

## **Does CEO Optimism affect Pay?**

### **Abstract**

This study investigates the association between CEO optimism and both the level and structure of CEO pay. The study is motivated by the limited literature in the area of optimism as a behavioral trait of CEOs, and provides the first evidence on the effect of CEO share ownership on the relationship between optimism and pay. Using a sample of US firms from 1992 to 2012 that have not changed their CEO, optimism is found to be negatively associated with cash bonus and positively associated with the proportion of incentives in compensation contracts. Changes in optimism are negatively associated with changes in compensation, and positively associated with changes in the proportion of incentive-based pay. Share ownership positively affects the association between optimism and the proportion of bonus received by CEOs. These findings have important implications for shareholders and regulators, assisting in analyzing the appropriateness of CEOs compensation contracts and regulatory developments.

## 1. Introduction

In recent years, researchers have become increasingly interested in managerial characteristics, and how such characteristics affect corporate behavior (see for example, Keiber, 2002; Bertrand and Schoar, 2003; Campbell, Gallmeyer, Johnson, Rutherford, and Stanlry, 2011, Boulton and Campbell, 2012; Graham, Li, and Qiu, 2012; Hirshleifer, Low, Hong Teoh, 2012, and Otto, 2012). For instance, managerial characteristics have been found to influence decisions concerning financing policies (Landier and Thesmar, 2009; Malmendier, Tate, and Yan, 2011; Graham, Harvey, Puri, 2013) and mergers and acquisitions (Malmendier and Tate, 2008; Aktas, De Bodt, Bollaert, Roll, 2012), amongst others. While many studies have documented the relationship between CEO pay and performance (Barkema and Gomez-Mejia, 1998a; Hall, 1998; Babenko, 2009; Doucouliagos, Haman, and Stanley, 2012), limited research investigates the link between managerial characteristics and CEO pay<sup>1</sup> and of these, fewer still examine optimism.<sup>2</sup> This study adds to this literature by examining whether a relationship exists between CEO optimism<sup>3</sup> and pay (both pay level and structure), and whether changes in optimism are associated with changes in CEO compensation.

Otto (2012) presents one of the few studies to investigate the effect of CEO optimism on compensation. He finds that more optimistic CEOs receive smaller stock option grants, fewer bonus payments and less total compensation when compared to their peers. Otto (2012) compares the remuneration of CEOs that work for the same firm but display different levels of optimism. While Otto (2012) controls for differences in the employment time period and time-varying firm characteristics, he does not take into account the fact that the pay contract of the incumbent CEO is likely to be affected by the terms and conditions incorporated in the contract

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<sup>1</sup> See, for example, Keiber, 2002; Bergman and Dirk, 2007; Gervais et al., 2011; Graham et al., 2013; Otto, 2012.

<sup>2</sup> See, for example, Bergman and Dirk (2007) who analyze whether the popularity of option compensation among employees may be driven by employee optimism, and Otto (2012) who examines CEO optimism and pay in U.S. firms.

<sup>3</sup> The Oxford Dictionary of English defines *optimism* as ‘hopefulness and confidence about the future or the success of something’. A related but different managerial characteristic is overconfidence, which is defined as being excessively confident. The distinction between the two terms is often blurred in the literature. For instance, Malmendier and Tate (2005; 2005a; 2008) classify overconfident managers as those who hold options of company stock until expiration; while other authors regard this as optimism (e.g. Campbell, Gallmeyer, Johnson, Rutherford, Stanley, 2011; Goel and Thakor, 2008; Gervais, Heaton, and Odean, 2011; Boulton and Campbell, 2012; Otto, 2012). Accordingly we differentiate between optimism and overconfidence. A person is considered optimistic when they believe that good outcomes are more likely than they really are; while a person is deemed overconfident when they believe the information they possess is more precise than it really is (Otto, 2012).

of the previous CEO. This is likely to bias the author's results. Whether Otto (2012) truly captures the pay associated with the optimism of the current CEO is therefore uncertain. To address this limitation, we examine only firms that have not changed CEO subsequent to listing, thereby removing any bias that may be evident as a result of previous CEO contracts. This is important because an unbiased compensation contract means that the contract is more likely to be based on the skills and characteristics (and likely optimism) of the incumbent only.

We also examine the extent to which CEO stock ownership moderates the association between optimism and pay. CEOs commonly hold stock, increasing such holdings over time. The extent to which stock ownership affects the relation between CEO optimism and pay remains unknown. When CEO ownership is high, the pay structure will likely consist of a greater proportion of cash, as a result of the level of risk stemming from the proportion of human capital already invested in the firm. A higher proportion of cash compensation may therefore be preferable since its value is fixed, thus presenting less risk to the CEO (Gomez-Mejia, Tosi, and Hinkin, 1987; Tosi and Gomez-Mejia, 1989; Hambrick and Finkelstein, 1995; Kroll, Wright, Toombs, and Leavell 1997, Werner, 2005). Prior studies find that firm value is a function of CEO ownership (McConnell and Servaes, 1990; Chen et al., 1993; Griffith, 1999). Whilst prior research (Keiber, 2002; Bergman and Dirk, 2007; Gervais, et al., 2011; Graham, et al., 2012; Otto, 2012; Wang, Sheng and Yang, 2013) investigates how CEO characteristics impact on pay there is little evidence on the role of CEO optimism, and no evidence on how CEO share ownership impacts on this relationship. This study therefore, examines the mediating effect of CEO ownership on the relationship between CEO optimism and pay.

Managerial characteristics can change over time. Overconfidence is a trait that has been found to change over time due to experience gained (Billet and Qian, 2008), and it is therefore also likely that the same can be observed for optimism. If CEO optimism changes over time, the relationship between optimism and CEO pay will also likely change. This study explores this issue by examining the association between changes in optimism and CEO pay.

Our contribution to the extant literature can be summarized as: (1) utilise a clear experiment, using only firms which have not changed CEO following listing, to examine the relation between optimism and pay for the current CEO; (2) the first study to analyze the impact of share ownership on the relation between optimism and pay; (3) the first to analyse the

association between changes in optimism and changes in compensation; and (4) provide empirical evidence on the impact of optimism on pay structure in addition to the level of CEO pay.

Our study also presents findings that are useful to practitioners and regulators. The findings can assist boards of directors, on behalf of owners, to design optimal compensation contracts in order to align shareholders' and CEO interests, by incorporating CEO characteristics into their design. Heaton, (2002, p. 34) suggests "principals may design incentive mechanisms that underpay irrational agents by exploiting the agent's incorrect assessments of their ability or the firm's risk."

A study examining CEO optimism and its relation to pay in the US is timely, given the introduction of the *Dodd-Frank Wall Street Reform and Consumer Protection Act (2010)* and in particular, its 'say on pay' legislation whereby shareholders have the right to vote on the remuneration contracts of executives. For shareholders, understanding how managerial characteristics impact on their pay will allow them to more accurately assess the appropriateness of proposed CEO pay packets.

Across our sample of 7,823 firm-year observations from 1992 to 2012, we find that CEO optimism is associated with the level of cash bonus and the proportion of incentive pay. These results indicate that more optimistic CEOs receive lower bonuses yet a higher proportion of incentive pay in their compensation contract. These findings however, are sensitive to the optimism measure used in the analysis. Further, a change in optimism is found to be negatively related with a change in the level of short-term bonus received by CEOs. We also find that changes in optimism are positively associated with changes in the proportion of long-term incentive pay. Finally, we find evidence to suggest that as share ownership increases, the association between optimism and the proportion of bonus also increases.

The remainder of the paper is organized as follows. Section 2 presents a review of the literature and development of the hypotheses to be tested are developed. Data and methodology used in analyzing the relationship between optimism and compensation are discussed in Section 3, with the results from the main tests and robustness discussed in section 4. Section 5 concludes the study.

