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The influence of Gender and Optimism on CEO Total Compensation

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ABSTRACT

Despite extensive academic focus, equal treatment in CEO compensation remains inconsistent, particularly concerning gender pay gaps. This thesis examines the CEO compensation differences based on gender and CEO personality trait such as an optimism. Using data from Compustat, Execucomp, Institutional Shareholder Services, and Institutional Brokers' Estimate System for the period from 2016 to 2023. The regression analysis reveals that female CEOs as well as the CEOs who exhibit optimistic behavior receive higher total compensation. However, the interaction effect of gender and optimism shows no significant effect of being female and optimist on total compensation. These findings contradict with prior literature that suggest that women are typically underpaid. This does not imply the absence of a gender gap but rather suggests that under current conditions being a female or an optimist positively impacts total compensation, at least at the CEO level.

Keywords: CEO, Gender, Executive, Compensation, Optimism.

JEL codes: G30, G34, J33, M12

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CHAPTER 1 Introduction

Since the introduction of gender equality legislation in the 1970s, there has been a concerted effort to ensure equal treatment between men and women in the labor market (Altonji & Blank, 1999). Despite this efforts, significant disparities in pay persist. As of 2023, women in the United States earned 83,6 cents for every dollar earned by man (U.S. Bureau of Labor Statistics, 2023). This represents a slight improvement from the 82 cents recorded in 2020, underscoring the slow pace of progress. The pay gap is not uniform; it varies across racial groups, education levels, occupations, and countries, affecting both full-time and part-time workers (Goldin, 2014). This disparity is also evident at the executive level. The recent ascent of women to Chief Executive Officers (CEO) positions in major corporations, notably highlighted by Jane Fraser's appointment at Citibank, stands for a major transformation in the corporate landscape, supporting the discussions on gender gap inequality. The inclusion of female in top executive positions is often viewed through the perspective of addressing long-standing gender gap inequalities in the corporate hierarchy. While current research has extensively explored the individual impacts of gender and CEO optimism on executive compensation, the nuanced interaction between these factors remains underexplored. This study aims to bridge this gap by examining this interaction between gender and optimism on CEO compensation, by investigating how gender and personal optimism collectively influence remuneration. Such research is not only timely but essential in understanding the multifaceted influences on CEO pay, which in turn, can inform more balanced and fair corporate governance policies.

The literature on CEO compensation has traditionally been focused on performance metrics and company outcomes as primary determinants. However, this focus has broadened over recent years to encompass different view of the determinants of compensation, incorporating factors like gender and CEO psychological traits, specifically optimism. The research by Bugeja et al. (2012) serves as a cornerstone in this discourse, challenging the prevailing narrative of a significant gender gap in CEO compensation within the U.S. Their findings identified a scenario where female at the CEO level receive compensation packages comparable to their male counterparts, highlighting a complex interplay of factors influencing compensation beyond gender alone. Complementing this perspective, Otto (2014) presents how optimism shapes executive compensation, positing that CEOs with optimistic outlooks – characterized by positive earnings forecasts – often receive smaller stock option grants and overall compensation. This inverse relationship between optimism and compensation depicts complex considerations in structuring executive pay, balancing the need to motivate and reward while mitigating overly risky behaviours from unwanted optimism.

De Amicis et al. (2021) introduce sentiment analysis into equitation, exploring how gender differences appear in earnings conference calls and potentially impact stakeholder perceptions and compensation fairness. Their research suggests that the way CEOs communicate, enforced by optimism, and shaped by their gender, significantly influences how their work is perceived and valued. Moreover, Xiao (2023) suggests that female CEOs not only tend to be more optimistic compared to male CEOs but also lead firms to better performance and stock market reaction. This work underscores a critical gap in the literature: while the effects of gender and optimism on CEO remuneration have been examined in isolation, their interaction and combined impact on compensation strategies remain largely unexamined.

Despite the advancements in understanding the components of executive compensation, a large gap persists in understating how factors such as gender and CEO optimism together influence the compensation packages. This oversight is backing the evolving corporate governance landscape, which increasingly recognises the importance of diverse leadership and the nuanced effects of psychological traits on executive decision-making and compensation fairness. The current literature on executive compensation ignores the effects of gender and optimism, failing to account for their potential interaction, and the unique consequences of this interaction may present in analysis of total compensation. This study seeks to address this gap by exploring the combined effects of gender and CEO optimism on executive compensation packages, thus posing the question:

"How do gender and CEO optimism interact to influence the compensation of top executives?"

To address the research question posed, this study will use OLS regression analysis to provide an in-depth analysis of the interaction between CEO gender and optimism on compensation. The quantitative analysis will draw upon a data on CEO compensation, gender, and optimism levels, with data sourced from reputable databases such as WRDS, IBES, and Execucomp. The primary dataset will consist of S&P 500 companies from 2016 to 2023, providing a rich foundation for analysis. This period offers a substantial, yet recent time span to observe the dynamics of executive compensation in relation to gender and CEO optimism. I will assess each of CEO's optimism levels with two different measures. The first approach is based on the CEO's option exercise decisions. If the total compensation including option grants is more than including options exercised – even though the options were already deep in the money – it can be classified as "late" and taken as an indication for optimistic beliefs about the company's prospects. The second approach is based on the earnings forecasts that are voluntarily released by each firm. A forecast that exceeds the analysts estimates (or ex-post realized earnings that can be further extracted) is classified as "optimistic". The fraction of forecasts that are classified as optimistic will be used as a proxy for CEO's optimism.

