



## Master Thesis

# **The effect of the Dodd-Frank Act on the pay-for-performance sensitivity in public firms**

As a reaction to the Global Financial Crisis, the U.S. government enacted the Dodd-Frank Act to increase firms' accountability, transparency, and governance. As a result, shareholders received a non-binding vote on CEO compensation to align shareholders' and CEOs' incentives. This paper uses the pay-for-performance sensitivity to proxy for the alignment between shareholders' and CEOs' incentives. The study aims to determine if the pay-for-performance sensitivity has increased after the enforcement of the Dodd-Frank Act. This paper uses four different compensation variables and three different performance measures. The sample includes firms of the S&P 1500. The results show an increase in the pay-for-performance sensitivity on options granted to the CEO. However, on the other compensation variables, the pay-for-performance sensitivity remained the same or decreased. These findings provide relevant and interesting insights to legislators and policymakers, as these findings show a primarily negative effect of the Dodd-Frank Act on CEO compensation.

Student name: Hanne Rijkschroeff

Student number: 442203

Thesis supervisor: Dr. Ying Gan

Co-reader: Dr. Jingwen Zhang

E-mail: [442203hr@eur.nl](mailto:442203hr@eur.nl)

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## 1. Introduction

CEO compensation is one of the most discussed topics in corporate governance nowadays. The COVID-19 pandemic has even made CEO compensation strategies more controversial. For example, Air France – KLM CEO Ben Smith has given up on his bonus of 2020 due to financial distress and the public opinion (Frost, 2020). In the past decades, researchers tried to test theories about CEO compensation empirically. Does compensation tie to the effort a CEO puts into his work? This paper attempts to investigate the effects on the pay-for-performance sensitivity in public firms of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act). The Dodd-Frank Act introduced governmental regulation on executive payment strategies by mandating a non-binding say-on-pay vote for the shareholders at least once every three years (Bainbridge, 2010). It is interesting to evaluate these regulations as a reaction to the Global Financial Crisis, as we will enter a new recession due to the COVID-19 pandemic. The research question empirically tested is:

*Did the pay-for-performance sensitivity increase for public companies after the enactment of the Dodd-Frank Act?*

The pay-for-performance sensitivity is, as just mentioned, a measure to empirically determine if CEO compensation is reasonable in comparison to firm performance. This paper uses several different performance measures and compensation variables to test the effect of the Dodd-Frank Act on pay-for-performance sensitivity. The performance measures I used are the Return on Assets (ROA), the Return on Equity (ROE), and the Annual Returns (RET). The first two measures are so-called accounting-based returns. The third measure is a market-based measure of firm performance. To assess CEO compensation in multiple ways, I use four compensation variables: Total Compensation, Total Cash Compensation, Grant Date Fair Value of Options Granted, and the Grant Date Fair Value of Stocks Awarded. I used each compensation variable as the dependent variable, and I used performance measures as an independent variable in an ordinary least squares regression model. I performed these regression models before and after the enactment of the Dodd-Frank Act.

The sample consists of cross-sectional data of all U.S. public firms available in the S&P 1500 index. I collected all variables through the Warton Research Data Services, in which I can access several databases needed for the performance measures, compensation variables, and control variables. For the compensation variables, I used Execucomp. For the control variables and performance measures, I used Execucomp, Thomson Reuters/Refinitiv, Compustat, and

CRSP. The sample consists of more than 10,000 observations, split into 5,418 observations before the Dodd-Frank Act and 5,272 observations after the Dodd-Frank Act.

The results contribute to the already large body of literature on CEO compensation. Say-on-pay is a policy that more and more governments apply. Most empirical research is performed on data in the U.K. or other countries in Europe. Surprisingly, research on the effect of the Dodd-Frank Act on the pay-for-performance sensitivity of CEO compensation in the U.S. has never been performed before and can therefore add relevant and interesting new insights to the widely debated discussion on CEO compensation. Also, learning more about governmental regulations on CEO compensation can benefit legislators and policymakers, as the debate became on-topic and more controversial due to the COVID-19 crisis.

Although policymakers would expect an increasing pay-for-performance sensitivity after enacting the Dodd-Frank Act, the results of the regression analyses prove otherwise. Total Compensation became even a little less dependent on firm performance. No significant changes to the pay-for-performance sensitivity were found for Total Cash Compensation or on the Grant Date Fair Value of Stocks Awarded. On the other hand, the pay-for-performance sensitivity on the Grant Date Fair Value of Options Granted undoubtedly increased. Also, the coefficients on the Grant Date Fair Value of Options Granted were the largest of them all, which implies a strong and increasing pay-for-performance sensitivity on the incentive-based compensation of options granted to a CEO. Therefore, these results do not prove a beneficial effect of the Dodd-Frank Act on the CEO compensation strategies unambiguously. Although the pay-for-performance sensitivity has increased on the Grant Date Fair Value of Options Granted, not all incentive-based compensation its pay-for-performance sensitivity increased, as the Grant Date Fair Value of Stocks Awarded did not show any positive and increasing results. Concluding, the hypothesis, stating that the pay-for-performance must increase due to the Dodd-Frank Act, is not supported by the results.

The regression analyses are all performed using control variables and fixed effects. I used these control variables and fixed effects to control for endogeneity concerns, and I chose these based on prior research. Although these practices are proven to work in ordinary least squares regression analyses, there are always some limitations and caveats in empirical research. For example, when analyzing the pay-for-performance sensitivity of CEOs, it is not possible to consider the performance of managers not as high up in the firm as CEOs. So, when a manager performs well and firm performance increases, this does not necessarily mean that the CEO is also performing well. Another caveat could be that the data gathered for the sample is influenced by the economic recovery after the Global Financial Crisis. Therefore, the data

and the results could be less generalizable due to time effects. Finally, the data is only from U.S. firms, which makes it less generalizable to other countries.

Due to these caveats, there are avenues for future research. For example, a difference-in-difference design could be used to decrease the possibility of endogeneity, using a comparable group of companies not affected by the Dodd-Frank Act. Another option is to use the same regression analyses and take all executives into account instead of only the CEOs. Previous research done in the U.K. has proven that say-on-pay regulations in the U.K. positively affect pay-for-performance sensitivity. Therefore, future research can be done on the differences between the U.S. and U.K. say-on-pay legislation.

The paper is organized as follows. After the introduction, in section 2, the literature review is provided covering all relevant information on the Dodd-Frank Act, previous research on executive compensation, shareholder activism, and previous research on say-on-pay regulation. Hereafter, in section 3, the hypothesis development is provided, followed by the data and sample selection in section 4. Then in section 5, the research methodology is provided, containing argumentation on why I made several choices for variables, which performance measures and compensation variables I used, and which control variables and fixed effects I used. Section 6 provides information on the descriptive statistics and the results of the regression analyses, including the regression analyses tables. Finally, section 7 provides the conclusion, the caveats and possible future research topics are suggested.

## 2. Literature review

In this section, I will provide an overview of the regulatory background of the Dodd-Frank Act and provide the specific rules possibly affecting CEO pay. Afterward, I will provide a literature review of the relevant theories on CEO compensation and pay-for-performance sensitivity. I will also provide relevant literature on shareholder activism and its connection to the Dodd-Frank Act. Finally, I conclude the literature review with prior research on the effects of the Dodd-Frank Act and similar legislation in the U.K.

### 2.1 Dodd-Frank Act

Nowadays, many firms are in financial distress due to COVID-19. Bonuses for CEOs are, as earlier mentioned, a hot topic during these times of crisis. Therefore, it could be beneficial to learn from the past Global Financial Crisis and its influence on legislation around CEO compensation. As a reaction to the Global Financial Crisis, the U.S. government enacted the Dodd-Frank Act on July 21, 2010. Conyon (2016) stated that the Dodd-Frank Act was enacted mainly to increase the accountability, transparency, and governance of public firms in the U.S. Conyon summarizes that the Dodd-Frank Act, therefore, empowers shareholders. Public firms in the U.S. had to apply to the say-on-pay regulations for the first time in 2011.

The Dodd-Frank Act holds many regulations, including requirements having an impact on executive compensation for public companies. For example, the Dodd-Frank Act, section 951, enacted three non-binding shareholder votes:

- Say-on-pay: Shareholders can vote on executive compensation.
- Say-on-frequency: The Dodd-Frank Act requires the say-on-pay vote to occur every once, two or three years.
- Say-on-golden parachutes: Each shareholder gets a separate vote on the compensation paid to the executives in mergers and acquisitions (Earle, 2011).

Earle argues that the votes should significantly influence compensation strategies as executives avoid negative shareholder votes, although the votes are non-binding.

