Do CEOs thrive in times of inflation?

An empirical study on the impact of inflation on CEO compensation in the United States

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Abstract

With CEO compensation and CEO-pay ratio growing to previously unobserved levels simultaneously as the United States has experienced inflation hikes, the discussion on the importance of understanding how CEO compensation develops increases for corporate governance to ensure shareholder value. This research paper aims to explore the impact of inflation on CEO compensation and whether inflation is the reason for the recent surge in CEO compensation. We use a multi-regression on panel data for CEO compensation of American firms between 1994 and 2022. The findings indicate a negative relationship between increases in the two-year lagged inflation and CEO compensation, also suggested by significant results for short-term and long-term compensation in parts of the subsets. Moreover, an amplifying effect is found when inflation is above the Federal Reserve's inflation target rate of 2%, with the negative impact of inflation deepening for certain periods while the positive impact grows for other periods. For CEOs who are new to their position during a period of higher inflation, a positive impact is found potentially indicating an improved bargaining power for their compensation package, which is larger for short-term compensation than the total compensation. These results deviate from the trend found for new CEOs irrespective of inflationary levels which found a decrease in their compensation. No significant results are found on differences in the influence of inflation between industries. To conclude, the negative impact of inflation on CEO compensation does not support recent speculations of inflation driving the growing CEO compensation and CEO-to-worker pay ratio increase. Nevertheless, CEOs are thriving in times of above-target inflation, with especially newly appointed CEOs receiving higher compensation.

Keywords: CEO compensation, compensation determinants, inflation, agency theory

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1. Introduction

Executive compensation has long been an area of interest for the public due to rising global income inequality and the deviation of executive pay from general wage trends (Frydman & Jenker, 2010). Wages for typical workers have been found to not keep up with the same growth, with a cumulative increase of 15.3% since 1978 while CEO pay increased by 1,209.2% in the same period (Bivens & Kandra, 2023).

CEO compensation commonly consists of salary, bonus, and payouts from long-term incentive plans (Frydman & Jenker, 2010, Jeppson et al., 2009), with the stock component becoming a larger share of the total compensation (Bivens & Kandra, 2022). Usually stated drivers of executive compensation are firm performance, firm size (Vemala et al., 2014), age, and experience (Šilingienė et al., 2015). CEO pay is set by the compensation committee and board of directors and serves as a means of corporate governance to protect shareholder wealth, align incentives, and mitigate agency problems (Daily et al., 1998). Despite this, criticism has emerged on the excessiveness of pay for CEOs and its harm to shareholders and workers with some CEOs found to be paid to an extent that is not economically justifiable (Hill et al., 2016).

The debate has taken new ground in the aftermath of the COVID-19 pandemic due to the high increase in CEO pay with expansive growth of the CEO-pay ratio to employees in the United States (Statista Research Department, 2023, Bivens & Kandra, 2023). During the same time, the inflation in the United States outpaced their developed countries' equivalents, reaching the country's highest inflation observed since the 1990s. Consequently, it becomes of interest to analyze the impact of inflation on CEO compensation to understand the development of CEO compensation and ensure protected shareholder value in times of inflation. The current research in this area is limited. In general, nominal salaries have been found to be positively impacted by inflation (Necșulescu & Șerbănescu, 2013), but to our knowledge, no current literature on the impact on CEO compensation has been conducted to understand if they divert from the general trend of workers. Most relevant publications analyze the impact of a financial crisis on CEO compensation (Vemala et al., 2014) and the general impact of the COVID-19 pandemic (Ye et al., 2023).

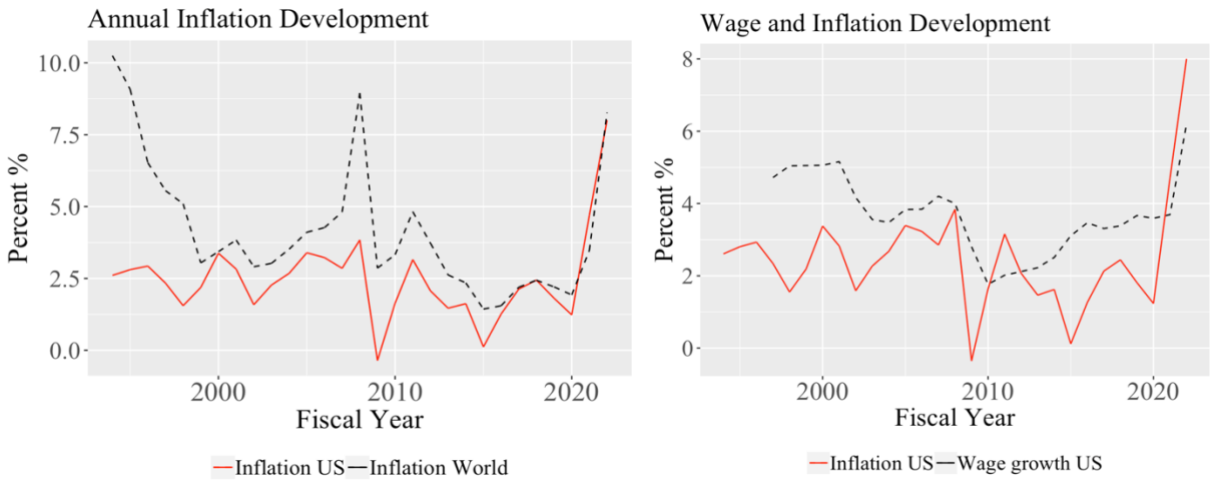
In this research paper, a dataset has been compiled of CEO compensation and its determinants for 454 American firms for the years 1994-2022. Using firm fixed effects panel data regression across several subsets, this paper aims to contribute to the existing literature by increasing the understanding of the impact of inflation on CEO compensation to answer the question: do CEOs thrive in times of inflation? This paper finds that increases in the two-year lagged inflation negatively impact CEO compensation in general, hence CEOs are not excessively compensated when inflation increases. However, when inflation is above the target inflation of 2%, we find an amplifying effect of the impact observed from lagged inflation for both newly appointed and incumbent CEOs, with new CEOs receiving significantly higher compensation when used as an interaction term.

2. Background

This section gives an overview of inflation, wages, and CEO compensation components. We focus on the United States, which is the geographic scope of this paper.

2.1 Inflation Overview

Inflation as measured by the consumer price index (CPI) is defined by the WorldBank as "the annual percentage change in the cost of the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly" (WorldBank, 2022).



Graph 2.1 – Average annual inflation rates, world and the United States
Graph 2.2 –Wage and inflation growth development[1]

Inflation in the United States has followed the trends of world inflation since the 2000s (Graph 2.1). Before the 2000s, inflation percentages deviated to a larger extent between the United States and the world average, with above 10% for the world average in 1994 and 2.5% for the United States. In general, the development follows similar trends while United States inflation has a lower percentage value. The gap between the United States and world inflation stayed relatively similar between 2000 and 2015 while closing in after 2015 with similar values since 2020. The United States inflation traditionally follows other developed countries, but after the COVID-19 pandemic, the percentage in the United States has outpaced other developed countries due to supply chain issues and changes in spending (Jordà et al., 2022), which could be a reason for the decreased gap from 2020. Another measure of inflation is inflation expectations, which move similarly to observed inflation however with less extreme fluctuations (Appendix A – Graph A.1).

[1] Source: The Federal Reserve Bank of Atlanta, 2023

To maintain a sustainable growth of inflation and keep stable expectations regarding price stability and unemployment, central banks usually set inflation targets with the Federal Reserve Bank in the United States targeting a 2% inflation in the long run. The economy can be weakened by low inflation, while excessively high inflation can hurt households purchasing power due to increases in the cost of living (Board of Governors of the Federal Reserve System, 2020). Inflation has been seen to increase in the aftermath of a financial crisis due to expansionary monetary policies (Kaehler & Weber, 2023), which have been seen to have a delayed effect of one year before reaching the maximum impact on the observed inflation (Batini & Nelson, 2001). The recent increase in inflation after the COVID-19 crisis emerged with constrained supply chains at the same time as demand for goods increased (Jordà & Nechio, 2023) and the stronger-than-expected economic recovery that followed.

2.2 Wages Overview

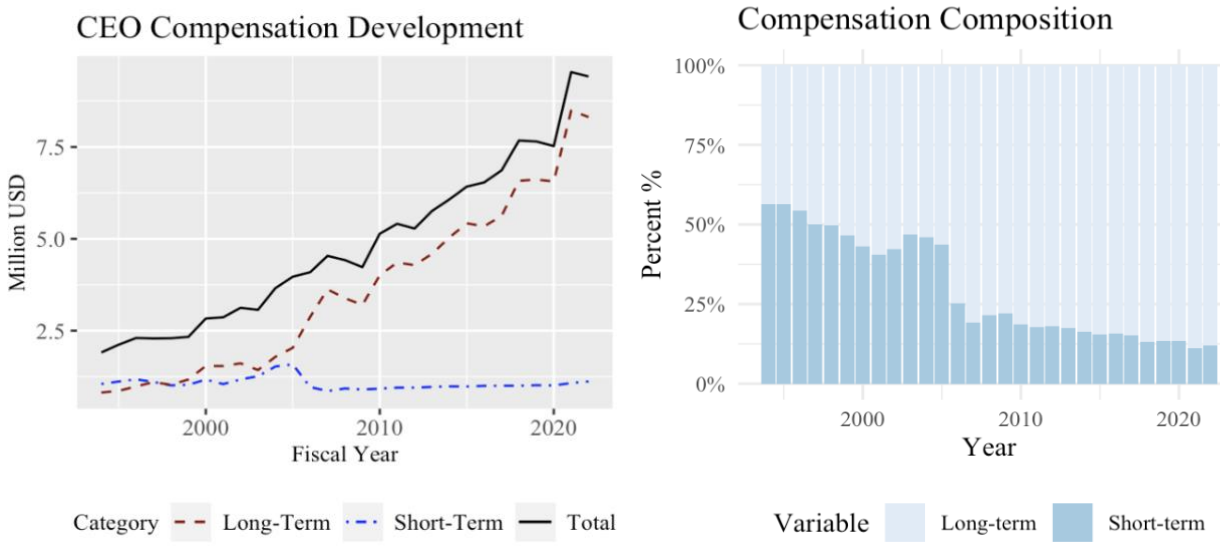
The quantification of an employee's labor is commonly represented by a single metric: their income. Wages and employment levels are determined by the price expectation, and labor market situation – e.g., the supply and demand of labor – as well as other factors such as unemployment insurance that may cause fluctuations in wages (Blanchard, 2021). In the United States, the average wage for workers has increased approximately 2% yearly over the last century (Jones, 2018). Graph 2.2 suggests similarities in movements between inflation and wage growth, with the right positioning of wages next to inflation indicating a delayed response to inflation. Over the past 25 years, wage growth in the United States has demonstrated fluctuations, and for the most part, has consistently outpaced the inflation rate. However, in the year 2021, a notable departure from this established trend became evident where wages grew slower than inflation (The Federal Reserve Bank of Atlanta, 2023). This deviation is attributable to a confluence of factors, including a tightened labor market and early indicators of an impending economic downturn, both on a domestic and international scale (Suthaharan & Bleakley, 2022).