The reasoning behind this approach is that optimistic CEOs overestimate their firms' future performance and thus more likely to release higher earnings forecasts. Incorporating control variables such as company size, industry, and CEO's tenure is critical to isolate the specific effects of gender and optimism from other factors that might influence compensation. This methodology will provide better understanding of how gender and CEO optimism interact to influence executive compensation, considering immediate reactions as well as long-term compensation trends.

This research anticipated to reveal compensation patterns that illustrate the combined effects of gender and CEO optimism, potentially challenging the conclusions drawn by Bugeja et al. (2012) regarding gender gap absence in compensation. Furthermore, the insights gained could significantly inform corporate governance reforms, advocating for compensation policies that are more connected to the diversity of executive profiles and psychological traits. Specifically, this study seeks to demonstrate that the gender gap in CEO remuneration is present and may be influenced by the interaction effect of gender and optimism, offering a plausible explanation for observed inequalities in executive pay. This research strives to promote a dialogue on creating more effective compensation frameworks, acknowledging the complex interplay of gender diversity and psychological differences in corporate governance.

The following section discusses relevant literature and previous studies. Specifically, CEO total compensation, gender and relationship between compensation and gender. Section 3 discusses the data, while methodology is described in section 4. Section 5 discusses the results followed by the conclusion in section 6.

CHAPTER 2 Theoretical Framework

2.1 CEO Total Compensation

CEO remuneration and particularly total compensation has been a central topic in corporate governance research. Total compensation refers to the complete package of financial remuneration provided to a CEO. It encompasses all forms of payment and benefits that a CEO receives in exchange for their effort and management of the company. This typically includes base salary, bonuses, stock options, long-term incentive plans and other forms of financial compensation such as pension plans. Within corporate finance, it is specifically related to the mechanisms designed to incentivize and to align the interests of CEOs (executives) with those of shareholders (principals) (Jensen & Meckling, 1976).

Recent studies have expanded this understanding, incorporating the impact of corporate governance mechanisms on CEO compensation. Core et al. (1999) found that CEOs at firms with weaker governance structures receive greater compensation, and that these firms perform worse. Moreover, Smith & Watts (1992) highlighted that firms with more growth opportunities tend to have less oversight over the actions of executives, which in turn increases CEO compensation. Thus, alignment of interests is crucial in ensuring that CEOs are motivated to act in shareholders' best interests.

The relationship between CEOs and shareholders is often discussed in the context of the principal-agent problem, with shareholders generally setting the compensation structure for CEOs. In this case, the composition of the supervisory board is important, as it influences compensation structures. Research by Elkinawy & Stater (2011) highlights that gender pay gap is larger in firms with male-dominated boards. These firms not only pay female executives less but also have fewer women in top managerial positions and lower chances of having any female executives at all. Thus, boards with greater female representation tend to provide more balanced compensation packages to female executives, indicating that diverse boards may contribute to mitigating gender disparities in CEO pay. If a board includes a higher proportion of women, it is more likely that the compensation for a female CEO will be equitable. However, Thomas & Wells (2011) argue that the Board Capture Theory complicated this dynamic. According to this theory, executives, including CEOs, can dominate their boards of directors and exert substantial influence over their compensation packages. The Board Capture Theory, initially proposed by Jensen (1989), posits that the dispersed ownership typical of public companies makes it difficult for smaller shareholders to effectively negotiate CEO compensation. In such a structure, CEOs can leverage their influence over the board to secure favorable compensation terms, potentially disregarding the board's gender composition. Thus, even if a board has more women, a powerful CEO might still set their own pay, aligning with their interests rather than those of the shareholders or the board.

2.2 Predictor – Gender

Gender disparities in CEO compensation have been widely researched. Factors contributing to these disparities include sentiment analysis, discrimination, and differing career paths. While traditional research highlighted a persistent gender pay gap, recent studies present a more nuanced picture.

Adams et al. (2007) examined the gender differences in executive compensation and conclude that gender does not play a significant role in determining total CEO compensation when controlling for firm and individual characteristics. Female CEOs, once they attain the top position, are compensated similarly to their male counterparts. However, the path to becoming a CEO may require women to have higher qualifications and experience. The study suggests that performance-based compensation is a critical component in bridging any remaining pay disparities, with female CEOs receiving more of their pay through bonuses and stock options. Moreover, they faced limitations due to smaller proportions of female CEOs compared to male CEOs. In this study, dataset included only 61 female CEOs against 4,634 male CEOs, which prompted the need to also consider lower-level executives for more robust analysis.

A more sophisticated approach called propensity score matching (PSM) proposed by Caliendo & Kopeinig (2008) is a powerful tool for estimating causal effects in observational studies when implemented correctly. In the context of CEO compensation research, where usually the sample of female CEOs is significantly smaller than that of male CEOs, PSM provides a method to address this imbalance and reduce selection bias. Seminal study by Bugeja et al. (2012) utilized this method and conclude that when using propensity score matching to control for firm and individual characteristics, there is no significant gender gap in CEO compensation. This study was pivotal as it challenged the prevailing narrative of a substantial gender pay gap at the CEO level, suggesting that once women reach the highest executive positions, their compensation is comparable to that of their male counterparts. However, this study does not employ this method due to its complexity.

Similarly, a more recent study by Gupta et al. (2018) , which built on Hill et al. (2015), utilized an expanded dataset and propensity score matching (PSM) with robust regression analyses. These studies conclude that that there is no reliable evidence of a gender gap among CEOs of U.S. publicly traded firms when controlling for relevant factors. This suggests that claims about gender gap in CEO compensation favoring women over men may be early.

