-19 crisis on the level and the composition of CEO compensation. Besides these two topics, previous research is also focused

on pay-for-performance developments and characteristics of CEO compensation. However, no clear answer is given on the relation between firm performance and CEO compensation in previous research. For instance, the research of Jeppson et al. (2009) does not find significant results suggesting the existence of pay-for-performance. Nevertheless, in line with Deckop (1988) and Jensen & Murphy (1990), I observe a significant effect of firm performance, as measured by the return on assets and the stock market return, on the level of CEO compensation. Therefore, my results support the existence of pay-for-performance within the compensation package of the CEO. To assess the potential influences of the COVID-19 crisis on the pay-for-performance characteristics of CEO pay, I perform several additional tests using data of accounting-based firm performance, market-based firm performance and relative firm performance.

The tests are performed in line with the regression model of equation (1). In addition to this model, I iteratively add interaction terms of *COVID19* with *ROA, ROApeer* and *MarketReturn*, respectively. The addition of the interaction term provides insights on a potential change in the pay-for-performance sensitivity for CEOs. In congruence with the first hypothesis, I divide the sample into two groups: firms negatively affected by the COVID-19 pandemic and firms positively or minimally affected by the pandemic. The results are presented in table 4. Moreover, I also performed the regressions on the full sample of firms. The results of these regressions are included in table B.2 as part of the appendix.

According to the insignificant coefficients of the interaction terms of *ROA*COVID19* and *ROApeer*COVID19* for all three subsamples, as shown in column (1), (2), (4) and (5), I conclude that the pay-for-performance sensitivity did not change for accounting-based firm performance and relative peer performance measures. However, I do observe significant positive coefficients in column (6) for the interaction term of *MarketReturn*COVID19*, based on a significance level of 5%. These results suggest an increase in sensitivity of the CEO pay relative to the stock-based performance measures in the COVID-19 period in comparison with the pre-COVID period for firms positively affected by the COVID-19 pandemic. This increased sensitivity of CEO compensation towards market-based firm performance is also observed in table B.2, reflecting the regression results of the full sample of firms. To conclude, the importance of stock-based performance in composing the level of CEO compensation has increased during the COVID-19 period. Though, this effect is not observed for firms negatively affected by the pandemic.

Table 4: Results of additional regression models reflecting the pay-for-performance sensitivity

Dependent variable: LNTotalcompensation

	Firms negatively affected			Firms positively affected		
	(1)	(2)	(3)	(4)	(5)	(6)
COVID19	0.085	0.082	0.059	0.074	0.129**	0.103**
	(1.402)	(1.365)	(1.120)	(1.117)	(2.230)	(2.113)
CEOChair	0.016	0.016	0.016	0.015	0.015	0.016
	(0.944)	(0.941)	(0.923)	(0.367)	(0.863)	(0.906)
Boardsize	-0.002	-0.002	-0.002	-0.001	-0.001	-0.001
	(-0.332)	(-0.332)	(-0.332)	(-0.200)	(-0.191)	(-0.218)
%Insiders	-0.437***	-0.438***	-0.439***	-0.443***	-0.442***	-0.441***
	(-5.244)	(-5.257)	(-5.275)	(-5.387)	(-5.371)	(-5.373)
ROA	0.530***	0.517***	0.509***	0.529***	0.549***	0.541***
	(4.097)	(4.032)	(3.962)	(4.092)	(4.270)	(4.211)
ROApeer	0.238	0.257	0.222	0.530	0.250	0.249
	(1.363)	(1.448)	(1.273)	(1.435)	(1.407)	(1.432)
Market Return	0.126***	0.125***	0.123***	0.128***	0.130***	0.122***
	(5.025)	(5.006)	(4.878)	(5.125)	(5.186)	(4.821)
ROA* COVID19	-0.787			1.120		
	(-0.937)			(1.244)		
ROApeer* COVID19		-0.720			0.072	
		(-0.875)			(0.927)	
MarketReturn* COVID19			0.089			0.315**
			(0.647)			(1.984)
LNTotalAssets	0.370***	0.370***	0.370***	0.369***	0.369***	0.368***
	(37.911)	(37.928)	(37.877)	(37.899)	(37.905)	(37.855)
CEOTenure	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(3.217)	(3.207)	(3.245)	(3.342)	(3.357)	(3.283)
CEOAge	0.003*	0.003*	0.003*	0.003**	0.003**	0.004**
	(1.859)	(1.867)	(1.857)	(2.153)	(2.101)	(2.172)
Constant	7.231***	7.227***	7.236***	7.226***	7.223***	7.236***
	(29.281)	(29.253)	(29.288)	(29.328)	(29.308)	(29.373)
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes	Yes
N						
Adjusted R^2	0.438	0.438	0.438	0.439	0.439	0.440