Section 953 (part 1 and part 2) requires public companies to provide information on planned and non-planned compensation for the CEO and other executives, as well as the total compensation of the CEO and the ratio of the CEO compensation of the total wage paid by the firm (Fischer and Lindermoyer, 2020). In addition, according to Fried and Shilon (2011), section 954 of the Dodd-Frank Act added a clawback policy for excess pay, due to incentive compensation, paid to executives when a financial restatement needs to be performed.



## 2.2 Executive payment

Prior literature about executive payment is mainly based on the agency theory. This theory forms the basis of many other theories within the literature on executive compensation. Jensen and Meckling (1976) define the agency relationship as a contract between two persons engaging with each other, in which one of them (agent) performs a service to the other (principal). When the agent and the principle maximize their utility, different incentives between the agent and principle could result in the agent not acting in the principal's best interest. Jensen and Meckling use the agency theory to argue that incentives between shareholders and management can be aligned by contracts, introducing executive compensation strategies. Hölmstrom (1979) states that maximizing shareholder value should be the goal of the firm. He also points out that CEOs can take risks without personal consequences, influencing shareholder value negatively. Eventually, the CEO needs to perform in the best interest of the shareholders.

Resulting from the agency theory, the managerial power approach is developed, which assumes that managers and CEOs have enough power to influence the board to receive higher compensation (Bebchuk, Fried and Walker, 2002). Bebchuk et al. find evidence for the correlation between managerial power and rent extraction by executives, resulting in the rent extraction view. Lin, Kuo and Wang (2013) provide additional evidence by providing evidence on the fat-cat theory. CEOs with a high tenure can use their position to receive higher compensation and extract rent from the company.

Unlike the managerial power approach, the optimal contracting view predicts an alignment between executive incentives and shareholder incentives. Therefore, executives and shareholders maximize their values simultaneously (Bebchuk et al., 2002). Shleifer and Vishny (1997) argue that incentive contracts could optimize compensation contracts, including performance measures in the contracts of CEOs related to their decision-making. The managerial power approach and the optimal contracting view both predict an opposite effect of executive compensation on shareholder value: the rent extraction view predicts a negative impact of executive compensation on shareholder value. The optimal contracting view predicts a positive effect of executive compensation on shareholder value.

To align CEOs' incentives to shareholders' incentives, a significant increase in the use of stocks and options in CEO compensation contracts took place (Core, Guay, and Larcker, 2002). As Core et al. describe, since 1980, CEO compensation has been changing from mainly cash to mainly stock options in 1994. These stock options fulfill an essential role in CEO equity

incentives. Jensen and Murphy (1990) state that aggressive pay-for-performance strategies would lead to a decline in compensation for CEOs doing a poor job, which eventually leads to replacement. Stocks and options can help increase the pay-for-performance sensitivity, as these payments are based on firm performance and therefore are incentive-based. The higher the pay-for-performance sensitivity, the better the alignment of shareholders' and managers their incentives.

As earlier mentioned in the introduction, executive compensation is scrutinized increasingly since the start of the COVID-19 pandemic. According to Batish et al. (2020), CEO payment strategies are even more scrutinized than they already were when the firm experiences financial distress. He argues that having an adequate CEO with the right incentives is beneficial to overcome financial setbacks during times of financial distress. He also mentions that others will argue that the high executive compensations are unacceptable because, at the same time, the company lays off "normal workers." Decreasing CEO compensation, on the other hand, could move a CEO to leave to another firm where he can earn more, resulting in more problems.

### 2.3 Shareholder activism

Hirschman (1970) states that shareholders can exercise shareholder activism by selling their shares, using 'their' voice to communicate their preferences, vote against or favor specific corporate governance tools. Therefore, say-on-pay, introduced by the Dodd-Frank Act, can be seen as shareholder activism.

In addition to the theoretical explanations in paragraph 2.2, shareholder activism plays an even more critical role after enacting the Dodd-Frank Act (Conyon, 2016). Conyon argues that shareholders can use their votes to engage with the management of the company. Thus, shareholders their votes can be seen as a signal to the management. Cai and Walking (2011) also focused on shareholder activism. They analyzed voluntary proposals by stakeholders to introduce say-on-pay to individually targeted companies before the U.S. government enacted the Dodd-Frank Act. These activist shareholders were likely to target large firms. As a result, the stock prices of these firms fell because of (by union initiated) say-on-pay proposals.

If shareholders disagree with the CEO's payment proposals by the management, this influences the executive compensation in several different ways. Conyon (2016) states that shareholders downvote management proposals on CEO payment when the firm has low performance, weak corporate governance structure, and excessive CEO pay. Shareholder dissent then leads to decreasing CEO payments. Therefore, shareholder activism and say-on-

pay seem to play an essential role in the corporate governance of U.S. firms nowadays. According to Gregory-Smith, Thompson, and Wright (2014), shareholder dissent in the U.K. is mainly seen when shareholders are unhappy in multiple aspects of corporate governance. Like Conyon, Gregory-Smith et al. also argue that shareholder dissent will directly negatively influence CEO pay when shareholder dissent reaches a certain threshold. Ferri and Maber (2013) focus on U.K. firms and find that shareholder dissent results in removing non-beneficial CEO pay practices. Armstrong, Gow, and Larcker (2013) used U.S. data and find little evidence of any changes to CEO payment strategies after shareholder dissent. They, therefore, argue that say-on-pay has a weak effect on actual corporate governance practices. Iliev and Vitanova (2013) find that voluntary say-on-pay adoptions by companies lead to higher CEO pay, leading to less shareholder dissent. Evidence on the effects of say-on-pay and the Dodd-Frank Act on executive payment in the U.S. is inconclusive and, therefore, is an interesting topic to research.

Another essential determinant to consider when analyzing CEO compensation is the presence of blockholders and institutional investors and their influence in U.S. firms. According to Hartzell and Starks (2003), CEO compensation is highly dependent on institutional investors, which results in CEO compensation being more dependent on firm performance. Institutional investors monitor the firm and try to mitigate agency costs by incentive compensation. Thomas and Van der Elst (2015) state that one of the most dominant factors behind the implementation of say-on-pay is the increased stock ownership by institutional investors. They aim to achieve long-term performances, and performance-based pay is important for these investors. Belcredi, Bozzi, and Ciavarella (2014) argue that shareholder dissent in more dispersed firms is higher, implying a negative relationship between the stake held by the largest shareholder and shareholder dissent. They also find that, at the same time, shareholder dissent is primarily due to institutional investor activism.

## 2.4 Prior studies

There is already a large body of research on say-on-pay regulations. For example, much research has been done in the U.K. On the other hand, the literature regarding say-on-pay in the U.S. grows. Larcker et al. (2014) state that one of the greatest myths regarding say-on-pay regulations is that it improves pay-for-performance because it is never empirically tested correctly. They argue that the amount earned relative to the stock price performance is the only correct way to assess if the pay-for-performance sensitivity improved as a reaction to the Dodd-Frank Act and its regulations on executive compensation.

In 2002, the U.K. introduced the Directors' Remuneration Report Regulations, which introduced a mandated but non-binding say-on-pay vote in the U.K. (Conyon and Sadler, 2010). They argue that shareholders more actively vote against pay resolutions compared to non-pay resolutions. Furthermore, they find a positive relation between CEO pay and say-on-pay dissent, implying that shareholders often vote against CEO pay when the remuneration is high. Ferri and Maber (2013) also examined the effects of the say-on-pay regulations in the U.K. Their tests suggest that investors in the U.K. did perceive these regulations as beneficial to the company's monitoring and helped to pressure the firms in removing controversial pay practices. However, they also saw an increase in the sensitivity of payments to poor performances. Ferri and Maber, therefore, imply a relationship between executive payment and the performance of executives.

However, there are differences between the say-on-pay regulations in the U.K. and the U.S. According to Thomas and Van der Elst (2015), say-on-pay regulation in the U.K. is binding since 2013 for companies listed on the Financial Services Authority Official List and U.K. companies listed on the NYSE and NASDAQ. In contrast, say-on-pay in the U.S. is not binding. Also, they state that firms in the U.S. are incentivized to act on behalf of the shareholders as shareholder-approved executive compensation increases the tax deductibility of the compensation. Furthermore, Thomas and Van der Elst point out that the frequency of voting is every year in the U.K., whereas it takes place at least once every three years in the U.S. Also, the U.K. has a mandatory vote to approve the remuneration package, which does not apply to U.S. firms. Say-on-pay in the U.K. and the U.S., therefore, differs significantly. Concluding, the effects of the say-on-pay legislation in the U.S. most likely differ from the effects say-on-pay has in the U.K. on CEO compensation.

In the U.S., there is some prior research on the influence of say-on-pay on compensation strategies, but most research on say-on-pay in the U.S. is based on market reactions and the motives behind shareholder dissent. According to Cai and Walking (2011), say-on-pay in the U.S. had a significant influence on the stocks of firms. They analyzed the impact around the day the bill had passed the House of Representatives and found striking results regarding the stocks of firms with positive abnormal CEO payments and low pay-for-performance sensitivity. In addition, stocks of firms with high CEO pay and low pay-for-performance sensitivity had significant positive reactions on the stock price. These results imply a relationship between say-on-pay and the pay-for-performance sensitivity, next to creating value for the firm. The researchers also found a relationship between the shareholders' vote and the level of abnormal executive compensation.