2.3 Relationship Between Compensation and Gender

A persisted earnings gap between male and female has existed through the last half century. This gap affects both full – and part-time workers across various ethnic groups, education levels, occupations, and countries. Attempts to explain this disparity by citing gender differences in work patterns often assume that male work patterns are standard. The paper by Lips (2003) provides an argument that the gender pay gap persists due to a combination of societal norms, workplace practices, and systemic biases rather than just differences in work patterns or choices. Despite complex causes, evidence based on data on women's lower pay with educational levels and occupations implicate the undervaluing of work, associated with female gender.

Furthermore, narrowing topic to the executive level, the paper by Jordan et al. (2007) shows that female executives are consistently paid 7-10% less than their male counterparts. Moreover, companies led by Democratic CEOs tend to have a smaller or non-existent gender pay gap as well as higher female representation in the executive suite compared to those led by Republican CEOs. The research also notes that female executives typically receive lower performance-sensitive compensation compared to male executives.

Moreover, paper by Kulich et al. (2011) highlights that male executives receive significantly higher remuneration than their female counterparts when controlling for factors such as company performance and executive role. The authors argue that these disparities are driven by gender stereotypes and systemic biases, where men's contributions are more likely to be recognized. Performance-related pay is less correlated with actual company performance for women compared to men, indicating a bias in performance evaluation and rewards. Traditional remuneration models favor masculine traits, leading to biased assessments of female executives' performance and potential.

2.4 Optimism

CEO optimism is described as a cognitive bias where leaders overestimate the likelihood of positive outcomes and underestimate potential risks. This trait can significantly influence strategic decision-making and corporate outcomes, including compensation structures. It is often leading optimistic CEOs to take bolder, riskier actions in response to competitive pressures and tend to present a more favorable view of the company's and their personal performance. These CEOs are often characterized by their positive earnings forecasts and investment decisions, which can impact their remuneration. They frequently anticipate higher future profits and growth, prompting them to make more behavioral decisions based on their stock options and performance. This optimistic outlook can lead to enhanced short-term market valuation and potentially higher bonuses and incentive-based pay.

2.4.1 Approach 1: Options

One approach to measuring CEO optimism involves analyzing their decisions regarding the exercise of stock options. This approach was proposed by Otto (2014), who explored the impact of CEO optimism on incentive compensation structures. The study revealed that optimistic CEOs tend to delay exercising their stock options, even when these options are significantly "in-the-money", meaning they could be exercised for a substantial profit. This behavior to hold onto options indicates confidence in the company's continued growth, serving as a behavioral proxy for CEO optimism. The delay in exercising options by optimistic CEOs is a clear indication of their positive outlook on the company's future performance. The study highlighted that boards of directors often respond to this optimism with caution. Specifically, it was found that optimistic CEOs are frequently awarded smaller stock option grants compared to their less optimistic counterparts. This finding suggests that boards may perceive a higher level of risk associated with overly optimistic executives.

2.4.2 Approach 2: Earnings Forecast

Another approach to measuring CEO optimism involves examining earnings forecasts. This method assesses the tendency of CEOs to release earnings forecasts that consistently exceed the predictions of market analysts. When CEOs regularly project higher earnings than those anticipated by analysts, it indicated a strong sense of optimism. (Xiao, 2023) indicated that female CEOs are generally exhibit higher levels of optimism than their male counterparts, leading to better firm performance and positive stock market reactions. This suggests that the fraction of optimistic forecasts can be used as a proxy for measuring CEO optimism, reflecting the CEO's confidence in the firm's future performance and their willingness to project positive outcomes to the market.

2.5 Moderator Optimism

The interaction between gender and optimism in influencing CEO compensation is a nuanced area of research. While gender alone might not significantly impact compensation, the combination of gender and optimism traits could present unique patterns.

Jalbert et al. (2013) demonstrated that female CEOs who exhibit high levels of optimism lead their firms to better financial performance, which in turn, can justify higher compensation packages. Moreover, the results showed no significant difference in the overall performance of firms led by male versus female CEOs. Faccio et al. (2016) found that female CEOs are generally more risk-averse, leading to different compensation structures compared to their male counterparts. This risk aversion might be mitigated by higher optimism, resulting in balanced compensation strategies. Moreover, female executives are less likely to engage in acquisitions and less likely to issue debt, which in turn affects the type of pay contracts.

The literature reveals that CEO compensation is influenced by a complex interplay of performance metrics, gender, and psychological traits like optimism. While traditional determinants such as firm size and governance structures play a crucial role, the interaction of gender and optimism provides a deeper understanding of compensation dynamics.

Research findings are mixed regarding the gender pay gap, with some studies indicating parity at the CEO level and others highlighting ongoing disparities. Similarly, CEO optimism significantly impacts compensation structures, with optimistic CEOs often receiving tailored compensation to balance potential risks.

