

Executive Compensation and Firm Performance

The Effect of the Dodd-Frank Act

ABSTRACT:

This paper examines the link between CEO compensation and firm performance in combination with the effect of the Dodd-Frank act. A panel dataset of 420 different CEO's from the Compustat North America database from 2007-2013 is used. The focus will be on the variable payment component of the CEO's compensation. In addition, several control variables are used. The results indicate a difference in the effect of incentive pay between before and after the implementation of the Dodd-Frank act. Where there is no effect of incentive pay on firm performance prior to the Dodd-Frank act there is a positive effect after the implementation of the Dodd-Frank act. Whether the Dodd-Frank act itself has a positive influence on firm performance is still open for discussion. However, the first results shown in this thesis can be seen as an indicator that the Dodd-Frank act indeed has a positive effect on firm performance. Furthermore, this paper shows slight evidence of the negative influence the Dodd-Frank act had on the effect of executive compensation on firm performance.

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PREFACE AND ACKNOWLEDGEMENTS

Before you lies the master thesis Executive Compensation and Firm Performance: The Effect of the Dodd-Frank Act. It is written to fulfill the graduation requirements of the Master Economics & Business at the Erasmus University of Rotterdam. I was engaged in researching and writing this thesis from May to July 2015 and January to August 2016.

After finding and discussing the topic of my thesis around May 2015 I started reading the literature and the history of executive compensation. Despite this early start I decided to put my thesis on hold and expand my knowledge by enrolling in another specialisation of my master, namely Behavioural Economics. I followed the courses and a tough seminar from September until the end of December 2015.

From January onwards I wanted to fully commit to the writing of my thesis. However, starting on the fourth of January, I started a full time job at NNIP, which had great influence on the available time I had for writing my thesis. Luckily, they acknowledged my situation as a student and offered me extra free time to work on my thesis in order to complete it in due time, for which I would like to thank them.

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Last but certainly not least I would like to thank my family and friends. Throughout the process they have supported me. Whenever I felt like I had taken on too much to handle they motivated me and no matter which step I took, they supported my decisions.

I hope you will enjoy reading my thesis.

Boris Keukenmeester

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CHAPTER 1, Introduction

There has been an ongoing debate in literature regarding executive compensation and its effect on firm performance. Agency theory (Ross, 1973) suggests that in order to align shareholders and managers interest there should be a positive relation between executive compensation and firm performance. Many researchers have tried to prove such a relation. Early works of Loomis (1982) and Drucker (1984) failed to do so. However, Murphy (1984) challenged this cross-sectional research, which led him to the conclusion that the way compensation plans were structured was sensible. Furthermore, Core, Wolthausen and Larker (1999) tested the agency theory suggested by Ross (1973). They found the exact opposite as predicted by agency theory. CEO's with bigger agency problems received greater compensation, while the company performed worse.

After the financial crisis, both governments and the public became more sceptical of CEO's getting high wages and bonuses, even during economic crashes or when their firm was on the verge of bankruptcy. Also several scandals regarding executive compensations came to light over time, usually during crisis or economic downfall. As a reaction to these scandals governments tried to eliminate the possibility for CEO's to gain unjustified compensation using rules and regulations. In July 2010, the Dodd-Frank act was implemented. This act is one of the biggest changes in regulation surrounding executive compensation since the great depression (Paletta & Lucchetti, 2010).

This study tries to combine the effect of executive compensation on firm performance with the effect of the Dodd-Frank act. This has led to the following hypotheses.

Hypothesis 1:

The effect of incentive pay on firm performance differs between pre- and post-Dodd-Frank act.

Hypothesis 2:

The introduction of the Dodd-Frank act leads to an increase in firm value.

Hypothesis 3:

The implementation of the Dodd-Frank act has a positive influence on the effect of executive compensation on firm performance.

Ozkan (2001) conducted a panel study in the UK examining the link between CEO pay and firm performance. This study will also use a panel study including a measure, being the incentive pay ratio, of executive compensation as used by Adams (2011). This measure will focus on the variable part of executive compensation that is used to create the right incentive for the CEO. This is then combined with the timespan in which the Dodd-Frank act is implemented.

Using the panel data a mean comparison paired T-test is performed to check whether the mean return on assets differs between pre- and post-Dodd-Frank act. Furthermore, a fixed effects ordinary least squares regression is performed twice. Once before the implementation of the Dodd-Frank act and once after the implementation of the Dodd-Frank act. Finally, the total sample will be used where the Dodd-Frank act will be added as a dummy variable.

Based on the results of the mean comparison paired T-test the average performance of the firms within the sample turns out to be significantly lower before the implementation of the Dodd-Frank act than the average performance after the Implementation of the Dodd-Frank act. The most important support for hypothesis 1 is found using the split regression. A change has been observed between the effect of the incentive pay on firm performance between pre- and post-Dodd Frank act. The first results of the entire sample with the Dodd-Frank act included as a dummy variable provided promising results in favour of hypothesis 2, though it must be noted that the robustness of these results is minimal. The analysis of the interaction effect, of the Dodd-Frank act dummy and the executive compensation measures, indicates a negative influence of the Dodd-Frank act on the effect of executive compensation on firm performance. Although these findings are contradicting hypothesis 3, they are not significant over the entire sample.

Chapter 2 will start with a detailed timeline of how executive compensation came to be, based on Murphey (2012). The last 100 years of company and regulation development will be discussed, ending with the regulation relevant for this study: the Dodd-Frank act. Chapter 3 starts with a description of the two most relevant theories surrounding executive compensation, agency theory and tournament theory. Following this, the relationship between executive compensation and firm performance will be described and earlier research and findings will be discussed. Chapter 4 will give insight in the used data, and will provide variable descriptions and summary statistics. In addition, there will be elaborated on the processing of the data and used methodology. Chapter 5 will provide the results of the followed methodology, whereas chapter 6 will conclude with the most important findings and recommendations for further research.

CHAPTER 2, Hundred Years of CEO Pay

In order to have a clear view on how executive compensation is established, what it consists of, and how the regulation around it is formed, this chapter will provide a summary of the history of U.S. executive pay and regulation. It will start with the first form of executive compensation; e.g. bonuses, and will elaborate to (restricted) stock and long term incentive plans. Due to a growing economy and changing economic circumstances, like the great depression, there was a need for regulation. The aim of this chapter is to highlight the most important changes, rules and scandals of the last hundred years.

2.1 The Beginning of Executive Compensation

Before 1900 there were mostly small businesses run by owners. In railroad and steel a few relatively large and complex firms emerged. Due to this growth the first managers became a fact. However, these firms were still run by founders or individuals who held large blocks of equity. Due to this, there was not yet a need for executive compensation plans that tied pay to firm performance (Murphy, 2012).

The first executive compensation plans that tied pay to firm performance were in the form of bonuses. Between 1895 and 1904, around two thousand small manufacturing firms combined in order to form 157 large corporations. Because of this merge, former owners became executive managers without having large equity stakes. This caused an agency problem¹. In order to tackle this problem, bonuses tied to the firms profit made their up rise during the next twenty years. The use of bonuses became so popular that between 1928 and 1929, 62 to 64 percent of the companies used them (Baker, 1938).

2.2 The First Regulation of Executive Compensation

Currently everybody is used to the fact that shareholders and the public have the right to know the ins and outs of compensation paid to executives in publicly traded firms. This wasn't always the case. The bonuses started to increase in magnitude but still executive compensation was not controversial in the 1920s. This was mostly due to a robust economy, a low unemployment rate and high shareholders return. But then the great depression started in 1929. This led to an unfavourable economic status and questions about compensation were being raised. By 1933, US regulators began investigating executive compensation. The Federal Trade Commission (FTC) requested disclosure of salaries and bonuses paid by all corporations with capital and assets over 1 million dollar. The Securities Act of 1934 inspired the creation of the Securities and Exchange Commission (SEC). The SEC issued permanent rules demanding companies to disclose the names and all compensation received by the three highest paid executives (Murphy, 2012).

¹ The agency problem is a conflict of interest between managers and shareholders. The problem is that the manager who is supposed to make the decision might act in his own best interests instead of the best interest of the shareholder (for a more extensive explanation of agency theory see chapter 3.1).

2.3 (Restricted) Stock Options

In the 1920s a new form of executive compensation emerged, stock options. This renewed form of compensation led to a new problem regarding the U.S. income tax: should options be taxed as compensation when they are exercised or should they be taxed as capital gains, when the stock purchased by the option is sold. The debate about this issue lasted for over twenty years. By 1950, as part of the Revenue Act, restricted stock options were created. Restricted stock options would be taxed only when the shares were sold and not upon exercise of the option. In the Revenue Act of 1954, the congress changed the restrictions on restricted stock options. Following this amendment, the exercise price of a granted option could be lowered if the market price (of the stock the option was for) declined subsequent to the granting of the option (Murphy, 2012). This provision of the Revenue Act of 1954 has been exploited by companies during the 1960 recession. Because of the declining stock market, companies reset the exercise prices of options or replaced them with new options at a lower exercise price. This became highly controversial and in 1961 the president demanded that the favourable tax for options should be removed and instead options should be taxed as ordinary income on the exercise date. Finally, in the Revenue Act of 1964, the congress removed this favourable tax status of restricted stock and instead posed a new law which made restricted stock much less attractive. The biggest change imposed by this law was a reduction of the top marginal tax rate on ordinary income from 91% to 70% which made cash more attractive compared to restricted stock options. Due to this law the popularity of restricted stock options fell and later even collapsed due to the Tax Reform Act of 1969. Evidence shows that restricted stock options were replaced by regular stock options during the early 70s and eventually disappeared (Hite & Long, 1982). However, as will be shown later in this paper restricted stock options will make a comeback.

2.4 Wage and Price Controls

Due to the changing tax policies, the use of stock options became stagnant. This lowered the compensation of executives, causing firms to look for other ways to compensate them. Firms used book-value plans, long-term performance plans, and guaranteed bonuses independent of performance (Ricklefs, 1975). This kind of incentive plans were also a follow up to the Nixon wage-and-price controls. In 1971, President Nixon tried to control inflation by freezing the commodity prices and wages for 90 days. Later that year a limit for the rise in executive pay was established, which meant that executive pay could not increase more than 5.5%. Due to the wage-and-price controls firms tended to give out more company provided benefits since the wage-and-price controls only restricted salaries. Shareholders were not always happy with these non-incentivised benefits leading to the SEC issuing Interpretive Release #5856 in 1977. This release stated that valuable company benefits should be reported as compensation for the executive. The SEC issued this release because the company provided benefits got out of hand (yachts, limousines, jets) (Jensen, 1978).

Between 1970 and 1982 the most important explanatory variable of cash compensation was company size. The highest paid executives were in the management of the largest companies (mostly in the steel, automotive, and oil industry). Also other aspects of compensation were related to company size such as year-to-year change in cash compensation, prestige, and board membership. This relationship created the incentive among executives to increase the company size. Due to the growing use of guaranteed bonuses independent of performance executives had no incentive to increase the stock price.

In 1973 and 1977, oil price shocks caused an increase in technological progress. Less regulation combined with an increase in global trading stimulated productivity in what is referred to as the Modern Industrial Revolution (Jensen, 1993). A lot of companies increased their capacity in anticipation of continued price increases. But when demand dropped, and prices dropped to the original level, firms were stuck with this excess capacity. Firms could not increase output due to the low demand so firms could decrease their workforce (since they have overcapacity). Nevertheless, executives were still reluctant to do so because the executive's compensation was tied to firm size. These firms were generating large amounts of cash which could be used to invest in Net Present Value projects or be distributed back to the shareholders. CEO's did not like distributing money to shareholders so instead they used it for unwise diversification and investment programs (Murphy, 2012).

2.5 Levered Buy Outs and Golden Parachutes

Since executives were still not paid on equity based performance measures. This created opportunities for hostile takeovers. This process was accelerated by the rise of Levered Buy Outs (LBOs). These were transactions to take over a firm with large amounts of debt, using the future cash flows of the firm as collateral. This created shareholder value with stable cash flows. Executives were most likely to lose their job in such a takeover. This is why they used takeover protection measures like staggered boards, supermajority rules, poison pills, and golden parachutes².

Especially the golden parachutes increased the cost of hostile takeovers for the acquirer and the congress attempted to discourage golden parachutes. The congress added Sections 280(G) and 4999 to the tax code. Section 280(G) stated that all payments in excess of the base amount were non-deductible to the employer. Section 4999 imposed a 20% tax on the amount of payment above the base amount of the executive who received the golden parachute payment (Murphy, 2012). Although section 280(G) was meant to reduce the golden parachute payments to executives this was not the

² Staggered boards indicate a board of directors divided into classes where directors have overlapping terms. Supermajority rules require more than 50% of votes to approve a merger. Poison pills give special rights to shareholders when there is a takeover bid. Golden parachutes indicate a direct payment to executives when there is a successful change in control.

case. Because early exercise of options, short vesting periods for (restricted) stock options, and employment agreements, the incentive effect of compensation for executives was reduced.

But due to the wealth creation of takeovers and LBO's, shareholders discovered that the incentives for executives were incorrect. Their focus should no longer be on company size or accounting profit but on creating company value. This was done by the more extensive use of options and other equity based compensation. This led to firms getting rid of the overcapacity they had left from the 70's (as discussed in section 2.4). They no longer needed to be large so they fired workers. This was efficient and created value for shareholders, but the combination with valuable stock options for executives caught the attention of labour unions, the media, and the Congress. During the recession of 1990-1991 this created pressure on executive pay and in 1992 the SEC came with new disclosure rules. These rules increased the available information about stock option grants and holdings in the annual proxy statement of firms. This also indicated that the main objective of the firm was no longer to be the biggest, but to create shareholder value.

2.6 Excessive Use of Stock Options

The growth of the use of stock options continued extensively and quickly became the largest component of CEO compensation. One of the reasons for this phenomenon was the increased shareholder pressure to increase the relation between CEO pay and shareholder returns. Another reason which increased the use of options was Section 162(m) of the Act of 1993. This Act tried to limit executive pay compensation and make base salary above one million dollars non-deductible. However, this backfired because stock options were considered as performance based compensation and performance based compensation was still deductible above one million dollars. Additionally, firms paying a base salary to executives of more than one million dollars lowered it to exactly one million dollars (Perry & Zenner, 2001), while firms paying base salary lower than one million raised their base pay to one million to fully make use of the tax deductibility (Rose & Wolfram, 2002).

Another important factor for the increase in the use of options was the fact that there was no accounting for options. According to many firms options could be granted without any cost for the company. This statement was obviously false. In 1995, the Financial Accounting Standard Board (FASB) issued a rule (FAS123) which recommended, but not required, that companies used the fair market value of options granted as an expense using Black-Scholes formula³ (Black & Scholes, 1973). But, as this was not required, the difference between the accounting and tax policy gave firms using

³ For an extensive explanation of the Black-Scholes formula I refer to the paper: *The Pricing of Options and Corporate Liabilities* (Black & Scholes, 1973).

option grants a huge benefit, which consisted of no accounting expenses while still receiving a large tax deduction.

2.7 Option Backdating and Accounting for Options

During the start of the new millennium a lot of accounting scandals came to light. This urged the congress to pass the Sarbanes-Oxley Act in July 2002. This act finally set standards for accounting firms, auditors, and boards of directors of publicly traded firms. An important section (403) of the Sarbanes-Oxley Act required executives to disclose new grants of stock options within two business days of the grant. This used to be possible until ten days after the end of the month in which the options were granted. The old rules let room for fraud and resulted in one of the biggest scandals in executive compensation; option backdating. Option backdating is the practice of firms to falsify stock options grants so that the grant date is reported as if they were granted on the day when the stock price was the lowest, resulting in an option that is immediately in-the-money. Although they were reported as if they were issued at the money, this led to the situation where there was no accounting expense although there should be one. Executives made a lot of money using these practices. One study, covering 7800 firms during 1996-2002, concluded that 30% of the sample firms manipulated option grants conform option backdating (Heron & Lie, 2009). The backdating of options was unintentionally stopped by the Sarbanes-Oxley Act two years before option backdating was discovered.

following the burst of the internet bubble in 2000 the use of stock options dropped and the use of restricted stock rose again. Because of fast decline of stock prices many of the outstanding options became far out-of-the-money and were replaced with restricted stock. This is favourable for executives as restricted stock will retain value as long as the firm value is higher than its liabilities. When this is combined with low expectations of firm performance restricted stock holdings are worth more than options, which will mostly likely expire worthless in a declining stock market.