Kimbro and Xu (2016) found that the Dodd-Frank Act's say-on-pay regulations resulted in downvoting excessive CEO payments and boards choosing to reduce the growth of executive pay. Kimbro and Xu conclude by stating that, although the vote is non-binding, say-on-pay provides an effective tool to influence CEO payment and reduces the possibility of rent extraction by CEOs.

Thomas and Van der Elst (2015) analyzed say-on-pay regulations across the world and focused on the Dodd-Frank Act as well. Downvoting of management proposals regarding CEO payment often relates to pay-for-performance concerns.

Burns and Minnick (2013) perform a difference-in-difference regression model to find that firms subject to say-on-pay do increase their executive compensation less than firms not subject to the regulation. Also, say-on-pay did cause a decrease in bonuses but an increase in option grants as a fraction of total compensation.

### 3. Hypothesis development

To find an answer to the research questions, a testable hypothesis is required.

After enacting the Dodd-Frank Act, shareholders received non-binding votes on executive compensation in public firms at least once every three years. The literature points to the fact that these votes (say-on-pay) could significantly influence the compensation strategy in public firms (Conyon, 2016). The Dodd-Frank Act includes several sections directly influencing CEO compensation regulations. Section 951, 953, and 954 contain rules regarding voting systems, information content regulations, and clawback policies that possibly affect CEO compensation strategies (Earle, 2011; Fried and Shilon, 2011; Fischer and Lindermoyer, 2020). Fried and Shilon argue that the Dodd-Frank Act will severely impact CEO compensation. Conyon states that the implementation of say-on-pay by the Dodd-Frank Act potentially leads to more shareholder activism and that downvoting of proposals is a signal to the management.

Furthermore, the literature review points out two conflicting theories in the research field of CEO compensation strategies: the managerial power approach and the rent extraction view (Bebchuk et al., 2002). Financial distress can affect CEO compensation strategies and, therefore, the pay-for-performance relation due to increasing scrutiny. On the one hand, cutting on CEO remuneration might cause CEOs to leave the firm to another firm due to higher compensation (and therefore extra incentives). On the other hand, firms do not want to make a wrong impression by compensating the CEO while laying off their workers because of financial distress (Batish et al., 2020).

After enacting the Dodd-Frank Act, say-on-pay voting became part of corporate governance regulations in the U.S. Shareholder activism now plays an even more prominent role than it already did. For example, Gregory-Smith et al. (2014) argue that shareholder dissent has an immediate effect on CEO compensation, and Ferri and Maber (2013) argue that controversial pay practices disappear more and more. Also, the impact of blockholders and increased institutional ownership is evident in striving for long-term performance and pay-for-performance sensitivity (Hartzell and Starks, 2003). Thomas and Van der Elst (2015) state that say-on-pay is enacted because of institutional investors and their growing importance.

Prior studies on say-on-pay in the U.K. reveal that shareholders more actively use their voting rights on pay resolutions than non-pay resolutions (Conyon and Sandler, 2010), implying that shareholders will use their votes. Ferri and Maber (2013) find a relation between bad performance and the pay-for-performance sensitivity in the U.K. because of say-on-pay,

suggesting a relation between the pay-for-performance sensitivity and say-on-pay regulations. However, the law in the U.K. is not the same as the regulation enacted by the Dodd-Frank Act in the U.S. Kimbro and Xu (2016) argue that say-on-pay in the U.S. is an effective tool to influence CEO payment strategies reducing possibilities of rent extraction, which is proven by Thomas and Van der Elst (2015). They find a relationship between downvoting of management proposals of CEO compensation and bad pay-for-performance. Burns and Minnick (2013) state that the arrangement of CEO compensation contracts has changed due to the Dodd-Frank Act, leading to a more equity-based composition of the contracts.

Prior research certainly points to a relationship between the Dodd-Frank Act, specifically say-on-pay, and CEO compensation strategies. Therefore, changes in compensation strategies are expected after the enactment of the Dodd-Frank Act. Shareholders also seem to use their voting rights when voting on management proposals regarding CEO payment. At the same time, institutional investors seem to force firms to strive for better pay-for-performance sensitivity. Previous literature, therefore, supports the efficient contracting hypothesis, stating that CEO compensation contracts are designed to align shareholders' and executives' incentives. Thus, the hypothesis is:

*H.: The pay-for-performance sensitivity increased after enacting the Dodd-Frank Act in public companies in the U.S.*

## 4. Data and sample selection

The Dodd-Frank Act applies to all public companies in the U.S. Therefore, I collected financial data on all firms of the S&P 500, S&P 400, and S&P 600 (also known as the S&P 1500 Composite), focusing on firms with large, mid, and small market capitalizations, excluding firms in the financial services (SIC codes 6000-6700). Considering each index of the S&P 1500 Composite accounts for possible biases due to firm size and therefore results in an increasing external validity. In addition, I collect a cross-sectional dataset for the years 2007-2014, which provides me with four years before and after the enactment of the Dodd-Frank Act. I provide descriptive statistics of all used variables in section 5. A detailed description of all used variables is provided in appendix.

I used Compustat's Execucomp database for the compensation data, which provides me with all needed compensation data on CEO compensation. Next to the total compensation of CEOs, the database also includes data on certain parts of the total compensation, such as stocks

awarded and options granted. Execucomp is also used to collect CEO characteristics, such as CEO age and CEO tenure.

After collecting the data on CEO compensation and CEO characteristics, I used Compustat to collect financial numbers and other firm characteristics. After collecting the data, I matched the data to the Execucomp dataset using the unique CUSIP codes of the firms and the fiscal year, which is provided in each used database. Then, I collected balance sheet items and added statistics such as the common shares outstanding, the annual closing price (fiscal year) of the shares, and the SIC code. Finally, I used these balance sheet items to calculate the Return on Assets (ROA) and Return on Equity (ROE), which are used later as performance measures.

To find data on institutional ownership and blockholders, I used the database of Thomson Reuters/Refinitiv. Again, after collecting the data, I used the unique CUSIP codes and the fiscal year to merge the dataset with the data of Execucomp and Compustat.

Finally, I collected data on stock performances using the CRSP database. Again, the CUSIP codes and fiscal year were used as variables to match the data to the data of Execucomp, Thomson Reuters/Refinitiv, and Compustat. Even though CRSP only provides monthly annual returns, I use these returns to calculate the yearly annual share returns, a performance measure in the regression analysis. Also, the stock price volatility is determined from the monthly stock returns, which will be used as a control variable in the regression analysis. In the table below, the sample selection procedure is provided.

<b>TABLE 1: Sample Selection and Sample Distribution</b>	
Sampling procedure	N
Firm year observations for CEOs of firms of the S&P 1500 in the U.S. from 2007-2014	17,228
<i>Less: Observations with critical missing values</i>	-308
<i>Less: Merging with CRSP, Compustat and Thomson Reuters/Refinitiv data and removing critical missing values<sup>1</sup></i>	-4,403
<i>Less: Financial companies with SIC Codes 6000-6700</i>	-1,827
Final sample for testing the hypothesis	10,690
Firm year observations before the Dodd-Frank Act (2007-2010)	5,418
Firm year observations after the Dodd-Frank Act (2011-2014)	5,272



## 5. Research design

### 5.1 Libby's predictive validity framework

To provide a clear overview of the research design, I used Libby's predictive validity framework, also known as the Libby boxes (Libby, Bloomfield and Nelson, 2002).