Table 1. Theoretical Relations and Expected Correlation of Variables with CEO Compensation

Variable	Theoretical Relation with the dependent/independent variable	Expected correlation (+/-)
Total CEO Compensation	Total CEO compensation is influenced by multiple factors, including CEO characteristics	-
Gender	Prior literature suggests that female CEOs may face compensation disparities despite controlling for other factors	-
CEO optimism (Options)	CEO optimism, measured by the execution of option exercises, indicates confidence in the company's future. Optimistic CEOs may receive different compensation structures to balance the potential risks associated with their decisions	-
CEO optimism (Forecasts)	Optimistic earnings forecasts reflect a CEO's positive outlook on company performance. This trait can lead to higher compensation if the optimism translates into actual performance gains	-
Company size	Larger companies tend to offer higher compensation to attract and retain talented CEOs, reflecting the complexity and scale of the organization	+
CEO Tenure	Longer tenure might be associated with higher compensation duet to accumulated experience, loyalty and proven achievements within the company	+
Industry	Compensation varies across industries due to differing norms and profitability levels.	+ -
CEO Age	Age may influence compensation due to experience and career stage, with older CEOs possibly earning more due to longer career trajectories	+

CHAPTER 3 Data

The study focuses on the CEOs of S&P 500 companies, aiming to understand the influence of gender and optimism on their total compensation. The sample includes all CEOs who served in S&P 500 companies over a specific period, such as from 2016 to 2023, rather than the already examined period from 1998 to 2010 (Bugeja et al., 2012). The data for this study is collected from multiple sources to ensure a comprehensive analysis. ExecuComp contains detailed information on executive compensation, including salary, bonuses, stock options and any other forms of remunerations. Since the focus group consists of S&P 500 companies, it perfectly covered by ExecuComp. Compustat provides financial data on companies, including all three financial statements. IBES (Institutional Brokers' Estimate System) supplies data on earnings forecasts, allowing for the measurement of CEO optimism. Institutional Shareholders Services (ISS), formerly known as the Investor Responsibility Research Center (IRRC), covers information about directors of the S&P 500 companies, which adds to the Execucomp.

I will be using several variables for this research. The variables are as follows: *totalcompensationO, ceo_gender, optimism1, optimism2, market_cap_category, industry, ceo_tenure, ceo_age.*

totalcompensationO is the variable that shows the total compensation of the CEO including salary, bonuses, stock options and other benefits. This variable is measured in millions of dollars (USD).

ceo_gender is a binary variable indicating the gender of the CEO. In this research, it can be either Male or Female. Male gender is coded as 0 and female gender as 1.

optimism1 is an independent binary variable measuring CEO optimism. It is based on the CEO's option exercise decisions. It takes value 1 if total compensation including options exercised larger than total compensation including option grants, 0 otherwise.

optimism2 is an independent binary variable measuring CEO optimism. It is based on the difference between CEO and analyst forecasts. It takes value 1 if forecasts by CEO is larger than the analyst forecasts, 0 otherwise.

market_cap_category is a categorical variable that shows the market capitalization of the company each year. This variable categorizes companies into 5 categories based on their market capitalization: micro-cap, small-cap, mid-cap, large-cap, and mega-cap.

industry is the categorical variable that shows the company's industry type and can be one of the 11 groups based on the Global Industry Classification Standard (GICS) codes. The GICS structure consists of 11 sectors, which are energy, materials, industrials, consumer discretionary, consumer staples, healthcare, financials, information technology, communication technology, communication services, utilities, and real estate.

ceo_tenure is a variable that shows the duration of time the CEO has worked in the company for a given year. This variable is measured in years and provides information about the CEO's experience in their role.

ceo_age is a variable that shows the age of the CEO at the time he or she worked in the company. If a CEO was 45 years old while working in the company in 2021, the value for that year would be 45. If the same CEO was 46 years old in 2022, the value would be 46.

Table 2. Variable Description and Data Source

Variable	Description	Data source
Total CEO compensation	Sum of salary, bonuses, stock options and other benefits	ExecuComp
CEO Gender	Binary variable (Female = 1, male = 0)	ExecuComp, ISS
CEO optimism (Options)	Exercise of in-the-money options	ExecuComp, SEC fillings
CEO optimism (Forecasts)	Fraction of optimistic earnings forecasts	IBES
Market capitalization category	Company category based on the Market capitalization of the company	Compustat
Industry	Industry sector based on GICS codes	Compustat
CEO Tenure	Number of years as CEO	ExecuComp
CEO Age	Age of the CEO	ExecuComp

The summary statistics for the sample containing CEOs of companies from the S&P 500 list are presented in Tables 3 and 4. The total number of observations is 4,324. Table 4 shows that there are 235 female CEOs in the sample, representing approximately 5.4 percent of the total. The percentage of female CEOs in the sample increased by 1 percent compared to Smulders (2022), due to the smaller sample size and focus on S&P 500 companies instead than S&P 1500. The mean age for the CEOs is 61.8 years, with the youngest being 39 years old and the oldest 93 years old.

According to Table 3, the average total compensation of CEO is approximately 13.71 million USD, with the lowest compensation being 0 and largest of 296.3 million USD. This indicates an increase of 7.5 million in mean total compensation compared to Smulders (2022). The average CEO Tenure is approximately 7.4 years. The data is roughly equally distributed over eight years. The industrials group is the most common industry type in the sample, while communication services are the least common.