The consequences of this discrepancy are profound, translating into a decline in the purchasing power and quality of life for a considerable portion of the American population, particularly affecting the American population who depend significantly on their earned income to meet their financial obligations (LendingClub, 2023). However, this may not be an issue for the top-income earners in the United States. Studies have found that the top 1% of income earners in the United States experienced a staggering increase of 138% between 1979 and 2013. In contrast, the annual income of the bottom 90% saw a comparatively modest increase of 15% (Bivens & Mishel, 2015). Wages have been found to differ between industries due to differences in technology. Firstly, it leads to increased labor productivity with firms of higher

productivity being able to pay out larger wages. Secondly, more advanced technology demands highly skilled workers, hence pushing up salaries (Mitra & Singh, 2016).

2.3 CEO Compensation Overview

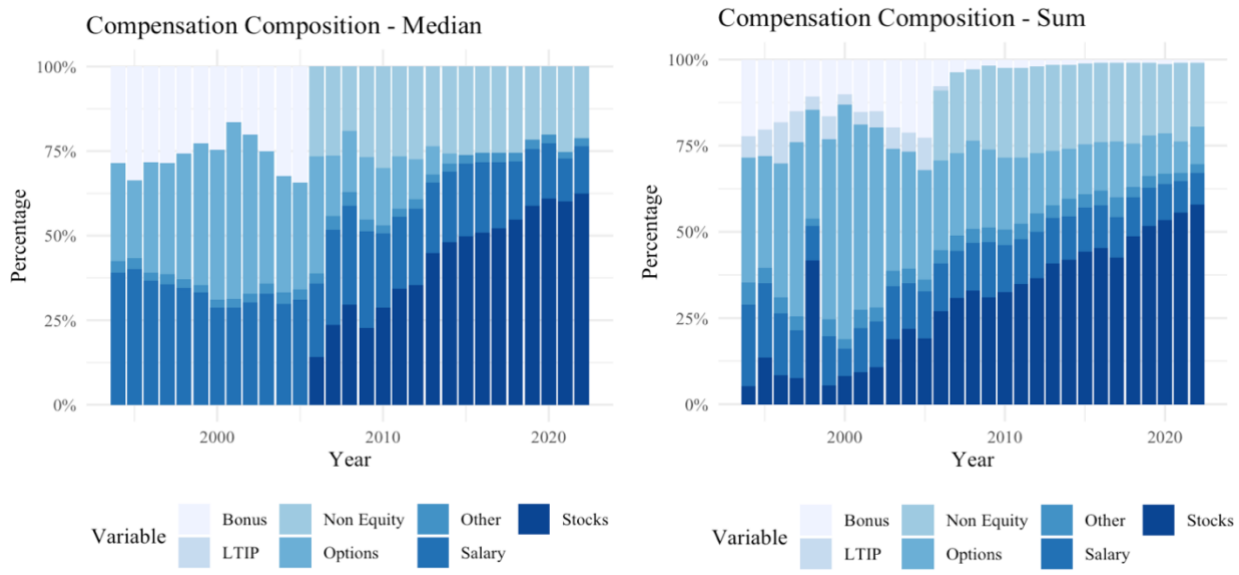
Before the 1970s, there were moderate differences in compensation across managers with a low sensitivity to performance-based compensation. Starting in the 1970s, compensation levels experienced growth. During this period, the gap between managers increased, especially as executive pay became linked to firm performance. This linkage aimed to align the interests of executives and shareholders through equity incentives (Frydman & Jenker, 2010). This growth continued with total compensation in the observed data sample seeing a sharp growth from 1994 to 2022, which was observable for long-term compensation[2] at the same time as short-term compensation[3] stagnated (Graph 2.3). In general, CEOs in the United States have been found to receive higher compensation than other countries potentially due to the extensive use of options in the compensation and favorable taxing on this compensation component (Murphy, 2002).



Graph 2.3– CEO compensation development 1994-2022 of analyzed firm sample, median volumes
Graph 2.4 – Percentage share of compensation as short-term and long-term, median volumes

[2] Definition from Execucomp. Defined as the sum of other annual, total value of restricted stock granted, total value of stock options granted by using the Black-Scholes model, long term incentive payouts (LTIP), and all other total. Changed accounting standards in 2006 changing the composition. Long-term compensation then defined as non-equity incentive plan compensation, grant-date fair value of option awards, grant-date fair value of stock awards, deferred compensation earnings reported as compensation, and other compensation.
[3] Definition from Execucomp. Defined as the sum of salary and bonus. Changed accounting standards in 2006 impacting reporting of the variables.

In 1994, the median short-term compensation components of salary and bonus corresponded to approximately 55%, while in 2022 had decreased to around 11% with long-term components such as stocks, options, and long-term incentive payouts corresponding to the majority of approximately 89% of total CEO compensation (Graph 2.4). Within the long-term component of pay, stocks have grown most dramatically at the same time as options granted have decreased (Graph 2.5 and Graph 2.6).[4]



Graph 2.5 – Percentage share of compensation for components, median value[5]
Graph 2.6 – Percentage share of compensation for components, aggregated value

In 2023, the total direct compensation[6] is expected to have a lower increase in the single digits. This is due to the impact of inflation and potential recession, which are expected to affect company earnings and consequently lowering total shareholder return (Bout et al., 2023).

CEO compensation has been seen to divert from the trends of wage development for average workers with the rapid increase initiating a debate on the pay-setting process and its consequences (Frydman & Jenker, 2010). The typical worker pay has increased cumulatively by 15.3% since 1978 and CEO pay has increased by 1,209.2%, adjusted for inflation. The growth is attributed to CEOs' bargaining power and close

[4] Stock is the sum of Restricted Stock Grant and Grant Date Fair Value of Stock Awarded Under Plan-Based Awards. Options is the sum of Options Granted and Grant Date Fair Value of Options Granted. Other is the variable All Other Compensation, which is the combined value of Other Annual and All Other Total.
[5] Noticeable is a change in the composition in 2006 with several components appear to have a zero value before or after 2006. Partially due to change in accounting standards with inclusion or exclusion of variables, as well as several companies reporting zero in value hence creating a median of zero. Due to the changes in reporting, it is noted that the composition before and after 2006 are not entirely comparable.
[6] Sum of base salary, actual incentive/bonus paid and grant date fair value of long-term incentive (Bout et al., 2023).

pay linkage to stocks (Bivens & Kandra, 2023). In 2022, the CEO-to-worker pay ratio was 344.5, a sharp increase from 131.6 in 1994. A sharp hike in the ratio was observed in the years before 2000, calculated from the 350 largest publicly owned companies in the United States (Bivens & Kandra, 2022, Bivens & Kandra, 2023).

Determination of the CEO compensation package has been deemed an important corporate governance task for boards and the compensation committee[7] to protect shareholder value by aligning the interest of the CEO and shareholders to mitigate agency problems (Daily et al., 1998). Consequently, a debate has arisen if CEOs are paid excessively, therefore harming employees and shareholder wealth. The most powerful CEOs, defined as power held over the board of directors, have been found to be paid to an extent that is not economically justifiable by CEO ability and efforts, or equity risk premiums (Hill et al., 2016). However, some argued that the increase in CEO pay in the 1990s was just catching up to levels of 50 years before and the CEOs holding as a percentage of firm value had decreased over the previous 15 years. A $1,000 increase in shareholder value corresponded to an increase of 6.7 cents in salary and bonus over two years for CEOs and $2.59 when also accounting for stock options and shares owned, indicating that the change was not attributed to firm performance improvements (Jensen & Murphy, 2010). Some researchers find the increase in CEO compensation to be fully justifiable by the growth in market capitalization (Gabaix & Landier, 2008) while others find the increase in pay to be justified by globalization and foreign direct investment and exports (Keller & Olney, 2021).

Amid the inflation increases after the COVID-19 pandemic in 2020, CEO pay growth has exceeded the increase in inflation, while the wage of typical workers has not kept up with the inflation rates, potentially indicating an excessiveness in pay. Possible factors attributing to the increase are the post-pandemic year that saw high economic growth after pandemic shutdowns, generating increases in pay from incentive awards from firm performance and stock prices (ICAEW Insights, 2023).