Finally, in December 2004, the FASB announced a revision of rule FAS123 by requiring all U.S. firms to recognize an accounting expense when granting stock options (Murphy, 2012). This rule would be enforced starting June 15, 2015. Firms had to report an accounting expense for every option granted before this date that was not yet exercised as of this date. Therefore, to avoid the accounting charge, many firms quickly vested those existing options so that they became exercisable before June 15, 2015 (Choudhary, et al., 2009). The accounting expensing of options resulted in a reduction in the use of options and an increase in the use of restricted stock.

Usually big companies make use of consultants in order to make recommendations about the pay level of executives. Additionally, consultants give advice about accounting, tax, and regulation regarding executive pay. However, critics accused these consultants of being the reason for the perceived

excesses in executive compensation. Therefore the SEC required that every consultant, who had a roll in the process of advising the company about executive compensation, would be identified.

Consultants also offered other services regarding human resources to companies. This could be seen as a problem as the decision to engage these consulting firms in other areas are often made by the same executives that were benefitted or harmed by the consultants executive pay recommendations. As a result of this, consultant may tend to give higher executive pay recommendations in return for employment in other areas of consulting within the same firm. To tackle this problem the SEC expanded the disclosure rules in 2009. Firms were also required to disclose the fees paid to their executive compensation consultants when the consultants received more than \$120,000 for providing services other than executive compensation.

2.8 The Emergency Economic Stabilization Act

In 2008 the most recent credit crisis started, namely the credit crisis. Right after the bankruptcy of Lehman Brothers, the Emergency Economic Stabilization Act (EESA) was passed by the congress together with president Bush. This Act concerned a bailout by the U.S. government using taxpayers' money to help the companies in trouble. Following the bailout, these firms were subjected to stricter rules regarding executive compensation. About a year later, in 2009, president Obama signed the American Recovery and Reinvestment Act (ARRA). This act further limited the freedom surrounding executive compensation for companies in the Troubled Asset Relief Program (TARP). This was necessary as first Merrill Lynch paid out \$3,6 billion in bonuses after receiving government help. The second scandal regarding bonuses involved the insurance company American International Group (AIG). AIG received over \$170 billion in government bailout funds in order to offset a \$40 billion credit default swap losses. Following this huge support, AIG reported that it was about to pay out \$168 million in contractual obligated bonuses. This resulted in an outrage with the government and the public. The Senate responded with new rules for all the TARP companies, but specifically aimed at AIG. These rules included a 100% tax on bonuses over \$100,000.

2.9 The Dodd-Frank Wall Street Reform and Consumer Protection Act

On July 21 2010, President Obama signed the Dodd-Frank Wall Street Reform and Consumer Protection Act, the Dodd-Frank Act in short (Dodd & Frank, 2010). The Dodd-Frank act is 848 pages long and is one of the biggest changes in the regulation regarding executive compensation since the great depression (Paletta & Lucchetti, 2010). The Dodd-Frank Act regulates pay for all financial institutions. Part (a) of Section 956 of the Dodd-Frank Act requires all financial institutions to disclose all incentive related compensation. This is an important feature of the Dodd-Frank act as this will reveal any compensation structure which could potentially lead to executives taking excessive risks. This is prohibited by Part (b) of Section 956.

Although the Dodd-Frank act was originally focused on the industry of financial services, it also reformed executive compensation of all large publicly traded firms. One of these new rules is stated in Section 951, and is commonly referred to as Say-On-Pay. Using Say-On-Pay, shareholders have to vote whether they approve the compensation practices in a non-binding vote at least once in three years. The U.S. was not the first to use Say-On-Pay. In 2002, the United Kingdom already introduced non-binding Say-On-Pay. More countries followed later and the Netherlands and Norway even allowed binding shareholder votes. Say-On-Pay has become more popular, however there is only little evidence that shows that Say-On-Pay results in big changes in executive compensation.

Sections 953, 955 and 972 of the Dodd-Frank Act required companies to disclose more statistics and ratios. First, companies are required to analyse and report on the relation between realized compensation and financial performance. Second, companies are required to disclose their policy regarding hedging by employees to protect against a fall in the stock price. Third, the companies must explain why they choose to have separate Chairman and CEO positions or why they choose to combine the Chairman and CEO positions. Fourth, companies are required to report the ratio of CEO compensation in relation to the median pay for all the employees. In practice, this ratio is hard to interpret for shareholders and consequently leads to high calculation costs for larger companies. This ratio is most likely only required so that boards will feel ashamed if the difference is too big, therefore urging them to lower the compensation of the CEO.

Section 952 of the Dodd-Frank Act requires companies to have compensation committees consisting solely of outside independent directors. Furthermore, companies must evaluate the independence of compensation consultants as an extension of the disclosure rules of the SEC as discussed in chapter 2.7. For most large companies these rules are not completely new, as the listing on the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) has required independent compensation committees since 2003.

Finally, Section 971 of the Dodd-Frank Act will be discussed. This Section authorizes the SEC to issue rules allowing shareholders to propose a candidate for the position of director. In August 2010 the SEC issued the first rule. This rule stated that shareholders who have held at least 3% of the company's shares for the last three years could propose a candidate. This Proxy Access rule was supposed to replace poor directors with better ones. But the benchmark of 3% was most likely chosen to be of good use for labour unions and political motivated organizations that could use their position to force companies to support political views instead of increasing shareholder value (Alinsky wins at the SEC, 2010). This resulted in a rejection of the rule by the U.S. Circuit Court of Appeals.

2.10 Summary Chapter 2

This chapter has extensively covered the path of executive compensation and regulation over the last 100 years. First we saw that the great depression of 1929 led to the first regulation regarding executive compensation. As a result, firms were required to disclose the names as well as the amount of all compensation received by the three highest paid executives. At the time executive compensation mostly consists of a base salary and an annual bonus. Years later stock options and restricted stock options became more popular. Initially options were tied to firm size which led to corporations with a high production capacity, but after the decrease in prices this was no longer useful which in turn created opportunities for hostile takeovers. Finally, this led to bonuses tied to firm performance in order to increase shareholder value instead of firm size. As there was no accounting standard for options they grew extremely popular, which created the opportunity for the option backdating. Due to the option backdating scandals, accounting standards for options were set in place. During, and even after the credit crisis, firms struggled to exist. This led to people taking a more critical look at why CEO's were earning large amounts when companies were on the verge of bankruptcy, causing the implementation of the Emergency Economic Stabilization Act, followed by the Dodd-Frank Act. The Dodd-Frank Act requires all financial institutions to disclose all incentive related compensation, to increase disclosure requirements of all large firms, and increase overall shareholders participation (e.g. Say-On-Pay and the right to propose a candidate for the position of director).

CHAPTER 3, Theory and Empiricism

This chapter will focus on the two most common theories regarding executive compensation, namely Agency theory as described by Stephen Ross (1973) and Tournament theory as described by Lazear and Rosen (1981). Hereafter the relationship between executive compensation is described based on the components of most recent executive pay packages (base salary, annual bonus, stock options, long-term incentive plans). Finally the chapter will end with a description of the empirical research that has been performed on executive compensation and firm performance.

3.1 Agency Theory

Most research on the relation between executive compensation and firm performance has started with the concept of agency theory. Agency theory describes the problems that arise when the ownership and control of a corporation is separated. To align the interests of the shareholders with the interests of executives (who are usually assumed to be risk-averse and self-interested) compensation plans tied to firm performance were designed (Ross, 1973).

The agency problems can be modelled in a 'hidden action' model. First the CEO has to take an action, a , this action results in shareholders' value of x depended on the CEO's action, $x(a)$. The CEO has to be compensated for his action, a , with compensation w depending on (x,z) , $w(x,z)$, where z is a vector of other observable measures in the contract. This compensation results in utility for the CEO depending on w and a , $u(w,a)$ (Murphy K. J., 1998). Both the shareholders and the CEO can observe the CEO's utility function and the production function, but only the CEO knows the action he took. In this model the shareholders know exactly what action they desire from the CEO but cannot directly observe the action the CEO took. The optimal contract, $w(x,z)$, maximizes the shareholders total value, $x-w$. This contract will be subject to two constraints. First, the incentive compatibility constraint, which means the CEO will choose the action which maximizes his utility. The second constraint is the participation constraint, which means that the expected utility of the contract must be higher than the CEO's reservation utility (utility value of his next best opportunity) (Murphy K. J., Executive compensation, 1998).

Holmström (1979) stated that executive compensation is based on stock-based measures, x , not because shareholders desire higher stock prices but because the realization of x indicates the action, a , the CEO took. Holmström referred to this as the informativeness principle. However, this is empirically not the case. The model mentioned above assumes that the shareholders know which action of the CEO maximizes firm value. If this is the case a contract could be designed that forces the CEO to take this best action. In practice shareholders entrust their money to CEO's because they believe they have superior skill or knowledge to make the best investing decisions. Even if shareholders could directly monitor the actions of CEO's they would still never know if this was truly

the best action given the circumstances. Additionally, Holmstrom suggest in 1992 that CEO's can choose from way more actions than suggested in the principal-agent framework. The action space is typically defined as unidimensional effort but overall there is a general consensus that the shareholder-CEO agency problem is not about the CEO to work harder but for the CEO to take actions that increase shareholder value (Murphy K. J., 1998). Typical actions CEO's could take to increase shareholder value include investing in positive Net Present Value (NPV) projects, waive negative NPV projects, choosing between debt and equity financing, defining the business strategy etc.

3.2 Tournament theory

Another theory explaining high CEO pay is tournament theory proposed by Lazear and Rosen (1981). The simple two-player tournament model specifies a fixed price W_1 to the winner and a fixed price W_2 to the loser. A worker's production follows the function:

$$q_j = \mu_j + \epsilon_j \tag{1}$$

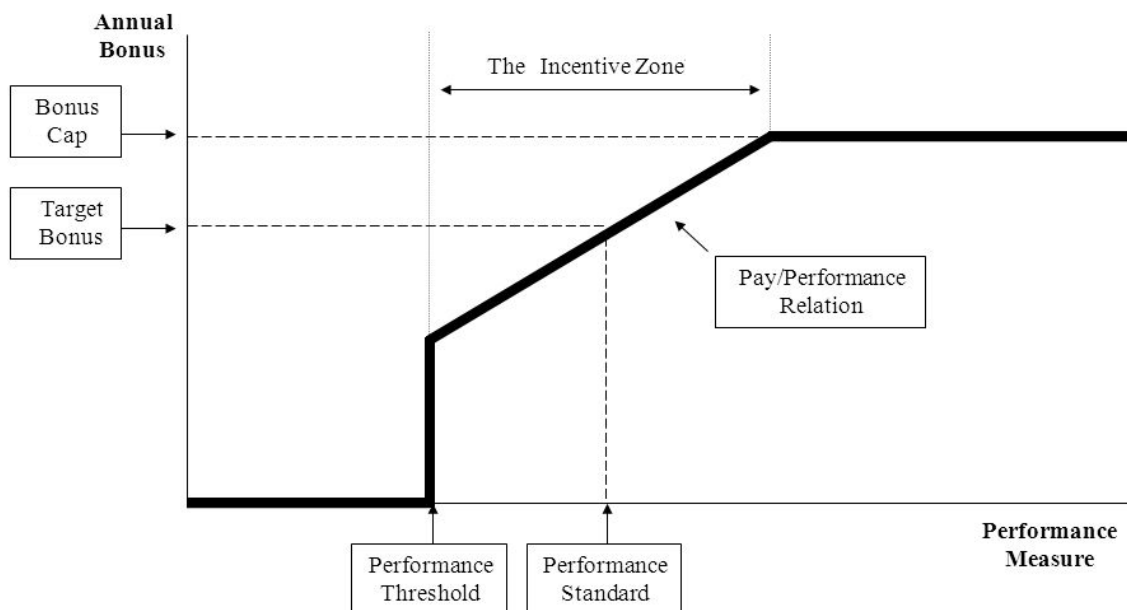
Worker j produces lifetime output q_j , where μ_j is the level of investment, a measure of skill or average output, chosen by the worker when young and prior to a realization of the random or luck component, ϵ_j (Lazear & Rosen, 1981). The winner of the contest is determined by the largest drawing of q . It is a rank ordered tournament because the size or margin of winning does not affect the earnings, W_1 .

Contestants pre commit their investments early in life, knowing the prizes and the rules of the game, but do not communicate with each other or collude. Notice that even though there are two players in a given match the market is competitive and not oligopolistic, because investment is pre committed and a given player does not know who his opponent will be at the time all decisions are made. Each person plays against the 'field'. We seek to determine the competitive prize structure (W_1, W_2). The method proceeds in two steps. First, the prizes W_1 and W_2 are fixed arbitrarily and workers' investment strategies are analysed. Given these strategies, we then find the pair (W_1, W_2) that maximizes a worker's expected utility, subject to a zero-profit constraint by firms. It will be seen that a worker's incentive to invest increases with the spread between winning and losing prizes, $W_1 - W_2$. Each participant wants to improve the probability of winning because the return of winning varies with the spread. The firm would always like to increase the spread, *ceteris paribus*, to induce greater investment and higher productivity, because its output and revenue are increased. But as contestants invest more, their costs also rise. That is what limits the spread in equilibrium: Firms offering a too large spread induce excessive investment. A competing firm can attract all of these workers by decreasing the spread because investment costs fall by more than expected product, raising expected net earnings. Increasing marginal cost of skill implies a unique equilibrium spread between the prizes that maximizes expected utility (Lazear & Rosen, 1981).

3.3 The Relation Between Executive Compensation and Firm Performance

As seen in chapter 2, there are a lot of different forms of executive compensation across firms, industries, and time. But most recent executive pay packages consist of four components: a base salary, annual bonus (tied to accounting performance), stock options, and long-term incentive plans (like restricted stock plans). Base salaries are usually determined through competitive benchmarking. This is mostly done by general industry surveys and detailed analyses of the industry or market peers. Annual bonuses usually consist of a few basic components as illustrated in figure 1. No bonus is paid until a minimum performance threshold is reached. At this point the executive starts to receive the minimum amount of bonus. The target bonus is paid to the executives who reach the performance standard. The incentive zone indicates the range where a direct increase in performance results in a direct increase of the paid bonus. The incentive zone stops at the bonus cap, this is the maximum amount of bonus an executive can achieve. A better performance after this point does not lead to an increase in bonus anymore (Murphy K. J., 1998).

Figure 1: Components of an annual compensation plan.



Stock options are contracts which give the executive the right to buy or sell a share at a pre-specified price. As a form of compensation they usually take the form of call options, so the right to buy a share. It is hard to put a value on options because there is a difference between the value for the company granting the option and the executive receiving the option. As already seen in section 2.6 the method used for valuing options is the Black and Scholes Formula (Black & Scholes, 1973). Long-term incentive plans have roughly the same structure as annual bonus plans (as seen in figure 1). The only

difference is that long-term incentive plans are based on the three of five-year performance unlike the annual bonus which is paid out every year. An example of a long-term incentive plan is restricted stock. Restricted stocks are lost if certain conditions are not met, these conditions are usually related to the executive's longevity (Murphy K. J., 1998).