Table 3: Descriptive statistics for Total compensation, CEO's age and tenure

Variable	Mean	Standard Deviation	Min	Max
TotalCompensation	13.71	14.52	0	296.25
Age	61.83	6.76	39	93
Tenure	7.39	6.894	0.016	57
Observations	4,324			

Table 4: Descriptive statistics for CEO's gender, year, and company's industry type

Variable	Frequency	Percent
Female	235	5.43
Male	4,089	94.57
2016	618	14.29
2017	608	14.06
2018	592	13.69
2019	583	13.48
2020	578	13.37
2021	576	13.32
2022	567	13.11
2023	202	4.67
Energy	251	5.80
Materials	236	5.46
Industrials	646	14.94
Consumer Discretionary	554	12.81
Consumer Staples	286	6.61
Health Care	525	12.14
Financials	643	14.87
Information Technology	544	12.58
Communication Services	186	4.30
Utilities	211	4.88
Real Estate	242	5.60
Total	4,324	100

CHAPTER 4 Method

To analyze the collected data, the study will employ a quantitative approach using pooled regression analysis to estimate the relationship between CEO compensation, gender, and optimism. In this case, the dependent variable will be the total CEO compensation including options exercised. The primary independent variables of interest are the CEO's gender and CEO's optimism. The analysis will also include several control variables to account for other factors that may influence the CEO compensation, such as company size, CEO tenure, industry, and CEO age.

To extract valid inference from the data at hand, it is essential to ensure that all the Classical Linear Regression Model (CLRM) assumptions are met. Regarding the first assumption of the expected value of the error term being zero, this assumption is satisfied as the model includes a constant term. Moreover, since the method of plotting the regression to account for the assumption of normally distributed errors around the zero mean is considered not particularly reliable, I have assumed that the error terms are indeed normally distributed. The Central Limit Theorem solves the issue of non-normality accordingly. Then, I have relied on a Hausman test to decide between a fixed effect and a random effect panel data model. It compares the two sets of estimates (fixed vs random) and rejects the null hypothesis of difference in coefficient not being systematic. The test statistic is 17.76, with a P-value of approximately 0.000 – lower than the critical value of 0.05 (see Appendix A for details). I test if the composite error term is uncorrelated with all regressors across time and clusters, which is the crucial assumption required for Random Effect Model. The test statistic indicates that I reject the null hypothesis and it's advisable to apply Fixed Effect Model, in which intercept is allowed to differ cross-sectionally. In what follows, by including various economically valid regressors and relying on a fixed panel data model, I have accounted for the assumption for exogeneity of regressors.

The independent variables will be categorized into several types. CEO's gender is a binary categorical variable, taking the value of 1 if the CEO is female and 0 if male. CEO's optimism is measured using two binary approaches: the execution of options and the difference between CEO and analyst earnings forecast. Optimism1 is an independent binary variable measuring CEO optimism based on the CEO's option exercise decisions. It takes the value of 1 if total compensation including options exercised is larger than total compensation including option grants, 0 otherwise. Optimism2 is an independent binary variable measuring CEO optimism based on the difference between CEO and analyst forecasts. It takes the value of 1 if forecasts by the CEO are larger than the analyst forecasts, and 0 otherwise. Control variables include company size (measured by market capitalization), CEO tenure (number of years in the current position), industry (categorized according GICS codes), and CEO age (continuous variable).

In order to focus on the moderation effect of optimism on the relationship between gender and CEO compensation, interaction terms will be included in the models. Specifically, the interaction terms Gender * Optimism (Options) and Gender * Optimism (Forecasts) will be introduced to examine whether the impact of gender on CEO compensation is moderated by optimism.

The pooled regressions will be used to estimate the impact of gender and optimism on CEO compensation and analyze the panel data observed over the time period using the following Ordinary Least Square regression equations:

Model 1:

$$Total\_Compensation_i$$
$$= \beta_0 + \beta_1 Gender_i + \beta_2 Optimism(Options)_i + \beta_3 CompanySize_i$$
$$+ \beta_4 Industry_i + \beta_5 Tenure_i + \beta_6 Age + \varepsilon_i$$

Model 2:

$$Total\_Compensation_i$$
$$= \beta_0 + \beta_1 Gender_i + \beta_2 Optimism(Forecasts)_i + \beta_3 CompanySize_i$$
$$+ \beta_4 Industry_i + \beta_5 Tenure_i + \beta_6 Age + \varepsilon_i$$

Control variables play an essential role in ensuring that the regression results accurately reflect the relationship between gender, optimism, and compensation. Company size is expected to have a positive correlation with CEO compensation, as larger companies tend to offer higher pay to attract and retain top executives. CEO tenure is anticipated to be positively correlated with compensation due to the accumulated experience and influence on board over time. Industry controls are included to account for sector-specific variations in pay structures. CEO age is included to control for potential variations in pay related to the executive's career stage.

One important assumption of my study is that gender is not correlated with unobservable factors explaining compensation. Because presence of female CEOs in companies may be influenced by other unobserved factors making gender endogenous. The ideal experiment to test this would involve randomly assigning CEOs, ensuring no bias based on gender, which is difficult to implement.

The regression analysis aims to determine whether gender and optimism significantly impact CEO compensation. A significant coefficient for the gender variable in either model would indicate a gender-based difference in CEO compensation.

Similarly, significant coefficients for the optimism variables would suggest that CEO optimism, measured through option exercises or earnings forecasts, affects total compensation. The interaction terms will reveal if the relationship between gender and compensation is influenced by the level of CEO optimism.