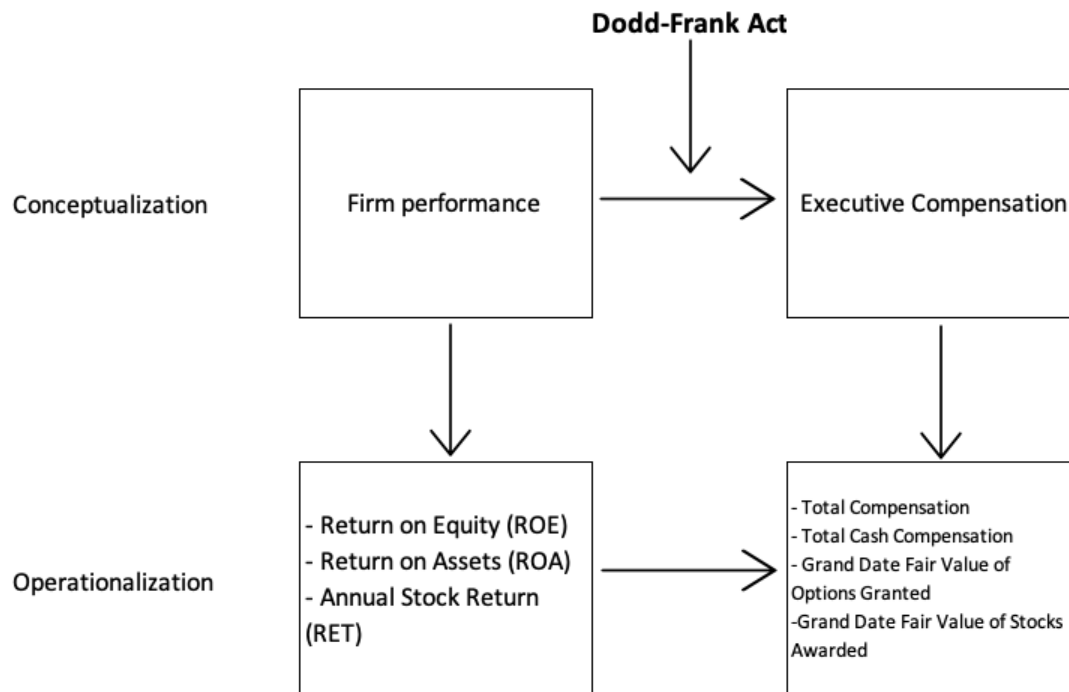


Figure 1: Libby's predictive validity framework.

A detailed table of all used variables is added in the appendix. The regression model includes several variables, categorized as performance measures, compensation variables, and control variables.

### 5.2 Performance measures

The Dodd-Frank Act is implemented in the regression analysis using a dummy variable, with a value of zero before the enactment and one after the enactment. As earlier mentioned, firms had to comply with the Dodd-Frank Act for the first time in 2011. Therefore, the years from 2011 to 2014 are when the dummy variable has a value of 1, and the years before 2011 have a value of 0.

To measure firm performance, I use three different performance measures: the accounting-based measures Return on Equity (ROE) and Return on Assets (ROA), and the market-based

measure of the Annual Returns (RET). The ROE variable is used in earlier studies regarding pay-for-performance sensitivity by Cornelisse, Duffhues and Kabir (2005) and Mertens, Knop and Strootman (2007). As the pay-for-performance sensitivity is primarily of interest for shareholders and the ROE is widely used to judge the shareholders' investments, ROE is the perfect accounting measure to define firm performance.

ROA is used frequently in earlier studies by Antle and Smith (1986), Core et al. (1999), Cornelisse, Duffhues and Kabir (2005), and Mertens, Knop and Strootman (2005) on the pay-for-performance sensitivity. According to Antle and Smith (1986), using ROA as a performance measure is complementary to the Annual Returns. It contains information on firm valuation and the performance of the firm's management. Additionally, Antle and Smith argue that incentive plans for CEO compensation are tied to the ROA.

Next to the ROE and ROA, Annual Returns (RET) are used to measure firm performance, analogously to Antle and Smith (1986). This is a market-based approach valuing firm performance. Antle and Smith argue that stock returns impound information on firm performance and its financial conditions. These are associated with current and future events, also depending on the choices of the CEO. Additionally, stock returns are an essential determinant of CEO compensation. The CRSP database only provides monthly stock returns, which I therefore annualize. I annualize the monthly stock returns using the following formula:

$$\text{Annualized Stock Returns} = \sum (1 + \text{Monthly Return}_{i,j,1}) * (1 + \text{Monthly Return}_{i,j,2}) \dots (1 + \text{Monthly Return}_{i,j,12}) - 1 \quad (1)$$

i = Firm

j = Year

### 5.3 CEO compensation variables

As CEO compensation consists of many different parts, all these parts could be influenced by the say-on-pay regulations enacted by the Dodd-Frank Act. Execucomp provides me with several CEO compensation variables, including a variable capturing the Total Compensation a CEO earns (TDC1). Total Compensation includes the salary, bonus, other annual earnings, long-term incentive payouts, and other parts of CEO compensation. I also added the Total Cash Compensation to my sample, which consists of the annual salary plus bonus (all paid in cash).

To account for the incentive-based compensation, I added two separate variables regarding stock and options awards provided by Execucomp. The Grant Date Fair Value of Options

Granted describes the fair value of the options on the day the options are granted to the CEO. I also included the Grant Date Fair Value of Stocks Awarded.

#### 5.4 Control Variables

To isolate the effect of the Dodd-Frank Act on CEO compensation levels, control variables are used to control for effects influencing CEO pay, other than the Dodd-Frank Act. I use CEO Age and CEO Tenure to account for CEO characteristics of the CEO, as several previous studies find a positive relationship between CEO compensation, CEO age and tenure (Hall and Liebmann, 1998; Conyon and Murphy, 2000; Erkens, Gan and Yurtoglu, 2018). I calculate CEO tenure because it is not directly available in Execucomp's database, using the following formula:

$$CEO\ Tenure = Fiscal\ year_{i,t} - Date\ became\ CEO_i \quad (2)$$

t = Fiscal Year

i = Firm

As earlier mentioned in the literature review, institutional ownership has a pronounced effect on CEO compensation and the pay-for-performance sensitivity due to the monitoring done by institutional investors and blockholders. To account for this relationship, I added a control variable to monitor for institutional ownership and blockholders, controlling for the number of blockholders owning more than 5% of the shares. Earlier studies, for instance, Conyon (2016) and Erkens, Gan and Yurtoglu (2018), also controlled for institutional ownership and blockholders.

Firm size influences CEO compensation as well, as CEOs of larger companies earn more. Several studies use different control variables to account for firm size. Firm size will be captured by the natural logarithm of total assets and the natural logarithm of total sales analogously to earlier studies by Erkens, Gan and Yurtoglu (2018), Fischer and Lindermoyer (2020) and Gao (2015). The natural logarithms are used because of the skewed nature of the data.

To account for the industry trends, I use industry fixed effects. These are based on the SIC codes provided in the databases. To account for firm risk, I added stock price volatility and leverage as control variables (Erkens, Gan and Yurtoglu, 2018). I calculated the stock price volatility using the following formula:

$$\text{Annualized Stock Price Volatility} = \sqrt{\text{variance}(\sum \text{Monthly Returns}_{i,j,t}) * 12} \quad (3)$$

t = Month

j = Year

i = Firm

## 5.5 Model specification

This study uses an ordinary least squares regression model to provide evidence on the hypothesis stated earlier and to find an answer to the research question. Using several different compensation parts, I can distinguishing more accurately the possible influence the Dodd-Frank Act has. As earlier mentioned, to provide robust results, I chose four different variables for firm performance. Murphy (1999) argues that there are several ways to model pay-for-performance sensitivity. One of the most common methods is the following regression formula:

$$\ln(\text{CEO Compensation}) = \alpha + \beta \ln(\text{Firm Performance}) \quad (4)$$

The pay-for-performance sensitivity represents the executives' share of value creation, which links directly to the agency theory. Additionally, the pay-for-performance sensitivity can form a good measure of CEO compensation its ties to firm performance. Murphy states that the pay-for-performance elasticity, using natural logarithms, could also be used. This is an appropriate way to consider the skewed CEO compensation data, ensuring better statistical results (Frydman and Jenter, 2010). So, due to the highly skewed nature of compensation data, the pay-for-performance elasticity is used, which uses natural logarithm values of the compensation variable and performance variable, resulting in a log-log regression model. Regression formula (4) therefore forms the basis for the regression formula used in the analysis. The pay-for-performance sensitivity is defined by the  $\beta_2$  in the regression formula below, which captures the relation between CEO compensation and firm performance. After adding all control variables, the regression formula is extended to:

$$\ln(\text{CEO Comp.}) = \alpha + \beta_1(\text{DF}) + \beta_2 \ln(\text{ROA}) + \beta_3(\text{CEO}_{\text{AGE}}) + \beta_4(\text{CEO}_{\text{TEN}}) + \beta_5(\text{IOWN}) + \beta_6(\text{LEV}) + \beta_7(\text{SALES}) + \beta_8(\text{TA}) + \beta_9(\text{VOL}) + \mu_i \quad (5)$$

$$\ln(\text{CEO Comp.}) = \alpha + \beta_1(\text{DF}) + \beta_2 \ln(\text{ROE}) + \beta_3(\text{CEO}_{\text{AGE}}) + \beta_4(\text{CEO}_{\text{TEN}}) + \beta_5(\text{IOWN}) + \beta_6(\text{LEV}) + \beta_7(\text{SALES}) + \beta_8(\text{TA}) + \beta_9(\text{VOL}) + \mu_i \quad (6)$$

$$\ln(\text{CEO Comp.}) = \alpha + \beta_1(\text{DF}) + \beta_2(\text{RET}) + \beta_3(\text{CEO}_{\text{AGE}}) + \beta_4(\text{CEO}_{\text{TEN}}) + \beta_5(\text{IOWN}) + \beta_6(\text{LEV}) + \beta_7(\text{SALES}) + \beta_8(\text{TA}) + \beta_9(\text{VOL}) + \mu_i \quad (7)$$

Dummy variable DF equals 0 or 1, depending on pre- or post-Dodd-Frank Act.  $\beta_2$  is the coefficient of interest.  $\mu_i$  describes the industry fixed effects. The dependent variable CEO compensation differs from each test. It could take the value of Total Compensation, the Total Cash Compensation (salary plus bonus paid in cash), the Grant Date Fair Value of Options, or the Grant Date Fair Value of Stocks granted. Because each regression formula is applied to four different compensation variables, there will be 12 tests on data before the enactment of the law and 12 tests after the enactment of the law (four compensation variables on three different performance measures).