With the scrutiny over high executive pay from shareholders increasing in times of crisis (Batish et al., 2020), the interest in analyzing the impact of inflation on CEO pay expands to maintain adequate corporate governance and protect shareholder's interests.

[7] Compensation committee existence and effectiveness have in some studies been found to be positively correlated with pay-performance alignment (Kanapathippillai et al., 2019). While others have found no relationship between committee independence and CEO compensation, which questions the increasing emphasis on independent directors on boards (Daily et al., 1998, Niap & Taylor, 2012).

3. Theoretical Framework – Agency Theory

The agency theory framework explains the conflict of interest that occurs between a firm's shareholders and the CEO, or between the CEO and the board of directors. This occurs when one party, the principal or shareholders, delegates work to another party, the agent or CEO to perform the work. As the principal and the agent may have different goals and risk appetite, there might be a misalignment of the interests of each party (Eisenhardt, 1989). The agency theory can be applied in various settings and is frequently applied in understanding organizational phenomena and corporate governance. Different corporate governance mechanisms such as the design of executive compensation, monitoring by financial institutions, and effective board of directors are used to mitigate the conflict of interest. With this, the corporation hopes to align the interests of the executives and the shareholders (Bonazzi & Islam, 2007). As large firms and multinational corporations are more susceptible to agency costs, they are more inclined to take measures to reduce the conflict of interest (Hashmi et al., 2020).

Agency theory suggests that the compensation of the CEO and other executives should be tied to the performance of the firm to provide incentives that encourage the agent to act according to the shareholder's interest. Such an arrangement includes stock ownership and stock options, bonuses, and salary raises based on the performance of the firm and the CEO (Gayle et al., 2018). CEO stock ownership could however have consequences for the firm. Brisley et al., (2021) found that CEOs who receive stock ownership reduce firm risk by lowering leverage and investing less in research and development projects, which thereby causes a decline in firm performance and firm valuation, hence reducing shareholder wealth. In contrast, Liliendfeld-Toal & Ruenzi, (2014) found that stock ownership by executives on average delivers higher stock market returns to shareholders than those with lower managerial ownership.

4. Literature Review

The subsequent section covers previous research of relevance to this study. The areas discussed are CEO compensation components and determinants, how wage and inflation are interlinked, followed by how CEO compensation could change with inflation by observing how the determinants are impacted by inflation.

4.1 CEO Compensation Components and Determinants

Common components of CEO compensation are salary, bonus, restricted option grants, payouts from LTIP, and restricted stock grants (Frydman & Jenker, 2010, Jeppson et al., 2009). Additional benefits can be in the form of pension plans, perquisites, and severance payments (Frydman & Jenker, 2010). The value of

CEO compensation has increased over time and observed to follow a J-shaped curve since 1936. Over time, the composition of CEO compensation has shifted progressively to share ownership (Frydman & Saks, 2010). Between the 1980s and 1990, stock option became the largest component of CEO total compensation but was partially replaced by restricted stock grants in 2000-2001 due to the stock market decline (Frydman & Saks, 2010). Bonuses have also been used by corporations to improve interest alignment among top management and have been a tool for mutual monitoring (Guay et al., 2019). The composition of compensation was noted to change after the Global Financial crisis, where pay was to a larger extent tied to firm performance rather than factors that are less linked to shareholder value, such as firm size, and have shifted further from cash to equity (Sonenshine et al., 2016).

Research usually divides compensation determinants into two parts: external determinants, and internal determinants. The former consists of the labor market situation, economic conditions and activities, legal determinants such as minimum wage and taxes (Šilingienė et al., 2015), social determinants such as labor unions (Vedder & Gallaway, 2002), and the competitive market for managerial talent (Frydman & Jenker, 2010). The internal determinants are twofold, employer- and employee-based. Employer-based determinants are the firm size as in assets (Newman & Bannister, 1998, Hashmi et al., 2020), sales (Jeppson et al., 2009, Zhou, 2000), or market capitalization (Gabaix & Landier, 2008, Gabaix et al., 2014), firm performance as return on assets (Ye et al., 2023), Tobin's Q (Vemala et al., 2014), or stock return (Bebchuk & Grinstein, 2005), financial potency, and leverage (Lin et al., 2019, Ortiz-Molina, 2007). Employee-based determinants include, but are not limited to, age, gender, tenure (Johnston, 2002, Hill & Phan, 1991), experience, and education (Šilingienė et al., 2015).

Elaborating on the above-mentioned determinants and their relation to CEO compensation, larger firms offer higher wages to retain talent (Ozkan, 2011). They also possess higher liquidity for payments and prioritize incentive payments to executives to reduce agency costs (Hashmi et al., 2020). Some previous research has found that there is a correlation between stock return and CEO pay through increasing firm size, suggesting a pay-performance linkage (Bebchuk & Grinstein, 2005). Both the current (Ye et al., 2023, Vemala et al., 2014) and past years' performance have been found to positively impact CEO compensation (Boschen & Smith, 1995), with the current year's performance having a larger impact than the past year (Ahn, 2015). Firms with higher leverage tend to offer higher compensation to employees as a way of compensating for added risk (Lin et al., 2019). For CEOs, stock options and new option grants have been found to decrease with increased leverage (Ortiz-Molina, 2007).

Prior research has identified a persistent gender pay gap and the presence of such disparity at the top executive level has been widely researched. The proportion of female top executives is relatively low with the observed pay gap starting to narrow after the year 2000 (Vieito & Khan, 2012). While a gap appears

to exist, research has found that it disappears when a female reaches the CEO position and hence is compensated at the same level as her male counterparts (Adams et al., 2007, Bugeja et al., 2012).

New CEOs, especially those appointed after the termination of their predecessor or in a turnaround, receive higher pay to attract talent and compensate for the risk of financial distress (Carpenter, 2011). Due to the financial distress risk, the pay-performance component has been noted to be larger in turnaround situations while cash bonuses are smaller (Chang et al., 2015).[8] Moreover, CEOs and other executives have been found to leverage their bargaining power, with the pay of new CEOs increasing by 69% over their predecessors (Elsaid & Davidson, 2009). Moreover, there might be occurrences of one-time payments such as hiring bonuses or compensation for lost benefits at former employers in the first year (Murphy, 2002). CEOs with industry experience can demand higher compensation, while internally recruited CEOs receive higher rewards than externally hired counterparts (Banker et al., 2013). Contradicting findings indicate a lower compensation for all new CEO hires after the global financial crisis for all compensation components, nevertheless with a premium for new outside hires for total direct compensation, close in value to the disadvantage of being a new hire (Sonenshine et al., 2016). The decline in compensation for new CEOs has been noted to potentially be because of partial reporting of compensation for the first year of a CEO's hire. Moreover, for externally hired CEOs with no ties to the board of the firm, the cash compensation has been identified to be lower than for internally hired CEOs while the total compensation has increased (Murphy, 2002), contradicting previous findings of internally hired CEOs utilizing their managerial power to influence their pay.

Lower pay-performance sensitivity has been noted for CEOs of a higher tenure motivated as an entrenchment effect of tenure (Ozkan, 2011) as the CEO may focus on building their wealth rather than shareholders' wealth. However, some argue that early in executives' tenure, cash and equity-based compensation is more common, but for long-tenured executives, equity incentives tend to increase, dominating cash incentives (Guay et al., 2019). Furthermore, CEO duality, i.e. that the CEO is also a chairman of the board, significantly impacts CEO compensation due to their influence on board members and board decisions (Vemala et al., 2014, Banker et al., 2013). Compensation has also been found to increase with the size of the board due to coordination issues resulting in CEOs having a larger influence over their own pay (Ozkan, 2011).

[8] With a new CEO, the board can reshape the compensation package and with corporate governance mitigate agency problems by decreasing the non-performance-based portion and increasing the performance-based compensation (Elsaid & Davidson, 2009).

4.2 Inflation and its Relation to Income

Historically, a general salary increase has been a common method to respond to inflationary pressures. However, companies found that this could be costly in the long run and slowly tried to replace the general salary increase with other methods such as bonus rewards which allowed for a boost in employee income without the company committing to a permanent increase. The merit-based increase was also a common method in the 1970s where well-performing employees were incentivized for their achievement (McIntosh, 1976). In 1974, merit-based increase was around 12% to 15% which in some cases was above the then prevailing inflation of 12%.

Inflation expectation is another measure used in academia to examine wage increases. Pattanaik et al., (2020) investigate how increased price level expectations could have a spillover on wage-setting and found that inflation expectations have an impact on wages in certain industries such as the service sector but not in the manufacturing industry. Moreover, the cost of living has been observed to increase with the growth in inflation (Teupe, 2021, Sulekha et al., 2019).[9] In the United States and Canada, the large-scale inflation crisis that followed the COVID-19 pandemic led to social policies to shield households and ensure that the real value of wages did not deteriorate from the increases in costs of living that emerged (Béland et al., 2023). With the increased cost of living forecasted from a positive inflation expectation, workers will likely expect increased compensation.

Inflation in a downtrend has been found to lead to a decrease in the average nominal salary (Necșulescu & Șerbănescu, 2013). However, in low levels of inflation, a downward nominal wage rigidity has been identified, motivated by concern for relative wages, unfairness, and contractual terms with mutual consent requirements (Holden, 2005). Inflation has further been found to impact income inequality.[10]

4.3 CEO Compensation and Inflation

Considerable research has been conducted on CEO compensation and inflation individually, however, research on the link between them has been scarce indicating a gap in the academic field. Analyzing changes in the internal and external determinants in cases of inflation can serve as a starting point for evaluating the potential impact of inflation on CEO compensation.

[9] Similar indications have been observed in Egypt when examining regional and income disparities for costs of living changes (AlAzzawi, 2020).