To check the efficiency of the coefficients of the regression results, a White test will be performed to check for heteroskedasticity. White test is a statistical test that establishes whether the variance of the errors in a regression model is constant: the assumption of homoskedasticity is satisfied. To perform a White test, squares of error terms are regressed on all regressors, their squares and cross products. Then, the F-test is conducted to test for joint significance. The null hypothesis of the White test states that the variance of the error term is constant across all observations. If the test indicates a significant heteroskedasticity, the regression results will be adjusted accordingly. Figure 1 below indicates that residuals have various variances across different years.
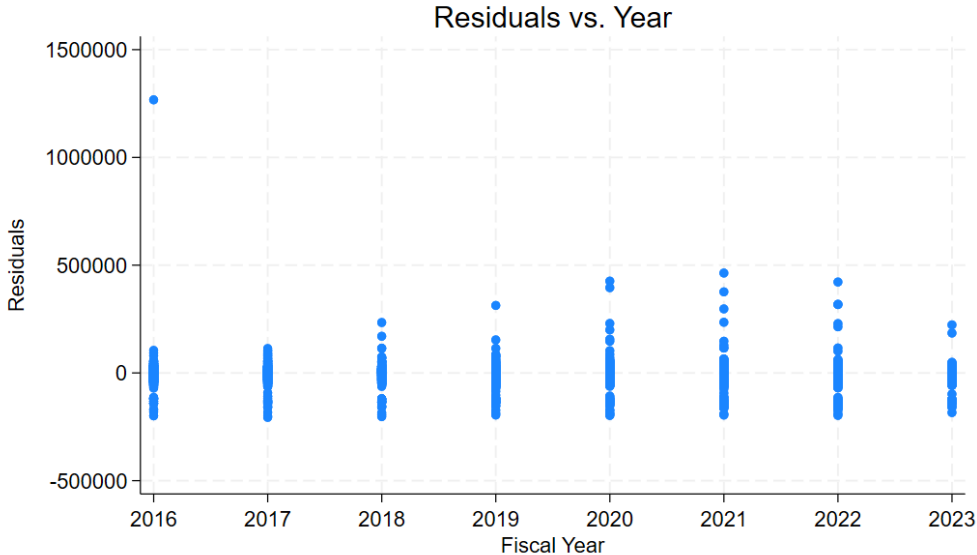

Figure 1: Residuals plotted against the year of the observation

The solution would be to use heteroskedasticity-consistent standard error estimates, like robust standard errors. I have opted for clustered standard errors which are robust to heteroskedasticity and autocorrelation within groups. This therefore helps to ensure that the statistical tests are valid in the presence of heteroskedasticity and within-group correlation. Additionally, the R-squared (R^2) value will be evaluated to determine the percentage of variance in CEO compensation explained by the predictor variables. Although a low R^2 value might suggest that the other factors influence CEO compensation, it will not invalidate the analysis, as the focus is on the significance and direction of the relationships between the key variables.

CHAPTER 5 Results & Discussion

The results of the regression analysis are presented in tables below, which show the coefficients of each variable along with their standard errors. For categorical variables such as ceo_gender, industry, and market cap, one category is treated as the base category. In this analysis, male is the base category for ceo_gender, the energy group for industry, and micro-cap for the company market cap variable. Significance levels are indicated by stars, with three stars denoting significance at the 1 percent level, two stars at the 5 percent level, and one star at the 10 percent level. Coefficients without stars are not significant. Model 1 and Model 2's results were adjusted for robustness following the White test results, which indicates the assumption of homoskedasticity is violated (see Appendix A for details). Moreover,

Table 5 below presents the regression results for Model 1, which examines the impact of gender and optimism (measured by options) on total CEO compensation with control variables included. According to Model 1, the regression results show that CEO gender is not statistically significant, meaning it does not impact CEO compensation. In contrast, optimism measured by options is significant at 1% level, indicating a strong positive effect on CEO compensation. This test involves hypothesis testing where the null hypothesis states that the coefficient is zero (no effect), and the alternative hypothesis states it is not zero (there is an effect). The significant p-value for optimism lead us to reject the null hypothesis, confirming its significant impact on CEO compensation. This means that being an optimist by exercising options deep in the money on average increased CEO total compensation by 40.22 million USD when compared to the non-optimistic CEO keeping other variables constant.

The table depicts that some of the market cap categories affect CEO total compensation. For this case, micro-cap is taken as the base market cap category. All 11 industries were omitted because of multicollinearity (see Appendix A for details). The variable for CEO tenure and age are not significant in this model. The model has an R^2 of 1.4%, which measures the proportion of the dependent variable's variance which is explained by the independent variables in the model. According to the Ozili (2023)

R-squared between 0 and 0.09 (or between 0% to 9%) is too low, indicating that the model explains only a small portion of the variance in CEO compensation.

Table 5: Regression results for the Model 1 - Optimism Calculated as CEO's Execution of Options.

Dependent variable	Total CEO Compensation
	(1) Options
Female	0.53
	(5.51)
Optimism1	40.22***
	(18.19)
Mega Cap	144.49
	(119.38)
Large Cap	-4.71*
	(5.03)
Mid Cap	-15.39**
	(8.17)
Small Cap	-19.35***
	(12.17)
Tenure	1.94
	(1.28)
Age	-2.28
	(19.60)
Constant	136.98
	(110.51)
Observations	4,324
R-squared	0.0142

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 6 below presents the regression results for Model 2, which examines the impact of gender and optimism (measured by forecast) on total CEO compensation with control variables. According to Model 2, CEO gender is significant at 10% level, while optimism measured by forecast is not significant. The positive coefficient suggests that female CEOs on average tend to receive increased total compensation by 3 million USD compared to their male counterparts, keeping other variables constant. However, this result is significant only at the 10% level, indicating relatively weak evidence against the null hypothesis that gender does not affect CEO compensation. The table depicts that some of the market cap categories affect CEO total compensation. For this case, micro-cap is taken as the base market cap category. All 11 industries were omitted because of multicollinearity. Tenure is significant at the 1% level, which means that each additional year of tenure on average increase the CEO total compensation by 0.58 million USD, keeping other factors constant. Age is significant at the 10% level, meaning that each additional year of CEO age on average is associated with an increase in total CEO compensation by 0.11 million USD, keeping other factors constant. The model has an R^2 value of approximately 14%, which indicates that the regression model explains a modest portion of the variance in CEO compensation.