This table presents the additional results of the OLS regressions of model (1), testing for a change in the sensitivity of pay-for-performance characteristics. Industry fixed effects, based on the two-digit SIC codes, are included to control for systematic differences between industries. All continuous variables are winsorized at the 1% and 99% level.

*, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively.

T-statistics are reported in parentheses.

5. Robustness tests

To increase the reliability of this research and to control for potential biases in the dataset, I perform a robustness test to control for the small sample size of firms in the COVID-19 period. This relatively low number of observations is mainly caused by the low availability of the data for fiscal year 2020. To increase the sample size, I will incorporate data of fiscal year 2019 into my sample. I divide the observations between the COVID period and pre-COVID period based on the end date of the fiscal year. The WHO has characterized the outbreak of the COVID-19 virus as a pandemic since 11th March, 2020 (Ghebreyesus, 2020). This date is used to identify the start of the COVID-19 pandemic. Therefore, firms with a fiscal year end previous to mid-March 2020 are allocated to the pre-COVID period. Consistently, firms with a fiscal year end after mid-March 2020 are allocated to the COVID period. After excluding missing values and transforming the variables consistent with the sample of hypothesis 1 and 2, the new sample consists of 4,148 observations. 207 observations of this sample are identified as COVID-19.

The results of this robustness test are shown in table 5. Consistent with hypothesis 1 and 2, the table consists of eight columns, representing the same underlying model as in table 2. Columns (1)-(4) show the regression results for the group of firms which face an decrease of their sales value during the COVID-19 period. These results are mostly in line with the results of table 2. However, as reflected in column (2), I find a significant moderating effect of *CEOChair* on the effect between COVID-19 and the total compensation of CEOs, based on a significance level of 5%. Conflicting with hypothesis 2, these results suggest that CEO duality weakens the effect of COVID-19 on the level of CEO compensation. However, moderating effects of *Boardsize* or *%Insiders* are not identified, following the insignificant coefficients of the interaction effect in column (3) and (4).

Columns (5)-(8) reflect the results of the regression models performed on the group of firms which experienced an increase in sales during the COVID-19 period. Remarkable is the decrease of the significance level belonging to the coefficient of *COVID19*. This implies that the positive impact of COVID-19 on the level of CEO compensation is only significant for a significance level of 5%. In addition, the magnitude of the effect is smaller as the coefficient is only 0.088, which is lower compared to the COVID-19 coefficient of 0.133 in column (5) of table 2. However, all other variables and directions of the coefficients are consistent with the results of table 2.

Table C.1 shows the results of the additional test on the full sample of firms including fiscal year 2019. In line with the decrease of the t-statistic of COVID-19 in column (5) of table 5, the full sample shows a lower significance level of COVID-19 in column (1). This implies that the effect of COVID-19 on the level of compensation is less persistent when taking into account fiscal year 2019. Concludingly, despite a small decrease for the significance level of the coefficients of COVID-19, I find that my results are robust for a larger sample of observations by including fiscal year 2019.