## **2. Literature review and hypotheses development**

### **2.1 CEO optimism**

Optimism, refers to the belief that positive outcomes are more likely to happen than they really are (see, for example, Goel and Thakor, 2008; Campbell et al., 2011; Gervais, Heaton, and Odean, 2011; Boulton and Campbell, 2012; Otto, 2012). Optimism, as a trait, can be seen in numerous work and life choices. For instance, Puri and Robinson (2007) show that people who are more optimistic tend to work longer hours, and tend to think that they will never retire. Bitler, Moskowitz, and Vissing-Jorgensen (2005) suggest that firm performance may be affected by optimism, given that most corporate decisions are made by the CEOs who bring their personality and traits to their work. The optimism of CEOs is therefore likely to be an important consideration for investors.

The concept of managerial optimism in corporate decisions goes back as far as Roll (1986), who examined managerial decisions relating to mergers and acquisitions. The author argued that losses to acquiring shareholders might be caused by managerial optimism, which leads managers to overbid for a target because they overestimate the synergies of the joint firms and their ability to extract them. The concept has been extended to other corporate decisions such as capital structure decisions (Barros, Silveira, and Vishny, 2007), dividend payments (DeAngelo, 1986; Deshmukh, Goel, and Howe, 2008), financial pecking order (Hackbarth, 2008; Malmendier and Tate, 2008), and the sensitivity of cash flow investments (Lin, Hu, and Chen, 2005; Malmendier and Tate, 2005a & b).

Studies have shown that significant variation in corporate practices and executive compensation can be explained by managerial characteristics (Bertrand and Schoar, 2003; Puri and Robinson, 2007; Graham, et al., 2012). As such, even though firms may have similar situations, they may act differently in handling these. Puri and Robinson (2007) find that while moderate optimism correlates to reasonably sensible economic decisions, extreme optimism is related to irrational decisions. Wang et al. (2013) further show that very optimistic managers, compared to those with normal or ordinary optimism levels, trade larger quantities of risky assets and thus have more risk. These findings show that optimism can offset CEO risk aversion, and

hence, reducing the agency problems that arise due to the different risk preference of CEOs and shareholders.

An example of how individual characteristics are associated with corporate actions can be seen in work by Campbell et al. (2011), who model the effects of optimism on risk averse CEOs' investment levels. Campbell et al. (2011) use CEO stock option holdings and net stock purchases, and the firm investment level as measures of optimism. The authors find that moderately optimistic CEOs may invest at a level optimal for wealth maximization while CEOs with low (high) optimism tend to underinvest (overinvest). These under and overinvestment are caused by differences in risk tolerance. Assuming that managers have the same risk tolerance, being more optimistic can thus help decrease risk aversion (Campbell et al., 2011).

Malmendier and Tate (2008) show that CEOs with high optimism may act overconfidently, especially in mergers, concluding that optimism can be harmful. In fact, similar to Roll (1986) who finds more optimistic CEOs tend to overpay the target company, Malmendier and Tate (2008) find that over-optimistic CEOs appear to over pay for the bid as they overvalue the possible synergies that can be created by mergers (Malmendier and Tate, 2008). All of these findings support the findings that managerial characteristics (optimism) affect managerial behavior, which then affects firm behavior.

Optimism, like other characteristics, differs between individuals. Maccoby and Jacklin (1974) and Alloys and Ahrens (1987), for instance, show that women are less optimistic compare to men. Graham et al. (2013) similarly, using psychometric tests conducted on senior executives aimed to obtain evidence on executives' psychological traits and attitudes, conclude that U.S. CEOs and their non-U.S. counterparts differ significantly in regards to their optimism. U.S. CEOs tend to be more optimistic and less risk averse, which contributes to one of many possible explanations for why U.S. firms behave in some ways quite differently from non-U.S. firms (Graham et al., 2013).

## **2.2 The association between CEO optimism and CEO pay**

Limited research has examined the association between CEO optimism and Pay. In a recent study, Otto (2012) estimates the effect of optimism on compensation by comparing the remuneration of multiple CEOs (employed by the same firm) with different levels of optimism, while controlling for time and other CEO and firm characteristics. He uses both the option exercise decision and the accuracy of earnings per share forecasts (EPS) as measures for optimism, and finds that more optimistic CEOs receive lower bonuses, stock grants, and total compensation payments than their peers. These can happen because CEOs believe that the future price of the firm's stock will be favorable for them. Therefore, unlike those CEOs who are pessimistic or has neutral optimism, more optimistic CEOs are more easily satisfied with lower equity compensation, and do not engage themselves more intense bargaining to achieve higher levels of equity compensation.

Otto (2012), by using multiple CEOs from the same firms in his sample, potentially specifies biased results. This bias may arise since the current CEO's compensation contract is likely to be related with previous CEO's compensation contract (given that CEOs base their pay expectations on the previous candidates pay). Hence, the current contract may potentially capture effects other than that of current CEOs optimism. Therefore, this study tries to mitigate this potential bias by examining only those firms that have not changed CEO since initial listing.

Heaton (2002) states that in order to best serve the interest of principals, the board of directors should design compensation contracts in a way that allows a firm's shareholders to exploit managerial irrationality rather than suppress it. This can be related to Otto's (2012) result that more optimistic CEOs are willing to take lower equity compensation. This lower equity compensation then leads to a lower total compensation. This exploitation of managerial irrationality can be achieved by designing compensation contracts that provide lower pay to these optimistic or irrational managers who have incorrect assessments of the firm's risk or future performance.

While the board of directors is responsible for compensation contracts (Bebchuk et al., 2001), CEOs arguably have some input to the composition of their compensation packages (Graham, et al., 2013). Hence, as CEOs have different preferences when it comes to their

compensation, holding everything else constant, CEOs who have higher optimism, may prefer a compensation payment that gives lower salary pay and a higher incentives pay. This can happen because CEOs with higher optimism believe that the future outcome of the firm will be favorable. Hence, they believe that having a higher proportion of incentive pay will give them more overall pay (Otto, 2012). Based on Otto's (2012) findings, this is illustrated below:

Suppose the CEO accepts a compensation package that is valued at least \$100, otherwise s/he prefers an outside option (for example finding an alternative source of employment). In addition, suppose that at least \$36 of the \$100 must be provided in the form of incentive pay, or the CEO does not exert any effort. Finally, assume that only two compensation instruments are available: cash and equity incentives. The owners and the CEO value cash the same. While incentive claims are valued by the board of directors at an expected payoff of \$10 per claim, the average CEO values incentive claims at less than their expected payoff, for example \$8. Thus, the optimal compensation package comprises \$64 in cash and six incentive claims<sup>4</sup>. Therefore, the board values this package as \$124<sup>5</sup>.

Now consider an optimistic CEO who overestimates the probability that the incentive claims will pay off. This CEO values each equity incentive claim at more than \$10 - for example \$12. It follows that the optimal compensation package for the optimistic CEO comprises \$64 in cash and only four incentive claims<sup>6</sup>. Therefore an optimistic CEO is satisfied enough in receiving fewer incentive claims. The optimistic CEO values this package at \$112. Valuing these incentive claims using the unbiased beliefs of the board, the optimistic CEO will receive lower total compensation than an unbiased CEO – the value of the package will be \$104<sup>7</sup>. This discussion leads to the following hypothesis:

***H1a: More optimistic CEOs receive a lower level of incentive compensation than less optimistic CEOs***

Assuming that the salary base for CEOs are the same and kept constant, CEOs who receive lower equity compensation will also receive lower total compensation. Otto (2012)

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<sup>4</sup> The incentive claims are valued at a total of  $6 \times 8 = \$48$ , giving a total of \$112 ( $64 + 48$ ).

<sup>5</sup> \$64 cash plus  $6 \times 10 = \$60$  incentive claims.

<sup>6</sup> The incentive claims are valued at a total of  $6 \times 12 = \$48$ .