## 6. Results

### 6.1 Descriptive statistics

As earlier mentioned, I use cross-sectional time-series data between 2007 and 2014. Table 1 and 2 below provide the descriptive statistics respectively before and after the Dodd-Frank Act. Before the Dodd-Frank Act, there are 5,418 observations, and after the Dodd-Frank Act, 5,272. Furthermore, the descriptive statistics include the mean, standard deviation, minimum, maximum, the 25th percentile, and 75th percentile. Table 2 includes descriptive statistics of the first four years of the sample, which is 2007-2010. Table 3 includes the years 2011-2014. For the regressions, I transformed some variables to their natural logarithm values due to the skewed nature of the data. The descriptive statistics show, for instance, for variable Total Compensation, that the mean is a lot closer to the minimum than to the maximum value of the variable. The same applies for the variables Total Cash Compensation, GD FV of Options Awards, GD FV Stocks Awarded, Total Assets, and Sales/Turnover (Net). These are therefore transformed to their natural logarithms, as well as the performance variables. All variables in dollars are presented in 1000 dollars. I winsorized all variables at the 1% lowest and 99% highest value to control for outliers.

Table 2: Descriptive statistics before the Dodd-Frank Act (in 1000 dollars).

Statistic	N	Mean	St. Dev.	Min	Pctl (25)	Pctl (75)	Max
Assets - Total	5,418	6,623.18	20,941.42	67.12	471.91	4,444.93	273,812.70
Sales/Turnover (Net)	5,418	5,026.21	12,875.58	31.28	414.01	3,639.51	99,945.34
CEO Age	5,418	55.19	7.24	40	50	60	76
CEO Tenure	5,418	7.78	7.00	0	2.75	10.42	34.02
Total Compensation	5,418	4,585.08	4,769.95	250.03	1,457.14	5,969.03	27,369.42
Total Cash Compensation	5,418	887.45	643.55	40.86	514.93	1,012.63	4,769.60
GD FV of Options Granted	5,418	996.58	1,744.49	0	0	1,25	9490
GD FV of Stocks Awarded	5,418	1,486.81	2,475.99	0	0	1,908.90	14762
>5% Blockholders	5,418	2.83	1.68	0	2	4	7
Annual Returns	5,418	0.13	0.54	-0.76	-0.22	0.38	2.05
Volatility	5,418	0.43	0.23	0.1	0.27	0.53	1.24
ROA	5,418	0.04	0.11	-0.42	0.01	0.09	0.27
ROE	5,418	0.07	0.38	-1.88	0.03	0.18	1.57
ln (TA)	5,418	7.35	1.61	4.21	6.16	8.40	12.52
ln (Sales)	5,418	7.14	1.63	3.44	6.03	8.20	11.51
ln (Total Compensation).	5,418	7.97	1.00	5.52	7.28	8.69	10.22
ln (Total Cash Compensation)	5,418	6.60	0.62	3.71	6.24	6.92	8.47
ln (GD FV of Options Granted)	5,418	3.71	3.59	0.00	0.00	7.10	9.00
ln (GD FV Stocks Awarded)	5,418	4.45	3.61	0.00	0.00	7.60	10.00

Table 3: Descriptive statistics after the Dodd-Frank Act (in 1000 dollars).

Statistic	N	Mean	St. Dev.	Min	Pctl (25)	Pctl (75)	Max
Assets - Total	5,272	8,821.75	25,348.93	67.12	654.65	5,963.90	273,812.70
Sales/Turnover (Net)	5,272	6,186.49	14,973.07	31.28	533.68	4,536.58	99,452.34
CEO Age	5,272	56.39	7.04	40	52	61	76
CEO Tenure	5,272	8.26	7.13	0	3	11.26	34.02
Total Compensation	5,272	5,594.95	5,145.08	250.03	2,045.01	7,367.47	27,369.42
Total Cash Compensation	5,272	931.18	614.59	41	589.90	1,066.5	4,77
GD FV of Options Granted	5,272	899.82	1,677.25	0	0	1,148.65	9,490.41
GD FV of Stocks Awarded	5,272	2,251.40	2,902.52	0	0	3,205.85	14,762.46
>5% Blockholders	5,272	3.41	1.63	0	2	4	7
Annual Returns	5,272	0.19	0.39	-0.76	-0.04	0.35	2.05
Volatility	5,272	0.31	0.15	0.10	0.19	0.38	1.24
ROA	5,272	0.05	0.09	-0.42	0.02	0.09	0.27
ROE	5,272	0.10	0.34	-1.88	0.05	0.19	1.57
ln (TA)	5,272	7.66	1.63	4.21	6.48	8.69	12.52
ln (Sales)	5,272	7.38	1.62	3.44	6.28	8.42	11.51
ln (Total Compensation)	5,272	8.23	0.95	5.52	7.62	8.90	10.22
ln (Total Cash Compensation)	5,272	6.67	0.61	3.71	6.38	6.97	8.47
ln (GD FV of Options Granted)	5,272	3.25	3.61	0.00	0.00	7.05	9.16
ln (GD FV Stocks Awarded)	5,272	5.57	3.44	0.00	0.00	8.07	9.60

From the descriptive statistics, it is possible to see differences between the statistics before and after the Dodd-Frank Act. Most variables increased after the Dodd-Frank Act. For example, Total Assets and Sales/Turnover increased, just like Total Compensation, Total Cash Compensation and the Grant Date Fair Value of Stocks Awarded. Other interesting changes are the decline in volatility, implying less risk in the stocks of the companies, and an increase of annual returns between the periods of 2007-2010 and 2011-2014. Also, the Grant Date Fair Value of Options Awarded declined, which is a surprising statistic as this type of compensation is incentive-based, and therefore should lead to changes in the pay-for-performance relationship. To provide more clarity on the differences between both periods, table 4 and table 5 below are provided.

Because of the differences pre- and post-Dodd-Frank, I performed an f-test and a t-test on means to find out if these differences are statistically significant. The results are provided in table 4. The f-test is performed to determine which variables in both periods can be assumed to have the same variance and which variables cannot be assumed to have the same variance. For example, on variable CEO Tenure, the p-value is statistically significant, and therefore the variances are not equal. This is taken into consideration when performing the t-test on means.

Table 4: Results of the f-test on the equality of variances.

Variable	Z-statistic	P-value
Assets - Total	0.68	0.00
Sales/Turnover (Net)	0.74	0.00
Executive's Age	1.06	0.04
CEO Tenure	0.96	0.16
Total Compensation	0.86	0.00
Total Cash Compensation	1.10	0.00
GD FV of Options Granted	1.08	0.00
GD FV Stocks Awarded	0.73	0.00
>5% blockholders	1.06	0.03
Annual Returns	1.94	0.00
Volatility	2.13	0.00
ROA	1.51	0.00
ROE	1.28	0.00

The results of the t-test on means are provided in table 5. The difference (pre – post) in table 5 denotes the difference between the mean of the variable pre- and post-Dodd-Frank. All differences between the mean values of the variables are significant. Significant changes in the means of the variables can lead to significant differences in the pay-for-performance sensitivity before and after the Dodd-Frank Act.



Table 5: Comparison of means before and after the Dodd-Frank Act.