Table 5: Results of regression models with increased sample size

Dependent variable: LNTotalcompensation

	Firms negatively affected				Firms positively affected			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
COVID19	0.006	0.075	-0.178	0.015	0.088**	0.090**	0.031	0.082
	(0.130)	(1.321)	(-0.654)	(0.172)	(2.306)	(2.056)	(0.127)	(1.147)
CEOChair	0.015	0.019	0.015	0.015	0.015	0.016	0.016	0.015
	(1.011)	(1.293)	(1.026)	(1.013)	(1.029)	(1.035)	(1.036)	(1.027)
Boardsize	-0.003	-0.003	-0.004	-0.003	-0.003	-0.003	-0.003	-0.003
	(-0.579)	(-0.616)	(-0.673)	(-0.578)	(-0.534)	(-0.535)	(-0.563)	(-0.535)
%Insiders	-0.416***	-0.415***	-0.417***	-0.415***	-0.414***	-0.414***	-0.414***	-0.415***
	(-5.641)	(-5.631)	(-5.654)	(-5.571)	(-5.663)	(-5.661)	(-5.667)	(-5.570)
CEOChair* COVID19		-0.191**				-0.010		
		(-2.028)				(-0.112)		
Boardsize* COVID19			0.019				0.006	
			(0.686)				(0.242)	
%Insiders* COVID19				-0.057				0.036
				(0.903)				(0.099)
ROA	0.497***	0.497***	0.496***	0.497***	0.508***	0.507***	0.508***	0.508***
	(4.451)	(4.454)	(4.437)	(4.451)	(4.564)	(4.559)	(4.564)	(4.564)
ROApeer	0.089	0.092	0.092	0.089	0.141	0.141	0.141	0.141
	(0.581)	(0.604)	(0.598)	(0.582)	(0.927)	(0.925)	(0.924)	(0.927)
MarketReturn	0.122***	0.122***	0.122***	0.122***	0.130***	0.130***	0.130***	0.130***
	(5.627)	(5.643)	(5.632)	(5.627)	(6.034)	(6.032)	(6.017)	(6.031)
LNTotalAssets	0.373***	0.372***	0.373***	0.373***	0.372***	0.372***	0.372***	0.372***
	(42.268)	(42.230)	(42.270)	(42.262)	(42.511)	(42.506)	(42.505)	(42.500)
CEOTenure	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005	0.005
	(3.460)	(3.469)	(3.469)	(3.456)	(3.895)	(3.893)	(3.893)	(3.895)
CEOAge	0.004***	0.004***	0.004***	0.004***	0.005***	0.005***	0.005***	0.005***
	(3.045)	(3.036)	(3.045)	(3.045)	(3.215)	(3.217)	(3.214)	(3.217)
Constant	7.150***	7.161***	7.152***	7.150***	7.133***	7.133***	7.135***	7.134***
	(32.661)	(32.714)	(32.666)	(32.655)	(32.761)	(32.754)	(32.752)	(32.755)
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,026	4,026	4,026	4,026	4,063	4,063	4,063	4,063
Adjusted R^2	0.434	0.434	0.434	0.434	0.436	0.436	0.436	0.436

This table presents the additional results of the OLS regressions of the first and second hypothesis. FY 2019 is included in the sample and divided among the pre-COVID and COVID period based on the end of the fiscal year. Column (1) and (5) present the OLS output of model (1). Column (2), (3), (4), (6), (7) and (8) present the OLS regression results of model (2). Industry fixed effects, based on the two-digit SIC codes, are included to control for systematic differences between industries. All continuous variables are winsorized at the 1% and 99% level.

*, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively.

T-statistics are reported in parentheses.

6. Conclusion

In this research I tried to find an answer on the following research question:

Does the COVID-19 crisis impact the level and the composition of the compensation of CEOs for U.S. public firms?