Looking at the components of an executive's pay package, one can see that there is an obvious connection between executive compensation and firm performance. The wealth of an executive is explicitly connected to the creation of shareholder value through the value of his holdings of stock, restricted stock, and stock options. In addition, the wealth of an executive is implicitly tied to stock price performance through year-to-year adjustments in salary level, accounting based bonuses and option and restricted stock grant sizes (Murphy K. J., 1998).

3.4 Previous Research on Executive Compensation and Firm Performance

So according to economic theory of efficient compensation there should be a positive relation between executive pay and firm performance. Early works of Loomis (1982) and Drucker (1984) fail to document the effect of executive compensation on firm performance. Their work was used by periodicals such as *The Wall Street Journal* and *Fortune* to report the apparent lack of correlation between executive compensation and firm performance. In addition, econometric studies, like Ciscel (1980), indicated that firm size (sales) is the only important factor of executive compensation. Ciscel (1980) concluded that executive compensation plays at best a small role in firm performance (return on equity, profits). However, these results are subject to various points of criticism. First, most research was focussed on the visible part of compensation, namely the salary and bonus. This means there are probably a few omitted relevant variables such as stock options or deferred compensation, which are likely to be of influence on firm performance. Second, most results were a cross-sectional analysis's of compensation and performance data. But not only current performance is important, also firm size, past performance and managerial responsibility are important. This indicates that a cross-sectional model has a big omitted variable problem. However, if these omitted factors are constant over time for individual executives one can correctly estimate the relation between executive compensation and firm performance (Murphy K. J., 1984).

In 1984, Murphy criticized the papers mentioned above and found a strong positive relation between firm performance and executive compensation using data from all publicly held corporations in the Fortune 500 from 1964-1981. This paper used the salary components as described in section 3.3 (Base Salary, Annual Bonus, Value of Stock Options, and long term incentive plans e.g. Restricted stock) and added total compensation as a variable. Firm performance was measured by shareholder return and growth in firm sales (Murphy K. J., 1984). Furthermore, in 1984, Coughlan and Schmidt found that executive compensation plans and management replacement decisions were in line with the incentives of the shareholder (Coughlan & Schmidt, 1984). Two years later Murphy (1986) wrote a paper stating 'Top executives are worth every penny they get'. His research indicated that the way compensation plans were structured was sensible and that companies were adopting more

compensation plans that benefited the shareholders through the creation of better managerial incentives (Murphy K. J., 1986).

Furthermore, Deckop (1988) analysed CEO compensation data of 120 firms from 1977 till 1981. The focus of this studies lied on the fact that firm size was often used as best predictor of CEO's compensation. This was often due to the positive correlation between CEO pay and firm size (measured by sales or revenue). However, other studies have concluded that profit is at least as good of a predictor of variability in CEO compensation as size. If this statement is true then there is a possibility that compensation contracts incentivise the CEO to increase the size of the firm at the expense of profit/shareholder value. This is contrary to what was found in the sample used by Deckop (1988). These results showed that a CEO's compensation tends to vary directly with the firm's profits as a percentage of sales. These findings also indicated that a CEO working for a bigger firm is paid more than a CEO working for a small firm. The key finding of this study was that, among firms of equal size (measured by sales), CEO compensation tends to increase directly with profits (Deckop, 1988).

Leonard (1990) studied the effects of executive compensation policy and organizational structure on the performance of 439 large U.S. corporations between 1981 and 1985. He found that companies with long-term incentive plans had significantly greater increases in return on equity (ROE) than companies without such plans. Corporate success was not significantly related to the level of executive pay or the degree of equity in executive pay (Leonard, 1990).

Core, Wolthausen and Larcker (1999) used agency theory to look at corporate governance, executive compensation, and firm performance. Their results suggested that firms with weaker governance structures had greater agency problems, CEOs at firms with greater agency problems received greater compensation, and that firms with greater agency problems performed worse (Core, et al., 1999). This contradicts other research, and additionally agency theory because CEO's of firms who perform worse got a higher compensation.

Brick, Palmon, and Wald (2005) modelled CEO and director compensation using firm characteristics, CEO characteristics, and governance variables over a more recent time period, namely from 1992 till 2001. They used over 1100 firms and found evidence that excess compensation (both director and CEO) was associated with firm underperformance (Brick, Palmon, & Wald, 2005). They also found a negative relation between director compensation and firm performance. They concluded that this was most likely due to cronyism.

Hastings, Graham, Richie, and Evers (2010) considered the relationship between executive compensation and firm performance in the financial services sector from 2000 through 2008. Their results indicated that the selected performance measures (company size, firm employment, market to book ratio, and return on equity) were significantly related to one or more forms of executive compensation. Another interesting finding was that the first merger or acquisition by the examined firms was associated with significant positive impact on executive compensation whereas the second merger or acquisition was associated with a significant negative impact on executive compensation (Hastings, Graham, Richie, & Evers, 2010).

Ozkan (2011) examined the link between CEO pay and firm performance using a panel data set of 390 UK firms from the FTSE all share index for the period 1999-2005. This paper used the same components of CEO pay as Murphy (1984) (salary, bonus, stock options, and long term incentive plans). The results showed that, compared to the previous findings in the US, pay-performance elasticity seemed to be lower for UK CEO's. Also the median share holdings and stock based pay-performance sensitivity are lower for UK CEO's. This paper showed using a panel data study, that governance reports such as the Greenbury Report (1995) that proposed CEO compensation to be more closely linked to performance had not been totally effective (Ozkan, 2011).

3.5 Summary Chapter 3

This chapter gave insight in the two most common theories surrounding executive compensation. First, agency theory as proposed by Ross (1973), which aimed to solve the incentive difference between shareholders and directors. This can only be achieved if the best action in the shareholders interest is also the action for the CEO that maximizes his own utility. The second theory that was discussed was tournament theory as proposed by Lazear and Rosen (1981). Tournament theory suggests a model with two participant competing for a price (e.g. the job of CEO). To increase the effort or to create the right incentive for the CEO, according to tournament theory, the shareholder tries to create an optimal spread between the winning and losing parties. Additionally, we have seen that most executive compensation consists of four components, namely base salary, annual bonus, stock options, and long term incentive plans. The end of this chapter gave insight in the implementation of these theories and the use of these salary components in the empirical literature over the past thirty years. Different methodologies and measures were used in order to find a relation between executive compensation and firm performance, which consequently lead to different outcomes. However, overall, it cannot be denied that there is indeed a link between executive compensation and firm performance.

CHAPTER 4, Data and Methodology

This chapter will provide insight in the data that is used for completing this study. The source of the used databases will be discussed. Furthermore, an explanation of the used variables will be given combined with the summary statistics of the underlying data. In addition, the construction of new variables will be illustrated. After reviewing the data the methodology will be discussed. This will start with the formatting and processing of the data followed by some specification tests. After the data is in the right format there will be an elaborated on the statistical methodology.

4.1 Data

The data regarding executive compensation is retrieved via the website of Wharton Research Data Services from the University of Pennsylvania (WRDS, 2016). The database *Compustat Executive Compensation - Annual Compensation* was used to retrieve all the data regarding the compensation of all executives from 2007-2013. The database *Compustat Monthly Updates - Fundamentals Annual* was used to retrieve all the firm level accounting data from the same time span. The CEO's were filtered from the sample, e.g. excluding all other board members. CEO's were included in the sample if the tenure within the time period was at least 5 years (Murphy K. J., 1984). Due to the minimum tenure of 5 years there is a fine distribution of the observation around the implementation of the Dodd-Frank act (July 2010). This can be seen in table 1 which shows the observations for each year within the sample. Table 2 enforces this distribution and as can be seen there are 1146 observations before the Dodd-Frank act (2007-2009) and 1525 after the Dodd-Frank act (2010-2013).

Table 1: Frequency table of the observations per year.

	N	percentage	cumulative percentage
2007	334	12.50	12.50
2008	393	14.71	27.22
2009	419	15.69	42.91
2010	418	15.65	58.55
2011	419	15.69	74.24
2012	364	13.63	87.87
2013	324	12.13	100.00
Total	2671	100.00	

Table 2: Frequency table of the observations before and after the implementation of the Dodd-Frank Act.

	N	percentage	cumulative percentage
Before the Dodd-Frank Act	1146	42.91	42.91
After the Dodd-Frank Act	1525	57.09	100.00
Total	2671	100.00	

Several variables were created, such as Return on Assets and leverage (an extensive explanation of the calculations and methodology will be discussed). If the coverage of the data was not sufficient to create these variables the firm was dropped from the sample. Finally, this led to a sample size of 2671

observations of a total of 420 different CEO's and companies. Table 3 shows the descriptive statistics of the variables. The correlation matrix as well as a split of the descriptive statistics from before and after the implementation of the Dodd-Frank Act are included in Appendix A.

Table 3: Descriptive statistics of all variables as in 1000 of dollars.

	Count	Mean	Std. Dev.	Min	p10	Median	p90	Max
Salary	2671	1083.234	465.828	0.001	625.000	1000.000	1550.000	3000.000
Bonus	2671	304.791	973.199	0.000	0.000	0.000	800.000	5460.000
Value of Option Award	2671	2197.928	2832.787	0.000	0.000	1499.996	5189.560	16329.994
Restricted Stock Holdings	2669	6362.968	9650.646	0.000	0.000	3344.187	15784.514	59697.545
ROA	2628	0.054	0.074	-0.221	0.000	0.050	0.143	0.266
Leverage	2628	0.178	0.173	0.000	0.000	0.157	0.416	0.722
Age	2671	56.098	6.130	37.000	48.000	56.000	63.000	83.000
Market Value	2630	19778.408	34446.224	0.000	0.000	8779.908	42340.700	209728.480
Net Income/Loss	2630	984.838	2209.535	-2796.000	0.000	384.732	2502.800	14065.000
Total Compensation	2671	9944.156	10420.951	0.001	1595.543	6894.305	20091.535	77527.539
Incentive Pay	2671	0.758	0.257	0.000	0.425	0.849	0.948	1.000
Equity Share	2669	0.458	0.345	0.000	0.000	0.528	0.885	1.000
Restricted Share	2671	0.269	0.272	0.000	0.000	0.194	0.705	1.000
(ln) Market Value	2630	8.337	3.030	0.000	0.000	9.080	10.654	12.254
(ln) Net Income	2630	8.073	0.913	0.000	7.936	8.065	8.575	9.733
(ln) Age	2671	4.021	0.109	3.611	3.871	4.025	4.143	4.419
Dummy Dodd-Frank Act	2671	0.571	0.495	0.000	0.000	1.000	1.000	1.000
<i>N</i>	2671							

4.2 Variable Definitions

This paragraph will give the definitions of the variables used in the empirical analysis of this paper.

4.2.1 Accounting measures

Market Value

Market value for single issue companies is the total of common shares outstanding multiplied by the month-end price for the corresponding period. Consolidated company-level market value is the sum of all issue-level market values (WRDS, 2016).

Net income (loss)

The variable Net income represents income or loss of the fiscal period reported by a company after subtracting expenses and losses from all revenues and gains (WRDS, 2016).

Leverage

The variable leverage is created by dividing two variables retrieved from WRDS (WRDS, 2016). The *total debt including current* which is all the debt from the firm, including the short term debt and the *total assets*, which is the balance total of assets from the firm. To create the variable leverage the following formula is used:

$$Leverage = \frac{Total\ debt}{Total\ assets} \quad (2)$$

ROA

Return on assets (ROA) is an indicator of the profitability of a company relative to its total assets. ROA is calculated by dividing a company's annual Net Income by its total assets (WRDS, 2016).

The formula for return on assets is:

$$ROA = \frac{Net\ income}{Total\ assets} \quad (3)$$

4.2.2 Compensation measures

Age

The variable age indicates the age of the executive in the years from 2007-2010.

Salary

The dollar value of the base salary earned by the named executive officer during the fiscal year (WRDS, 2016).

Bonus

The dollar value of a bonus earned by the named executive officer during the fiscal year (WRDS, 2016).

Value of Option Awards

The value of option awards is defined as the total US dollar value of the CEO's outstanding option awards valued by the constraints of FAS 123R (WRDS, 2016). FAS 123R recommends using the fair market value of options granted using the Black-Scholes formula (Black & Scholes, 1973).

Restricted Stock Holdings

This variable consists of the total value of restricted stock holding held by the CEO (WRDS, 2016).

Total compensation

The variable total compensation consists of the total compensation for the individual year. This is calculated by the sum of Salary, Bonus, Total Value of Restricted Stock Granted, and Total Value of Stock Options Granted (based on FAS 123R).

Incentive pay ratio

The incentive pay ratio is defined as the part of the CEO's payment which is used to create the right incentives for the CEO divided by the total compensation. In formula form the incentive pay ratio is defined as:

$$\text{Incentive pay ratio} = \frac{(\text{Bonus} + \text{Restricted Stock Holdings} + \text{Value of option awards})}{\text{Total compensation}} \quad (4)$$

Equity share

The equity share is the part of executive compensation which is related to shares.

$$\text{Equity share} = \frac{(\text{Total Compensation} - \text{Salary} - \text{Bonus})}{\text{Total compensation}} \quad (5)$$

Restricted share

The restricted share is the part of executive compensation related only to restricted stock.

$$\text{Restricted share} = \frac{\text{Restricted stock holdings}}{\text{Total compensation}} \quad (6)$$

4.3 Methodology

To see the effects of the Dodd-Frank Act on executive compensation a panel study similar to Ozkan (2011) is performed. The CEO's were followed from 2007 until 2013. For each year, the annual compensation (Salary, Bonus, Value of option awards, and Restricted stock holdings) and the accounting data of the matching company is monitored. By constructing a variable combining the Global Company Key⁴ and the year, the database *Compustat Executive Compensation - Annual Compensation* can be matched to the database *Compustat Monthly Updates - Fundamentals Annual*. This results in a final panel database including both executive compensation data on CEO level and accounting data on firm level.

First the data obtained from the databases *Compustat Executive Compensation - Annual Compensation*

⁴ The Global Company Key or GVKEY is a unique six-digit number key assigned to each company (issue, currency, index) in the Capital IQ Compustat database. It is a company (issue, currency, index) identifier similar to a TICKER symbol. It represents the primary key for a company that is an index constituent (WRDS, 2016).

and *Compustat Monthly Updates - Fundamentals Annual* is formatted. The original values of the variables are winsorized between 1 and 99% to exclude outliers. After the winsorizing the data is used to create the ratio variables, ROA, Leverage, the incentive pay ratio, the equity share, and the restricted share (using formulas 2-6). The equity share ratio is already used earlier, as a measure of incentive pay. Adams (2011) used this measure in combination with governance scores to indicate a relation between governance and the financial crisis (Adams, 2011). This study elaborates on this variable to see to what extent the overall incentive pay ratio and the restricted pay ratio have an effect on firm performance. Because the accounting variables are not normally distributed, the natural logarithm (\ln) is taken. This is done for the variables Age and Market value. The variable Net income/loss can also be negative which makes it impossible to take a natural logarithm. Therefore, the minimum value (-2796, see table 3: descriptive statistics) of this variable is subtracted from the original value and consequently 1 is added. This makes every value positive which makes taking the natural logarithm possible without changing the scale of the variable. Hereafter a dummy for the Dodd-Frank act is created which takes a value of 0 for pre Dodd-Frank act (<2009) and 1 for post Dodd-Frank act (\geq 2010). Also a dummy for the financial crisis is created. The dummy takes a value of 1 during the crisis (2007 and 2008) and a value of 0 after the crisis (\geq 2010). The timespan of 2007-2008 as dummy for crisis are based on the paper of Erkens, Hung, and Matos (2012). They used the peak years (2007-2008) of the crisis to examine the corporate governance determinants of financial firms performance (Erkens, Hung, & Matos, 2012).