Variable	Difference (pre - post)	Mean pre- DF	Mean post-DF	T-statistic	P-value
Assets - Total	-2198.58	6623.18	8821.75	-4.88	1.07e-06
Sales/Turnover (Net)	-1160.28	5026.21	6186.49	-4.29	1.80e-05
Executive's Age	-1.20	55.19	56.39	-8.69	4.06e-18
CEO Tenure	-0.48	7.78	8.26	-3.51	4.58e-04
Total Compensation	-1009.88	4585.08	5594.95	-10.52	9.67e-26
Total Cash Compensation	-43.73	887.45	931.18	-3.59	3.28e-04
GD FV of Options Granted	96.77	996.58	899.82	2.92	3.46e-03
GD FV Stocks Awarded	-764.59	1486.81	2251.40	-14.63	5.09e-48
>5% blockholders	-0.58	2.83	3.41	-17.96	4.21e-71
Annual Returns	-0.05	0.13	0.19	-5.84	5.35e-09
Volatility	0.13	0.43	0.31	33.62	2.63e-234
ROA	-0.01	0.04	0.05	-6.49	8.92e-11
ROE	-0.03	0.07	0.10	-4.38	1.18e-05

## 6.2 Regression results on Total Compensation and Total Cash Compensation

The first six regression models all test the pay-for-performance sensitivity between Total Compensation and Total Cash Compensation.

$$\ln(\text{Total Compensation}) = \alpha + \beta_1(DF) + \beta_2 \ln(ROA) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (1)$$

$$\ln(\text{Total Compensation}) = \alpha + \beta_1(DF) + \beta_2 \ln(ROE) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (2)$$

$$\ln(\text{Total Compensation}) = \alpha + \beta_1(DF) + \beta_2(RET) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (3)$$

$$\ln(\text{Total Cash Compensation}) = \alpha + \beta_1(DF) + \beta_2 \ln(ROA) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (4)$$

$$\ln(\text{Total Cash Compensation}) = \alpha + \beta_1(DF) + \beta_2 \ln(ROE) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (5)$$

$$\ln(\text{Total Cash Compensation}) = \alpha + \beta_1(DF) + \beta_2 \ln(RET) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (6)$$

Table 6 provides the results of the regression analyses before the Dodd-Frank Act; table 6 provides the results after the Dodd-Frank Act. Regression (1), (2), and (3) in table 6 are the regression analyses on Total Compensation as dependent variable before the Dodd-Frank Act. Regression (4), (5), and (6) in table 6 are the analyses on Total Cash Compensation before the Dodd-Frank Act. Analogously, in table 7, the first three regression models (7, 8, and 9) have Total Compensation as the dependent variable, and the last three regressions (10, 11, 12) have Total Cash Compensation as the dependent variable. However, these coefficients are based on data after the Dodd-Frank Act.

Table 6: Results Regression on Total Compensation and Total Cash Compensation before Dodd-Frank.

	<i>Dependent variable:</i>					
	ln(Total Compensation)			ln(Total Cash Compensation)		
	(1)	(2)	(3)	(4)	(5)	(6)
ln(ROA)	0.11*** (0.01)			0.01 (0.01)		
ln(ROE)		0.09*** (0.01)			0.02** (0.01)	
ln(RET)			0.04*** (0.01)			-0.004 (0.01)
Age	0.001 (0.002)	0.0004 (0.002)	-0.0003 (0.002)	0.004*** (0.001)	0.003*** (0.001)	0.003** (0.001)
CEO Tenure	-0.01*** (0.002)	-0.01*** (0.002)	-0.01*** (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.0004 (0.001)
> 5% blockholders	0.04*** (0.01)	0.04*** (0.01)	0.02*** (0.01)	0.03*** (0.005)	0.03*** (0.005)	0.02*** (0.01)
Volatility	-0.02 (0.06)	-0.13** (0.06)	-0.39*** (0.06)	0.06 (0.04)	0.07 (0.04)	0.04 (0.04)
ln(TA)	0.43*** (0.02)	0.42*** (0.02)	0.38*** (0.02)	0.17*** (0.02)	0.17*** (0.02)	0.16*** (0.02)
ln(Sales)	0.05** (0.02)	0.05** (0.02)	0.07*** (0.02)	0.08*** (0.02)	0.07*** (0.02)	0.08*** (0.02)
Constant	4.81*** (0.18)	4.87*** (0.18)	5.06*** (0.19)	4.74*** (0.13)	4.80*** (0.13)	4.79*** (0.14)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,361	4,351	3,129	4,361	4,351	3,129
R <sup>2</sup>	0.56	0.56	0.57	0.39	0.40	0.40
Adjusted R <sup>2</sup>	0.55	0.56	0.56	0.38	0.39	0.38

Note:

\* p < 0.1  
\*\* p < 0.05  
\*\*\* p < 0.01

Table 7: Results Regression on Total Compensation and Total Cash Compensation after Dodd-Frank.

	<i>Dependent variable:</i>					
	ln(Total Compensation)			ln(Total Cash Compensation)		
	(7)	(8)	(9)	(10)	(11)	(12)
ln(ROA)	0.08*** (0.01)			0.01 (0.01)		
ln(ROE)		0.07*** (0.01)			0.02*** (0.01)	
ln(RET)			0.03*** (0.01)			-0.005 (0.01)
Age	-0.004*** (0.002)	-0.004*** (0.002)	-0.004** (0.002)	0.003*** (0.001)	0.003** (0.001)	0.004*** (0.001)
CEO Tenure	-0.001 (0.002)	-0.0004 (0.002)	0.0000 (0.002)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)
> 5% blockholders	0.06*** (0.01)	0.06*** (0.01)	0.06*** (0.01)	0.04*** (0.005)	0.04*** (0.005)	0.04*** (0.01)
Volatility	0.04 (0.08)	0.02 (0.08)	-0.18** (0.09)	0.10 (0.06)	0.13** (0.06)	0.03 (0.07)
ln(TA)	0.33*** (0.02)	0.33*** (0.02)	0.29*** (0.02)	0.13*** (0.02)	0.14*** (0.02)	0.11*** (0.02)
ln(Sales)	0.14*** (0.02)	0.12*** (0.02)	0.16*** (0.02)	0.09*** (0.02)	0.07*** (0.02)	0.09*** (0.02)
Constant	5.13*** (0.18)	5.18*** (0.18)	4.97*** (0.21)	4.89*** (0.14)	4.94*** (0.14)	4.87*** (0.17)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,524	4,477	3,683	4,524	4,477	3,683
R <sup>2</sup>	0.54	0.54	0.53	0.31	0.31	0.30
Adjusted R <sup>2</sup>	0.53	0.53	0.53	0.30	0.30	0.29

Note:

\* p < 0.10  
\*\* p < 0.05  
\*\*\* p < 0.01

Tables 6 and 7 both imply a positive and statistically strong significant relationship between  $\ln(\text{ROA})$  and  $\ln(\text{Total Compensation})$ , indicating a positive pay-for-performance relationship before and after the Dodd-Frank Act. More surprisingly is the declining coefficient on ROA from 0.11 to 0.08, both statistically significant at a 1% level, suggesting a declining pay-for-performance sensitivity after the Dodd-Frank Act. The log-log model implies that a 0.08% change in ROA leads to an increase of 1% in Total Compensation for the CEO. Therefore, the CEO their Total Compensation is less dependent on firm performance after the Dodd-Frank Act, based on the ROA. The same conclusions can be drawn from the regression regarding  $\ln(\text{Total Compensation})$  and  $\ln(\text{ROE})$ . Both coefficients before and after the Dodd-Frank Act are statistically significant at the 1% level, which again indicates a deteriorating pay-for-performance relationship after the enactment in 2011. Both accounting measures, therefore, suggest a decline in pay-for-performance sensitivity. The same can be concluded from the market-based measure of annual stock returns: the coefficients are highly significant and show a decline of 0.04 to 0.03 after the Dodd-Frank Act. Thus, all performance measures show consistent results towards a declining pay-for-performance sensitivity after the Dodd-Frank Act.

As  $\ln(\text{Total Compensation})$  includes all sorts of compensation,  $\ln(\text{Total Cash Compensation})$  excludes incentive-based parts of CEO remuneration, such as stocks and options granted. The coefficients pre- and post-Dodd-Frank are insignificant, resulting in insignificant coefficients on  $\ln(\text{ROA})$  and  $\ln(\text{RET})$ . Although the values of coefficients on  $\ln(\text{ROA})$  are positive and have the same value (0.01) before and after the law's enactment, these results do not statistically hold because they are not significant. Only the coefficients on  $\ln(\text{ROE})$  are statistically significant, but they do not show any difference before and after the law's enactment, remaining the same with a coefficient of 0.02.

As the hypothesis predicts a statistically significant and increasing pay-for-performance relationship after the Dodd-Frank Act, the results in table 6 and 7 do not support the alternative hypothesis. Although prior research found evidence on an increasing incentive-based part of compensation, these increases do not show up in the pay-for-performance sensitivity of Total Compensation and Total Cash Compensation. Therefore, additional tests on the incentive-based parts of CEO compensation, such as the Grand Date Fair Value of Options and the Grand Date Fair Value of Stocks Awarded, could provide more information on the possible CEO compensation changes after the Dodd-Frank Act.