<sup>7</sup> \$64 cash plus  $4 \times 10 = \$40$  incentive claims

supports this statement as he finds that more optimistic CEOs receive lower levels of total compensation. Hence, the next hypothesis is:

***H1b: More optimistic CEOs receive lower total compensation than less optimistic CEOs***

If CEOs are more optimistic, they should be willing to take on greater risk through incentive pay. This is because they believe the incentive pay they receive through compensation will achieve a higher value in the future. Hence, they should be more likely to engage in a contract that gives a greater proportion of incentive-based pay. As such, the following hypothesis is presented:

***H1c: More optimistic CEOs receive a greater proportion of incentive pay than less optimistic CEOs***

### **2.3 Changes in CEO optimism and their compensation contracts**

Prior studies by Hillary and Menzly (2006), and Billet and Qian (2008) find that individual characteristics, such as overconfidence, are acquired and are not traits people are born with. In other words, the level of overconfidence changes over time, and any change is likely to depend on how well managers have performed in the past. More specifically, Hilary and Menzly (2006) analyze the short-term dynamics of analysts' forecasts, and find that analysts whose earnings forecasts are more accurate than the median for the previous four quarters are more likely to release less accurate future earnings forecasts. This result is likely due to increased confidence or overconfidence of the analysts, which is triggered by their past successes.

Although these findings focus on analyst forecasts, Hilary and Menzly (2006) state that the results are likely to be generalizable to other settings. Similarly, Billet and Qian (2008) examine the sequence of merger and acquisition deals made by CEOs, and find that the pattern of deals made by CEOs reflects CEOs overconfidence. CEOs are more likely to acquire target company when they had positive experience from past acquisition deal, even if these future deal is negative in value.

As previously indicated, managerial traits are found to affect firm performance (Campbell et al., 2011; Hirshleifer et al., 2012) and agency theory proposes that compensation is linked to firm performance. If managerial traits are developed over time, as Hilary and Menzly

(2006) and Billet and Qian (2008) indicate, whether changes in managerial traits leads to a change in compensation payments, is an empirical question.

If, through experiences, optimism changes (Hilary and Menzly, 2006; Billet and Qian, 2008), firm performance will also change, as managerial characteristics have been found to affect firm performance (see, for example, Campbell et al., 2011; Hirshleifer et al., 2012).

As outlined in section 2.1, agency theory proposes that CEOs compensation is linked to the firm performance in order to provide incentives to CEOs (Ross, 1973). Hence, if CEOs optimism changes, the incentives needed (incentives pay) to motivate CEOs are likely to change as well. The hypothesis arising from this discussion is:

***H2a: An increase (decrease) in optimism is associated with a decrease (increase) in the level of incentive compensation***

As previously outlined, CEOs who receive lower equity compensation will also receive lower total compensation, assuming the salary base for CEOs remains constant. Hence, the next hypothesis is presented below:

***H2b: An increase (decrease) in optimism is associated with a decrease (increase) in the level of total compensation***

A change in CEOs optimism will change the willingness of CEOs to take on greater risk through incentive pay. Hence, if CEOs experience a positive change in their optimism, as optimistic CEOs believe the future outcome is going to be better than it really is, there should be a positive change in their proportion of incentive compensation as well. As such, the following hypothesis is presented:

***H2c: An increase (decrease) in optimism is associated with an increase (decrease) in the proportion of incentive pay compensation***

## **2.4 The impact of CEO ownership on the relation between optimism and pay**

Following Jensen and Meckling (1976), many studies document a positive relation between CEO ownership and firm value (Morck, Shleifer, Vishny, 1988; Stulz, 1988; McConnell and Servaes, 1990; Chen et al., 1993; Griffith, 1999). When CEO ownership is already high, such that it might support the alignment of interests between the CEO and owners, whether CEO ownership affects the association between the CEO optimism and pay is uncertain. Extant research (see for example Gomez-Mejia et al., 1987; Tosi & Gomez-Mejia, 1989; Hambrick & Finkelstein, 1995; Kroll et al., 1997; and Werner, Tosi, & Luis, 2005) documents that CEOs with higher ownership become more risk averse and choose a greater proportion of cash in their pay contracts. This is due to higher human capital tied with the firm because of the proportion of the firm's shares owned by the CEOs. Therefore, those CEOs with high share ownership are more likely to prefer cash-based payments that do not impose additional undiversified risk onto them (Mehran, 1995). Hence, the structure of the CEO pay contract is likely to be influenced by the level of ownership that the CEO possesses. This thesis thus, looks into whether share ownership has any effect on the relationship between optimism and compensation.

Share ownership is also likely to affect the relationship between optimism and compensation because CEOs who are more optimistic tend to release higher earnings forecasts (Otto, 2012). This is because more optimistic CEOs perceive the future value of the firm is higher than it is. On the other hand, CEOs with a high level of ownership may also release higher forecasts to induce an increase in share price, in order to increase their wealth. Therefore, it is possible that high earnings forecast caused by high CEO ownership rather than optimism. Hence, the structure of CEO pay may not only be influenced by the optimism of CEO, but also by the CEO's equity ownership. CEO ownership therefore may affect the relation between CEO optimism and CEO pay.

As previously indicated, where a CEO has greater human capital in the firm through share ownership, they are going to be subject to higher firm-specific risk. Consequently, the compensation contract of a CEO with greater share ownership is likely to demand a greater proportion of cash compared to equity (Mehran, 1995). Hence, CEO ownership level can affect the influence of CEO optimism on the compensation contract. This discussion leads to the following hypothesis:

***H3: More optimistic CEOs with higher share ownership will receive a smaller proportion of equity compensation than those with lower share ownership.***

### **3. Data and Methodology**

#### **3.1 Sample selection**

The sample selection procedure commences by identifying the listed CEOs for each firm on *Execucomp* for the period 1992 to 2012 (yielding 81,358 firm-year observations for 1,749 firms) (see Table 1). Any CEO who is not the first CEO (that is, who were not the CEO at or before the IPO date) is deleted. In addition, 1,409 firm-year observations without an IPO date were excluded. Observations with CEOs that only appear once, possibly due to only acting as CEO for that particular year, are also deleted (2,051 observations). A further 70,075 observations was deleted for firms with multiple CEOs, where the CEO has changed. The available sample from *Execucomp*, therefore, consists of 7,823 firm-year observations for 1,071 firms from 1992 to 2012.

In order to test our hypotheses, the observations are further reduced due to missing control variable data. Specifically, 672 firm-year observations are deleted due to missing book to market value of equity return on asset (ROA) data or stock return data. This resulted in 7,121 observations for 1011 firms available to test hypotheses 1 and 2. A further 1,045 observations are removed in order to test hypothesis 3 as a result of missing share ownership data.

Panel B of Table 1 summarizes the final sample sizes for each measure of optimism used to test each hypotheses. For hypothesis 1, the analysis employing average moneyness as the measure of optimism utilizes a sample of 6,556 observations (722 firms), while the analysis employing firm investment rate as the optimism measure uses a sample of 6,496 observations for 939 firms. The procedure resulted in 3,087 (634 firms) and 6,435 (935 firm) observations available for hypothesis 2 (using average percent moneyness and firm investment rate as optimism measure respectively) while 3,189 (702 firms) and 5,569 (906 firms) observations are available for hypothesis 3 (using average percent moneyness and firm investment rate as optimism measure respectively).

[Table 1 about here]

Table 2 presents a summary of sample firms by industry. The dominant industries represented in the sample are information technology (26.9%) and consumer discretionary (20.9%). Health care (15.0%), industrials (10.1%) and financials (13.2%) are also well represented. The least prevalent industries are utilities, telecommunication services, and consumer staples, with firms in these industries representing only 5.7% of the sample.

[Table 2 about here]

### **3.2 Variable measurement**

To analyze the association between optimism and CEO compensation, data for CEO compensation (bonus, option grants, restricted stock grants and total compensation), CEO optimism, and for other control variables, such as ROA and stock return are required. All data are obtained from the *Compustat* fundamental annual and *Execucomp* databases. The *Riskmetrics* database is employed to obtain board characteristics data, used in robustness tests. The specific measures for dependent, independent and control variables are discussed below.

#### **3.2.1 Dependent variables**

The dependent variable used to test the hypotheses is CEO compensation. Seven alternative measures of CEO compensation are used in this study. Short term incentives (Bonus) payments is directly downloaded from the Compustat Execucomp database, while long term incentive pay (LTIP) is calculated as the sum of restricted stock and option grants. Total incentive payments (Incent) is calculated as the sum of bonus and LTIP. Total compensation (Tcomp), proportion of bonus (Propbonus), proportion of LTIP (PropLTIP) and proportion of pay given as incentives (Propincent) are also used as dependent variables. Total compensation comprises salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted, long term incentive payouts, and all other total. Propbonus is calculated as bonus divided by total compensation (Tcomp). The same calculation is employed when estimating the proportion of LTIP (PropLTIP) and proportion of total incentives (Propincent).