Previous research finds that the COVID-19 pandemic heavily impacts the economic environment, putting the years of economic growth in reverse (Boot et al., 2020). This causes many firms to struggle how to compensate their management during this uncertain period. However, not all firms seem to be negatively affected by the COVID-19 crisis (Bloom et al., 2021). For instance, Sharma & Jhamb (2020) show that online businesses were able to increase their revenues due to increased demand following the government restrictions and orders to stay home. Therefore, I examined the impact of the COVID-19 virus on CEO compensation from different perspectives. Consistent with the research of Chang et al. (2016) and Miller et al. (2002), I find evidence that suggest the existence of the so-called "risk premium". Chang et al. (2016) and Miller et al. (2002) have already observed this risk premium to be rewarded to the CEO of firms facing an increase in systematic market risks. The outbreak of the COVID-19 virus went along with many uncertainties (e.g., government restrictions), which could negatively affect the future cashflows of a firm. Consequently, it is likely that these uncertainties increased the systematic market risks. The risk premium is used to compensate the CEO for a potential loss of income in the future due to the loss of value of equity-based holdings and reputational damage (Chang et al., 2016). Caused by this risk premium, I observe that firms that experienced a positive development of sales during COVID-19 significantly increased the compensation level of their CEOs due to the COVID-19 virus. However, in accordance with hypothesis 1b, I do not find an adjustment in the level of CEO compensation for firms negatively affected by the pandemic. This could be caused by the solidarity of CEOs with their staff, as many firms were compelled to decrease salaries of workers (Cajner et al., 2020). Therefore management, including the CEO, cannot justify an increase in their own compensation. Moreover, I find that CEOs do not use or are not able to use their power over the board to further increase their level of CEO compensation during COVID-19. However, my results suggest that in general, CEOs are able to negotiate better pay packages when the relative amount of independent directors on the board is lower. This finding provides additional evidence that helps to resolve the current diversified evidence on the influence of the composition of the board of directors on the compensation of the CEO. In fact, my results support the theory of Benkraiem et al. (2017) and Core et al. (1999), who find that the fraction of independent outside directors is negatively correlated with the level of CEO pay. Though, I do not observe a relation between the level of CEO compensation and other measures of the quality of the board, that is CEO duality and the size of the board.

In addition to the effect of COVID-19 on CEO compensation, I also find other drivers of CEO compensation. Consistent with the findings of Ghosh (2006), Nourayi & Mintz (2008) and Ozkan (2011), I observe a significant and positive relation between the size of the firm and the level of CEO compensation. Also the ability of the CEO, as measured by age and tenure, seems to be valued by the board, since higher quality CEOs receive relatively higher pay. Finally, my

results provide evidence for the existence of pay-for-performance characteristics of CEO compensation packages using both accounting and market-based performance measures. The implementation of relative peer performance is yet not incorporated in the assessment of the level of compensation for the CEO. This observation is remarkable as Archbold & Alexandrou (2013) advices firms to use relative peer performance measures when the firm is facing influences outside the control of the CEO, which is the case during the current COVID-19 pandemic. More striking is the finding that the level of CEO compensation became more sensitive towards the market-based performance during the COVID-19 outbreak. The sensitivity towards relative peer performance measures and accounting-based performance measures did not change during the COVID-19 period, which implies that firms seem to value insights of investors and are focused on future prospects of the firm in determining the compensation during the current pandemic. Finally, I hypothesized that the level of stock compensation would increase relative to cash-based compensation. My results suggest that the relation between cash compensation and stock compensation remained constant in the COVID-19 period. In contrast to what I expected, companies currently see no need to improve their liquidity or implement measures to prevent agency conflicts. However, I observe an increase in the relative amount of stock-based compensation for firms positively affected by the COVID-19 pandemic. In conjunction with the results of the impact of COVID-19 virus on the level of compensation, this finding suggests that firms, positively affected by the pandemic, increased the total compensation level of their CEOs by rewarding them with relatively higher stock-based compensation.

In this research, I tried to find the first effects of the COVID-19 pandemic on the level and composition of CEO compensation. However, I also identify several limitations of this research. First, the results of this thesis should be interpreted with caution, because of the small amount of observations for the COVID-19 period. This is caused by the limited data available on CEO compensation for fiscal year 2020 in the commonly used databases (e.g., Execucomp). Second, due to the time constraints of this research in contrast to the outbreak of the virus, little is known about the consequences of the pandemic. Consequently, it is hard to identify the main characteristics of the COVID-19 virus that caused the increase of the level of CEO compensation. Therefore, this research should be seen as a first exploration of the consequences of the COVID-19 virus on the compensation packages of CEOs. Third, I measured the quality of corporate governance using three proxies based on the quality of the board, i.e., the relative amount of dependent members of the board, CEO duality and the size of the board of directors. However, previous literature identifies some other proxies for the quality of corporate governance, which could have led to different insights. For example, Morse et al. (2011) proxy for the quality of the board by measuring the relative amount of directors that is appointed by the current CEO. Thereby, Ozkan (2011) shows a significant and negative impact of the percentage of institutional shareholders of the firm on the level of CEO compensation.