[10] Berisha et al. (2023) find that the dynamic response of income inequality to inflation depends on the level of income equality, but the impact is negative with higher levels of income equality. Low inflation is found to be associated with improved financial well-being for the less fortunate in the long run (Romer & Romer, 1999) as well as a small to moderate effect of inflation on the level of inequality (Sintos, 2023).

As previously described in section 4.1, the internal determinants are divided into firm and CEO characteristics, with employer determinants impacting CEO compensation to a larger extent than employee determinants. CEO characteristics such as age, experience, gender, and education (Šilingienė et al., 2015), are likely to not be influenced by inflation since these characteristics are either time-independent or independent of external factors. In contrast, firm characteristics are more likely to change with inflation.

Firm size is adversely affected by inflation as changes in monetary policy are made in times of higher inflation. Tighter monetary policy not only affects the consumption and demand for goods and service but also impact the opportunity cost of holding money for firms (Zhang & Wu, 2001). Similarly, an increase in interest rate has been found to have a negative effect on firm size (Sami et al., 2020) suggesting that firms may be more conservative in their investment decision, limiting their ability to expand operations and enter new markets. Consequently, this conservative approach during tougher times and the impact of firm size on CEO compensation discussed in section 4.1 implies a potential decrease in CEO compensation.

When observing the impact on firm performance, inflation has been found to have a negative impact on real equity prices and dividend payout ratios in the United States (Jung & Pyun, 2023). Financially constrained firms in the United States have shown a weaker CEO pay-performance linkage for bonuses, where firms possibly must retain the cash on hand due to their lower liquidity (Kweh et al., 2022). During periods where inflation exhibits large changes, such as in 2008 in the United States, financially constrained firms increased prices to pass on the increasing costs to consumers, while firms with stronger balance sheets could lower prices and gain market share (Gilchrist et al., 2017) indicating difference in performance possibilities amongst firms during an inflationary episode. Nevertheless, passing on costs to consumers is not always possible without losing sales, hence impacting firms negatively. In general, real interest rates as a monetary policy to tackle inflation have a negative relation to stock market returns (Lucotte & Pradines-Jobet, 2023). In times of economic turbulence, not only does CEO reputation have a significant positive impact on compensation, but also the volatility of return on equity and net operating cash flows as measures of firm performance (Niap & Taylor, 2012). Moreover, real stock returns respond negatively to stock market volatility, which is positively correlated with inflation in the United States (Chiang, 2023), and in the financial sector nominal stock returns have been found to move in a one-to-one negative relation with inflation (Boyd et al., 2001). With CEO compensation having a positive correlation to firm performance, irrespective of a financial crisis or not (Vemala et al., 2014), CEO compensation can be expected to decrease in times of inflation when stock returns are expected to decline.

The labor market, an external determinant defined as the supply and demand of labor, could be impacted since inflation leads to higher labor supply (Jung & Pyun, 2023) with the well-known Philips curve indicating the inverse relationship between inflation and unemployment (Liu & Lin, 2023). Nevertheless, the timing of this correlation is debated where labor force changes in the United States have

been observed to have a two-year lag from inflation changes and five years from unemployment rate changes (Jo et al., 2023). With the compensation of workers being negatively impacted by increases in unemployment rates with a more extreme negative correlation in times of higher inflation (Donayre & Panovska, 2018), one could argue that this would consequently also be the case for CEO compensation, with a potential lag. Nevertheless, labor force changes are a determinant that is seen to impact CEOs less than typical workers (Newman & Bannister, 1998), potentially limiting the impact it could have on CEO compensation.

Another external market factor is public social pressure that arises especially in times of crisis when public discontent grows from disproportional salaries and increasing income inequality (Newman & Bannister, 1998). During the COVID-19 pandemic, potentially due to reputational risks, firms started to decrease CEO salaries but at the same time strengthened the pay-performance linkage and bonuses (Bedford et al., 2023, Carter et al., 2022), which aligns with previous studies indicating that in times of crisis, the social pressure can impact compensation composition (Newman & Bannister, 1998). In times of crisis, CEO pay cuts are often used as a signaling device for CEO sacrifice and improved future CEO performance (Hamm et al., 2015), as well as a symbolic gesture of sharing the pain with employees in an economic crisis when layoffs are more common due to impaired firm performance (Afzali et al., 2023). The change in composition is a way to save cash for the firm and align incentives. It has further been noted that if peers to the firm make cuts, it is more likely that the firm will undertake CEO wage cuts as well (Carter et al., 2022).

4.3.1 Reverse Causality

There are some concerns about reverse causality between inflation and CEO compensation, with low consensus in previous research. A unidirectional relation was identified from inflation to wages, but a partially implied feedback relation from wage inflation to prices is observed as a percentage change in annual pay in the United States (Fosu & Huq, 1988). In unison, some research indicates that wages can cause changes in prices and hence spur inflation (Russell & Myles, 1985, Fountas et al., 1999). Reverse causality has been observed in times of high wage indexation during the Great Inflation,[11] where the consequent changes in wages to keep up with inflation, spurred on inflation (Hofmann et al., 2012, Lucotte & Pradines-Jobet, 2023). In contrast, when wage indexation is low, the reaction to inflation is reduced and contributes to price stabilization (Hofmann et al., 2012). Some however attribute the decrease in inflation after the Great Inflation to wage cuts which reduced firm costs and prices could fall (Perry & Cline, 2016).

[11] 1964 to 1978, time in the United States characterized by high inflation (Federal Reserve History, 2013)

Nevertheless, inflation in the United States has been found to depend on the previous year's inflation rather than past wage changes, indicating a stickiness of inflation rather than reverse causality. In combination, some studies find no relation between price changes and wage adjustment (Gordon, 1988). Additionally, the previously identified relationship in the United States has decreased in recent years, with shocks in labor cost showing an impact on core inflation statistically indistinguishable from zero (Peneva & Rudd, 2017). A similar trend is evident in Europe after the Global Financial Crisis, with the link weakening from better anchoring of inflation expectations (Boranova et al., 2021). The link is found to be weaker when inflation is lower than the historical average and in supply shocks, while a stronger pass-through link when demand shocks trigger co-movements (Bobeica et al., 2021). Countries with higher collective bargaining power tend to experience wage stickiness due to a longer pay agreement (Suthaharan & Bleakley, 2022). Therefore, a country such as the United States which has relatively low collective bargaining coverage (OECD, 2023), is less likely to have a slow reaction in wages to outside forces such as changes in inflation.

With low consensus amongst previous research, we have chosen to lag the variable for inflation to limit the potential endogeneity problem of reverse causality (Zaefarian et al., 2017). The choice of periods to lag has been done in an optimal lag selection test to choose a lagged period that is best fitted for the model (section 7.1 and Appendix C - Table C.1), as well as test Granger causality (Table C.2).

4.4 Contribution to Previous Research

With most of the previous research addressing the determinants of CEO compensation, inflation's impact on firms, and performance during times of crisis, limited research has been conducted to assess the impact of inflation on CEO compensation. Given that the determination of CEO compensation is an important governance tool for protecting shareholder wealth, the emphasis of this research is stressed in the recent period of inflationary hikes at the same time as extensive criticism of the substantial increase in CEO pay is surfacing. This paper hence aims to increase the understanding of the development of CEO compensation through the impact of inflation.

5. Research Question and Hypotheses

With the previously described gap in the current literature, this paper aims to address the research question: *Do CEOs thrive in times of inflation?*

As described in section 4.3, CEO compensation is determined by internal and external factors. With research indicating a reduction in firm size, worsened firm performance, worsened market condition, and

increased social pressure of pay cuts in times of inflation, changes in inflation are expected to have a negative impact on CEO compensation. Therefore, hypothesis 1 is:

$$H_1 = Increase\ in\ inflation\ will\ have\ a\ negative\ impact\ on\ CEO\ compensation$$

As described in section 2.2, the share of long-term compensation out of total compensation is increasing for CEOs and creates a pay-performance linkage that aligns interest between the CEO and shareholders. As described in section 4.3, in times of inflation, firms start to cut salaries while increasing the pay-performance part of compensation due to reputational risk and to save cash when financially constrained. Short-term compensation is noted to have stabilized over the observed period and potentially indicates a lower sensitivity to external shocks. Therefore, hypothesis 2 is:

$$H_2 = The\ long\ term\ compensation\ component\ will\ be\ impacted\ by\ inflation\ to\ a\ larger\ absolute\ extent\ than\ short\ term\ compensation$$

There are indications in research that new CEOs are likely to receive higher total compensation than their predecessors. Similarly, as described in section 4.2, the cost of living has also been an aspect to consider when compensating employees. Given this, the bargaining power of a CEO on their compensation in periods of high inflation, i.e., when the inflation is higher than the target rate in the United States, should increase. Therefore, hypothesis 3 is:

$$H_3 = A\ new\ CEO\ will\ recieve\ higher\ compensation\ when\ inflation > 2\%$$

Different industries have separate performance sensitivities to changes in inflation and with wages varying across industries as described in section 2.3. Moreover, CEO pay cuts are more likely to happen if peer firms initiate similar measures. It is hence likely that the influence of inflation on CEO compensation will differ across industries. Therefore, hypothesis 4 is:

$$H_4 = Inflation\ affects\ CEO\ compensation\ differently\ across\ industries$$

6. Data

This section outlines the data sources used for the study, the different variables included in the regressions, and investigates multicollinearity across the variables.

6.1 Data Sources

The primary data sources used in this paper are Compustat Execucomp and North America, the WorldBank World Development Indicators, and FRED. Additional control variables are collected from EIKON by Refinitiv (see section 6.3.4).