#### **3.2.2 Optimism**

The key variables of interest in this study are CEO optimism (for all hypotheses) and share ownership (used in analyzing hypothesis 3). Optimism is measured in two ways.

The first measure follows Malmendier and Tate (2005), Campbell et al. (2011), and Hirshleifer et al. (2012). It is based on option exercise decisions of CEOs (average percentage moneyness). The second measure following Campbell et al. (2011) and is based on firm investment level or rate. Both dummy and continuous forms of these optimism measures are employed. The calculation of each optimism proxy is discussed below.

*Option exercise decisions (average percentage moneyness)*

Option exercise by CEOs late in the option life, ignoring the fact that their option is already deep in the money, is likely to be an indication that CEOs believe future prospects of the firm are better (Malmendier and Tate, 2005). As such, we follow Hirshleifer et al. (2012) and measure CEO optimism based on the non-exercise of those options that has 67% or more moneyness.

In order to calculate moneyness, we follow Campbell et al. (2011) and Hirshleifer et al. (2012) and use the approximation method of Core and Guay (2002). This requires the exercise price for the options and the stock price at fiscal year-end. The estimate of average exercise price of options requires ‘per-option realizable value’, calculated by dividing the ‘total realizable value’ of the exercisable options by the number of exercisable options (Equation 1). After the ‘per option realizable value’ is calculated, the estimated average exercise price is assessed by subtracting ‘per option realizable value’ from the stock price at the fiscal year end (Equation 2). The average percent moneyness of the options can then be calculated by dividing the ‘per option realizable value’ by the estimated average exercise price (Equation 3).

$$OptRealize_{ijt} = exercisable_{ijt} / exercisablenum_{ijt} \quad (1)$$

Where:

$exercisable_{ijt}$  = Total realizable value of the exercisable options

$exercisablenum_{ijt}$  = Number of exercisable options

$$Estimateprice_{ijt} = PRCC_{F_{jt}} - OptRealize_{ijt} \quad (2)$$

Where:

$PRCC_{F_{jt}}$  = Stock price at fiscal year end

$$Averagemoneyness_{ijt} = OptRealize_{ijt} / Estimateprice_{ijt} \quad (3)$$

This estimation yields the first continuous optimism measure ( $Opt1_{ij}$ ) in this study. The dummy for this option based measure ( $Opt1dum_{ij}$ ) is created by assigning a value of 1 to those where CEOs have exercisable, yet unexercised, options with a percentage moneyness of 67% or more (representing an optimistic CEO), whilst zero indicates a non-optimistic CEO (less than 67% of moneyness). This 67 % cut off is consistent with that applied by Malmendier and Tate (2005 & 2008) and Campbell et al. (2011).

### ***Firm investment rate***

Firms with optimistic CEOs tend to invest more as they overestimate firm future performance. A modified firm investment rate (Campbell et al., 2011) is used to classify CEOs as optimistic or otherwise. A CEO is considered optimistic when the firms' investment rate is higher or equal to the median of the sample's investment rates.

Firm investment rate is calculated by dividing the capital expenditures with the beginning of year Property Plant and Equipment (PPE) (Equation 4).

$$firminvrates_{jt} = CAPX_{jt} / PPEGT_{jt-1} \quad (4)$$

Where:

$CAPX_{jt}$  = Capital expenditures for that year

$PPEGT_{jt-1}$  = Beginning balance of PPE

This equation provides a continuous optimism proxy, documenting the extent to which CEOs are optimistic. A dummy variable is also constructed ( $Opt2dum_{ij}$ ) by denoting a value of one to those observations where the firm investment rate is greater than or equal to the median and zero where observations falls below the median.

### ***Shares ownership***

CEO share ownership data is used to examine hypothesis 3. Share ownership ( $Sharesown_{ijt}$ ) represents the percentage of firm's shares owned by the CEO. This data is downloaded from Compustat Execucomp. The interaction variable between the optimism and the CEO stock ownership ( $Interaction_{ijt}$ ) is estimated by multiplying share ownership ( $Sharesown_{ijt}$ ) by each of the respective optimism measures.

### **3.2.3 Control variables**

A number of variables have been shown to be associated with components of CEO pay. These are therefore controlled for in this study. CEO tenure, gender, and age are included, consistent with Otto (2012), to control for managerial characteristics. Following Low (2009) and Otto (2012), firm and year fixed effects are also controlled. Return on assets (ROA) and stock return ( $R_{jt}$ ) are used as proxies for firm performance. The natural log of total assets (lnTA) is used as a proxy for firm size. Book to market ratio (BM) is included as a variable to control for growth and investment opportunities (Low, 2009). Industry dummies are also included.

When analyzing hypothesis 2, prior year earnings ( $EAR_{t-1}$ ) is also included to control for firm performance when examining changes in optimism and compensation. Prior year earning is estimated by lagging earnings before interest and tax (EBIT) divided by lagged total assets.

### **3.3 Empirical Models**

Ordinary least squares (OLS) models are used in hypotheses testing. Given the use of panel data, the residuals may be correlated across firms and time (Petersen, 2009), resulting in biased OLS regressions (Petersen, 2009). Standard errors are clustered by year and firm (Petersen, 2009) to mitigate this issue.

The following ordinary least squares (OLS) regression model is estimated to examine the relationship between CEO optimism and total compensation, in order to test hypothesis 1. The model is sourced from Otto (2012), with slight modifications, including incorporation of ROA as one of the  $Performance_{jt}$  variables, and industry dummies as control variables.

$$\ln(y_{ijt} + 0.001) = \alpha + \beta_1 \text{Optimism}_{ij} + \beta_2 \text{Tenure}_{ijt} + \beta_{3-4} \text{Performance}_{jt} + \beta_5 \text{Firmssize}_{jt} + \beta_6 \text{Gender}_i + \beta_7 \text{Age}_i + \beta_8 \text{BM}_{jt} + \beta_{9-17} \text{Industry}_{jt} + \varepsilon_{ijt} \quad (5)$$

$\ln(y_{ijt})$  represents the dependent variable – CEO compensation, with  $y$  representing compensation in both dollar and percentage terms. Compensation includes short term incentive (Bonus), long term incentive pay (LTIP), total incentives (Incent) and total compensation (Tcomp), while compensation in percentage terms includes proportion of bonus, proportion of LTIP and proportion of total incentive (Propbonus, PropLTIP, Propincent respectively).  $\text{Optimism}_{ij}$  denotes the optimism of the CEO, with measures previously defined.

$\text{Tenure}_{ijt}$  is a continuous variable representing the number of years the CEO has been in that position with the firm.  $\text{Performance}_{jt}$  captures ROA, and stock returns ( $R_{jt}$ ) for the fiscal year. Following Otto (2012), the gender-pay gap is controlled for by including a dummy variable ( $\text{Gender}_i$ ), given a value of one if the CEO is male and zero if female.  $\text{Firmssize}_{jt}$  is measured as the log total assets, while  $\text{BM}_{jt}$  is the firm's book to market value of equity used to control for growth and investment opportunities.  $\text{Age}_{it}$  is a continuous variable indicating the CEO's age.  $\text{Industry}_{jt}$  is a vector of dummy variables, categorizing firms into 10 industry groupings.

To test Hypotheses 2, which aims to test relationship between changes in optimism and changes in compensation, the following model (Model 6) is utilized:

$$\Delta \ln(y_{ijt} + 0.001) = \alpha + \beta_1 \Delta \text{Optimism}_{ij} + \beta_2 \text{Tenure}_{ijt} + \beta_{3-4} \text{Performance}_{jt} + \beta_5 \text{Firmssize}_{jt} + \beta_6 \text{BM}_{jt} + \beta_7 \text{EAR}_{t-1jt} + \beta_8 \text{Gender}_i + \beta_9 \text{Age}_{it} + \beta_{10-19} \text{Industry}_{jt} + \varepsilon_{ijt} \quad (6)$$

In order to calculate the effect of changes in optimism on changes in compensation, the model employs the calculated changes of the seven measures of compensation and the two continuous measures of optimism. While the other variables are as defined earlier, an additional variable,  $\text{EAR}_{t-1jt}$ , reflecting prior year's performance, is included in model 6.