As some of these coefficients are highly significant but small, the economic significance should be considered. So, does the effect on the pay-for-performance sensitivity economically

matter? As earlier mentioned, the log-log model ensures that a 1% change in the dependent variable is associated with  $\beta\%$  change in the independent variable. For example, the mean of Total Compensation is \$4,585,080 before the Dodd-Frank Act and \$5,594,950 after the Dodd-Frank Act. Therefore, an increase of ROA of 0.11% is associated with an increase in Total Compensation of \$45,850 before the Dodd-Frank Act. After the Dodd-Frank Act, a 0.08% change in ROA leads to an increase of \$55,950. On ROE, these increases in CEO remuneration are associated with a respectively 0.09% increase in ROE before and 0.07% after the Dodd-Frank Act. On RET, firm performance needs to increase by 0.04% before and 0.03% after the Dodd-Frank Act. Thus, although these coefficients look small, the economic influence of increasing firm performance on CEO compensation is evident.

### 6.3 Regression results on the Grant Date Fair Value of Options and Stocks

#### Awarded

To test the incentive-based parts of CEO Compensation, the same log-log models are used as the first six regression models, only changing the dependent variables:

$$\ln(GD\ FV\ of\ Options\ Granted) = \alpha + \beta_1(DF) + \beta_2 \ln(ROA) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (13)$$

$$\ln(GD\ FV\ of\ Options\ Granted) = \alpha + \beta_1(DF) + \beta_2 \ln(ROE) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (14)$$

$$\ln(GD\ FV\ of\ Options\ Granted) = \alpha + \beta_1(DF) + \beta_2 \ln(RET) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (15)$$

$$\ln(GD\ FV\ Stocks\ Awarded) = \alpha + \beta_1(DF) + \beta_2 \ln(ROA) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (16)$$

$$\ln(GD\ FV\ Stocks\ Awarded) = \alpha + \beta_1(DF) + \beta_2 \ln(ROE) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (17)$$

$$\ln(GD\ FV\ Stocks\ Awarded) = \alpha + \beta_1(DF) + \beta_2 \ln(RET) + \beta_3(CEO_{AGE}) + \beta_4(CEO_{TEN}) + \beta_5(IOWN) + \beta_6(LEV) + \beta_7 \ln(SALES) + \beta_8 \ln(TA) + \beta_9(VOL) + \mu_i \quad (18)$$

Just as the earlier tests on Total Compensation and Total Cash Compensation, all six regressions are performed before and after the Dodd-Frank Act. Again, the numbers of the regression formula correspond to the numbers in tables 8 and 9. Only the dependent variables change between regressions (13), (14), (15), and regressions (16), (17), (18), next to the performance measure. Table 8 shows the results before the enactment of the Dodd-Frank Act, table 9 shows the results after the enactment (regression 19-24).

Table 8: Results Regression on Grant Date Fair Value of Options and Stocks Granted before Dodd-Frank.

	<i>Dependent variable:</i>					
	ln (GD FV of Options Granted)			ln (GD FV Stocks Awarded)		
	(13)	(14)	(15)	(16)	(17)	(18)
ln(ROA)	0.21*** (0.06)			-0.07 (0.06)		
ln(ROE)		0.08 (0.06)			0.004 (0.06)	
ln(RET)			0.07 (0.05)			-0.06 (0.05)
Age	-0.03*** (0.01)	-0.02*** (0.01)	-0.04*** (0.01)	0.002 (0.01)	0.0001 (0.01)	0.01 (0.01)
CEO Tenure	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.08*** (0.01)	-0.07*** (0.01)	-0.08*** (0.01)
> 5% blockholders	0.06* (0.03)	0.06* (0.03)	-0.03 (0.04)	0.13*** (0.03)	0.15*** (0.03)	0.16*** (0.04)
Volatility	0.40 (0.30)	0.33 (0.29)	-0.07 (0.29)	-0.54* (0.30)	-0.49* (0.28)	-0.65** (0.29)
ln(TA)	0.60*** (0.11)	0.60*** (0.11)	0.55*** (0.13)	0.93*** (0.11)	0.99*** (0.11)	0.87*** (0.12)
ln(Sales)	0.09 (0.12)	0.07 (0.12)	0.05 (0.13)	-0.13 (0.11)	-0.16 (0.11)	-0.07 (0.12)
Constant	0.65 (0.92)	0.33 (0.92)	2.60*** (0.96)	-1.20 (0.90)	-1.24 (0.90)	-0.67 (0.93)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,361	4,351	3,129	4,361	4,351	3,129
R <sup>2</sup>	0.16	0.16	0.15	0.19	0.20	0.20
Adjusted R <sup>2</sup>	0.15	0.15	0.14	0.18	0.19	0.18

Note:

\* \*\* p\*\*\* p<0.01

Table 9: Results Regression on Grant Date Fair Value of Options and Stocks Granted after Dodd-Frank.

	<i>Dependent variable:</i>					
	ln (GD FV of Options Granted)			ln (GD FV Stocks Awarded)		
	(19)	(20)	(21)	(22)	(23)	(24)
ln(ROA)	0.27*** (0.06)			-0.12** (0.06)		
ln(ROE)		0.16** (0.06)			-0.01 (0.05)	
ln(RET)			-0.07 (0.05)			0.06 (0.05)
Age	-0.02** (0.01)	-0.02* (0.01)	-0.03*** (0.01)	-0.01 (0.01)	-0.004 (0.01)	0.002 (0.01)
CEO Tenure	-0.03*** (0.01)	-0.03*** (0.01)	-0.02*** (0.01)	-0.06*** (0.01)	-0.06*** (0.01)	-0.06*** (0.01)
> 5% blockholders	0.04 (0.03)	0.04 (0.03)	0.03 (0.04)	0.24*** (0.03)	0.24*** (0.03)	0.28*** (0.03)
Volatility	0.37 (0.44)	0.16 (0.43)	-0.06 (0.45)	-1.81*** (0.40)	-1.73*** (0.39)	-1.77*** (0.41)
ln(TA)	0.27** (0.11)	0.29*** (0.11)	0.23* (0.12)	0.59*** (0.10)	0.65*** (0.10)	0.61*** (0.10)
ln(Sales)	0.27** (0.11)	0.21* (0.12)	0.26** (0.12)	0.19* (0.10)	0.15 (0.10)	0.19* (0.11)
Constant	1.70* (0.96)	1.49 (0.97)	1.96* (1.12)	0.94 (0.86)	0.97 (0.87)	-0.91 (1.01)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,524	4,477	3,683	4,524	4,477	3,683
R <sup>2</sup>	0.14	0.13	0.14	0.20	0.20	0.20
Adjusted R <sup>2</sup>	0.12	0.12	0.13	0.18	0.19	0.19

Note:

\* p < 0.10  
\*\* p < 0.05  
\*\*\* p < 0.01

Before enacting the law, ln(ROA) is statistically significant at the 1% level with a coefficient of 0.21 on the Grand Date Fair Value of Options. This coefficient on ln(ROA) is considerably higher when comparing it to the coefficients on ln(Total Compensation), which is 0.11. After the Dodd-Frank Act, the coefficient on the Grand Date Fair Value of Options increased to 0.27, still strongly significant at the 1% level. Ln(ROE), on the other hand, has a coefficient of 0.08 before the Dodd-Frank Act, but insignificant. After the Dodd-Frank Act, the



coefficient increased to 0.16, significant at the 5% level. When considering the coefficient on the Annual Returns, a decline from 0.07 to a negative -0.07 is seen, but these coefficients are both insignificant.

Because I use log-log regressions, a 0.27% increase in ROA after the Dodd-Frank Act should be associated with a 1% change in the Grant Date Fair Value of Options Granted. Therefore, the options granted to CEOs have become significantly more dependent on performance, which is in line with the stated hypothesis. This association is also applicable to ROE, as a 0.16% (instead of an insignificant of 0.08%) change in ROE after the Dodd-Frank Act is associated with a 1% increase in the Grant Date Fair Value of Options Granted to the CEO. In conclusion, the regression analyses on the Grant Date Fair Value of Options Granted to a CEO as part of their incentive-based compensation are more dependent on the firm's performance, pointing to a positive effect of the Dodd-Frank Act on the pay-for-performance sensitivity.

Although the results regarding the Grant Date Fair Value of Options Granted look promising, the results of the regressions on the Grant Date Fair Value of Stocks Awarded are less favorable. Before the Dodd-Frank Act, the coefficient on the Grant Date Fair Value of Stocks Awarded was negative on  $\ln(\text{ROA})$  and  $\ln(\text{Annual Returns})$  and slightly positive on  $\ln(\text{ROE})$  although these coefficients are all not significant. After enacting the Dodd-Frank Act, the coefficient on  $\ln(\text{ROA})$  decreased, resulting in a coefficient of -0.12 (significant at the 5% level). So, when ROA decreases by 0.12%, the Grant Date Fair Value of Stocks Awarded to the CEO increases by 1%. This coefficient would imply a reversed pay-for-performance relationship. Looking at the coefficients on  $\ln(\text{Annual Returns})$ , the coefficients increased from -0.06 to 0.06, both insignificant. The coefficients on  $\ln(\text{ROE})$  remained the same and are also statistically insignificant.