Compustat is provided by the database Wharton Research Data Services (wrds) by the Wharton University of Pennsylvania. Compustat Fundamentals provides financial statements and market data for 80,000 active and inactive publicly traded firms in North America. Within Compustat Fundamentals, the sub-databases North America and Execucomp have been used for collecting data on S&P 1500 for this paper. For CEO compensation and characteristics data, Execucomp Annual Compensation has been used that collect data from the company's annual proxy statement (DEF14A SEC form). Firm data points have been gathered from Compustat North America which provides income statements, balance sheets, statements of cash flows, and supplemental data items. The data used has been taken from both Financial Ratios Suite and Fundamentals Annual sub-sub databases.

The WorldBank World Development Indicators has been used to gather yearly American GDP growth and inflation data both in the United States and globally. The database is the World Bank Group collection of development indicators which includes regional, national, and global estimates.

The Federal Reserve Economic Data (FRED) is used to extract The Federal Funds Effective rate by the Board of Governors of the Federal Reserve System (US). FRED was created by the Federal Reserve Bank of St. Louis and provides economic data from national, international, public, and private sources.

6.2 Data Consolidation

The extracted data have been consolidated into one dataset of 3,981 companies[12] between the years of 1994-2022, following 5,645 CEOs and a total of 39 variables that are either company-specific, CEO characteristics or macroeconomic data. Observations with missing data points are removed from the dataset. Some manual corrections have been made to the data. In 14 companies, one of the past CEOs was reinstated causing inaccurate calculation of the variable "Tenure" and the dummy variable "NEWCEO". We manually corrected these data points, using the year the CEO was reinstated as the new date to calculate tenure and compute the "NEWCEO" dummy. This correction does not capture potential changes in contract negotiation as previous CEO experience at the firm may play a pivotal role in the new compensation. However, the effect of this is marginal for this study considering the size of the corrected data points in comparison to the total dataset. The full dataset after filtering is comprised of 8,326 data observations

[12] Including firms that were once part of the S&P 1500 during the observed period hence the total amount of firms is higher than 1,500.

following a total of 454 distinct firms across various periods spanning from 1994 to 2022, hence characterized as an unbalanced panel data. The programming software R has been used in this research to analyze the consolidated data, provide descriptive on the variables, and perform regressions and robustness tests.

6.2.1 Subset Selection

The full dataset has been used to generate three subsets: (P1) 1994-2003, (P2) 2004-2013 and (P3) 2014-2022. The subsets include firms that have complete data for the entire period to achieve balanced panel data where the same entities are observed across time. The length of the subset period is similar, 9 or 10 years each. The subsets capture different periods of historical market activity that have affected the United States economy; the dot-com bubble in the late 1990s,[13] the financial crisis of 2008,[14] the oil price plunge of 2014-2016,[15] the COVID-19 crisis,[16] and the Russia-Ukraine war in the 2020s.[17] The subsets have different inflationary characteristics and embody various stages of the economic cycle. Although the average inflation is similar across the subset (Table 6.1), the yearly fluctuations differ immensely as seen in Graph 2.1. 1994-2003 have milder inflation fluctuations across the period. 2004-2013 include a larger decline in inflation below the target inflation, falling to negative numbers due to the financial crisis, to recoup back to previous levels. 2014-2022 begins with a decline in inflation with the oil price plunge, to recover and later face a sharp hike in the light of the COVID-19 pandemic. The largest subset in observations is 2004-2013, while the largest number of firms is observed in the 2014-2022 subset (Table 6.1).

Period	Years	Number of firms	Number of observations	Avg. inflation US
FULL	1994-2022	454	8,326	2.47
P1	1994-2003	52	520	2.45
P2	2004-2013	210	2,100	2.40
P3	2014-2022	219	1,971	2.59

Table 6.1 - Summary of full and subset data[18]

[13] Dot.com bubble emerged with the expansion of internet technology. When it burst, the United States faced a mild recession after their longest time of economic expansion (Turner & Quinn, 2020).
[14] Global financial crisis triggered by the housing market in the United States. Resulted in The Great Recession with one of the worst economic downturns in history. Lasted 18 months and characterized by deflation (Farlow, 2018).
[15] Global fall in the oil price of 70% due to excess oil supply harming the economy (Stocker et al., 2018).
[16] Pandemic that reached the United States in February 2020. Resulted in a short recession with high unemployment, followed by high inflation due to catch up from supply shortage and high demand pull (IMF, 2022).
[17] Russian invasion of Ukraine in February 2022, resulting in supply chain & energy issues raising prices (IMF, 2022).
[18] Since the subsets only include firms that have full coverage of datapoints for the respective period, some firms are not in the subsets, only the FULL dataset. Similarly, some firms have observations for more than one subset period. Therefore, neither the sum of the firms or observations in the subsets equal the values illustrated for the FULL dataset.

6.3 Variables

6.3.1 Dependent Variable

The dependent variable used in this paper will be CEO compensation of the S&P 1500 firms in the sample reported by Compustat Execucomp as the data variable TDC1 which is comprised of Salary, Bonus, Other Annual, Total Value of Restricted Stock Granted, Total Value of Stock Options Granted by using the Black-Scholes model, Long Term Incentive Payouts (LTIP), and All Other Total. The formula is calculated based on the 1992 reporting format with the formula changing in 2006 due to changes in accounting standards. The 2006 reporting includes Salary, Bonus, Non-Equity Incentive Plan Compensation, Grand-Date Fair Value of Option Awards, Grant-Date Fair Value of Stock Awards, Deferred Compensation Earnings Reported as Compensation, and Other Compensation.[19] [20] To assess the impact of inflation on the different components of compensation, a dependent variable for short-term compensation – comprising salary and bonus – has been extracted as well as the long-term compensation representing the remaining components of the total compensation.

6.3.2 Independent Variables

The independent variable in the panel data multivariable regression is annual inflation reported by the World Development Indicators by the WorldBank. The indicator name is "Inflation, consumer prices (annual %)", which is inflation measured by the consumer price index. The Laspeyres formula is used with aggregation method of the median. For consistency across all variables, the annual average inflation rate for the United States will be used. For robustness, the world annual inflation value will be used in a regression to observe consistency between the United States and world inflation,[21] as well as inflation expectations in the United States (Appendix E – Table E.1).

6.3.3 Control Variables

The control variables for the regression can be divided into three categories: macroeconomic variables, firm characteristics, and CEO characteristics.

[19] The pension and other post-employment benefits are not included in the total compensation as they typically are not based on the short-term performance of the CEO as not changing yearly.
[20] We note that the variable for total compensation will not be entirely comparable over time due to difference in reporting standards. Due to Execucomp having large data coverage and small differences in reporting, the data item will be used as representable of total compensation.
[21] 30% of revenue at S&P 1500 firms are generated from international operations (Brzenk et al., 2020) and there is a high correlation between the United States and global inflation due to impact on import and exports, (Guirguis et al., 2022). This could indicate that CEO compensation would be adjusted to global inflation rather than the United States.

Interest rate: With the daily rate from FRED, the yearly average interest rate was computed and is provided in percentage units. Values are not seasonally adjusted.

GDP growth: A variable used to explain the overall health of the economic development of a country, extracted from The WorldBank World Development Indicators in percentage units, defined as an annual percentage growth of the sum of gross value added by all producers in the United States.

ROA: Return on asset, is used to capture firm performance and is given as percentage points calculated as operating income before depreciation as a fraction of average total asset based on the most recent two periods. ROA has been found to have a positive relationship with the development of CEO compensation (Ye et al., 2023). ROA is extracted as a monthly percentage from Compustat North America Financial Ratios. To align with the annual compensation data, an annual average is derived.

Price change: Share price change is another firm performance metric used. The yearly change in price has been generated by the difference between the current year's closing price and the previous year's closing price and dividing it by the previous year's closing price. Stock returns without dividends have been found to positively correlate with CEO pay (Bebchuk & Grinstein, 2005). In contrast to ROA, which is a backward-looking metric, stock price change is a more forward-looking performance metric (Banker et al., 2013).

Total assets: Firm size is measured as the natural logarithm of the total assets of the firm. It is well documented in previous literature that the size of a firm affects the compensation of top executives and CEOs (Zhou, 2000, Vemala et al., 2014, Hashmi et al., 2020, Ozkan, 2011)

Leverage: Leverage which defines the capital structure of the firm is calculated as total debt divided by total assets. Leverage is extracted from Compustat as monthly percentages. To align with the annual compensation data, an annual average is derived. Leverage has been found to both increase and decrease compensation (Lin et al., 2019, Ortiz-Molina, 2007).

Industry: The dummy variable industry is used to observe the potential difference in impact across industries on compensation since wages have been found to differ between industries (Mitra & Singh, 2016), as well as responsiveness to changes in economic cycles. The dummy is derived from the two-digit SIC code which represents the primary industry group of the companies.

Gender: The gender dummy is used to indicate the effect of CEO compensation given their gender. The dummy assumes the value 1 if male and 0 if female. Previous studies conducted have found that there is a pay gap between the genders, however the gap noted to decrease or disappear at the top executive level (Vieito & Khan, 2012, Bugeja et al., 2012, Adams et al., 2007). In the P1 subset, there are no female CEOs.

Age and Tenure: Tenure is calculated as the difference between the year the executive became CEO and the fiscal year of the observation i.e., the number of years that the CEO has held the position. Compensation composition has been found to change with the tenure and age of the CEO (Ozkan, 2011,

Guay et al., 2019) with an increased possibility to influence compensation the longer the position has been held.

NewCEO: A dummy variable used to identify if the CEO is new. It is defined as a person who became CEO the same year as the current fiscal year. The dummy assumes the value 1 if the CEO is new and 0 otherwise. This variable is used to control for the potential impact that a new CEO can have on their compensation.