A Heteroscedasticity test and a Shapiro-Wilk Normality test have been performed. The results indicate that there is heteroscedasticity in the data and normality is rejected. However, based on the histogram normality can be assumed (Specification tests, histograms, and QQ plots can be found in Appendix B). To correct for the heteroscedasticity and for autocorrelation the Robust function in Stata is used. To check whether to use firm fixed effects or random effects a Hausman specification test is performed. The null hypothesis⁵ is rejected which indicates that fixed effects should be used and not random effects.

Due to the implementation of the Dodd-Frank act and the renewed legislation the criteria surrounding executive compensation have changed. First a test is done as to whether the Dodd-Frank act changes the executive compensation to such an extent that it influences firm performance. After diagnosing that there is indeed a difference between pre- and post-Dodd-Frank act, a new question arises. Is the implementation of the Dodd-Frank act a positive event? E.g. does the Dodd-Frank act have a positive effect on firm value (through better and more efficient executive compensation)? These questions consequently led to the following hypotheses:

⁵ The null hypothesis of the Hausman test is that both random and fixed effects can be used.

Hypothesis 1:

The effect of incentive pay on firm performance differs between pre- and post-Dodd-Frank act.

Because base salary does not change based on the performance of the CEO, the incentive pay ratio is constructed (as calculated by formula 4). The incentive pay is dependent on the actions of the CEO. Due to this, it is interesting to see whether the Dodd-Frank act increases the efficiency of this variable payment.

Hypothesis 2:

The introduction of the Dodd-Frank act leads to an increase in firm value.

To see whether the implementation of the Dodd-Frank act is a positive event, the test whether the Dodd-Frank act has a positive effect on firm performance has been performed.

Hypothesis 3:

The implementation of the Dodd-Frank act has a positive influence on the effect of executive compensation on firm performance.

This hypothesis aims to analyze to what extent the new regulations, imposed by the Dodd-Frank act, influences the effect that executive compensation has on firm performance.

First a mean comparison paired T-test is performed. The T-test compares the mean of ROA before the Dodd-Frank Act and the mean of ROA after the Dodd-Frank Act and checks whether they differ significantly. This way one can see whether there is a difference in firm performance between both time periods.

To test hypothesis 1 a split Fixed Effects Ordinary Least Squares regression (FE-OLS) is done. First the effect of the Incentive pay ratio on ROA is tested. Leverage, (ln) Market Value, (ln) Net Income, and (ln)age are used as control variables. The split is made on the year the Dodd-Frank act was implemented. So the first regression contains data from 2007-2009 and the second regression contains the data of 2010-2013. The estimated FE-OLS regression is shown in formula 7.

$$ROA_{it} = \alpha_i + \beta_i * Incentive\ Pay\ Ratio_{it} + \eta_i + \gamma_i * ln(control\ variables_{it}) + \varepsilon_t \quad (7)$$

Where ROA_{it} is used as a measure for firm performance, α_i is a constant, $\beta_i * Incentive\ Pay\ Ratio_{it}$ provides the FE-OLS estimate of the value of the Incentive pay ratio, η_i are firm fixed effects, and γ_i gives the FE-OLS estimate of the control variables. To check whether these results are robust to the Equity share and the Restricted stock share of the Incentive pay ratio FE-OLS regression 8 and 9 are estimated.

$$ROA_{it} = \alpha_i + \beta_i * Equity\ Share_{it} + \eta_i + \gamma_i * \ln(control\ variables_{it}) + \varepsilon_t \quad (8)$$

Where ROA_{it} is used as a measure for firm performance, α_i is a constant, $\beta_i * Equity\ Share_{it}$ provides the FE-OLS estimate of the value of the Equity share of variable compensation, η_i are firm fixed effects, and γ_i gives the FE-OLS estimate of the control variables.

$$ROA_{it} = \alpha_i + \beta_i * Restricted\ Share_{it} + \eta_i + \gamma_i * \ln(control\ variables_{it}) + \varepsilon_t \quad (9)$$

Where ROA_{it} is used as a measure for firm performance, α_i is a constant, $\beta_i * Restricted\ Share_{it}$ provides the FE-OLS estimate of the value of the Restricted share of variable compensation, η_i are firm fixed effects, and γ_i gives the FE-OLS estimate of the control variables.

To test hypothesis 2 a FE-OLS regression over the entire sample is done. This regression includes a dummy which takes the value 0 before the Dodd-Frank act (2007-2009) and 1 after the Dodd-Frank act (2010-2013).

$$ROA_{it} = \alpha_i + \beta_i * Incentive\ Pay\ Ratio_{it} + \beta_i * Dummy + \eta_i + \gamma_i * \ln(control\ variables_{it}) + \varepsilon_t \quad (10)$$

Where ROA_{it} is used as a measure for firm performance, α_i is a constant, $\beta_i * Incentive\ Pay\ Ratio_{it}$ provides the FE-OLS estimate of the value of the Incentive pay ratio, $\beta_i * Dummy$ provides the FE-OLS estimate of the value of the implementation of the Dodd-Frank act, η_i are firm fixed effects, and γ_i gives the FE-OLS estimate of the control variables. This regression is extended for robustness to the Equity- and Restricted share with a similar methodology as formula 8 and 9.

In order to test hypothesis 3, the interaction effect of the Dodd-Frank act dummy and the Incentive Pay ratio is added to the regression.

$$ROA_{it} = \alpha_i + \beta_i * Incentive\ Pay\ Ratio_{it} + \beta_i * Dummy + \beta_i * Incentive\ Pay\ Ratio_{it} * Dummy + \eta_i + \gamma_i * \ln(control\ variables_{it}) + \varepsilon_t \quad (11)$$

Where ROA_{it} is used as a measure for firm performance, α_i is a constant, $\beta_i * Incentive\ Pay\ Ratio_{it}$ provides the FE-OLS estimate of the value of the Incentive pay ratio, $\beta_i * Dummy$ provides the FE-OLS estimate of the value of the implementation of the Dodd-Frank act, $\beta_i * Incentive\ Pay\ Ratio_{it} * Dummy$ indicates the interaction effect of the Dodd-Frank act dummy and the Incentive Pay Ratio, η_i are firm fixed effects, and γ_i gives the FE-OLS estimate of the control variables. This regression is

extended for robustness to the Equity- and Restricted share, replacing the Incentive Pay Ratio with the equity- and restricted share, similar to formula 8 and 9.

4.4 Summary Chapter 4

This chapter provided insight in the data that is used in this paper. The sources of the data are carefully described and summary statistics of all variables are provided. Every variable is explained using either the database source or a formula. Thereafter the process of the study is described. Starting with the data collection, following up with data processing, and finally the data formatting. Due to correcting for outliers, controlling for heteroscedasticity and non-normality, and adding fixed effects, a more precise estimation can be made. First, the mean comparison T-test will be performed in order to see whether firm performance, as measured by ROA, differs between pre- and post- Dodd Frank Act. Second, the split regression will indicate the difference in the effect of the incentive pay ratio pre- and post- Dodd Frank Act. Ultimately, the total database is used, a FE-OLS regression will be performed in order to see whether the implementation of the Dodd-Frank act leads to an increase in firm value. Furthermore, the effect on how the Dodd-Frank act changes the effect of executive compensation on firm performance will be captured by the interaction effect between the Dodd-Frank act dummy and the corresponding executive pay measure.

CHAPTER 5, Results

The first results of the mean comparison paired T-test are presented in table 4. This test is used to compare the mean of ROA before the Dodd-Frank act to the mean of ROA after the implementation of the Dodd-Frank Act. The mean of ROA before and after the implementation of the Dodd-Frank Act can be found in the descriptive statistics split between the two time periods. As discussed in section 4.1 these descriptive statistics can be found in Appendix A and are 0.050 and 0.057 respectively.

Table 4: Mean comparison paired T-test on the variable ROA. This test compares the mean difference between ROA and the Dodd-Frank Act dummy. The comparison between the mean of ROA from 2007-2009 to the mean of ROA from 2010-2013 can be made.

Variable	Observations	Mean	Std. Err.	Std. Dev.	[95% Confidence interval]	
ROA	2628	0.0538578	0.0014489	0.0742782	0.0510166	0.0566989
Dodd Frank Act	2628	0.564688	0.0096733	0.4958922	0.5457199	0.583656
Diff	2628	-0.5108302	0.009715	0.4980298	-0.52988	-0.4917804

Mean(diff) = Mean(ROA-Dodd Frank Act)
H0: Mean(diff) = 0

t = -52.5815
Degrees of freedom 2627

1: Ha: Mean(diff)≠0 Pr(T > t) = 0.000	2: Ha: Mean(diff)<0 Pr(T<t) = 0.000	3: Ha: Mean(diff)>0 Pr(T > t) = 1.000
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At the bottom of table 4 three alternative hypotheses are tested. The first one tests whether the mean difference (as defined in the middle of table 4) of ROA differs significantly from zero. As the P-value of 0.000 indicates, the null hypothesis of a mean equal to zero is rejected. Consequently, the alternative hypothesis is accepted which indicates that the mean of ROA is significantly different from zero. The second alternative hypothesis that is tested is whether the mean difference is smaller than zero. Also here a P-value of 0.000 indicates that the null hypothesis is rejected. The alternative hypothesis of a mean difference smaller than zero is accepted. This indicates that the mean of ROA before the implementation of the Dodd-Frank Act is significantly smaller than the mean of ROA after the implementation of the Dodd-Frank Act. The third and final alternative hypothesis tests whether the mean difference is larger than zero. With a P-value of 1.000 it is clear that the null hypothesis is not rejected and the mean difference is not significantly higher than zero.

The results of the split regression are shown in table 5 and 6. Table 5 indicates the effect of the incentive pay ratio on ROA for the period 2007-2009. Each control variable was added separately to see whether they are significant and whether they stay significant after adding all the variables. The effect of the incentive pay ratio purely on ROA is equal to -0.005, as seen in regression 5. This indicates that the higher the incentive pay ratio, the lower ROA e.g. firm performance. This

counterintuitive result is unexpected. One expects that the higher the ratio of incentive pay the more motivated the CEO is which in turn results in a higher return on assets. After adding the control variables the effect of the incentive pay ratio becomes 0.000, regression 6. However, both coefficients are insignificant. These results are robust to both the equity- and the restricted share of the executives compensation. For the equity share the coefficient takes a value of -0.005 without controls and -0.002 with the controls included, regressions 7 and 8 respectively. The restricted share has a coefficient of -0.003 and 0.000 as can be seen in regression 9 and 10 respectively. Also in these regressions none of the coefficients are significant.

The results of the second half of the split regression, from 2010-2013, are presented in table 6. In addition, for this regression, each control variable was added separately in order to see whether they are significant and whether they stay significant after adding all the variables. The effect of the incentive pay ratio on ROA alone gives a coefficient of 0.026, regression 5. This positive result is more in line with the general expectation of the effect of incentive pay on firm performance. Also the coefficient is significant to the 1 percent level. Furthermore we see that after adding the control variables the coefficient decreases until 0.019 in regression 6 but remains significant at the 5 percent level. The results are comparable when the equity share of the incentive pay ratio is used. The coefficient of the equity share alone is also significant at the 1 percent level and takes a value of 0.024 before adding the control variables. After adding the control variables the coefficient also decreases slightly, to 0.019, and remains significant at the 5 percent level, regression 7 and 8. However, the option share remains negative and insignificant both with and without control variables as can be seen in regression 9 and 10.

These results show that the effect of the incentive pay ratio changes from before the Dodd-Frank act to after the Dodd-Frank act. If we compare regression 6 from table 5 and 6 one can see the change of an insignificant coefficient of 0.000 to a significant coefficient of 0.019 for the incentive pay ratio. This indicates that for a 1% increase in the incentive pay ratio, ROA will increase by 0.019%. The same phenomena can be observed with regard to the Equity share of the incentive pay ratio. This coefficient even changes from an insignificant negative sign of -0.002 to a significant positive sign of 0.016. This can be observed by the comparison of regression 8 over table 5 and 6. The restricted share is disregarded as the coefficients in both tables are insignificant.

Table 5: Split regression before the implementation of the Dodd-Frank act e.g. 2007-2009. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Leverage	-0.309*** (0.087)					-0.193** (0.085)		-0.192** (0.085)		-0.193** (0.085)
(ln) Market Value		0.005*** (0.002)				0.003** (0.001)		0.003** (0.001)		0.003** (0.001)
(ln) Net Income			0.030*** (0.003)			0.029*** (0.003)		0.029*** (0.003)		0.029*** (0.003)
(ln) Age				-0.537*** (0.110)		-0.429*** (0.110)		-0.428*** (0.106)		-0.429*** (0.109)
Incentive Pay Ratio					-0.005 (0.017)	0.000 (0.016)				
Equity Share							-0.005 (0.013)	-0.002 (0.010)		
Restricted Share									-0.003 (0.014)	0.000 (0.009)
Constant	0.102*** (0.015)	0.009 (0.013)	-0.192*** (0.021)	2.195*** (0.438)	0.054*** (0.013)	1.544*** (0.434)	0.052*** (0.006)	1.542*** (0.417)	0.051*** (0.004)	1.543*** (0.426)
Observations	1,144	1,144	1,144	1,144	1,144	1,144	1,142	1,142	1,144	1,144
R-squared	0.080	0.013	0.342	0.033	0.000	0.406	0.000	0.406	0.000	0.406
ID number for each executive	420	420	420	420	420	420	419	419	420	420
adj. R-squared	0.0794	0.0117	0.3418	0.0323	-0.0007	0.4030	-0.0006	0.4031	-0.0008	0.4030
F-statistic	12.5327	10.3441	129.9757	23.9893	0.0837	36.9231	0.1209	36.7981	0.0464	36.8242
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 6: Split regression after the implementation of the Dodd-Frank act e.g. 2010-2013. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Leverage	-0.207*** (0.040)					-0.184*** (0.039)		-0.182*** (0.038)		-0.185*** (0.039)
(ln) Market Value		0.001** (0.000)				0.001*** (0.000)		0.001*** (0.000)		0.001*** (0.000)
(ln) Net Income			0.037*** (0.013)			0.035*** (0.012)		0.035*** (0.012)		0.035*** (0.012)
(ln) Age				-0.063 (0.066)		0.011 (0.067)		-0.001 (0.067)		-0.004 (0.066)
Incentive Pay Ratio					0.026*** (0.010)	0.019** (0.009)				
Equity Share							0.024*** (0.009)	0.016** (0.007)		
Restricted Share									-0.015 (0.010)	-0.011 (0.010)
Constant	0.095*** (0.007)	0.047*** (0.004)	-0.243** (0.108)	0.310 (0.268)	0.037*** (0.007)	-0.261 (0.292)	0.045*** (0.004)	-0.205 (0.293)	0.060*** (0.002)	-0.187 (0.290)
Observations	1,484	1,484	1,484	1,484	1,484	1,484	1,484	1,484	1,484	1,484
R-squared	0.067	0.003	0.137	0.001	0.009	0.200	0.013	0.201	0.003	0.197
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0666	0.0023	0.1369	0.0007	0.0086	0.1970	0.0122	0.1980	0.0027	0.1942
F-statistic	27.1615	6.0889	7.7284	0.8912	7.4449	12.0949	7.4714	11.9594	2.1353	11.6402
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 7 shows the regression results of the entire data sample from 2007-2013. A dummy is added which takes a value of 0 for the period before the Dodd-Frank act e.g. 2007-2009 and a value of 1 after the implementation of the Dodd-Frank act e.g. 2010-2013. Also a dummy for the effects of the financial crisis is added. This dummy takes a value of 1 during the peak year of the crisis (2007-2008) and a value of 0 for the period after the peak of the crisis (2009-2013). Both dummies are added to the regression while each control variable is being added separately.