Further research could build on this thesis by investigating the pay-for-performance sensitivity during COVID-19. I have already found a development of companies increasing the importance of stock market performance in determining the level of CEO compensation. Unfortunately, I was not able to find the exact motivation of this development. This could therefore be examined

in further research. In addition, as the main weakness of this research is the small sample size, this research could be replicated in a few years. By then, more information is probably available on the impact of the COVID-19 virus on CEO compensation, which could help to identify the main driver of the increase of CEO compensation. It is also likely that all data for fiscal year 2020 and, depending on the duration of the virus, fiscal year 2021 is available. A larger sample size could thereby increase the reliability of the results. Finally, future research could assess the relevance of relative performance measures during economic crises. Gong, Li & Shin (2011) and Farmer, Archbold & Alexandrou (2013) have already introduced the importance of relative peer performance, since this measure controls for influences of market wide risks on the overall firm performance. As firm performance might drop during economic crises, adapting relative peer performance measures instead of absolute firm performance measures would be a more reliable proxy for the actual performance of the CEO.

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Appendix A: Data and methodology

Table A.1: Variable descriptions

Variable	Definition	Source
LNTotalcompensation	The natural logarithm of total annual compensation of the chief executive officer for firm i in year t.	ExecuComp
Composition (stock/total)	The ratio of stock-based compensation over total compensation for firm i in year t.	ExecuComp
COVID19	Dummy variable indicating whether the fiscal year is 2020 (=1) or previous to the COVID-19 period (=0).	
CEOChair	Dummy variable indicating whether the CEO is also the Chairperson of the board of directors (Chairperson = 1)	ExecuComp
Boardsize	The total number of members of the board of directors of firm i in year t.	BoardEx
%Insiders	The number of dependent directors relative to the total number of board directors.	BoardEx
ROA	The return on total assets of firm i in year t. This variable reflects the firm performance.	Compustat
ROApeer	The median return on total assets from a peer group of firms for firm i in year t.	Compustat & ISS Incentive Lab
MarketReturn	The market return reflects the return on the stock price between the start of the fiscal year and the end of the fiscal year for firm i.	Yahoo Finance
LNTotalAssets	The natural logarithm of total assets for firm i in year t. This variable is used to measure the size of a firm.	Compustat
CEOTenure	The tenure of the CEO.	Execucomp
CEOAge	The age of the CEO.	Execucomp

Table A.3: Descriptive statistics COVID-19 period

	COVID-19 negatively affected (FY 2020) N = 63					COVID-19 positively affected (FY 2020) N = 82					Differences
	Mean	Median	St. Dev.	Min	Max	Mean	Median	St. Dev.	Min	Max	Mean dif.
LNTotalcompensation	15.604	15.610	0.452	14.560	16.510	15.645	15.700	0.498	14.400	16.460	0.041
Composition (stock/total)	0.728	0.819	0.280	0.000	0.992	0.775	0.833	0.203	0.000	1.000	0.047
CEOChair	0.286	0.000	0.455	0.000	1.000	0.256	0.000	0.439	0.000	1.000	-0.030
Boardsize	9.567	9.000	1.581	6.000	15.000	9.406	9.000	1.502	6.000	13.000	-0.161
%Insiders	0.159	0.125	0.087	0.077	0.545	0.174	0.143	0.113	0.077	0.625	0.015
ROA	0.035	0.039	0.063	-0.142	0.180	0.053	0.049	0.051	-0.080	0.188	0.018*
ROApeer	0.033	0.049	0.065	-0.164	0.240	0.045	0.050	0.060	-0.160	0.258	0.012
MarketReturn	-0.030	-0.006	0.271	-0.599	0.991	0.095	0.098	0.292	-0.712	1.072	0.125***
LNTotalAssets	22.069	22.010	0.956	19.710	23.710	21.881	21.960	0.949	18.940	23.400	-0.188
CEOTenure	6.834	5.679	5.365	1.252	29.011	7.348	5.575	5.233	1.252	27.016	0.514
CEOAge	58.090	58.000	4.179	49.000	74.000	57.300	57.000	5.443	46.000	84.000	-0.790

This table presents the descriptive statistics of all variables included in the sample. This sample includes observations representing the COVID-19 period, which are divided into firms with positive sales development and firms with a negative sales development during the COVID-19 period. All continuous variables are winsorized at the 1% and 99% level. *, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively (based on two-samples t-test).