6.3.4 Additional Variables

Additional variables will be used in robustness checks to examine how other corporate governance variables and inflation measures may affect the dependent variable.

Board size & CEO duality: The additional governance characteristics extracted from EIKON are board size and a dummy variable for CEO duality. The dummy will be 1 if there is duality, otherwise 0. EIKON is a software program provided by Refinitiv that monitors and analyses market data, both real-time and historical, for firm information, financials, and global economics. Data is only available from 2002, hence the additional variables will only be added to P2 and P3, since not applicable for P1.

Inflation expectation: Defined as the inflation expected one year ahead of time is extracted from FRED in monthly rates, with a yearly average computed for the alternative regressions. The variable is provided in percentage units and not seasonally adjusted. Estimates are based on inflation data and swaps, Treasury yields, and inflation expectations through surveys.

6.3.5 Descriptive Statistics

The descriptive table for the FULL dataset is presented in Table 6.2. The median annual total compensation for the CEO of a firm in the sample is approximately USD 4.7 million. However, the average total compensation is notably higher, standing at approximately USD 7.2 million. In the FULL dataset, there are 8004 observations with male CEOs and 322 observations with female CEOs corresponding to 3.9% of observations.

	Min	Max	Mean	Median	Variance	Std	Skewness	Kurtosis
Age	32	96	57	57	43	7	0	2
TotComp	0.00	655.45	7.16	4.74	164.82	12.84	29.56	1 353.06
Asset	5.08	797 769	17 163	3 483	2 368 849 917	48 671	8	82
ROA %	-110.28	139.36	14.21	13.42	84.50	9.19	-0.68	22.46
Leverage %	2.28	217.97	58.20	58.27	477.52	21.85	0.69	2.93
Tenure	0	61	7	5	48	7	2	8
GDPGrowth %	-2.77	5.95	2.33	2.29	3.54	1.88	-1.02	1.64
Interest_rate %	0.08	6.24	2.14	1.67	4.38	2.09	0.64	-1.14
PriceChange %	-96.90	4 436.47	11.23	6.15	7 318.66	85.55	27.23	1 145.86

Table 6.2 – Descriptive statistics for FULL data sample

When examining the descriptive table for the subsets as presented in Appendix B, Table B2-B4, it is evident that the average (median) compensation increases progressively over the subset periods. For instance, within the first subset during the years 1994-2003, the average (median) starts at $5.6 ($3.5) million USD and reaches $9.9 ($8.1) million USD during the years 2014-2022. Furthermore, due to skewed values in some variables, it is deemed appropriate to apply the natural logarithm for their transformation. These variables include total compensation, assets, and tenure. However, for the remaining skewed variables, the natural logarithm is not applied as these variables can assume negative values.[22] This pertains to the variables of inflation and price change.

Appendix B, Table B.1 provides a comprehensive table of the industries that are encompassed within the complete dataset. The FULL dataset consists of firms in nine different industries defined after their SIC code. The table underscores the prominent representation of three key industries: manufacturing, transportation, and services accounting for 53.5%, 16.7%, and 10.4% respectively.

6.4 Multicollinearity

Multicollinearity between predictive variables is tested through a correlation matrix which is done on the full dataset as well as the three subsets (Appendix B - table B.5-B.8). No correlation between two variables exceeds the rule of thumb of an absolute value of 0.7 (Dormann et al., 2013), hence the possibility of pairwise multicollinearity within the data is assumed to be low with stability of the predictive coefficients within the model. Also observable between the variables of different lags of inflation (Appendix C – Table C.3).

[22] We note that keeping the skewed variables as they are, can have implications on the fit of the model with lower predictive performance, and reduced reliability of p-values and model diagnostics. Since the natural logarithm of negative values or zero is not defined, this was deemed most appropriate.

7. Method

This section includes a description of the regressions that will be used to answer the hypotheses and the research question of this paper, followed by the subject of stickiness for the dependent and independent variables.

7.1 Regression

This study will use a multi-regression model on panel data, hence including variables impacted by time as well as firm-specific and CEO-specific characteristics. The initial Pooled OLS regression model is:

Regression 1:

$$lnComp_{ijt} = \alpha + \beta_1 * Inflation_t + \beta_2 * GDPgrowth_t + \beta_3 * InterestRate_t + \beta_4 * ROA_{it} + \beta_5 * Leverage_{it} + \beta_6 * PriceReturn_{it} + \beta_7 * lnAssets_{it} + \beta_8 * Gender_j + \beta_9 * lnTenure_{ijt} + \beta_{10} * Age_{jt} + \beta_{11} * NewCEO_{it} + \varepsilon_{ijt}$$

Where t = time-dependent variable, i = firm-specific, j = CEO-specific

As the panel data in the FULL sample is unbalanced, the Pooled OLS may be inappropriate to estimate the model. Firm fixed effect is applied to capture the impact of inflation on CEO compensation. Additionally, with the firm fixed effect, we account for unobserved, time-invariant characteristics of firms.

Regression 2:

$$lnComp_{ijt} = \alpha + \beta_1 * Inflation_t + \beta_2 * GDPgrowth_t + \beta_3 * InterestRate_t + \beta_4 * ROA_{it} + \beta_5 * Leverage_{it} + \beta_6 * PriceReturn_{it} + \beta_7 * lnAssets_{it} + \beta_8 * Gender_j + \beta_9 * lnTenure_{ijt} + \beta_{10} * Age_{jt} + \beta_{11} * NewCEO_{it} + \alpha_i + \varepsilon_{ijt}$$

On the assumption of delayed effects by inflation on compensation illustrated by Graph 2.2, and reduction of reverse causality issues, an optimal lag selection test was performed to determine if lag should be used, and if so, by how many years. The selection test was done on the United States inflation. The selection and Granger test (Appendix C - Table C.1 & C.2), indicate a two-year lag of inflation. The reduction of reverse causality issues is further supported by no Granger causality found between compensation and the lagged inflation (Appendix C - Table C.2). To test for different years of lag, the regression has been run with several years of lag and joint relationship as robustness (Appendix E - Table E.4 & E.5).

Regression 3:

$$lnComp_{ijt} = \alpha + \beta_1 * Inflation_{t-2} + \beta_2 * GDPgrowth_t + \beta_3 * InterestRate_t + \beta_4 * ROA_{it} + \beta_5 * Leverage_{it} + \beta_6 * PriceReturn_{it} + \beta_7 * lnAssets_{it} + \beta_8 * Gender_j + \beta_9 * lnTenure_{ijt} + \beta_{10} * Age_{jt} + \beta_{11} * NewCEO_{it} + \alpha_i + \varepsilon_{ijt}$$

With the development in CEO compensation composition (Graph 2.2, and Table 2.2-2.4), it is further of interest to analyze how the different components of compensation are impacted by inflation to assess the development of compensation during the observed period. Therefore, regression 3 is run on the natural logarithm of short-term compensation and long-term compensation.

Regression 4:

$$lnShortComp_{ijt} = \alpha + \beta_1 * Inflation_{t-2} + \beta_2 * GDPgrowth_t + \beta_3 * InterestRate_t + \beta_4 * ROA_{it} + \beta_5 * Leverage_{it} + \beta_6 * PriceReturn_{it} + \beta_7 * lnAssets_{it} + \beta_8 * Gender_j + \beta_9 * lnTenure_{ijt} + \beta_{10} * Age_{jt} + \beta_{11} * NewCEO_{it} + \alpha_i + \varepsilon_{ijt}$$

Regression 5:

$$lnLongComp_{ijt} = \alpha + \beta_1 * Inflation_{t-2} + \beta_2 * GDPgrowth_t + \beta_3 * InterestRate_t + \beta_4 * ROA_{it} + \beta_5 * Leverage_{it} + \beta_6 * PriceReturn_{it} + \beta_7 * lnAssets_{it} + \beta_8 * Gender_j + \beta_9 * lnTenure_{ijt} + \beta_{10} * Age_{jt} + \beta_{11} * NewCEO_{it} + \alpha_i + \varepsilon_{ijt}$$

With support from previous research, the cost of living is often considered when wages are being set. Also, with contrasting findings in prior research on the bargaining power of new CEOs and the size of their compensation package as seen in sections 4.1 & 4.3. The interaction of a new CEO and the dummy variable for when the prevailing inflation is higher than the target of 2% is used to capture the impact of inflation on the new CEO's total compensation. The dummy InfHigh takes the value of 1 when the current inflation is higher than 2%, otherwise 0.

Regression 6:

$$lnComp_{ijt} = \alpha + \beta_1 * Inflation_{t-2} + \beta_2 * GDPgrowth_t + \beta_3 * InterestRate_t + \beta_4 * ROA_{it} + \beta_5 * Leverage_{it} + \beta_6 * PriceReturn_{it} + \beta_7 * lnAssets_{it} + \beta_8 * Gender_j + \beta_9 * lnTenure_{ijt} + \beta_{10} * Age_{jt} + \beta_{11} * NewCEO_{it} + \beta_{12} * InfHigh_t + \beta_{13} * NewCEO_{it} * InfHigh_t + \alpha_i + \varepsilon_{ijt}$$

Lastly, previous research indicates a difference in wages across industries (Mitra & Singh, 2016). It is further of interest to understand if inflation fluctuations have an impact on CEO compensation across the manufacturing, transportation, and financial industries as these industries are characterized by high labor productivity, advanced technology, or highly skilled workers. Since the industry dummies are time-invariant and stay constant for each firm, the impact will be captured through an interaction term with the two-year lagged inflation.