The Dodd-Frank act dummy is positive and significant at the 1 percent level for each model that is estimated (1-10). Regression 5 shows the effect of the incentive pay ratio including the dummies for both the Dodd-Frank act and the financial crisis. The coefficient of the incentive pay ratio (0.024) is positive and significant at the 1 percent level. Regression 6 shows the full regression including the incentive pay ratio and all the control variables. The coefficient of the incentive pay ratio decreases slightly to 0.019 which is significant at the 5 percent level. The coefficient of the dummy takes a significant positive value of 0.015 significant at the 1 percent level. These results are similar for the equity share as presented in regression 8 and 9. Regression 8 shows the same coefficient and significance level as regression 6 for the Dodd-Frank dummy. After the control variables were added, the coefficient of the equity share takes a positive value of 0.013 significant at the 5 percent level. The restricted share remains insignificant also when the entire sample is used, with and without control variables (regression 9-10).

Table 8 also includes the interaction effect between the Dodd-Frank act dummy and the corresponding measure for variable executive compensation. When the interaction effect is included the coefficient of the Dodd-Frank act dummy and the incentive pay ratio change. When regression 6 from table 7 and 8 are compared, an increase of 0.002 is observed for both the Dodd-Frank act dummy as for the incentive pay ratio. Interaction dummy 1, which represents the interaction between the incentive pay ratio and the Dodd-Frank act dummy, has a negative sign. This indicates that after the implementation of the Dodd-Frank act the effect of the incentive pay ratio decreases. However, the coefficient is not significant. Next to that, the total effect, the coefficient of the incentive pay ratio plus the coefficient of the interaction term, remains positive. A similar pattern is observed for the equity share. Though the restricted share remains insignificant the interaction term between the restricted share and the Dodd-Frank act is positive.

These results as presented in table 7 are in line with the expectations. Using the underlying theories, the incentive pay ratio should have a positive effect on firm performance. The Dodd-Frank act dummy also has a positive effect on ROA. This is in line with expectations since regulators want to improve the transparency and efficiency of executive compensation without having a negative effect on the performance of the company. An outstanding result is the positive and significant coefficient of the

dummy for financial crisis. This result indicated that, firm performance is higher during the crisis than firm performance after the crisis, which is counterintuitive. The results of table 8 are not in line with expectations. The interaction effect was expected to be positive, due to the Dodd-Frank act one compensation should become more efficient indicating an increase in the effect of incentive pay on firm performance.

Table 7: Regression results of the entire sample from 2007-2013 including fixed effects. The Dodd-Frank Act dummy takes a value of 0 for 2007-2009 and a value of 1 for the period 2010-2013. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act	0.019*** (0.003)	0.015*** (0.003)	0.013*** (0.003)	0.023*** (0.004)	0.016*** (0.003)	0.015*** (0.003)	0.016*** (0.003)	0.015*** (0.003)	0.016*** (0.003)	0.015*** (0.003)
Leverage	-0.206*** (0.035)					-0.162*** (0.032)		-0.163*** (0.032)		-0.162*** (0.032)
Dummy Crisis	0.010*** (0.003)	0.012*** (0.003)	0.014*** (0.003)	0.007* (0.004)	0.012*** (0.003)	0.013*** (0.003)	0.012*** (0.003)	0.013*** (0.003)	0.012*** (0.003)	0.013*** (0.003)
(ln) Market Value		0.002*** (0.001)				0.001*** (0.000)		0.001*** (0.000)		0.001*** (0.000)
(ln) Net Income			0.032*** (0.003)			0.031*** (0.003)		0.031*** (0.003)		0.031*** (0.003)
(ln) Age				-0.152** (0.069)		-0.020 (0.065)		-0.031 (0.065)		-0.035 (0.065)
Incentive Pay Ratio					0.024*** (0.009)	0.019** (0.008)				
Equity Share							0.018*** (0.007)	0.013** (0.005)		
Restricted Share									-0.007 (0.008)	-0.007 (0.006)
Constant	0.077*** (0.007)	0.022*** (0.006)	-0.219*** (0.023)	0.652** (0.277)	0.023*** (0.007)	-0.126 (0.261)	0.033*** (0.004)	-0.069 (0.262)	0.043*** (0.003)	-0.051 (0.260)
Observations	2,628	2,628	2,628	2,628	2,628	2,628	2,626	2,626	2,628	2,628
R-squared	0.074	0.024	0.275	0.020	0.023	0.316	0.023	0.316	0.018	0.313
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0726	0.0230	0.2740	0.0190	0.0221	0.3143	0.0223	0.3139	0.0169	0.3113
F-statistic	25.2106	14.0989	58.3974	14.6595	14.3902	33.8699	12.6792	33.4987	11.4428	33.9413
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 8: Regression results of the entire sample from 2007-2013 including fixed effects. The Dodd-Frank Act dummy takes a value of 0 for 2007-2009 and a value of 1 for the period 2010-2013. The interaction dummies indicates the interaction effect between the Dodd-Frank act dummy and variable compensation measure, which are the Incentive Pay Ratio (1), the Equity Share (2), and the Restricted share (3) respectively. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act	0.019*** (0.003)	0.015*** (0.003)	0.013*** (0.003)	0.023*** (0.004)	0.015* (0.008)	0.017** (0.007)	0.016*** (0.004)	0.016*** (0.004)	0.018*** (0.004)	0.015*** (0.004)
Leverage	-0.206*** (0.035)					-0.162*** (0.032)		-0.163*** (0.032)		-0.162*** (0.032)
Dummy Crisis	0.010*** (0.003)	0.012*** (0.003)	0.014*** (0.003)	0.007* (0.004)	0.012*** (0.003)	0.013*** (0.003)	0.012*** (0.003)	0.013*** (0.003)	0.011*** (0.003)	0.012*** (0.003)
(ln) Market Value		0.002*** (0.001)				0.001*** (0.000)		0.001*** (0.000)		0.001*** (0.000)
(ln) Net Income			0.032*** (0.003)			0.031*** (0.003)		0.031*** (0.003)		0.031*** (0.003)
(ln) Age				-0.152** (0.069)		-0.019 (0.065)		-0.031 (0.066)		-0.035 (0.065)
Incentive Pay Ratio					0.023** (0.011)	0.021** (0.009)				
Interaction dummy 1					0.002 (0.009)	-0.003 (0.008)				
Equity Share							0.018** (0.008)	0.015** (0.006)		
Interaction dummy 2							0.000 (0.007)	-0.003 (0.007)		
Restricted Share									-0.004 (0.009)	-0.006 (0.007)
Interaction dummy 3									-0.006 (0.009)	-0.002 (0.008)
Constant	0.077*** (0.007)	0.022*** (0.006)	-0.219*** (0.023)	0.652** (0.277)	0.024*** (0.008)	-0.129 (0.261)	0.033*** (0.004)	-0.074 (0.263)	0.043*** (0.003)	-0.050 (0.261)
Observations	2,628	2,628	2,628	2,628	2,628	2,628	2,626	2,626	2,628	2,628
R-squared	0.074	0.024	0.275	0.020	0.023	0.316	0.023	0.316	0.018	0.313
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0726	0.0230	0.2740	0.0190	0.0217	0.3141	0.0219	0.3137	0.0168	0.3111
F-statistic	25.2106	14.0989	58.3974	14.6595	10.8230	29.5970	9.5093	29.3172	8.6935	29.7195
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Due to the fact that the Dodd-Frank act was implemented in July 2010 one can argue that the dummy should take a value of 0 from 2007-2010 and a value of 1 from 2011-2013. The same regressions as in table 7 are estimated using the changed timespan of the Dodd-Frank act dummy (Dummy Dodd-Frank act 2011). The results are presented in table 9.

Regression 5 shows the effect of the incentive pay ratio including the dummies for both the Dodd-Frank act and the financial crisis. The coefficient of the incentive pay ratio (0.026) is positive and significant at the 1 percent level. Also the renewed dummy for the Dodd-Frank act remains positive and significant although it decreases in size (0.016 to 0.006, regression 5 table 7 compared to regression 5 table 9). The dummy for the financial crisis including the new Dodd-Frank act dummy loses its significance. What is interesting to see is that when the control variables are added, in regression 6, the Dodd-Frank act dummy is no longer significant. These results are similar for regression 8 and 10 which show the full model using the equity share and the restricted share.

Furthermore, the results when the interaction effects are added are shown in table 10. These results are similar as the results shown in table 8. Both the coefficient of the Dodd-Frank act dummy and the incentive pay ratio increase, as can be seen by a comparison between regression 6 of table 9 and 10. The interaction dummies 1 and 2 have a negative sign. This indicates that after the implementation of the Dodd-Frank act the effect of the incentive pay ratio and the equity share decreases. However, the coefficients are not significant. Also here the restricted share remains insignificant, however the interaction term between the restricted share and the Dodd-Frank act is positive.

Another view on incentive pay could be that the incentive pay of year x has an effect on the ROA on year $x+1$. In other words there could be a relation between ROA in year x and the incentive pay ratio of year $x-1$. Similar models are estimated as in table 7 and 9 but instead of the incentive pay ratio, equity share, and the restricted share, the 1-year lagged variables are used. The outcome of these models can be found in Appendix C. The results indicate no significant coefficients when the Dodd-Frank act dummy split on 2010 is used. When the Dodd-Frank act dummy is split on 2011 the lagged equity share is positive and significant at the 10 percent level and the lagged restricted share is negative and significant at the 10 percent level. The effects of the interaction terms do not change when using the lagged variables.

As shown in table 9 the earlier results were not robust when the Dodd-Frank act dummy was changed to start from 2011. However the coefficients of the incentive pay ratio and the equity share are still positive and significant which is in line with research of Murphey (1986). Additionally, the results were not robust when the lagged incentive pay ratio was used. Most coefficients lost their significance and even if they were significant it was only at the 10 percent level.

Table 9: Regression results of the entire sample from 2007-2013 including fixed effects. The Dodd-Frank Act dummy takes a value of 0 for 2007-2010 and a value of 1 for the period 2011-2013. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act 2011	0.010*** (0.002)	0.005** (0.002)	0.004** (0.002)	0.005* (0.003)	0.006*** (0.002)	0.001 (0.003)	0.006** (0.002)	0.001 (0.003)	0.006*** (0.002)	0.001 (0.003)
Leverage	-0.205*** (0.036)					-0.164*** (0.031)		-0.165*** (0.031)		-0.165*** (0.032)
Dummy Crisis	0.001 (0.003)	0.003 (0.003)	0.007*** (0.003)	0.003 (0.004)	0.002 (0.003)	0.011*** (0.003)	0.003 (0.003)	0.011*** (0.003)	0.002 (0.003)	0.011*** (0.003)
(ln) Market Value		0.003*** (0.001)				0.002*** (0.000)		0.002*** (0.000)		0.002*** (0.000)
(ln) Net Income			0.033*** (0.003)			0.031*** (0.003)		0.031*** (0.003)		0.031*** (0.003)
(ln) Age				0.022 (0.079)		0.136** (0.069)		0.121* (0.068)		0.121* (0.068)
Incentive Pay Ratio					0.026*** (0.009)	0.021*** (0.008)				
Equity Share							0.020*** (0.007)	0.014*** (0.005)		
Restricted Share									-0.009 (0.008)	-0.008 (0.006)
Constant	0.086*** (0.006)	0.028*** (0.006)	-0.214*** (0.023)	-0.039 (0.317)	0.031*** (0.007)	-0.750*** (0.276)	0.041*** (0.004)	-0.680** (0.273)	0.053*** (0.002)	-0.673** (0.272)
Observations	2,628	2,628	2,628	2,628	2,628	2,628	2,626	2,626	2,628	2,628
R-squared	0.059	0.013	0.266	0.004	0.010	0.309	0.011	0.309	0.005	0.306
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0581	0.0115	0.2656	0.0026	0.0090	0.3075	0.0101	0.3071	0.0036	0.3041
F-statistic	13.6367	7.8655	46.9982	3.0819	6.1841	28.1201	5.1018	27.1075	2.8337	26.8397
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 10: Regression results of the entire sample from 2007-2013 including fixed effects. The Dodd-Frank Act dummy takes a value of 0 for 2007-2010 and a value of 1 for the period 2011-2013. The interaction dummies indicates the interaction effect between the Dodd-Frank act dummy and variable compensation measure, which are the Incentive Pay Ratio (1), the Equity Share (2), and the Restricted share (3) respectively. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act 2011	0.010*** (0.002)	0.005** (0.002)	0.004** (0.002)	0.005* (0.003)	0.006 (0.007)	0.004 (0.007)	0.007 (0.004)	0.002 (0.004)	0.006** (0.003)	0.001 (0.003)
Leverage	-0.205*** (0.036)					-0.165*** (0.031)		-0.166*** (0.031)		-0.165*** (0.032)
Dummy Crisis	0.001 (0.003)	0.003 (0.003)	0.007*** (0.003)	0.003 (0.004)	0.002 (0.003)	0.011*** (0.003)	0.003 (0.003)	0.011*** (0.003)	0.002 (0.003)	0.011*** (0.003)
(ln) Market Value		0.003*** (0.001)				0.002*** (0.000)		0.002*** (0.000)		0.002*** (0.000)
(ln) Net Income			0.033*** (0.003)			0.031*** (0.003)		0.031*** (0.003)		0.031*** (0.003)
(ln) Age				0.022 (0.079)		0.138** (0.069)		0.122* (0.068)		0.121* (0.068)
Incentive Pay Ratio					0.026** (0.010)	0.023*** (0.008)				
Interaction dummy 1					0.000 (0.009)	-0.005 (0.008)				
Equity Share							0.021*** (0.008)	0.016*** (0.006)		
Interaction dummy 2							-0.002 (0.007)	-0.003 (0.006)		
Restricted Share									-0.009 (0.009)	-0.008 (0.007)
Interaction dummy 3									-0.000 (0.009)	0.001 (0.008)
Constant	0.086*** (0.006)	0.028*** (0.006)	-0.214*** (0.023)	-0.039 (0.317)	0.031*** (0.007)	-0.758*** (0.275)	0.041*** (0.004)	-0.684** (0.274)	0.053*** (0.002)	-0.673** (0.272)
Observations	2,628	2,628	2,628	2,628	2,628	2,628	2,626	2,626	2,628	2,628
R-squared	0.059	0.013	0.266	0.004	0.010	0.309	0.011	0.309	0.005	0.306
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0581	0.0115	0.2656	0.0026	0.0086	0.3074	0.0097	0.3069	0.0033	0.3039
F-statistic	13.6367	7.8655	46.9982	3.0819	4.6488	24.6743	3.8191	23.6966	2.1660	23.8979
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

CHAPTER 6, Conclusion

The results presented and discussed in chapter 5 have created insight in the hypotheses used in this study. The mean comparison paired T-test gave insight in the mean of ROA between pre- and post-Dodd-Frank act. Based on this test and using ROA as a measure of firm performance one can state that the average firm performance before the Dodd-Frank act is significantly lower than the average firm performance after the implementation of the Dodd-Frank act. These results have helped testing the first hypothesis: *The effect of incentive pay on firm performance differs between pre- and post-Dodd-Frank act.* The T-test defined a difference in firm performance but the split regression compares the effect of the incentive pay ratio between pre- and post-Dodd-Frank act. The most important result for testing hypothesis 1 is the change of the effect of the incentive pay ratio on ROA between before and after the implementation of the Dodd-Frank act. The regression including control variables before the implementation of the Dodd-Frank act indicates no effect of the incentive pay ratio as the coefficient is 0.000 and not significant. The regression including control variables after the implementation of the Dodd-Frank act indicates a positive relationship between the incentive pay ratio and ROA since the coefficient is 0.0019 and significant. Based on the results of the split regression the effect of the incentive pay ratio differs significantly between pre- and post-Dodd-Frank act, hence leading to the conclusion that hypothesis one can be accepted.