Table A.4: Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12
1 LNTotalcompensation	1											
2 Composition (stock/total)	0.413**	1										
3 COVID19	0.041	0.016	1									
4 CEOChair	0.104	-0.007	-0.028	1								
5 Boardsize	0.317*	0.134	0.031	0.063	1							
6 %Insiders	-0.045	-0.146	0.011	0.002	-0.137	1						
7 ROA	0.080	0.027	-0.035	0.028	0.056	0.049	1					
8 ROApeer	0.093	0.005	-0.047	0.030	0.142	-0.008	0.195	1				
9 MarketReturn	0.015	0.009	-0.055	-0.008	-0.065	0.013	0.100	-0.055	1			
10 LNTotalAssets	0.592***	0.224	0.013	0.130	0.518***	-0.009	-0.021	0.121	-0.100	1		
11 CEOTenure	-0.023	-0.043	0.001	0.280	-0.114*	0.124	0.059	-0.042	0.009	-0.154*	1	
12 CEOAge	0.062	-0.053	0.034	0.218	0.004	0.066	0.034	-0.012	-0.048	0.016	0.429**	1

This table presents the correlation matrix of all variables included in the sample. All continuous variables are winsorized at the 1% and 99% level. *, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively (based on two-samples t-test).

Appendix B: Results

Table B.1: Results regression models full sample

Dependent variable: LNTotalcompensation

	All firms			
	(1)	(2)	(3)	(4)
COVID19	0.100***	0.110***	0.151	0.071
	(2.964)	(2.700)	(0.692)	(1.053)
CEOChair	0.015	0.017	0.015	0.015
	(0.898)	(0.974)	(0.891)	(0.881)
Boardsize	-0.001	-0.001	-0.001	-0.001
	(-0.215)	(-0.214)	(-0.168)	(-0.224)
%Insiders	-0.433***	-0.433***	-0.433***	-0.443***
	(-5.338)	(-5.327)	(-5.328)	(-5.314)
CEOChair* COVID19		-0.038		
		(-0.480)		
Boardsize* COVID19			-0.005	
			(-0.237)	
%Insiders* COVID19				0.175
				(0.510)
ROA	0.537***	0.536***	0.537***	0.537***
	(4.245)	(4.235)	(4.244)	(4.240)
ROApeer	0.228	0.228	0.228	0.228
	(1.346)	(1.350)	(1.348)	(1.343)
MarketReturn	0.132***	0.132***	0.132***	0.132***
	(5.359)	(5.358)	(5.362)	(5.348)
LNTotalAssets	0.369***	0.369***	0.369***	0.369***
	(38.580)	(38.534)	(38.572)	(38.571)
CEOTenure	0.005***	0.005***	0.005***	0.005***
	(3.329)	(3.331)	(3.330)	(3.342)
CEOAge	0.003**	0.003**	0.003**	0.003**
	(2.025)	(2.035)	(2.024)	(2.038)
Constant	7.227***	7.230	7.225	7.228
	(29.713)	(29.713)	(29.675)	(29.721)
INDUSTRY FE	Yes	Yes	Yes	Yes
N	3,136	3,136	3,136	3,136
Adjusted R^2	0.441	0.441	0.441	0.441

This table presents the results of the OLS regressions of the first and second hypothesis. Column (1) presents the OLS output of model (1). Column (2), (3) and (4) present the OLS regression results of model (2). Industry fixed effects, based on the two-digit SIC codes, are included to control for systematic differences between industries. All continuous variables are winsorized at the 1% and 99% level.

*, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively. T-statistics are reported in parentheses

Table B.2: Full sample results of additional regression models reflecting the pay-for-performance sensitivity

Dependent variable: LNTotalcompensation

	Full sample		
	(1)	(2)	(3)
COVID19	0.092**	0.111***	0.089**
	(2.045)	(2.631)	(2.513)
CEOChair	0.015	0.015	0.015
	(0.902)	(0.898)	(0.908)
Boardsize	-0.001	-0.001	-0.001
	(-0.220)	(-0.214)	(-0.204)
%Insiders	-0.434***	-0.432***	-0.436***
	(-5.343)	(-5.325)	(-5.370)
ROA	0.530***	0.538***	0.519***
	(4.122)	(4.251)	(4.092)
ROApeer	0.225	0.250	0.211
	(1.324)	(1.419)	(1.245)
Market Return	0.132***	0.133***	0.122***
	(5.310)	(5.375)	(4.851)
ROA* COVID19	0.184		
	(0.301)		
ROApeer* COVID19		-0.261	
		(-0.456)	
MarketReturn* COVID19			0.243**
			(2.007)
LNTotalAssets	0..369***	0..369***	0..368***
	(38.572)	(38.570)	(38.483)
CEOTenure	0.005***	0.005***	0.005***
	(3.330)	(3.311)	(3.295)
CEOAge	0.003**	0.003**	0.003**
	(2.032)	(2.028)	(2.104)
Constant	7.228***	7.226***	7.242***
	(29.710)	(29.705)	(29.773)
INDUSTRY FE	Yes	Yes	Yes
N			
Adjusted R^2	0.441	0.441	0.441

This table presents the additional results of the OLS regressions of model (1), testing for a change in the sensitivity of pay-for-performance characteristics. The dataset used in the three regressions include the full sample of firms. Industry fixed effects, based on the two-digit SIC codes, are included to control for systematic differences between industries. All continuous variables are winsorized at the 1% and 99% level.

*, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively.

T-statistics are reported in parentheses.

Appendix C: Robustness tests

Table C.1: Results regression models full sample for robustness test

Dependent variable: LNTotalcompensation

	All firms			
	(1)	(2)	(3)	(4)
COVID19	0.056*	0.086**	-0.057	0.055
	(1.872)	(2.429)	(-0.314)	(0.970)
CEOChair	0.014	0.018	0.014	0.014
	(0.930)	(1.223)	(0.954)	(0.929)
Boardsize	-0.002	-0.002	-0.003	-0.002
	(-0.379)	(-0.411)	(-0.499)	(-0.379)
%Insiders	-0.414***	-0.412***	-0.415***	-0.414***
	(-5.737)	(-5.715)	(-5.753)	(-5.577)
CEOChair* COVID19		-0.102		
		(-1.581)		
Boardsize* COVID19			0.012	
			(0.629)	
%Insiders* COVID19				0.006
				(0.019)
ROA	0.501***	0.497***	0.500***	0.501***
	(4.559)	(4.525)	(4.551)	(4.558)
ROApeer	0.106	0.105	0.107	0.106
	(0.712)	(0.703)	(0.717)	(0.712)
MarketReturn	0.129***	0.129***	0.129***	0.129***
	(6.068)	(6.062)	(6.049)	(6.064)
LNTotalAssets	0.372***	0.372***	0.372***	0.372***
	(42.991)	(42.983)	(42.991)	(42.984)
CEOTenure	0.005***	0.005***	0.005***	0.005***
	(3.560)	(3.601)	(3.563)	(3.559)
CEOAge	0.005***	0.005***	0.005***	0.005***
	(3.212)	(3.234)	(3.210)	(3.211)
Constant	7.150***	7.152***	7.154***	7.150***
	(33.161)	(33.175)	(33.162)	(33.152)
INDUSTRY FE	Yes	Yes	Yes	Yes
N	4,148	4,148	4,148	4,148
Adjusted R^2	0.436	0.436	0.436	0.436

This table presents the additional results of the OLS regressions of the first and second hypothesis. FY 2019 is included in the sample and divided among the pre-COVID and COVID period based on the end of the fiscal year. Column (1) presents the OLS output of model (1). Column (2), (3) and (4) present the OLS regression results of model (2). Industry fixed effects, based on the two-digit SIC codes, are included to control for systematic differences between industries. All continuous variables are winsorized at the 1% and 99% level.

*, ** and *** indicate significance at 0.10, 0.05 and 0.01 levels, respectively.

T-statistics are reported in parentheses