To test hypothesis 3, which aims to test the effect of CEOs share ownership on the relationship between optimism and compensation, Model 7 incorporates an interaction between CEO ownership and CEO optimism. In addition to the variables discussed previously,  $\text{Sharesown}_{ijt}$  and an interaction between share ownership and optimism is included.

$$\begin{aligned} \ln(y_{ijt} + 0.001) = & \alpha + \beta_1 \text{Optimism}_{ij} + \beta_2 \text{Sharesown}_{ijt} + \beta_3 \text{Optimism} * \text{Sharesown}_{ijt} + \beta_4 \text{Firmssize}_{jt} \\ & + \beta_5 \text{Tenure}_{ijt} + \beta_{6-7} \text{Performance}_{jt} + \beta_8 \text{Gender}_i + \beta_9 \text{Age}_{it} + \beta_{10-18} \text{Industry}_{jt} \\ & + \varepsilon_{ijt} \end{aligned} \quad (3)$$

## 4. Results

### 4.1 Descriptive statistics and correlation matrix

The descriptive statistics for the compensation components are presented in Table 3. In Panel A, bonus payments indicate a minimum (maximum) of \$0 (\$76,951,000) and mean (standard deviation) of \$710,053 (\$1,896,474). The long-term incentive payments (LTIP) minimum (maximum) is \$0 (\$369,311,619) with a mean (standard deviation) of \$3,270,065 (\$11,194,042). This minimum of \$0 for LTIP shows that some CEOs, do not receive long-term incentive payments (4127 observations). Whilst incentive pay (sum of Bonus and LTIP) received by CEOs has a minimum (maximum) of \$0 (\$ 369,385,869) and a mean (standard deviation) of \$2,485,241 (\$9,055,879), total compensation received by CEOs has a minimum (maximum) of \$0 (\$369,888,044) a mean (standard deviation) of \$3,398,739 (\$10,367,627). The minimum of \$0 for the compensation indicates that some CEOs do not receive any payment in some years. The high standard deviations of these compensation components imply that CEOs salary distribution is highly dispersed. Table 3 also shows that the average compensation package received by CEOs in the U.S. consists of around 64% in incentive payments, with some receiving no incentive payments, and others receiving only incentive payments. The table also shows that the average compensation contract in the U.S. has around 24% in bonus pay and 56% LTIP.

Panel B, indicates that CEOs, on average, own around 5.4% of the company's shares with some, holding as much as 38.7% and others, holding none. Looking at the optimism measures (the continuous measures), the mean or average CEOs are classified as optimistic. This can be seen from the mean values of Opt1 and Opt2, 2.614 and 0.285 respectively (see Table 4.1, Panel B). Specifically, mean value of 2.614 for Opt1 is larger than the 0.67 optimism classification mark identified in Malmendier and Tate (2005 & 2008) and Campbell et al., (2011). The mean value of 0.285 for Opt2 is larger than the median value of Opt2 (positively skewed), which is 0.16635. This median value of Opt2 is the optimism classification mark based on modified

Campbell et al., (2011) optimism measure (recalling discussion in Chapter 3). The descriptive statistic for sample's control variables (Table 4.1, panel C), indicates that the average CEO is 52 years old with a range between 34 and 75 years. On average, CEOs have been in their role with the firm for 11 years, with some having been CEO for as long as 38 years.

A correlation matrix, presented as Table 4, indicates no evidence of multicollinearity in the sample data. The variable of interest – optimism (measured by Opt1, Opt2, Opt1dum and Opt2dum) – does not appear to be highly correlated with other control variables.

[Table 4 about here]

#### **4.2 CEO optimism and compensation**

Table 5 presents the results for hypothesis 1. While results for four measures of optimism are computed, for brevity, only results using the continuous measure of firm investment rate as the measure of optimism (Opt2) are reported. Hypothesis 1a states that more optimistic CEOs receive a lower level of incentive compensation than less optimistic CEOs. Results are presented in columns 1, 2, and 3 of Table 5 for Bonus, LTIP and total incentives, respectively.

[Table 5 about here]

Consistent with hypothesis 1a, results indicate that more optimistic CEOs receive lower bonus payment (coefficient = -0.2446). This finding is also consistent with findings in prior literature (see Otto, 2012 and Wang et al., 2013), One unit increase in optimism decreases the unit of bonus received by 0.2446. This negative and significant relationship with optimism does not persist in when LTIP and incentives payment (Incent), are used as dependent variables (refer columns 2 and 3). Nor are these results observed for our other measures of optimism (average percent moneyiness, or the dummy variants of both measures).

Control variables that also relate to pay are firm size (lnTA), performance (ROA and stock returns, and the tenure of the CEO (Tenure). These results support propositions of agency theory and prior research examining determinants of CEO pay.

Hypothesis 1b, predicting that more optimistic CEOs are likely to receive lower levels of total compensation than less optimistic CEOs is not supported for any of our measures of optimism.

Columns 5-7 of Table 5 present results of hypothesis 1c, predicting that higher optimism is associated with a greater proportion of equity pay in compensation contracts. Columns 6 and 7 show a positive and significant relationship between optimism and the proportion of LTIP (coefficient = 0.0582) and proportion of incentive payment (coefficient = 0.0390). These results support hypothesis 1c, by showing that an increase in one unit of optimism increases the proportion of LTIP and proportion of total incentive payment by 5.82% and 3.9% respectively. These results are supported by our other measures of optimism – both continuous (Opt1) and dummy (Opt3) measures of average moneyness at the 10 % and 5% level of significance respectively, and our dummy measure of firm investment rate (Opt4) at the 5% level of significance.

### **4.3 Changes in CEOs optimism and their compensation**

Hypothesis 2 examines the relation between changes in optimism and changes in compensation. Given, hypothesis 2 predicts the association between changes in optimism and pay, only continuous optimism measures are used in hypotheses testing. For brevity, only results using changes in average percentage moneyness are presented in Table 6, changes in firm investment rate are discussed, but not reported.

[Table 6 about here]

In support of hypothesis 2a, predicting an increase (decrease) in optimism to be associated with a decrease (increase) in the level of incentive compensation, Table 6, column 1 indicates that a change in optimism is negatively associated with a change in bonus (coefficient = -0.0075). This result indicates that for every one-unit change in optimism, bonus compensation decreases by 0.0075. This significant relationship however, does not persist in column 2 and 3 of Table 6 when changes in LTIP and changes in total incentive pay are used as dependent variables.

Changes in optimism are not found to be associated with changes in total compensation, in contrast with hypothesis 2b, which predicts an increase (decrease) in optimism to be associated with a decrease (increase) in the level of total compensation. Hypothesis 2c, which predicts that an increase (decrease) in optimism is associated with an increase (decrease) in the proportion of equity compensation, is supported (refer column 6 of Table 6). A change in optimism (both  $\Delta\text{Opt1}$  and  $\Delta\text{Opt2}$ ) is positive and significantly associated with changes in the proportion of LTIP (coefficient = 0.0025). This indicates that for every one-unit increase in optimism, changes in the proportion of LTIP increase by 0.25 %. This positive and significant result however, is not observed in columns 5 and 7, when changes in the proportion of bonus and changes in proportion of total incentive pay are used as dependent variables.

Results also indicate that larger and more profitable firms have larger changes in incentive pay, consistent with the analysis presented in Table 5, for hypothesis 1. While gender was not a significant variable when testing hypothesis 1, in this model, female CEOs appear to have received a greater increase in total compensation<sup>8</sup> and a smaller change in the proportion of equity pay as shown in columns 4 and 5. This supports the findings of prior literature showing that women appear to be less optimistic (Alloys and Ahrens, 1987; Maccoby and Jacklin, 1974).