For testing hypothesis 2: *The introduction of the Dodd-Frank act leads to an increase in firm value,* the full sample was used while using the Dodd-Frank act as a dummy variable. The first results, included all control variables and defined the Dodd-Frank act dummy as 0 for the time period 2007-2009 and 1 for 2010-2013, indicating evidence in favour of this hypothesis. The Regression including all control variables and the incentive pay ratio indicated a positive effect of 0.015 of the Dodd-frank act dummy. Based on this result hypothesis 2 can be accepted. However, when the year 2010 is transferred to the before Dodd-Frank act scenario, creating a dummy which is 0 for 2007-2010 and 1 for 2011-2013, the results change. When all control variables and the incentive pay ratio are included, the renewed dummy loses its significance. So based on these results hypothesis 2 cannot be accepted. In contrast, the study as provided for in this research did find a positive effect of the incentive pay ratio, which is in line with earlier research on the effect of executive compensation on firm performance.

To analyze to what extend the new regulations, imposed by the Dodd-Frank act, influences the effect that executive compensation has on firm performance, hypothesis 3 was tested:

The implementation of the Dodd-Frank act has a positive influence on the effect of executive compensation on firm performance. The entire sample is used and the interaction effect between the executive compensation measures and firm performance is analysed. The negative signs of the

interaction effects of the Incentive Pay Ratio and the Equity share indicate that the Dodd-Frank act has a negative influence on the effect of executive compensation on firm performance. However for the Restricted share the interaction effect is positive. Since all the coefficients are insignificant there is no solid evidence to either accept nor reject hypothesis 3. However, based on the signs of the incentive pay ratio and the equity share this paper shows slight evidence that hypothesis 3 must be rejected.

Based on this research one cannot distinguish between a CEO doing his job very well and creating firm value, and a company that is doing really well which makes it seem as if the CEO is doing really well. This creates an endogeneity problem and is a limitation of this research. Further research could start by trying to determine where the difference in the dummy variable of the Dodd-Frank act came from. Alternatively, it could use a different methodology to further isolate the effect of the Dodd-Frank act.

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APPENDIX A, Split summary statistics and correlations

Summary statistics of the time period before the implementation of the Dodd-Frank Act (2007-2009).

	count	mean	Std. Dev	Min	p10	median	p90	max
Salary	1146	1017.741	447.097	0.001	561.871	987.504	1500.000	3000.000
Bonus	1146	307.503	957.185	0.000	0.000	0.000	881.027	5460.000
Value of Option Awards	1146	2312.728	2898.003	0.000	0.000	1509.517	5623.200	16329.994
Restricted Stock Holdings	1144	4958.344	8318.442	0.000	0.000	2221.707	12102.358	59697.545
ROA	1144	0.050	0.084	-0.221	-0.014	0.049	0.146	0.266
Leverage	1144	0.169	0.170	0.000	0.000	0.143	0.411	0.722
Age	1146	54.483	5.962	37.000	47.000	55.000	61.000	79.000
Market Value	1146	17392.256	32338.735	0.000	0.000	6880.484	38534.940	209728.480
Net Income/Loss	1146	834.469	2101.104	-2796.000	-86.600	303.636	2338.000	14065.000
Total	1146	8587.662	9184.398	0.001	1439.696	6073.338	17693.922	66935.852
Compensation								
Incentive Pay	1146	0.747	0.256	0.000	0.402	0.836	0.943	1.000
Equity Share	1144	0.409	0.329	0.000	0.000	0.443	0.847	1.000
Restricted Share	1146	0.305	0.279	0.000	0.000	0.255	0.729	1.000
(ln) Market Value	1146	8.004	3.210	0.000	0.000	8.837	10.559	12.254
(ln) Net Income	1146	7.987	1.116	0.000	7.905	8.039	8.544	9.733
(ln) Age	1146	3.992	0.109	3.611	3.850	4.007	4.111	4.369
Dummy Dodd-Frank Act	1146	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Summary statistics of the time period after the implementation of the Dodd-Frank Act (2010-2013).

	count	mean	Std. Dev.	min	median	p10	p90	max
Salary	1525	1132.450	473.642	0.001	1050.000	680.000	1625.000	3000.000
Bonus	1525	302.754	985.371	0.000	0.000	0.000	750.000	5460.000
Value of Option Awards	1525	2111.658	2780.610	0.000	1492.208	0.000	4896.057	16329.994
Restricted Stock Holdings	1525	7416.666	10419.114	0.000	4309.425	0.000	18187.934	59697.545
ROA	1484	0.057	0.066	-0.221	0.052	0.000	0.141	0.266
Leverage	1484	0.184	0.175	0.000	0.166	0.000	0.428	0.722
Age	1525	57.312	5.975	40.000	57.000	50.000	64.000	83.000
Market Value	1484	21621.084	35891.705	0.000	10251.365	870.284	45720.902	209728.480
Net Income/Loss	1484	1100.957	2283.691	-2796.000	443.400	0.000	2655.000	14065.000
Total	1525	10963.528	11156.080	0.001	7829.386	1800.000	22072.014	77527.539
Compensation								
Incentive Pay	1525	0.766	0.257	0.000	0.859	0.454	0.951	1.000
Equity Share	1525	0.495	0.352	0.000	0.604	0.000	0.900	1.000
Restricted Share	1525	0.241	0.264	0.000	0.164	0.000	0.687	1.000
(ln) Market Value	1484	8.594	2.859	0.000	9.235	6.770	10.730	12.254
(ln) Net Income	1484	8.139	0.712	0.000	8.083	7.936	8.604	9.733
(ln) Age	1525	4.043	0.104	3.689	4.043	3.912	4.159	4.419
Dummy Dodd-Frank Act	1525	1.000	0.000	1.000	1.000	1.000	1.000	1.000

Correlation matrix of the variables described in chapter 4.

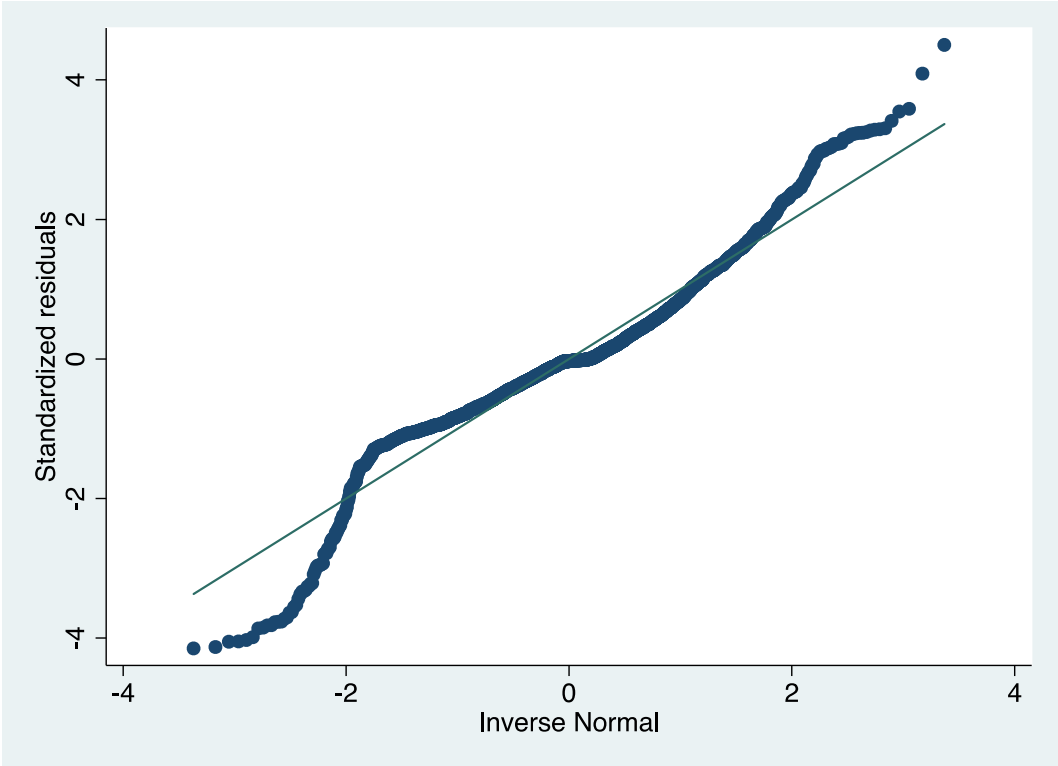
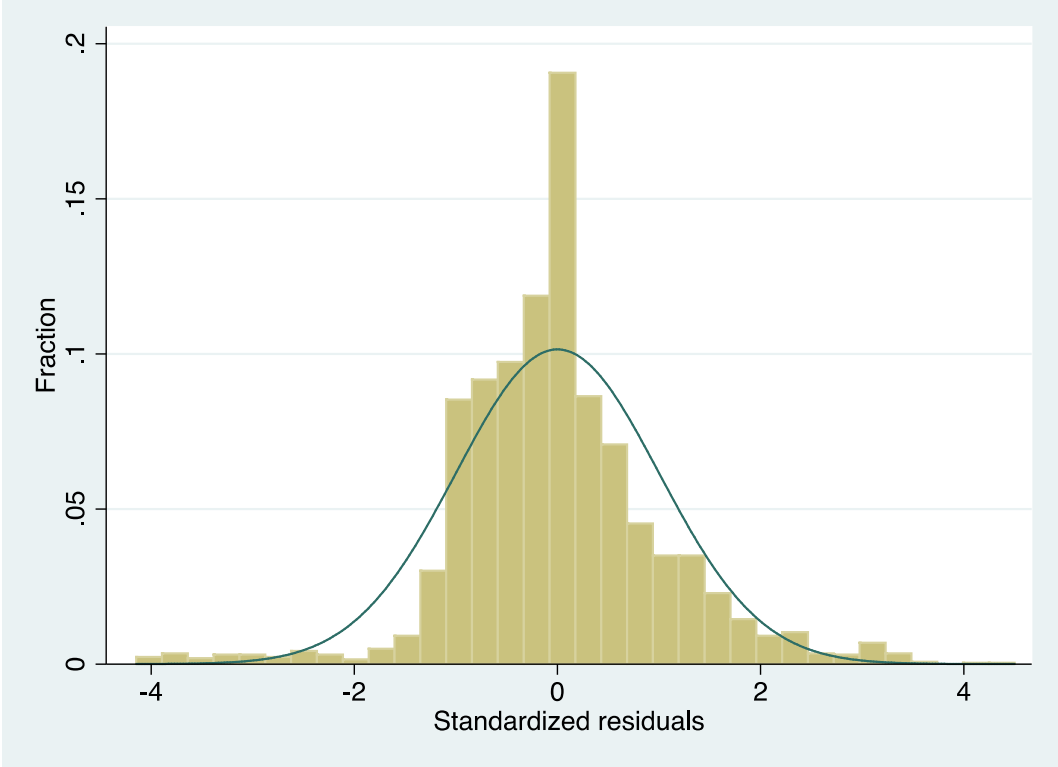
	ROA	Leverage	Incentive Pay ratio	Equity Share	Restricted Share	(ln) Market Value	(ln) Net Income	(ln) Age	Dummy Dodd-Frank Act
ROA	1								
Leverage	-0.0486*	1							
Incentive Pay ratio	0.0310	0.0625**	1						
Equity Share	0.0128	-0.00112	0.596***	1					
Restricted Share	0.0345	0.0636**	0.173***	-0.636***	1				
(ln) Market Value	0.336***	0.209***	0.0607**	0.0681***	0.0276	1			
(ln) Net Income	0.446***	-0.0618**	0.0261	0.0372	-0.0174	0.220***	1		
(ln) Age	0.0452*	-0.00880	-0.103***	0.00347	-0.101***	0.123***	0.0365	1	
Dummy Dodd-Frank Act	0.0461*	0.0445*	0.0369	0.123***	-0.115***	0.0966***	0.0822***	0.232***	1

APPENDIX B, Specification tests

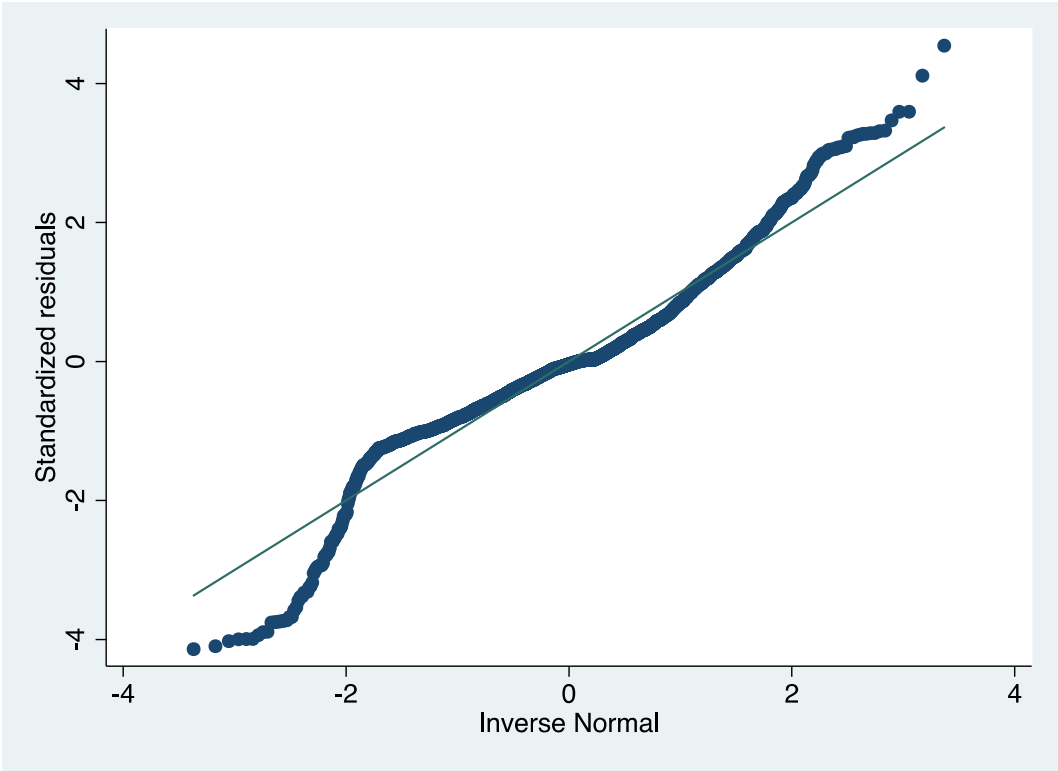
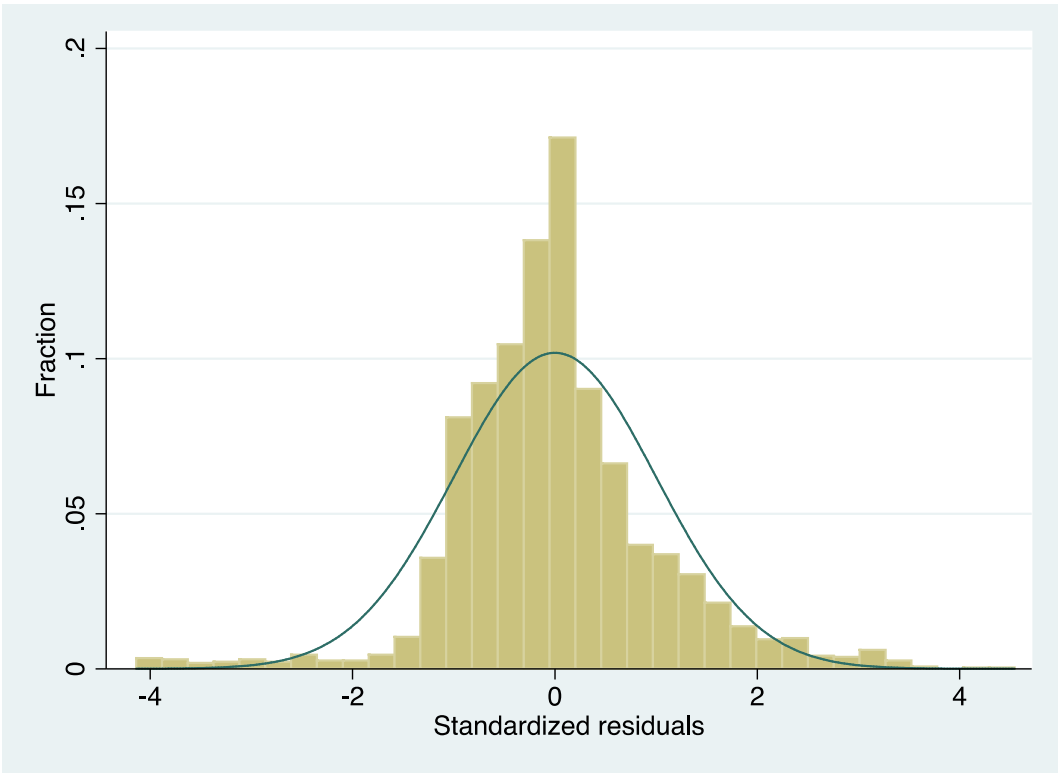
The results of the Heteroscedasticity test and the Shapiro-Wilk Normality test are presented below. Three models are estimated indicating the regression with controls and the Incentive pay ratio, restricted share, and equity share, respectively. As can be seen for each model heteroscedasticity is accepted and normality is rejected.