My results differ from the paper by Otto (2014) which found that CEOs whose option exercise behavior and earnings forecasts indicated optimistic beliefs received less total compensation than their peers. According to model 1, positive options exercise behavior increases CEO total compensation by 40 million USD. On the other hand, my results in terms of gender influence on remuneration aligns with the previous research by (Adams et al., 2007; Geiler & Renneboog, 2015) concluded that compensation for women and men is comparable when reaching the CEO position. Moreover, tenure and age are both positive and significant, which corresponds to the paper by (Adhikari et al., 2015) concluding that to motivate older CEOs (who would have raised substantial personal wealth over time) to keep working rather than retiring or moving to a competitor, their compensation package must be highly competitive.

Table 6: Regression Results for Model 2 - Optimism Calculated as CEO Earnings Forecasts vs. Analysts' Forecasts.

Dependent variable	Total CEO Compensation
	(2) Forecast
Female	3.006*
	(18.73)
Optimism2	0.96
	(0.84)
Mega Cap	21.79***
	(6.12)
Large Cap	6.027***
	(2.68)
Mid Cap	-4.05
	(2.65)
Small Cap	-3.45
	(2.96)
Tenure	0.58***
	(0.12)
Age	0.11*
	(0.71)
Constant	-4.38
	(5.47)
Observations	4,319
R-squared	0.1402

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 7 below presents the regression results for Model 1, which examines the impact of gender and optimism (measured by forecast) on total CEO compensation with control variables including the interaction effect of Female and Optimism. According to Model 1, both CEO gender and Optimism are significant. The coefficient for Female is positive and significant at the 5% level, which indicates that female CEOs on average tend to receive increased total compensation by 3.77 million USD compared to male CEOs, holding other factors constant. The coefficient for Optimism1 is positive and significant ant 1% level, which indicates that higher levels of optimism, as measured by the CEO's execution of options, are associated with a substantial increase of 40.84 million USD in total CEO compensation, suggesting that optimistic CEOs are rewarded financially.

The interaction term Female * Optimism1 has a negative coefficient, but it is not statistically significant. This suggests that while there may be an interaction effect between gender and optimism on CEO compensation, the evidence is not strong enough to conclude that this effect is different from zero. The table depicts that some of the market cap categories affect CEO total compensation. For this case, micro-cap is taken as the base market cap category. All 11 industries were omitted because of multicollinearity. The variable for CEO tenure and age are not significant in this model. The model has an R^2 of 1.4%, which is very low, indicating that the model explains only a small portion of the variance in CEO compensation.

Table 7: Regression Results for Model 1 - Optimism Calculated as CEO's Execution of Options, Including the Interaction Effect of Gender, and Optimism.

Dependent variable	Total CEO Compensation
	(1)
Female	3.76**
	(2.24)
Optimism1	40.84***
	(19.19)
Female * Optimism1	-13.54
	(23.59)
Mega Cap	144.44
	(119.38)
Large Cap	-4.83
	(5.027)
Mid Cap	-15.48
	(8.17)
Small Cap	-19.61
	(12.17)
Tenure	1.94
	(1.29)
Age	-2.28
	(1.96)
Constant	136.99
	(110.53)
Observations	4,324
R-squared	0.0142

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8 below presents the regression results for Model 2, which examines the impact of gender and optimism (measured by forecast) on total CEO compensation with control variables including the interaction effect of Female and Optimism. According to Model 2, CEO gender is significant at 10% level, while Optimism2 measured by forecast is not significant. The coefficient for Female is positive and significant at the 10% level, which indicates that female CEOs on average tend to receive increased total compensation by approximately 4.1 million USD compared to male CEOs, holding other factors constant. However, this result is significant only at the 10% level, indicating relatively weak evidence against the null hypothesis that gender does not affect CEO compensation. The interaction term Female * Optimism2 has a negative coefficient, but it is not statistically significant. This suggests that while there may be an interaction effect between gender and optimism on CEO compensation, the evidence is not strong enough to conclude that this effect is different from zero. The table depicts that some of the market cap categories affect CEO total compensation. For this case, micro-cap is taken as the base market cap category. All 11 industries were omitted because of multicollinearity. Tenure is significant at the 1% level, which means that each additional year of tenure on average increase the CEO total compensation by 0.58 million USD, keeping other factors constant. Age is not significant. The model has an R^2 value of approximately 14%, which indicates that the regression model explains a modest portion of the variance in CEO compensation.

Table 8: Regression Results for Model 2 - Optimism Calculated as CEO Earnings Forecasts vs. Analysts' Forecasts, Including the Interaction Effect of Gender, and Optimism.