#### **4.4 CEO ownership effects on the relation between optimism and pay**

Share ownership is also likely to be associated with the relationship between optimism and compensation, and specifically the proportion of equity that CEOs receive in their compensation contracts. Table 7 presents results for hypothesis 3, which predicts that CEOs with higher optimism and higher share ownership will receive a smaller proportion of incentive compensation than those with lower share ownership.

[Table 7 about here]

In order to analyze the impact of share ownership on the proportion of incentive payment in compensation contracts, for this third model, a variable measuring CEO share ownership variables (Sharesown), together with its interaction with optimism are included in the model. Again, for brevity results of analysis using firm investment rate as the measure of optimism are

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<sup>8</sup> However, given the small proportion of female CEOs in the sample, these results should be viewed with caution.

tabulated. The first three columns show the results using the continuous variable of the optimism measures (Opt1 and Opt2), while the last three columns show the results using the dummy variable of the optimism measure (Opt1dum and Opt2dum).

Results indicate that using the continuous variable (Opt2) of firms' investment rate as optimism measure, the interaction variables are not significant and hence, hypothesis 3 is not supported. However, when a dummy variable of firm investment rate (Opt2dum) is used as optimism measure, column 4 of Table 7 indicates that when the proportion of bonus is used as the dependent variable, the interaction variable between optimism and share ownership is positive and significant (coefficient = 0.4050).

This positive coefficient indicates that an increase in CEOs share ownership increases the established relationship between optimism and the proportion of bonus by 0.4050. Hence, when considering two CEOs with the same level of optimism but different levels of share ownership, the CEO with the higher share ownership has a higher proportion of bonus in his/her compensation contract. This positive and significant coefficient contrasts with hypothesis 3 which predicts that more optimistic CEOs with higher share ownership will receive a smaller proportion of compensation than those with lower share ownership.

#### **4.5 Additional and robustness tests**

We follow prior work by Nourayi et al. (2012) and Otto (2012) in including the percentage of independent directors as a proxy for corporate governance in additional testing. Untabulated analysis that includes board independence shows similar results to that discussed in the main tests.

Results of hypotheses tests thus far presented including dichotomous endogenous variables (Opt1dum, Opt2dum) are prone to bias. Consequently, a treatment effect model is used to mitigate this bias. The results of employing a treatment effect model, which are untabulated, provide support for the main tests, indicating our main findings are not biased as a result of our optimism measures.

Finally, two-stage least square (2SLS) regression models are carried out for those tests that employed optimism continuous measures as independent variables. Again, our main tests present robust results.

## **5. Conclusion**

Individual characteristics such as overconfidence and optimism are well documented determinants of corporate behavior (for example, Keiber, 2002; Bertrand and Schoar, 2003; Campbell et al., 2011, Boulton and Campbell, 2012; Graham et al., 2012; Hirshleifer et al., 2012, Otto, 2012). In this study we investigate CEO optimism as one of these managerial characteristics to determine whether it is associated with the compensation received by CEOs.

Two optimism measures are employed in hypotheses tests – average percent moneyness and firm investment rate. Both continuous and dummy forms of these measures are used. Results provide support for hypothesis 1a and 1c that more optimistic CEOs receive lower incentive payments, and a larger proportion of incentive pay. This also supports findings of prior research (see for example Otto, 2012 and Wang et al., 2013). Our results are sensitive to the measure of optimism and compensation used in the analysis, with cash bonus more likely to present significant results.

We also find support for our hypothesis (hypothesis 2) an increase (decrease) in optimism is associated with a decrease (increase) in the level of incentive compensation; and an increase (decrease) in the proportion of incentive pay compensation. Finally, whilst share ownership positively interacts with the association between optimism measured by firm investment rate dummy and the proportion of bonus, share ownership does not affect the association between optimism and the proportion of incentives payment. These findings contrast with hypothesis 3 that states more optimistic CEOs with higher share ownership will receive a smaller proportion of equity compensation than those with lower share ownership. The positive relationship found between optimism and proportion of bonus indicates that as share ownership increases, the association between optimism and proportion of bonus increases as well. The results found appear qualitatively robust after conducting tests using 2SLS and treatment effect models in order to control for potential endogeneity biases.

These findings thus contribute to the extant literature by showing that by using a dataset where CEO pay is not impacted by that of the preceding CEO (in contrast to Otto, 2012), optimism indeed does affect CEO pay and its structure, including proportion of the bonus, LTIP and total incentives pay. These findings can be of assistance to boards in readjusting compensation contracts to ensure better alignment between shareholders' and CEO's interests. It could also enable better decision-making regarding the appropriateness of proposed CEO pay packets.

While Gomez-Mejia et al. (1987), Gomez-Mejia and Balkin (1989), Hambrick and Finkelstein (1995) and others show that CEO ownership affects CEO pay, we go further by examining whether CEO ownership impacts on the relation between CEO optimism and pay. We find, however, CEO ownership does not seem to have a statistically significant impact on the relation. Hence, the association between optimism and proportion of incentive pay in compensation contracts does not depend on the percentage of firm shares owned by CEOs.

As with all studies of this nature, our work is subject to several limitations. First, by examining the measure of optimism based on a firm investment rate, CEOs are classified as optimistic in a particular year when the firm investment rate in the previous year satisfies the optimism criteria. Hence, CEOs are classified as optimistic based on one time classification. This can be compared to Campbell et al. (2011), who in order to avoid lumpy investment require CEOs to be classified as optimistic if the firm investment rate satisfies the optimism criteria for at least two consecutive years. Secondly, alternative measures of optimism, based on net stock purchases used by Malmendier and Tate (2005) and Campbell et al. (2011); and based on a firm's earnings per share forecast, used by Otto (2012), have not been incorporated in our analysis. Future research could consider these alternative measures to assess whether our results are robust to the measure of optimism.

Future research could also expand on the findings in this study by examining whether the strength of the association between optimism and compensation is the same over time. Perhaps in some years the association between optimism and compensation is stronger than in others. Studies could then analyze the determinants of the difference. This could provide useful knowledge to board of directors in creating compensation contracts that can better align the

interests of shareholders and CEOs. The findings could also be useful for government in establishing more optimal regulation regarding CEO pay.

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### Table 1: Sample selection

This table presents the sample selection procedure employed in this study. Panel A presents the filtering steps for CEOs compensation observations. A number of data filters are imposed to prepare valid data for analysis. Panel B presents the samples available for each hypothesis based on available optimism data.

Panel A: Sample selection for CEOs compensation		No. of obs.	No. of firms
Initial CEO compensation firm-years from 1992-2012		81,358	1,749
LESS:	Observations without IPO date	1,409	
	CEOs with only 1 year of observations	2,051	
	Firms with a change in CEOs	70,075	
Observations available for analysis		7,823	1,071
LESS:	Observations without required financial or stock return data	672	
Observations available for hypotheses 1 and 2		7,121	1,011
LESS:	Observations without share ownership data	1,045	
Observations available for hypothesis 3		6,076	978
Panel B: Sample sizes for each hypothesis matched with optimism variables		No. of obs.	No. of firms
Hypothesis 1			
Observations using average percent moneyiness		3,556	722
Observations using firm investment moneyiness		6,496	939
Hypothesis 2			
Observations using changes in average percent moneyiness		3,087	634
Observations using changes in firm investment moneyiness		6,435	935
Hypothesis 3			
Observations using average percent moneyiness		3,189	702
Observations using firm investment moneyiness		5,569	906

### Table 2: Sample firms by industry

	No. of observations	Freq. (%)
Industry classifications		
Information technology	2104	26.90
Financials	1036	13.24
Energy	311	3.98
Materials	331	4.23
Industrials	792	10.12
Consumer discretionary	1631	20.85
Consumer staples	292	3.73
Health care	1171	14.97
Telecommunication services	125	1.60
Utilities	30	0.38

**Table 3: Descriptive statistics for the sample**

This table reports the summary statistics for the pooled sample of 7,823 firm-year observations over the period 1992 – 2012. Incent is the total incentive pay, which is the sum of Bonus and LTIP. Bonus is the bonus received by CEOs. LTIP is the total sum of option grants and stock return grants received by CEOs. Tcomp is the total compensation received by CEO. Propbonus is the proportion of bonus in the total compensation payment. PropLTIP is the proportion of LTIP in the total compensation payment. Propincent is the proportion of total incentive payment in the total compensation payment. Opt1 is the continuous measure of the average percent moneyness. Opt2 is the continuous measure of the optimism measure based on firms' investment rate. Opt1dum is the dummy variable from the average percent moneyness. Opt2dum is the dummy variable from the optimism measure based on firm investment rate. Sharesown is the percentage of firm's shares owned by CEOs. TA is the total assets. ROA is the firm's return on asset.  $R_{jt}$  is the firm's physical stock return at the end of the year.  $EAR_{t-1}$  is the firm's previous year earnings. BM is the firm's book to market ratio. Tenure is the CEOs tenure. Board is the percentage of independent directors within the board. Age is the CEO's age.