Variables	(1) ROA	(2) ROA	(3) ROA
Dummy Dodd-Frank Act	-0.00112 (0.00259)	-0.00044 (0.00260)	-0.00078 (0.00261)
Incentive Pay Ratio	0.00326 (0.00491)		
Leverage	-0.03466*** (0.00743)	-0.03544*** (0.00743)	-0.03483*** (0.00742)
(ln) Market Value	0.00658*** (0.00044)	0.00657*** (0.00044)	0.00663*** (0.00044)
(ln) Net Income	0.03117*** (0.00141)	0.03121*** (0.00141)	0.03120*** (0.00141)
(ln) Age	0.00013 (0.01189)	0.00143 (0.01184)	-0.00133 (0.01181)
Restricted Share		0.01046** (0.00464)	
Equity Share			-0.00379 (0.00366)
Constant	-0.25571*** (0.04939)	-0.26063*** (0.04873)	-0.24549*** (0.04864)
Observations	2,628	2,628	2,626
R-squared	0.265	0.266	0.265
adj. R-squared	0.2631	0.2644	0.2634
F-statistic	135.0046	135.9087	135.0648
p(F)	0.0000	0.0000	0.0000
Heterosc Test: chi2(1)	56.5157	58.3435	53.9269
Heterosc Test: P(chi2(1))	0.0000	0.0000	0.0000
Heteroscedasticity accepted?	Yes	Yes	Yes
Corrected for heteroscedastic errors	0.0000	0.0000	0.0000
Shapiro-Wilk Normality Statistic	11.1945	11.2361	11.1835
Shapiro-Wilk p-statistic	0.0000	0.0000	0.0000
Normality rejected?	Yes	Yes	Yes

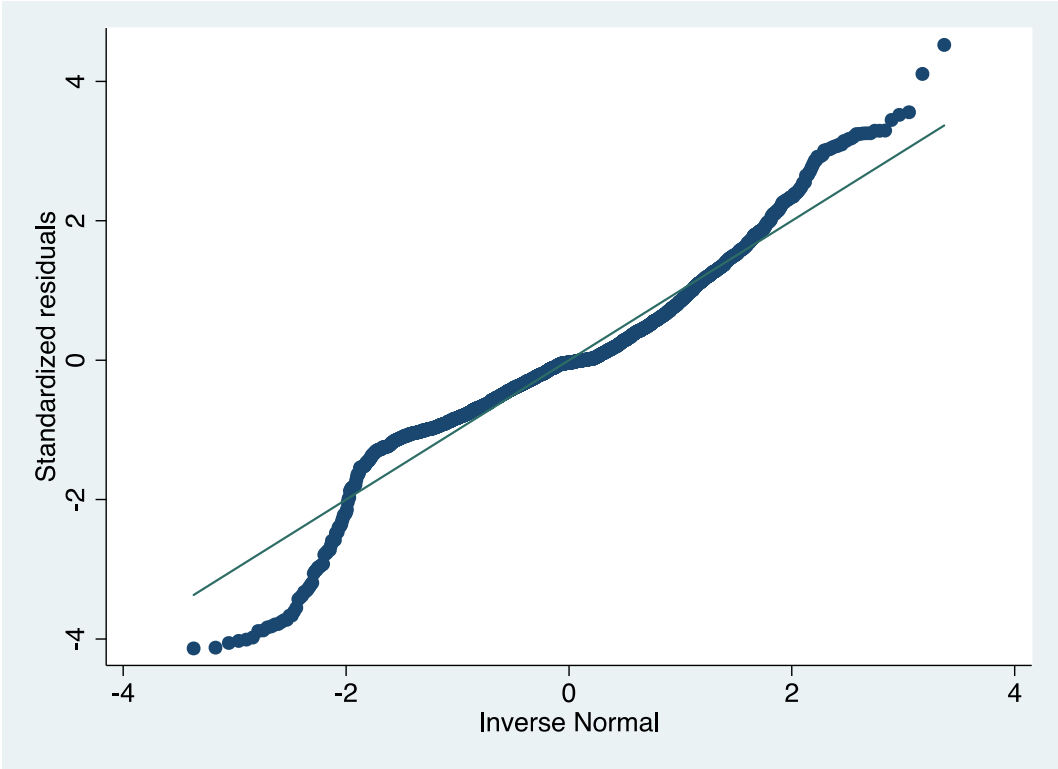
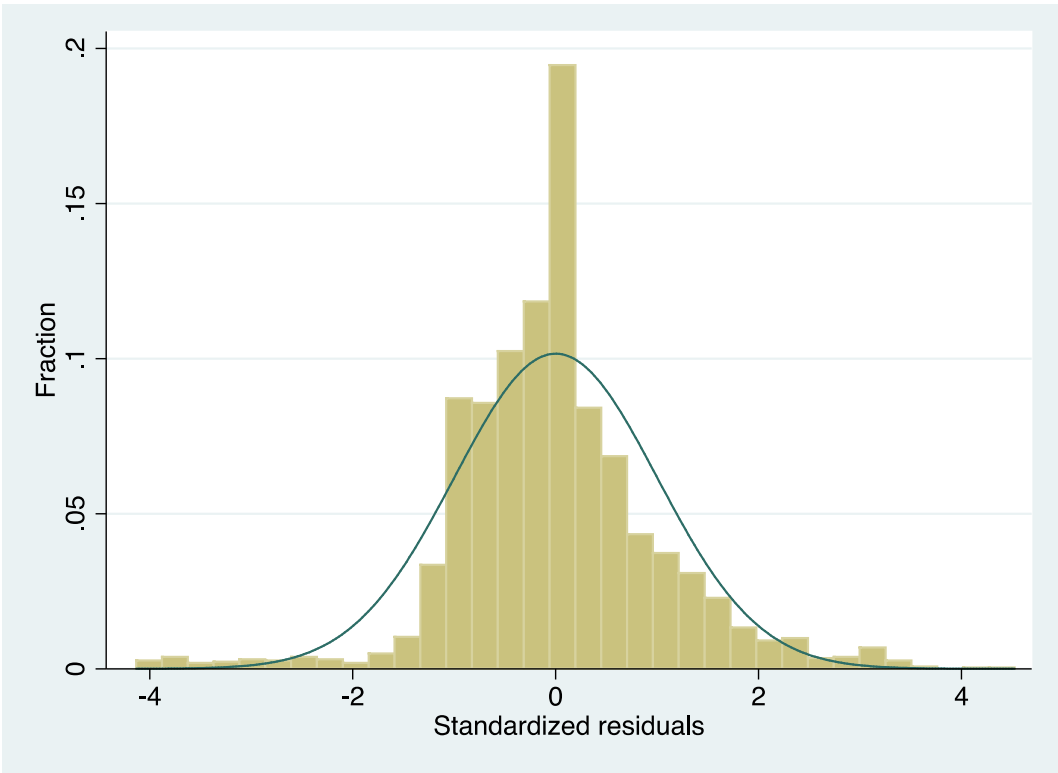
This page contains the histogram of the error term and the QQ-plot for the incentive pay ratio. The histogram shows that the error terms, visually, seem to follow a normal distribution. Also the QQ-plot is visually close to the 45 degree line, indicating slight support for normality.



This page contains the histogram of the error term and the QQ-plot for the restricted share. The histogram shows that the error terms, visually, seem to follow a normal distribution. Also the QQ-plot is visually close to the 45 degree line, indicating slight support for normality.



This page contains the histogram of the error term and the QQ-plot for the equity share. The histogram shows that the error terms, visually, seem to follow a normal distribution. Also the QQ-plot is visually close to the 45 degree line, indicating slight support for normality.



APPENDIX C, Lagged Incentive Pay ratios

Regression results of the entire sample from 2007-2013 including fixed effects. As measure for incentive pay the 1 year lagged variables of incentive pay, the equity share, and the restricted share are used. The Dodd-Frank Act dummy takes a value of 0 for 2007-2009 and a value of 1 for the period 2010-2013. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act	0.019*** (0.003)	0.015*** (0.003)	0.013*** (0.003)	0.023*** (0.004)	0.016*** (0.003)	0.015*** (0.003)	0.016*** (0.003)	0.014*** (0.003)	0.016*** (0.003)	0.014*** (0.003)
Leverage	-0.206*** (0.035)					-0.156*** (0.031)		-0.157*** (0.031)		-0.158*** (0.031)
Dummy Crisis	0.010*** (0.003)	0.012*** (0.003)	0.014*** (0.003)	0.007* (0.004)	0.004 (0.004)	0.010*** (0.003)	0.004 (0.004)	0.010*** (0.003)	0.004 (0.004)	0.010*** (0.003)
(ln) Market Value		0.002*** (0.001)				0.001* (0.000)		0.001* (0.000)		0.001* (0.000)
(ln) Net Income			0.032*** (0.003)			0.030*** (0.003)		0.030*** (0.003)		0.030*** (0.003)
(ln) Age				-0.152** (0.069)		0.001 (0.069)		-0.007 (0.070)		-0.008 (0.068)
Lagged Incentive Pay Ratio					0.009 (0.011)	0.003 (0.010)				
Lagged Equity Share							0.008 (0.007)	0.007 (0.006)		
Lagged Restricted Share									-0.006 (0.008)	-0.010 (0.006)
Constant	0.077*** (0.007)	0.022*** (0.006)	-0.219*** (0.023)	0.652** (0.277)	0.035*** (0.008)	-0.185 (0.276)	0.039*** (0.003)	-0.152 (0.280)	0.043*** (0.003)	-0.144 (0.273)
Observations	2,628	2,628	2,628	2,628	2,205	2,205	2,204	2,204	2,205	2,205
R-squared	0.074	0.024	0.275	0.020	0.027	0.295	0.027	0.296	0.026	0.296
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0726	0.0230	0.2740	0.0190	0.0253	0.2924	0.0257	0.2933	0.0251	0.2937
F-statistic	25.2106	14.0989	58.3974	14.6595	10.9380	25.8332	10.9339	25.2475	10.8989	25.7432
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Regression results of the entire sample from 2007-2013 including fixed effects. As measure for incentive pay the 1 year lagged variables of incentive pay, the equity share, and the restricted share are used. The Dodd-Frank Act dummy takes a value of 0 for 2007-2010 and a value of 1 for the period 2011-2013. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act 2011	0.010*** (0.002)	0.005** (0.002)	0.004** (0.002)	0.005* (0.003)	0.005** (0.002)	-0.003 (0.002)	0.005** (0.002)	-0.003 (0.002)	0.005** (0.002)	-0.003 (0.002)
Leverage	-0.205*** (0.036)					-0.158*** (0.031)		-0.159*** (0.031)		-0.159*** (0.031)
Dummy Crisis	0.001 (0.003)	0.003 (0.003)	0.007*** (0.003)	0.003 (0.004)	-0.006 (0.004)	0.009** (0.004)	-0.006 (0.004)	0.008** (0.003)	-0.006 (0.004)	0.009** (0.003)
(ln) Market Value		0.003*** (0.001)				0.001** (0.000)		0.001** (0.000)		0.001** (0.000)
(ln) Net Income			0.033*** (0.003)			0.030*** (0.003)		0.030*** (0.003)		0.030*** (0.003)
(ln) Age				0.022 (0.079)		0.230*** (0.080)		0.218*** (0.080)		0.217*** (0.078)
Lagged Incentive Pay Ratio					0.012 (0.011)	0.005 (0.010)				
Lagged Equity Share							0.012* (0.007)	0.010* (0.006)		
Lagged Restricted Share									-0.010 (0.008)	-0.012* (0.006)
Constant	0.086*** (0.006)	0.028*** (0.006)	-0.214*** (0.023)	-0.039 (0.317)	0.042*** (0.008)	-1.099*** (0.318)	0.046*** (0.003)	-1.049*** (0.322)	0.054*** (0.003)	-1.041*** (0.313)
Observations	2,628	2,628	2,628	2,628	2,205	2,205	2,204	2,204	2,205	2,205
R-squared	0.059	0.013	0.266	0.004	0.010	0.287	0.012	0.288	0.010	0.288
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0581	0.0115	0.2656	0.0026	0.0089	0.2844	0.0102	0.2858	0.0088	0.2860
F-statistic	13.6367	7.8655	46.9982	3.0819	3.5393	19.0302	3.8191	19.5195	3.2970	19.9363
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Regression results of the entire sample from 2007-2013 including fixed effects. As measure for incentive pay the 1 year lagged variables of incentive pay, the equity share, and the restricted share are used. The Dodd-Frank Act dummy takes a value of 0 for 2007-2010 and a value of 1 for the period 2011-2013. The interaction dummies indicates the interaction effect between the Dodd-Frank act dummy and variable compensation measure, which are the Incentive Pay Ratio (1), the Equity Share (2), and the Restricted share (3) respectively. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act	0.019*** (0.003)	0.015*** (0.003)	0.013*** (0.003)	0.023*** (0.004)	0.019** (0.008)	0.021*** (0.008)	0.019*** (0.005)	0.018*** (0.004)	0.016*** (0.005)	0.014*** (0.005)
Leverage	-0.206*** (0.035)					-0.157*** (0.031)		-0.158*** (0.031)		-0.158*** (0.031)
Dummy Crisis	0.010*** (0.003)	0.012*** (0.003)	0.014*** (0.003)	0.007* (0.004)	0.004 (0.004)	0.010*** (0.003)	0.003 (0.004)	0.010*** (0.003)	0.004 (0.004)	0.010*** (0.003)
(ln) Market Value		0.002*** (0.001)				0.001* (0.000)		0.001* (0.000)		0.001* (0.000)
(ln) Net Income			0.032*** (0.003)			0.030*** (0.003)		0.030*** (0.003)		0.030*** (0.003)
(ln) Age				-0.152** (0.069)		0.003 (0.069)		-0.003 (0.071)		-0.007 (0.069)
Lagged Incentive Pay Ratio					0.011 (0.012)	0.008 (0.011)				
Interaction dummy 1					-0.004 (0.011)	-0.009 (0.009)				
Lagged Equity Share							0.013 (0.010)	0.013* (0.008)		
Interaction dummy 2							-0.007 (0.010)	-0.009 (0.008)		
Lagged Restricted Share									-0.006 (0.012)	-0.011 (0.009)
Interaction dummy 3									0.000 (0.012)	0.001 (0.010)
Constant	0.077*** (0.007)	0.022*** (0.006)	-0.219*** (0.023)	0.652** (0.277)	0.033*** (0.009)	-0.197 (0.277)	0.037*** (0.004)	-0.169 (0.284)	0.043*** (0.004)	-0.145 (0.275)
Observations	2,628	2,628	2,628	2,628	2,205	2,205	2,204	2,204	2,205	2,205
R-squared	0.074	0.024	0.275	0.020	0.027	0.295	0.028	0.296	0.026	0.296
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0726	0.0230	0.2740	0.0190	0.0250	0.2926	0.0258	0.2938	0.0247	0.2934
F-statistic	25.2106	14.0989	58.3974	14.6595	8.3036	22.6027	8.2696	22.2110	8.2553	22.5477
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Regression results of the entire sample from 2007-2013 including fixed effects. As measure for incentive pay the 1 year lagged variables of incentive pay, the equity share, and the restricted share are used. The Dodd-Frank Act dummy takes a value of 0 for 2007-2010 and a value of 1 for the period 2011-2013. The interaction dummies indicates the interaction effect between the Dodd-Frank act dummy and variable compensation measure, which are the Incentive Pay Ratio (1), the Equity Share (2), and the Restricted share (3) respectively. The robust standard errors are in parentheses. The asterisks indicate the significance at the 1, 5, and 10 percent respectively *** p<0.01, ** p<0.05, * p<0.1.