Dependent variable	Total CEO Compensation
	(1)
Fem	4.096*
	(2.42)
Optimism2	1.086
	(0.87)
Female * Optimism2	-2.16
	(3.68)
Mega Cap	21.71***
	(6.13)
Large Cap	5.99**
	(2.69)
Mid Cap	-4.11
	(8.17)
Small Cap	-3.56
	(2.98)
Tenure	0.58***
	(0.12)
Age	0.11
	(0.07)
Constant	-4.52
	(5.47)
Observations	4,319
R-squared	0.1404

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

For the results of both models, I expected to see a negative effect of being a female on the CEO total compensation. However, the results in Model 1 were insignificant meaning that it is not possible to say that being a female has a negative effect on CEO's total compensation. On the other hand, the results in Model 2 were positive and significant, indicating that being female has a positive effect on CEO's total compensation. I was also expecting that the optimism in both models to have positive effect on the total compensation. It turns out to be positive and significant in Model 1, but not significant in Model 2. My results are different from the paper by Bugeja et al. (2012), which found no association between CEO pay and gender. There is a difference with this research as I changed the sample by increasing it to S&P 500 companies and changed the time from 2017 till 2023. Moreover, regarding the optimism in both models, it turns out to be positive but significant only in Model 1. My results differ from Otto (2014) as he found that CEOs whose option exercise behavior and earnings forecasts are indicative of optimistic beliefs receive less total compensation than their peers. One notable alteration for both models was an increase in a number of female CEOs over time. This could be attributed to the change in corporate governance landscape, which likely drove companies to support and appoint female CEOs. The low R-squared value for Model 1 indicate that the variables included in the regression explain only a small portion of the variance in CEO total compensation. The higher R-squared value for Model 2 indicate that the variables included in the regression explain a modest portion of the variance in CEO total compensation. This is likely because total compensation is influenced by a more nuanced factors and metrics measuring executive's performance such as revenue growth, stock performance, board evaluations etc. Although the R-squared values are low, this does not mean that results are unreliable. However, it highlights the complexity of remuneration policies and numerous factors that contribute to changes in total compensation.

The results are different from the previous research, as they showed that female gender and presence of optimism increase CEO total compensation. It does not mean that there is no gender gap between the two genders but means that being a female or optimist in current conditions affects positively on total compensation, at least on the CEO level.

CHAPTER 6 Conclusion

In this study, I analyzed the relationship between an executive's gender and total compensation difference including CEO optimism as a moderator. To examine this question, I utilized datasets from Compustat, Execucomp, Institutional Brokers' Estimate System (IBES) and Institutional Shareholder Services (ISS), covering the period from 2017 to 2023. Previous research indicated than on average women CEOs are compensated similarly to their male counterparts, but those studies relied on older data from periods with very few women executives. Additionally, corporate governance landscape has changed, which could lead to different results in the end. Furthermore, previous research used propensity score matching to provide a better matched control firm for those firms employing a female CEO, which is not used in this research.

The central question addressed in this thesis was: *"How do gender and CEO optimism interact to influence the compensation of top executives?"*. The analysis used pooled (robust) regressions, which resulted in significant findings such as higher total compensation for female CEOs compared to males and significantly higher compensation when CEO exhibit optimistic behavior (measured by the execution of options). However, the interaction effect of gender and optimism in both Models showed no significant effect of being female and optimist on total compensation.

These findings contradict some prior literature such as (Bugeja et al., 2012) , which found no significant evidence of gender gap, and (Otto, 2014), which found that CEOs whose option exercise behavior and earnings forecasts indicated optimistic beliefs received less total compensation than their peers. It is unexpected because much of the focus in the literature and prevailing attitudes on this topic suggest that women are typically underpaid.

This study concludes that both being female and exhibiting optimism increase CEO total compensation. This does not imply the absence of a gender gap but rather suggests that under current conditions being a female or an optimism positively impacts total compensation, at least at the CEO level.

A primary limitation is the lack of propensity score matching (PSM) to address the disproportionate gender sample sizes. Without PSM, unequal variances could affect the assumptions of the regression analysis, reducing statistical power and potentially leading to incorrect conclusions. However, the large sample size should mitigate this issue to some extent.
Another limitation is the fitted regression model itself, as not all variables yielded significant results, suggesting room for improvement.

Last limitation is that gender is endogenous, so there might be unobserved factors influencing both the likelihood of a woman becoming a CEO and hidden biases or discrimination affecting both CEO selection and company performance as well as remuneration. Future research would involve randomly assigning CEOs, ensuring no bias based on gender.

My findings are relevant to various stakeholders, including the media, academics, companies, and particularly those in high executive positions. This knowledge could encourage more women to pursue higher roles. While significant progress has been made toward achieving equal pay through total compensation or salary, it is important to be cautious about the potential for overcompensation.

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APPENDIX A

Table 9: Hausman test of fixed vs random effects

Test statistic distribution	Test statistic value	P-value
$\chi^2(6)$	17.76	0.00

Table 10: White test results for model 1 and 2

Sample	General test statistic	P-value
Total Compensation 1	117.00	0.00
Total Compensation 2	103.00	0.00

Table 11: Test of multicollinearity including industry

Variable	VIF	1/VIF
Gender	1.03	0.96
Optimism	1.04	0.96
Market cap category		
Small Cap	1.65	0.60
Mid Cap	7.50	0.13
Large Cap	9.09	0.11
Mega Cap	2.88	0.34
Industry		
Materials	11.95	0.08
Industrials	34.41	0.02
Consumer Discretionary	25.46	0.03
Consumer Staples	20.77	0.04
HealthCare	35.16	0.02
Financials	13.57	0.07
IT	27.45	0.03
Communication services	4.86	0.20
Utilities	21.11	0.04
Real Estate	3.32	0.30
Tenure	1.36	0.73
Age	1.31	0.76
Mean VIF	12.44	

Note: This table presents a test for multicollinearity. The second column shows the Variance Inflation Factor (VIF). VIF above 5 indicate the presence of multicollinearity in the model. Variable Industry exhibit high VIF above 10, which inflates the variance of the estimated coefficients, which makes them less reliable.