Panel A: Dependent variables	N	Mean	Std. Dev.	Median	Minimum	Maximum
Incent	6224	\$2,485,241	\$9,055,879	\$769,747	\$ -	\$369,385,869
Bonus	4763	\$710,053	\$1,896,474	\$320,221	\$ -	\$76,951,000
LTIP	3696	\$3,270,065	\$11,194,042	\$1,160,219	\$ -	\$369,311,619
Tcomp	4228	\$3,398,739	\$10,367,627	\$1,397,270	\$ -	\$369,888,044
Propbonus	2416	0.2375	0.1829	0.1910	0.0000	1.0000
PropLTIP	3144	0.5643	0.2744	0.6152	0.0000	1.0000
Propincent	3683	0.6375	0.2512	0.6998	0.0000	1.0000
Panel B: Independent variables	N	Mean	Std Dev.	Median	Minimum	Maximum
Opt1	3753	2.6147	7.9733	0.6774	-1.0000	62.1497
Opt2	7086	0.2855	0.3603	0.1664	0.0000	2.1502
Opt1dum	3753	0.5047	0.5000	1.0000	0.0000	1.0000
Opt2dum	7086	0.5000	0.5000	0.5000	0.0000	1.0000
Sharesown	6655	0.0538	0.0818	0.0180	0.0000	0.3865
Panel C: Control variables	N	Mean	Std. Dev.	Median	Minimum	Maximum
TA	7806	\$ 4,736,963	\$ 29,744,993	\$ 647,451	\$ -	\$ 838,201,000
ROA	7754	0.0478	0.1598	0.0567	-0.7371	0.4628
$R_{jt}$	7174	0.1412	0.6669	0.0396	-0.9130	3.6214
$EAR_{t-1}$	7754	0.0898	0.1232	0.0914	-0.4051	0.4149
BM	7566	0.4789	0.4045	0.3829	-0.2845	2.3150
Tenure	7544	11.2094	7.6623	10.0000	0.0000	38.0000
Board	2997	0.6477	0.1756	0.6666	0.1429	0.9090
Age	7800	52	9	52	34	75

**Table 4: Correlation Matrix**

This table reports the correlation between individual variables. The top half shows the Pearson correlations, while bottom half shows Spearman correlations. Gender is the CEOs gender. Other variables are as defined in Table 3.

	Incent	Bonus	LTIP	Tcomp	Opt1	Opt2	Opt1dum	Opt2dum	TA	ROA	R <sub>jt</sub>	EAR <sub>t-1</sub>	BM	Tenure	Board	Sharesown	Age	Gender
Incent		0.696	0.683	0.277	-0.018	-0.006	0.037	0.003	-0.010	0.042	0.048	0.020	-0.046	-0.098	-0.056	-0.110	-0.071	-0.007
Bonus	0.678		0.190	0.214	-0.058	-0.121	0.035	-0.066	0.148	0.079	0.040	0.077	0.024	-0.039	-0.038	-0.091	0.077	-0.008
LTIP	0.960	0.397		0.504	0.035	0.033	0.058	0.039	0.024	0.012	0.069	0.001	-0.049	-0.084	0.080	-0.107	-0.032	0.001
Tcomp	0.934	0.609	0.927		-0.022	0.013	0.045	0.026	-0.050	0.065	0.010	0.045	-0.034	-0.048	0.016	-0.010	-0.047	-0.013
Opt1	0.086	0.015	0.123	0.069		0.316	0.304	0.179	-0.047	-0.009	0.155	-0.054	-0.174	-0.125	-0.036	-0.023	-0.128	-0.005
Opt2	0.011	-0.101	0.103	0.004	0.362		0.246	0.545	-0.036	-0.069	-0.002	-0.056	-0.193	-0.230	-0.058	0.045	-0.296	-0.019
Opt1dum	0.087	0.039	0.098	0.067	0.867	0.299		0.242	-0.053	0.160	0.226	0.075	-0.371	-0.095	0.041	-0.051	-0.137	0.053
Opt2dum	0.005	-0.085	0.082	0.005	0.286	0.866	0.242		-0.023	0.081	-0.020	0.092	-0.198	-0.152	-0.085	0.032	-0.247	-0.016
TA	0.175	0.424	0.283	0.352	-0.143	-0.223	-0.100	-0.196		-0.025	-0.003	-0.046	0.054	-0.019	0.034	-0.056	0.035	0.007
ROA	0.066	0.022	0.083	0.063	0.324	0.250	0.278	0.207	-0.184		0.130	0.675	-0.194	0.055	-0.015	0.075	0.087	-0.003
R <sub>jt</sub>	0.090	0.084	0.105	0.078	0.302	-0.042	0.245	-0.049	-0.014	0.194		-0.087	-0.253	-0.024	0.005	0.036	-0.035	0.024
EAR <sub>t-1</sub>	0.028	0.029	0.018	0.024	0.149	0.166	0.131	0.142	-0.130	0.686	-0.017		-0.184	0.060	-0.057	0.084	0.114	-0.006
BM	-0.061	0.045	-0.166	-0.059	-0.470	-0.296	-0.412	-0.245	0.229	-0.398	-0.282	-0.305		0.065	0.002	-0.039	0.116	0.003
Tenure	-0.108	-0.015	-0.119	-0.088	-0.110	-0.181	-0.080	-0.128	0.089	0.015	-0.011	0.037	0.077		-0.059	0.297	0.468	-0.011
Board	-0.007	-0.023	0.081	0.095	0.053	-0.077	0.052	-0.074	0.096	-0.041	0.016	-0.062	-0.022	-0.056		-0.208	-0.022	-0.039
Sharesown	-0.128	-0.062	-0.120	-0.108	-0.018	0.046	-0.021	0.054	-0.180	0.108	-0.014	0.101	-0.044	0.334	-0.243		0.060	-0.023
Age	-0.070	0.095	-0.065	-0.025	-0.166	-0.294	-0.135	-0.244	0.253	0.007	0.001	0.066	0.154	0.410	-0.028	0.059		0.025
Gender	-0.015	0.000	-0.034	-0.042	0.055	-0.015	0.053	-0.016	0.005	-0.004	0.030	-0.003	0.016	0.016	-0.044	-0.024	0.029	

**Table 5: Relationship between CEO optimism and compensation pay using firm investment rate as measure**

This table presents regression results for hypothesis 1, predicting the relationship between CEO optimism and compensation. Optimism is measured as the firm investment rate. Model numbers 1, 2, 3, 4, 5, 6 and 7 represent bonus (Bonus), long-term incentive payments (LTIP), total incentive payments (Incent), total compensation (Tcomp), proportion of bonus (Propbonus), proportion of LTIP (PropLTIP) and proportion of total incentive payments (Propincent) respectively. All other variables are as defined in Table 3. P values are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