Regression 7:

$$lnComp_{ijt} = \alpha + \beta_1 * Inflation_{t-2} + \beta_2 * GDPgrowth_t + \beta_3 * InterestRate_t + \beta_4 * ROA_{it} + \beta_5 * Leverage_{it} + \beta_6 * PriceReturn_{it} + \beta_7 * lnAssets_{it} + \beta_8 * Gender_j + \beta_9 * lnTenure_{ijt} + \beta_{10} * Age_{jt} + \beta_{11} * NewCEO_{it} + \beta_{12} * Inflation_{t-2} * Industry_i + \alpha_i + \varepsilon_{ijt}$$

7.2 Stickiness of Inflation and Wage

Both the independent variable inflation, as well as the dependent variable CEO compensation are relatively slow-developing variables. One should be aware of the stickiness of the variables in the model since the slow development creates a possibility to project next year's value. Especially for inflation, since there are both inflation expectations from the public, published inflation projections from central banks, and national inflation targets, the possibility arises for firms to adjust their compensation strategies accordingly for CEOs. As described in section 4.3.1, there is research that has found wage changes to impact inflation with the expectations that are set, indicating a potential problem of reverse causality with the stickiness of wages that are usually set yearly with slow responsiveness to changes in the economy. To address this, the paper has used the lagged inflation in the regression. It is further assumed in this paper that both inflation and wages can face external shocks such as unforeseen events like the Dotcom bubble, the 2008 financial crisis, and the COVID-19 pandemic which could result in yearly changes for the variables that have deviated from inflation expectations (Appendix A - Graph A.1).

8. Results

The following section illustrates the generated regression results and their indications for the hypotheses of the paper, firstly examining the Pooled OLS regression results.

Table 8.1 – Regression 1, Pooled OLS regression

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS	0.035***	0.073	-0.002	0.016***
	(0.004)	(0.053)	(0.013)	(0.005)
GDPGrowth	0.005	0.030	0.013*	0.003
	(0.003)	(0.026)	(0.007)	(0.005)
Interest_rate	-0.057***	-0.062***	-0.021***	0.006
	(0.003)	(0.022)	(0.007)	(0.014)
lnAsset	0.333***	0.368***	0.324***	0.314***
	(0.004)	(0.019)	(0.007)	(0.006)
PriceChange	0.0001*	0.001	0.00001	0.0003**
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.010***	0.016***	0.012***	0.014***
	(0.001)	(0.003)	(0.001)	(0.001)
Leverage	-0.0001	-0.005***	0.0003	0.002***
	(0.0003)	(0.002)	(0.001)	(0.001)
Age	-0.001	0.004	-0.002	0.007***
	(0.001)	(0.004)	(0.002)	(0.002)
NEWCEO	0.024	0.094	0.034	-0.026
	(0.030)	(0.113)	(0.055)	(0.051)
dGender	0.004		0.139**	0.069*
	(0.030)		(0.059)	(0.040)
lnTenure	0.053***	0.108***	0.072***	0.025
	(0.010)	(0.037)	(0.017)	(0.017)
Constant	-1.150***	-1.843***	-1.259***	-1.516***
	(0.068)	(0.313)	(0.130)	(0.127)
Observations	7.626	468	2.086	1.961
R2	0.578	0.534	0.558	0.607
Adjusted R2	0.578	0.523	0.555	0.605
Residual Std. Error	0.513 (df=7614)	0.517 (df=457)	0.484 (df=2074)	0.451 (df=1949)
F Statistic:	949.471**	52.292***	237.858**	273.411**
Note:				*p<0.1; **p<0.05;***p<0.01

The Pooled OLS regressions indicate a positive impact of inflation on CEO compensation for the datasets FULL and P3 at a significance level of 0.01, with insignificant results for the other subsets, hence not supporting Hypothesis 1. For each one percentage unit increase in inflation in the FULL and the P3 dataset, compensation increases by 3.5% and 1.6% respectively. For the control variables, the interest rate is significantly negative, with GDP growth weakly positive at a significance level of 0.1 in P2. Total assets and ROA have a positive significant impact on compensation at a significance level of 0.01. Price change shows a weak significant positive impact of 0.01% in the FULL dataset at 0.1 significance level and 0.03%

in P3 at 0.05 significance level when return increases by one percentage unit. The impact of unit increases in leverage differs across the datasets, with a significant negative impact for P1 where an increase in leverage leads to a small decrease in total compensation, and a positive significant effect in P3. Age has a significant positive impact in P3, where one additional year of age consequent in a 0.7% increase in total compensation. No significant results were found for NEWCEO. The gender dummy indicates that male CEOs receive 13.9% higher compensation than females in the period 2 subset and 6.9% in period 3, at 5% and 10% significance levels respectively. The natural logarithm of tenure indicates that with a one percent increase in tenure, CEO compensation increases between 5.3% to 10.8% for all datasets except period 3, at a 0.01 significance level.

Table 8.2 – Regression 2, Firm fixed effects regression

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS	0.030***	0.063	0.0002	0.019***
	(0.004)	(0.043)	(0.008)	(0.004)
GDPGrowth	0.005*	0.026	0.013***	0.004
	(0.003)	(0.021)	(0.005)	(0.003)
Interest_rate	-0.047***	-0.039*	-0.024***	0.012
	(0.003)	(0.020)	(0.005)	(0.009)
lnAsset	0.379***	0.485***	0.267***	0.274***
	(0.010)	(0.060)	(0.026)	(0.029)
PriceChange	0.0001	0.0003	0.0001	0.0002**
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.005***	0.013***	0.010***	0.004***
	(0.001)	(0.004)	(0.002)	(0.001)
Leverage	0.0003	-0.001	-0.001	0.002**
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	-0.00000	0.006	-0.007***	0.009***
	(0.001)	(0.007)	(0.002)	(0.002)
NEWCEO	0.008	0.089	0.042	-0.021
	(0.025)	(0.106)	(0.039)	(0.037)
dGender	-0.090***		0.063	0.041
	(0.032)		(0.067)	(0.050)
lnTenure	0.047***	0.045	0.091***	0.037**
	(0.010)	(0.054)	(0.018)	(0.017)
Observations	7.626	468	2.086	1.961
R2	0.755	0.734	0.831	0.852
Adjusted R2	0.739	0.694	0.811	0.833
Residual Std. Error	0.403 (df=7173)	0.414 (df=406)	0.315 (df=1865)	0.294 (df=1731)
Note:				*p<0.1; **p<0.05; ***p<0.01

The firm fixed effect model continues to generate a positive significant impact by the inflation on CEO compensation for the datasets FULL and P3, not supporting Hypothesis 1. GDP growth indicates a positive impact on compensation in the FULL dataset and P2. Interest rate indicates a negative impact in most of the datasets. Assets continue to show significant positive results. Price change indicates a low significant positive impact in P3 of 0.02%, suggesting a small percentage increase in compensation for each percentage unit increase in price changes. ROA continues to generate a positive impact on the total compensation. A small but significant positive impact of leverage is found in P3 at a 5% significance level. The results indicate a small positive impact of 0.9% for each additional year lived by the CEO in P3, while a negative of 0.7% in P2 with a 1% significance level in both subsets. No significant results were found for new CEOs.

In contrast to the Pooled OLS, the gender dummy indicates a negative total compensation for males of 9% in FULL at a 1% significance level. Tenure continues to indicate a significant positive relation in all subsets except P1, at a significance level between 1% and 5%. The addition of firm fixed effects has improved the R squared of the model for all datasets.

Table 8.3 – Regression 3, Firm fixed effects regression, with optimal lags

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS_lag_2	-0.033***	-0.174***	0.002	0.020*
	(0.005)	(0.056)	(0.006)	(0.011)
GDPGrowth	0.007**	0.002	0.013***	0.012***
	(0.003)	(0.022)	(0.004)	(0.003)
Interest_rate	-0.034***	-0.052**	-0.025***	0.030***
	(0.003)	(0.023)	(0.004)	(0.009)
lnAsset	0.387***	0.366***	0.267***	0.329***
	(0.010)	(0.073)	(0.026)	(0.027)
PriceChange	0.0001	0.0004	0.0001	0.0002**
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.005***	0.015***	0.010***	0.004***
	(0.001)	(0.005)	(0.002)	(0.001)
Leverage	0.0001	-0.003	-0.001	0.002***
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	-0.00004	0.008	-0.007***	0.010***
	(0.001)	(0.007)	(0.002)	(0.002)
NEWCEO	0.014	0.088	0.042	-0.026
	(0.025)	(0.117)	(0.039)	(0.037)
dGender	-0.092***		0.064	0.038
	(0.032)		(0.067)	(0.051)
lnTenure	0.049***	0.045	0.091***	0.032*
	(0.010)	(0.061)	(0.018)	(0.017)
Observations	7.512	416	2.086	1.961
R2	0.755	0.750	0.831	0.850
Adjusted R2	0.739	0.706	0.811	0.830
Residual Std. Error	0.403 (df=7060)	0.412 (df=354)	0.315 (df=1865)	0.295 (df=1731)
Note:				*p<0.1; **p<0.05; ***p<0.01

In contrast to Tables 8.1 and 8.2, the introduction of lags changes the inflation coefficient. A unit percentage increase in inflation from two years prior decreases the CEO compensation at a significance level of 0.01 for FULL and P1. However, for P3, even when lagging and therefore eliminating the steep increase in inflation experienced in the last two years of the subset, there are weak results that indicate inflation's

continued positive effect on CEO compensation at a 10% significance level. In contrast, the results from FULL and P1 support Hypothesis 1 of the negative impact of inflation on compensation. GDP growth has a significant positive effect on CEO pay in all datasets except P1. On the other hand, the interest rate has a significant negative effect on CEO compensation in most of the dataset except for a positive in P3. The result of the natural logarithm of assets continues to have a positive impact on CEO compensation. Similarly, the positive result for ROA stays consistent with previous regressions. The results for the age coefficient are inconsistent across the subsets, with a small negative impact in P2 and a positive in P3. PriceChange is observed to have a small positive effect on CEO compensation in P3. The gender dummy has a negative effect on the CEO pay in FULL where male CEOs receive 9.2% less compensation compared to their female counterparts.