	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
Dummy Dodd-Frank Act 2011	0.010*** (0.002)	0.005** (0.002)	0.004** (0.002)	0.005* (0.003)	0.013* (0.008)	0.006 (0.007)	0.009** (0.004)	0.000 (0.004)	0.004 (0.003)	-0.004 (0.004)
Leverage	-0.205*** (0.036)					-0.159*** (0.031)		-0.160*** (0.031)		-0.160*** (0.031)
Dummy Crisis	0.001 (0.003)	0.003 (0.003)	0.007*** (0.003)	0.003 (0.004)	-0.006 (0.004)	0.009** (0.004)	-0.006 (0.004)	0.008** (0.003)	-0.006 (0.004)	0.009** (0.003)
(ln) Market Value		0.003*** (0.001)				0.001** (0.000)		0.001** (0.000)		0.001** (0.000)
(ln) Net Income			0.033*** (0.003)			0.030*** (0.003)		0.030*** (0.003)		0.030*** (0.003)
(ln) Age				0.022 (0.079)		0.230*** (0.080)		0.215*** (0.080)		0.216*** (0.078)
Lagged Incentive Pay Ratio					0.017 (0.011)	0.011 (0.010)				
Interaction dummy 1					-0.010 (0.010)	-0.012 (0.009)				
Lagged Equity Share							0.017** (0.008)	0.014** (0.006)		
Interaction dummy 2							-0.009 (0.008)	-0.009 (0.007)		
Lagged Restricted Share									-0.012 (0.009)	-0.013* (0.007)
Interaction dummy 3									0.004 (0.010)	0.004 (0.009)
Constant	0.086*** (0.006)	0.028*** (0.006)	-0.214*** (0.023)	-0.039 (0.317)	0.039*** (0.008)	-1.103*** (0.318)	0.044*** (0.004)	-1.042*** (0.321)	0.055*** (0.003)	-1.037*** (0.312)
Observations	2,628	2,628	2,628	2,628	2,205	2,205	2,204	2,204	2,205	2,205
R-squared	0.059	0.013	0.266	0.004	0.011	0.288	0.013	0.289	0.010	0.288
ID number for each executive	420	420	420	420	420	420	420	420	420	420
adj. R-squared	0.0581	0.0115	0.2656	0.0026	0.0092	0.2852	0.0109	0.2864	0.0085	0.2859
F-statistic	13.6367	7.8655	46.9982	3.0819	3.0055	16.6356	3.0202	17.1566	2.4748	17.5147
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

APPENDIX D, Stata code

This appendix will show the code used in Stata to perform this study.

```
set more off
```

```
cd "Boris Keukenmeester/Stata"
```

```
use "Data 28 juni 2016", clear
```

```
bys IDnumberforeachexecutivecomp: egen count = count( FiscalYear)
```

```
keep if inrange(count,5,7)
```

```
xtset IDnumberforeachexecutivecomp FiscalYear, yearly
```

```
*-----  
*  
*                      Create variables  
*  
*-----
```

```
/*  
                      Incentive pay  
*/
```

```
winsor2 Salary Bonus ValueofOptionAwardsFAS123R RestrictedStockHoldings ROA Leverage  
MarketValueTotalFiscal NetIncomeLoss, cuts(1 99) replace
```

```
egen TotalComp = rowtotal(Salary Bonus ValueofOptionAwardsFAS123R RestrictedStockHoldings)  
egen TotalSalExcl = rowtotal(Bonus ValueofOptionAwardsFAS123R RestrictedStockHoldings)  
g incentivePay = TotalSalExcl/TotalComp  
g equityShare = RestrictedStockHoldings/TotalComp  
g optionsShare = ValueofOptionAwardsFAS123R/TotalComp
```

```
// Log of variables  
g lnSalary = ln(Salary)  
g lnBonus = ln(Bonus)  
g lnOptions = ln(ValueofOptionAwardsFAS123R)  
g lnStock = ln(RestrictedStockHoldings)  
g lnMVE = ln(1+ MarketValueTotalFiscal)  
su NetIncomeLoss  
g lnNetIncome = ln(NetIncomeLoss - r(min) +1)
```

```
g lnAge = ln(ExecutivesAge)  
rename ExecutivesAge Age
```

```
// Dummy Dodd Frank Act  
g DoddAct = FiscalYear>=2010  
label define DoddActs 1 "After Dodd Act" 0 "Before Dodd Act"  
label values DoddAct DoddActs
```

```
g DoddAct2011 = FiscalYear>=2011
label values DoddAct2011 DoddActs
```

```
// Dummy crisis
g Crisis = inrange(FiscalYear,2007,2008)
```

```
*-----
*
*           Lagged variables
*
*-----
```

```
g incentivePay_lag = l.incentivePay
g equityShare_lag = l.equityShare
g optionsShare_lag = l.optionsShare
g lnSalary_lag = l.lnSalary
g lnBonus_lag = l.lnBonus
g lnOptions_lag = l.lnOptions
g lnStock_lag = l.lnStock
```

```
*-----
*
*           Declare variables
*
*-----
```

```
global variables Salary Bonus ValueofOptionAwardsFAS123R RestrictedStockHoldings ROA
Leverage Age MarketValueTotalFiscal NetIncomeLoss TotalComp TotalSalExcl incentivePay
equityShare optionsShare lnSalary lnBonus lnOptions lnStock incentivePay_lag equityShare_lag
optionsShare_lag lnSalary_lag lnBonus_lag lnOptions_lag lnStock_lag lnMVE lnNetIncome lnAge
```

```
global corrvariables ROA Leverage incentivePay equityShare optionsShare lnSalary lnBonus
lnOptions lnStock lnMVE lnNetIncome lnAge DoddAct
global corr_lag_variables ROA Leverage incentivePay equityShare optionsShare incentivePay_lag
equityShare_lag optionsShare_lag lnSalary_lag lnBonus_lag lnOptions_lag lnStock_lag lnMVE
lnNetIncome lnAge DoddAct
```

```
// Merge firm names
merge m:1 FullName using Firmnames
keep if _m==3
drop _m
```

```

*-----
*
*                               Frequencies
*
*-----

set more off

local categorical DoddAct ind_label FiscalYear FullName Firmname

foreach d of local categorical {

    eststo dum`d': estpost tabulate `d'

    esttab dum`d' using frequencies_first.rtf, cells("b( label(N)) pct(fmt(2)) cumpct(fmt(2))")
noobs append
}

*-----
*
*                               Average over all observations
*
*-----

// Full sample

estpost tabstat $variables, ///
                statistics( count mean sd median min max p10 p25 p75 p90)
columns(statistics)

esttab using summary_statistics.rtf, ///
        cells("count(fmt(0)) mean(fmt(3)) sd(fmt(3)) p50(fmt(3)) min(fmt(3)) max(fmt(3))
p10(fmt(3)) p25(fmt(3)) p75(fmt(3)) p90(fmt(3))" ) ///
        nomtitle nonumber replace

// Separate correlations for Dodd Act periods

estpost tabstat $variables, ///
                statistics( count mean sd median min max p10 p25 p75 p90) by(DoddAct) columns(statistics)

esttab using sumstats_dodd_act.rtf, ///
        cells("count(fmt(0)) mean(fmt(3)) sd(fmt(3)) p50(fmt(3)) min(fmt(3)) max(fmt(3))
p10(fmt(3)) p25(fmt(3)) p75(fmt(3)) p90(fmt(3))" ) ///
        nomtitle nonumber replace

```



```

*-----
*
*                               Correlations
*
*-----

```

```
// Full sample
```

```
qui estpost correlate $corrvariables, matrix
```

```
esttab using correlations.rtf, not unstack compress noobs replace
```

```
qui estpost correlate $corr_lag_variables, matrix
```

```
esttab using correlations_lagged_vars.rtf, not unstack compress noobs replace
```

```

*-----
*
*                               OLS Specification Tests
*
*-----

```

```
set more off
```

```
local set1 DoddAct incentivePay Leverage lnMVE lnNetIncome lnAge
```

```
local set2 DoddAct optionsShare Leverage lnMVE lnNetIncome lnAge
```

```
local set3 DoddAct equityShare Leverage lnMVE lnNetIncome lnAge
```

```
local set set1 set2 set3
```

```
foreach s of local set {
```

```
    xi: reg ROA ``s"
```

```
    predict fit, xb // fit of the regression
```

```
    egen float stand_fit = std(fit), mean(0) std(1) // standardized fit
```

```
    predict standres, rstandard // standardized residuals
```

```
    estat vif
```

```
    hettest
```

```
    local hetchi2=r(chi2)
```

```
    local hetp=r(p)
```

```
    * numerical test (H0: normal distribution)
```

```
    swilk standres
```

```
    local swilkstat = r(z)
```

```
    local swilkp = r(p)
```

```

local fmodel = Ftail(`e(df_m)',`e(df_r)',`e(F)') //Store the p-value of the F statistic.

outreg2 using OLS_tests.doc, addstat( adj. R-squared, e(r2_a), ///
`replace' F-statistic, e(F), p(F), `fmodel', Heteroscedasticity accepted?, 0,
Heterosc Test: chi2(1), `hetchi2', ///
Heterosc Test: P(chi2(1)), `hetp', Corrected for heteroscedastic errors,0,
Shapiro-Wilk Normality Statistic, `swilkstat', ///
Shapiro-Wilk p-statistic, `swilkp') bdec(5) bfmt(f) sdec(5) sfmt(f) adec(4)
afmt(f) ctitle(`d') drop() word

*Now that we have the predictions we need to check their relationship with the residuals
scatter stand_fit standres // scatter between stand fit and stand residuals
graph save scatter_fit_res_`s', replace
hist standres, fraction normal // histogram of residuals
graph save hist_res_`s', replace

*kdensity m, normals
qnorm standres
graph save qq_plot_`s', replace

drop fit stand_fit standres

}

*-----
*
*Hausman test for the choice between fixed-effects and random effects panel regression.
*
*-----

set more off

local set1 DoddAct incentivePay Leverage lnMVE lnNetIncome lnAge
local set2 DoddAct optionsShare Leverage lnMVE lnNetIncome lnAge
local set3 DoddAct equityShare Leverage lnMVE lnNetIncome lnAge

local set set1 set2 set3

foreach s of local set {

    qui xi: xtreg ROA ``s", fe

        estimates store fixed

    qui xi: xtreg ROA ``s", re

        hausman fixed ., sigmamore

```

```
}
```

```
/*
```

```
Test: Ho: difference in coefficients not systematic
```

```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 99.33
Prob>chi2 = 0.0000
```

```
Test: Ho: difference in coefficients not systematic
```

```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 100.64
Prob>chi2 = 0.0000
```

```
Test: Ho: difference in coefficients not systematic
```

```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 103.98
Prob>chi2 = 0.0000
```

```
*/
```

```
*-----
*
*           Panel regression corrected for heteroskedastic errors
*                   Fixed Effects
*-----
```

```
// DoddAct2011
```

```
global corrvariables ROA Leverage incentivePay equityShare optionsShare lnSalary lnBonus
lnOptions lnStock lnMVE lnNetIncome lnAge DoddAct
global corr_lag_variables ROA Leverage incentivePay equityShare optionsShare incentivePay_lag
equityShare_lag optionsShare_lag lnSalary_lag lnBonus_lag lnOptions_lag lnStock_lag lnMVE
lnNetIncome lnAge DoddAct
```

```
set more off
local dep ROA
```

```
local set1 DoddAct Leverage Crisis
local set2 DoddAct lnMVE Crisis
local set3 DoddAct lnNetIncome Crisis
local set4 DoddAct lnAge Crisis
local set5 DoddAct incentivePay_lag Crisis
local set6 DoddAct incentivePay_lag Leverage lnMVE lnNetIncome lnAge Crisis
local set7 DoddAct equityShare_lag Crisis
local set8 DoddAct equityShare_lag Leverage lnMVE lnNetIncome lnAge Crisis
```

```

local set9 DoddAct optionsShare_lag Crisis
local set10 DoddAct optionsShare_lag Leverage lnMVE lnNetIncome lnAge Crisis

local set set1 set2 set3 set4 set5 set6 set7 set8 set9 set10

* The test is rejected. OLS with robust standard errors.

foreach d of local dep {
foreach s of local set {

    xi: xtreg ROA `s", fe vce(robust)

    if missing(e(chi2)) {
        local fmodel = 0 //Alternative Chi statistic.
    }

    else {
        local fmodel = Ftail(`e(df_m)',`e(df_r)',`e(F)') //Store the p-value of the F statistic.
    }

    outreg2 using PLS_corrected_hetc_fe_Lags.doc, addstat( adj. R-squared, e(r2_a), ///
        `replace' F-statistic, e(F), p(F), ///
        `fmodel') bdec(3) bfmt(f) sdec(3) sfmt(f) adec(4) afmt(f) ctitle(`d') word

}
}

*-----
*
*                Panel regression corrected for heterocedastic errors
*                Fixed Effects fort wo separate periods
*-----

global corrvariables ROA Leverage incentivePay equityShare optionsShare lnSalary lnBonus
lnOptions lnStock lnMVE lnNetIncome lnAge DoddAct
global corr_lag_variables ROA Leverage incentivePay equityShare optionsShare incentivePay_lag
equityShare_lag optionsShare_lag lnSalary_lag lnBonus_lag lnOptions_lag lnStock_lag lnMVE
lnNetIncome lnAge DoddAct

set more off
local dep ROA

local set1 Leverage
local set2 lnMVE
local set3 lnNetIncome
local set4 lnAge
local set5 incentivePay
local set6 incentivePay Leverage lnMVE lnNetIncome lnAge
local set7 equityShare
local set8 equityShare Leverage lnMVE lnNetIncome lnAge
local set9 optionsShare

```

```

local set10 optionsShare Leverage lnMVE lnNetIncome lnAge

local set set1 set2 set3 set4 set5 set6 set7 set8 set9 set10

* The test is rejected. OLS with robust standard errors.

forval i=0/1 {
  foreach s of local set {

    xtreg ROA `s' if DoddAct==`i', fe vce(robust)

    if missing(e(chi2)) {
      local fmodel = 0 //Alternative Chi statistic.
    }

    else {
      local fmodel = Ftail(`e(df_m)',`e(df_r)',`e(F)') //Store the p-value of the F statistic.
    }

    outreg2 using PLS_corrected_hetc_fe_`i'.doc, addstat( adj. R-squared, e(r2_a), ///
      `replace' F-statistic, e(F), p(F), ///
      `fmodel') bdec(3) bfmt(f) sdec(3) sfmt(f) adec(4) afmt(f) ctitle(`d') word

  }
}

```