The economic magnitude of these coefficients is evident. Before the Dodd-Frank Act, the average Grant Date Fair Value of Options Granted was \$999,580. After the Dodd-Frank Act, the average Grant Date Fair Value of Options Granted was \$889,280. Therefore, a 1% increase in CEO remuneration before the Dodd-Frank Act is associated with \$99,958 and \$88,928 after the Dodd-Frank Act. The pre-Dodd-Frank increase in the Grant Date Fair Value of Options Granted is achieved when firm performance, based on ROA, increases by 0.21% before the enactment. After the Dodd-Frank Act, the \$88,928 increase in the Grant Date Fair Value of Options Granted is associated with a 0.27% increase in ROA and a 0.16% increase in ROE.

## 7. Conclusion, caveats, and further research

The research I performed in this paper focused on the Dodd-Frank Act and its influence on the pay-for-performance sensitivity of CEO compensation. The Dodd-Frank Act got enacted in 2011 as a reaction to the Global Financial Crisis of 2007. CEOs of large public companies, all being in financial distress during the Crisis, received large bonuses the years before the Crisis started. To increase transparency, accountability, and corporate governance, shareholders received a non-binding vote on executive compensation. With this, the Dodd-Frank Act enables the shareholders to vote at least once every three years on management proposals, including executive compensation. As shareholder activism plays an even more prominent role in corporate governance nowadays due to the Dodd-Frank Act, and the U.S. companies have an increasing percentage of shares held by institutional investors and an increasing number of blockholders, the dependency of CEO compensation on firm performance becomes more and more important. Therefore, I expect the pay-for-performance sensitivity to increase after the enactment of the new legislation in 2011, leading to the following research question:

*Did the pay-for-performance sensitivity increase for public companies after the enactment of the Dodd-Frank Act?*

In this field of research, there are two main theories on executive compensation: the managerial power approach (implying executives extracting rent from the firm) and the efficient contracting view (implying compensation contracts are designed to align executives and shareholders' incentives). When the Dodd-Frank Act leads to an increasing pay-for-performance sensitivity, the alignment between the incentives of the shareholders and the executives has also increased, providing evidence on the efficient contracting method. Conversely, when the pay-for-performance sensitivity decreases, the results support the managerial power theory.

To find an answer to the research question, I used several different CEO compensation variables in the regression analyses: Total Compensation, Total Cash Compensation, the Grant Date Fair Value of Options Granted and the Grant Date Fair Value of Stocks Awarded. Total Compensation includes all kinds of CEO compensation together. The stocks and options granted are incorporated in the CEO remuneration to incentivize the CEOs to act in the best interest of the shareholders.

Although you would expect an increase in pay-for-performance sensitivity after the Dodd-Frank Act, the results of the regression analyses on Total Compensation do not comply

with these expectations. There is a positive pay-for-performance relationship before and after the Dodd-Frank Act, but the relationship declined. These results are robust, as each performance indicator (ROA, ROE, and RET) shows roughly the same results. All coefficients are statistically significant and therefore imply a deteriorating pay-for-performance sensitivity on Total Compensation. Although the coefficients are small, the economic influence of increases or decreases in firm performance is considerable. For example, an increase of ROA of 0.11% results in an increase in Total Compensation of \$45,850 before the Dodd-Frank Act. After the Dodd-Frank Act, a 0.08% change in ROA leads to an increase of \$55,950 in Total Compensation. Thus, even though the coefficients, and therefore, the pay-for-performance sensitivity decreased, the change in Total Compensation is larger. This increase is attributable to the overall increase in Total Compensation.

On the other hand, the coefficients on the Grant Date Fair Value of Options Granted increased significantly, and therefore show an increasing pay-for-performance sensitivity after the Dodd-Frank Act. This increase is seen on both accounting-based performance measures, ROA, and ROE. Therefore, these results can be interpreted as robust. The economic magnitude is also significant. A 1% increase in the Grant Date Fair Value of Options is associated with \$99,958 before the Dodd-Frank Act and \$88,928 after the Dodd-Frank Act. The increase in compensation before the Dodd-Frank Act is achieved by a 0.21% increase in ROA. After the Dodd-Frank Act, an increase in ROA of 0.27% or an increase of 0.16% on ROE is needed.

The results on Total Cash Compensation do not show any increase in pay-for-performance sensitivity. More surprisingly, on performance measure ROA, the coefficients on the Grant Date Fair Value of Stocks Awarded show a statistically significant decline, resulting in a negative coefficient. After the Dodd-Frank Act, this result would imply a negative pay-for-performance sensitivity on stocks awarded to the CEO.

Concluding, the results of the regressions do not show an unambiguous increase of the pay-for-performance sensitivity after the enactment of the Dodd-Frank Act. As Burns and Minnick (2013) already concluded in their research, equity-based compensation plays a more significant role in CEO compensation nowadays. In this paper, I only find robust evidence for an increase in pay-for-performance sensitivity on the Grant Date Fair Value of Options Granted to the CEO. Therefore, these results are in line with the prior research of Burns and Minnick. All other compensation variables show no result or a slightly negative influence of the Dodd-Frank Act on the pay-for-performance sensitivity. Therefore, the alternative hypothesis cannot be confirmed. This evidence is contradictory to what I expected of the effects of the Dodd-

Frank Act and therefore my alternative hypothesis. These results also do not provide any evidence on the managerial power theory or the efficient contracting view.

Although these findings are statistically significant, there are still some caveats in the research on CEO compensation. For example, when analyzing the pay-for-performance sensitivity for CEOs, it is impossible to determine if the firm performance did change due to the activities of the CEO or due to other managers or executives. Also, as the Dodd-Frank Act has been enacted to react to the Global Financial Crisis, the numbers could be largely influenced by the economic recovery. Moreover, the results are not entirely generalizable to other countries, as say-on-pay regulations in other countries can differ. I try to mitigate these influences by using different performance measures, using control variables and fixed effects, but it is always hard to exclude every possible endogenous factor.

For future research, it could be possible to perform a difference-in-difference design, assessing the pay-for-performance sensitivity between public firms and private firms in the U.S. Changes in the pay-for-performance sensitivity in the group of public firms can be compared to the pay-for-performance sensitivity for private companies. Another possibility is to compare the results of say-on-pay regulations in the U.K. to say-on-pay in the U.S. Finally, future research could consider all executives in their research, instead of only the CEO. These studies can be useful for legislation- and policymakers when assessing executive compensation, as this is an ongoing debate in corporate governance.

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## Appendix

Variable	Database	Description and explanation
Assets - Total	Compustat	AT -- Assets - Total (AT)
Common shares outstanding	Compustat	CSHO -- Common Shares Outstanding (CSHO)
Debt in Current Liabilities	Compustat	DLC -- Debt in Current Liabilities - Total (DLC)
Long-Term Debt - Total	Compustat	DLTT -- Long-Term Debt - Total (DLTT)
Net Income (Loss)	Compustat	NI -- Net Income (Loss) (NI)
Sales	Compustat	SALE -- Sales or Turnover (Net) (SALE)
Stockholders Equity - parent	Compustat	SEQ -- Stockholders' Equity - Total (SEQ)
Price Close - Annual - Fiscal	Compustat	PRCC_C -- Price Close - Annual - Calendar (PRCC_C)
Executive's Age	Execucomp	
CEO Tenure	Execucomp/Own computation	(End fiscal year - Date became CEO)/365
Total Compensation	Execucomp	Total Compensation (Salary + Bonus + Other Annual + Restricted Stock Grants + LTIP Payouts + All Other + Value of Option Grants)

Total Current Compensation	Execucomp	Salary + Bonus
Value of Option Awards	Execucomp	Value of option-related awards (e.g. options, stock appreciation rights, and other instruments with option-like features). Valuation is based upon the value of options that vested during the year as detailed in FAS123R. The amount here is the cost recorded by the company on its income statement as well as any amounts that were capitalized on the balance sheet for the fiscal year. This column discloses the cost that was charged to the company (and thus to shareholders) for the year, as distinct from the grant date fair value of the award.
GD FV of Options Awards	Execucomp	Fair value of all options awarded during the year as detailed in the Plan Based Awards table. Valuation is based upon the grant-date fair value as detailed in FAS 123R.
GD FV Stocks Awarded	Execucomp	Fair value of all stock awards during the year as detailed in the Plan Based Awards table. Valuation is based upon the grant-date fair value as detailed in FAS 123R.
>5% blockholders	Thomson Reuters	Number of >5% institutional block ownerships.
Annual Returns	CRSP/Own computation	Computed from the monthly returns, retrieved from CRSP.
Volatility	CRSP/Own computation	Computed using the annualized returns, which are based on data from CRSP.
ROA	Compustat/Own computation	ROA = Net Income (Loss) / Assets - Total

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ROE	Compustat/Own computation	ROE = Net Income (Loss) / Stockholders Equity - parent
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