	H1a			H1b	H1c		
	1	2	3	4	5	6	7
Intercept	8.3489*** (0.0000)	7.7016*** (0.0000)	14.4218*** (0.0000)	14.0446*** (0.0000)	0.0849 (0.4307)	0.0869 (0.6037)	0.1626 (0.2821)
Optimism	-0.2446*** (0.0042)	-0.0215 (0.9391)	-0.6985 (0.1097)	-0.0239 (0.9088)	-0.0139 (0.4513)	0.0582** (0.0231)	0.0390** (0.0402)
BM	-0.1605** (0.0392)	-0.2945 (0.1917)	-0.4116 (0.3678)	-0.2266 (0.2231)	0.0134 (0.3493)	-0.0707*** (0.0004)	-0.0487*** (0.0002)
Age	-0.0004 (0.9263)	-0.0047 (0.7342)	-0.066** (0.0244)	-0.0265** (0.0245)	0.0017** (0.0392)	-0.0025*** (0.0094)	-0.0030*** (0.0015)
Gender	-0.0896 (0.7887)	-0.2290 (0.7832)	-0.2738 (0.8218)	-0.6257 (0.4374)	-0.0086 (0.8414)	-0.0507 (0.3183)	-0.0160 (0.7157)
Tenure	-0.0151*** (0.005)	-0.0555*** (0.0012)	-0.0735** (0.0261)	-0.0229 (0.2504)	0.0007 (0.4574)	-0.0031** (0.0107)	-0.0037*** (0.0001)
LnTA	0.3202*** (0.0000)	0.4837*** (0.0000)	0.3396* (0.0673)	0.2211 (0.1295)	0.0050 (0.3621)	0.0498*** (0.0000)	0.0511*** (0.0000)
ROA	0.6834*** (0.0002)	0.5793 (0.2420)	2.6963** (0.0411)	2.8799*** (0.0006)	0.0469* (0.0850)	0.0901** (0.0205)	0.1787*** (0.0000)
Rjt	0.0874*** (0.0073)	0.3582*** (0.0031)	0.4590** (0.0413)	-0.0558 (0.7300)	0.0041 (0.5786)	0.0266** (0.0119)	0.0323*** (0.0008)
Clustering standard error at CEO year and firm level	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	40.74	8.39	8.94	3.78	6.61	26.79	29.35
Adj R-square	0.1519	0.0403	0.021	0.0133	0.0469	0.1437	0.137
n	3772	2988	6295	3492	1942	2615	3037

**Table 6: Relationship between changes CEO optimism and changes in compensation pay using average percent moneyness as measure**

This table presents regression results regarding the hypothesis 2, which look at the relationship between changes CEO optimism and changes compensation.  $\Delta\text{Opt}_t$  is the optimism measure based on changes in average percent moneyness.  $\text{EAR}_{t-1}$  is the firm's last fiscal year earning. The number 1, 2,3,4,5, 6 and 7 and all other variables are as define in Table 4.3. P values are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

	H1a			H1b	H1c		
	1	2	3	4	1	2	3
Intercept	8.5874*** (0.0000)	8.9070*** (0.0000)	8.7184*** (0.0000)	9.2707*** (0.0000)	0.1143* (0.0812)	0.0292 (0.7498)	0.0135 (0.8879)
$\Delta\text{Opt}_t$	-0.0075*** (0.0009)	0.0244 (0.2384)	-0.0074 (0.4454)	0.0097 (0.2421)	0.0005 (0.4584)	0.0025* (0.0865)	0.0008 (0.3969)
BM	0.1947 (0.1502)	-0.0703 (0.8924)	-0.4290 (0.1866)	-0.2702* (0.0986)	-0.0218 (0.2052)	-0.0055 (0.7766)	0.0318* (0.0596)
$\text{EAR}_{t-1}$	0.8683 (0.1004)	-1.2255 (0.5185)	0.1115 (0.8833)	0.4324 (0.5841)	0.0414 (0.4927)	-0.0537 (0.6699)	-0.0185 (0.8618)
Age	-0.0085 (0.2516)	-0.0211 (0.2396)	-0.0157 (0.1000)	-0.0239** (0.0117)	0.0002 (0.2980)	0.0011 (0.3503)	0.0007 (0.4501)
Gender	-0.4600 (0.2580)	-0.1941 (0.6537)	0.0846 (0.8422)	-1.0343* (0.0611)	0.1058*** (0.0000)	0.0020 (0.9621)	0.0104 (0.7903)
Tenure	0.0009 (0.9326)	-0.0474 (0.1096)	-0.0334*** (0.0000)	-0.0356*** (0.0002)	0.0001 (0.7997)	-0.0017** (0.0378)	-0.0006 (0.3946)
LnTA	0.2808*** (0.0000)	0.4158*** (0.0001)	0.4234*** (0.0000)	0.4980*** (0.0000)	-0.0061** (0.0104)	-0.0071* (0.0584)	-0.0093*** (0.0061)
ROA	-0.4897 (0.1908)	1.9104* (0.0925)	0.2695 (0.5812)	-0.2885 (0.6112)	-0.2225** (0.0412)	0.0981 (0.4031)	-0.0382 (0.6326)
$R_{jt}$	0.1073** (0.0498)	0.3197** (0.0379)	0.2548*** (0.0006)	0.1640** (0.0411)	-0.0359** (0.0120)	0.0185 (0.2790)	0.0137 (0.1036)
Clustering standard error at CEO year and firm level	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	5.36	2.44	6.13	14.28	1.71	1.3	0.99
Adj R-square	0.072	0.0232	0.0693	0.1773	0.0144	0.0032	-0.0001
n	1012	1090	1240	1110	879	1664	1851

**Table 7: CEO's share ownership effect on relationship between CEO optimism and compensation pay using firm investment rate**

This table presents regression results regarding the hypothesis 3, which look at the effect of CEO's share ownership on the relationship between CEO optimism and compensation. The number 1, 2, 3 represent proportion of bonus, proportion of LTIP in total compensation payment and proportion of incentive payment in total compensation payment respectively. All other variables are defined as in Table 4.3, 4.5, 4.6 and 4.9. P values are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

	Firm investment rate			Firm investment rate dummy		
	1	2	3	1	2	3
Intercept	0.1160 (0.2905)	0.1215 (0.5123)	0.3071*** (0.0028)	0.1112 (0.2625)	0.1450 (0.4459)	0.2934*** (0.0044)
Opt2	-0.0304* (0.0977)	0.0600** (0.0461)	0.0421* (0.0969)			
Opt2Dummy				-0.0235* (0.0619)	0.0357*** (0.0993)	0.0402** (0.0109)
Optimism*Shareown	0.2754 (0.1128)	-0.0190 (0.9446)	-0.1154 (0.6660)	0.4050*** (0.0001)	-0.2320 (0.2447)	-0.1862 (0.2175)
BM	0.0252 (0.1177)	-0.0707*** (0.0010)	-0.0555*** (0.0002)	0.0279* (0.0779)	-0.0740*** (0.0006)	-0.0545*** (0.0002)
Age	0.0019** (0.0319)	-0.0029*** (0.0053)	-0.0037*** (0.0002)	0.0020** (0.0172)	-0.0032*** (0.0025)	-0.0037*** (0.0001)
Gender	-0.0293 (0.5479)	-0.0558 (0.3359)	-0.0427 (0.3447)	-0.0273 (0.5833)	-0.0543 (0.3819)	-0.0423 (0.3768)
Tenure	-0.0001 (0.9504)	-0.0016 (0.2425)	-0.0021** (0.0461)	0.0002 (0.8533)	-0.0018 (0.1584)	-0.0021** (0.0331)
LnTA	0.0084 (0.1232)	0.0462*** (0.0000)	0.0487*** (0.0000)	0.0085* (0.0998)	0.0461*** (0.0000)	0.0491*** (0.0000)
ROA	0.0537 (0.1282)	0.1057** (0.0181)	0.1903*** (0.0000)	0.0555 (0.1366)	0.1011** (0.0238)	0.1820*** (0.0000)
Rjt	0.0070 (0.3728)	0.0295*** (0.0050)	0.0341*** (0.0002)	0.0083 (0.2894)	0.0287*** (0.0072)	0.0349*** (0.0002)
Sharesown	-0.0216 (0.8438)	-0.3071** (0.0490)	-0.2916** (0.0471)	-0.1580* (0.0948)	-0.2004 (0.2649)	-0.2318 (0.138)
Clustering standard errors	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	5.55	20.81	25	6.08	20.57	25.38
Adj R-square	0.0496	0.1429	0.1482	0.055	0.1415	0.1501
n	1657	2258	2623	1657	2258	2623