Furthermore, two-year lagged world inflation (Appendix E - Table E.1) shows a similar negative impact on CEO compensation as the two-year lagged inflation for the FULL and P1. This suggests that American firms with a global presence, where world inflation might be a more fitting independent variable, would likely be impacted similarly as to domestic inflation, indicating robustness of the results. However, world inflation does not support robust findings for P2 and P3. The other alternative independent variable, inflation expectations (Appendix E – Table E.2), suggests robustness of the positive impact of inflation in P3. Nevertheless, it does not provide robust results for FULL or P1.

When extending the model to observe several lagged periods (Appendix E - Table E.4 & E.5), the result indicates a positive influence of current inflation while mostly negative for lagged years between 1-3, with the number of lags having the most absolute extreme impact differing between the subsets. This supports the negative coefficient found for lagged inflation in Regression 3 and suggests a variation between the impact of different lags of inflation. The extended regression (Appendix D - Table D.1) which includes an interaction term between inflation and gender to observe if additional impact is found for males, found no significant result for the interaction term. Moreover, the interaction term of the two-year lagged inflation and firm characteristics shows significant result (Appendix D – Table D.3) with the positive joint effect of inflation and ROA of 0.2% while price change and inflation exhibit a low negative impact of 0.02% on CEO compensation.

Lastly, adding the variables of CEO duality and board size to the regression for P2 and P3 (Appendix E – Table E.6), no significant results are found on the impact of CEO duality. A weak coefficient was found of a 2.7% decrease in compensation for CEOs for each additional person on the board in P3.

Table 8.4 – Regression 4, Firm fixed effects regression, optimal lag, short-term compensation

	Dependent variable:			
	lnshort			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS_lag_2	-0.004	-0.097	-0.021*	-0.006
	(0.008)	(0.109)	(0.012)	(0.018)
GDPGrowth	0.027***	0.033	0.057***	0.008
	(0.004)	(0.042)	(0.008)	(0.005)
Interest_rate	0.017***	-0.008	-0.007	0.016
	(0.005)	(0.045)	(0.008)	(0.014)
lnAsset	0.082***	0.671***	-0.105**	0.068
	(0.016)	(0.141)	(0.047)	(0.041)
PriceChange	0.0002**	0.003***	0.0003**	0.0001
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.007***	0.046***	0.018***	0.007***
	(0.001)	(0.009)	(0.003)	(0.002)
Leverage	0.001	0.014**	0.001	-0.0003
	(0.001)	(0.006)	(0.002)	(0.001)
Age	0.003	0.023	0.010**	0.028***
	(0.002)	(0.014)	(0.004)	(0.004)
NEWCEO	-0.020	-0.026	-0.073	-0.094
	(0.040)	(0.225)	(0.071)	(0.057)
dGender	0.033		-0.025	-0.034
	(0.051)		(0.121)	(0.078)
lnTenure	0.036**	-0.042	-0.030	-0.102***
	(0.016)	(0.117)	(0.033)	(0.026)
Observations	7.512	416	2.086	1.961
R2	0.518	0.522	0.661	0.775
Adjusted R2	0.487	0.440	0.621	0.745
Residual Std. Error	0.644 (df=7060)	0.795 (df=354)	0.570 (df=1865)	0.456 (df=1731)
Note:				*p<0.1; **p<0.05; ***p<0.01

The firm fixed effect regression with the optimal lags is run on the natural logarithm of the short-term component of CEO compensation. A weak negative significant impact of lagged inflation is found for P2 of 2.1%. As the regression for total compensation, GDP growth has a positive impact on short-term compensation both in FULL and P2, however, the effect of interest rate is positive in the FULL dataset which was previously negative for total compensation. There are no significant results for NEWCEO in any of the subsets. Assets continue to indicate a positively significant impact on CEO compensation in the FULL and P1 data but a negative effect in P2. PriceChange indicates a significant positive impact for P1 with a 0.3% increase in short-term compensation when price change increases by one percentage unit, and a smaller impact in FULL and P2. ROA has a significantly positive impact on the CEO's short-term

compensation for all subsets. A positive impact of leverage is found at 1.4% in P1 indicating an increase in compensation when leverage increases. An additional year of age gives a 1% and 2.8% increase in the short-term compensation in P2 and P3 respectively. No significant result on the dummy for gender was found. Tenure has a positive impact on the short-term compensation in the FULL dataset, but a negative impact of 10.2% in P3.

Table 8.5 – Regression 5, Firm fixed effects regression, optimal lag, long-term compensation

	Dependent variable:			
	lnlong			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS_lag_2	-0.067***	-0.108	0.032	0.014
	(0.014)	(0.148)	(0.020)	(0.028)
GDPGrowth	-0.007	-0.009	-0.030**	0.020**
	(0.008)	(0.058)	(0.013)	(0.008)
Interest_rate	-0.101***	-0.035	-0.064***	0.029
	(0.008)	(0.062)	(0.014)	(0.022)
lnAsset	0.843***	0.703***	0.823***	0.529***
	(0.028)	(0.192)	(0.081)	(0.065)
PriceChange	-0.00001	0.001	-0.00001	0.0002
	(0.0002)	(0.002)	(0.0002)	(0.0002)
ROA	0.010***	0.026**	0.021***	0.007**
	(0.002)	(0.012)	(0.006)	(0.003)
Leverage	-0.0003	0.001	-0.002	0.004*
	(0.001)	(0.008)	(0.003)	(0.002)
Age	-0.009***	0.003	-0.026***	0.007
	(0.003)	(0.020)	(0.008)	(0.006)
NEWCEO	0.007	0.198	0.136	-0.045
	(0.069)	(0.308)	(0.123)	(0.090)
dGender	-0.194**		-0.177	0.076
	(0.089)		(0.210)	(0.123)
lnTenure	0.036	0.001	0.165***	0.019
	(0.027)	(0.160)	(0.057)	(0.041)
Observations	7.512	416	2.086	1.961
R2	0.632	0.619	0.696	0.778
Adjusted R2	0.608	0.553	0.660	0.749
Residual Std. Error	1.123 (df=7060)	1.087 (df=354)	0.985 (df=1865)	0.718 (df=1731)
Note:				*p<0.1; **p<0.05; ***p<0.01

A two-year lag of inflation indicates a negative significant impact of 6.7% on long-term CEO compensation in FULL, supporting Hypothesis 1. The magnitude of the two-year lag inflation on long-term compensation for the FULL dataset is more extreme than that of the inflation coefficient for total compensation in Regression 3. However, since significant results are found in different subsets, a comparison between the short- (Table 8.4) and long-term compensation becomes challenging with no conclusions to be drawn for Hypothesis 2. The impact of interest rate is consistent in the FULL and P2 subsets, where the variable is found to have a significant negative impact on the CEO's long-term compensation. At a 5% significance level, the GDP growth has a negative impact on the long-term component in P2 but a positive at P3. In comparison to previous regressions, the impact of assets increases in magnitude for long-term compensation. The impact varies between a percentage increase of 52.9% to 84.3% across the datasets. NEWCEO and PriceChange find no significant impact on long-term compensation. The results for leverage found a weak positive impact in P3 at a 10% significance level. Tenure has a positive coefficient of 16.5% increase in long-term compensation for each percent increase in tenure in P2. The coefficient for ROA indicates a significant positive effect on long-term compensation for all datasets, ranging from 0.7% to 2.6% across the subsets. Age has a negative impact in P2 and FULL. The gender dummy indicates a negative significant impact on long-term compensation for males in the FULL dataset of 19.4% compared to females, which is found to be more extreme than in the regressions on total compensation.

Table 8.6 - Regression 6. Firm fixed effect, NEWCEO when current inflation > 2%

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS_lag_2	-0.036***	-0.282***	-0.015	0.088***
	(0.006)	(0.076)	(0.010)	(0.015)
GDPGrowth	0.008***	0.012	0.015***	0.0003
	(0.003)	(0.023)	(0.004)	(0.004)
Interest_rate	-0.033***	-0.071***	-0.014**	0.014
	(0.003)	(0.025)	(0.006)	(0.009)
lnAsset	0.386***	0.327***	0.264***	0.240***
	(0.010)	(0.075)	(0.026)	(0.029)
PriceChange	0.0001	0.001	0.0001	0.0002*
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.005***	0.014***	0.011***	0.005***
	(0.001)	(0.005)	(0.002)	(0.001)
Leverage	0.0001	-0.004	-0.001	0.002*
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	-0.0001	0.008	-0.007***	0.008***
	(0.001)	(0.008)	(0.002)	(0.002)
NEWCEO	0.004	0.113	0.004	-0.082*
	(0.036)	(0.194)	(0.066)	(0.044)
dGender	-0.091***		0.063	0.047
	(0.032)		(0.067)	(0.050)
lnTenure	0.049***	0.045	0.091***	0.046***
	(0.010)	(0.061)	(0.018)	(0.017)
InfHigh	-0.015	-0.138**	-0.072**	0.149***
	(0.013)	(0.068)	(0.029)	(0.023)
NEWCEO:InfHigh	0.017	-0.029	0.053	0.174***
	(0.042)	(0.200)	(0.072)	(0.059)
Observations	7.512	416	2.086	1.961
R2	0.755	0.753	0.832	0.855
Adjusted R2	0.739	0.708	0.812	0.836
Residual Std. Error	0.403 (df=7058)	0.411 (df=352)	0.315 (df=1863)	0.291 (df=1729)

Note: *p<0.1; **p<0.05; ***p<0.01

The regression is extended to include an interaction term of being appointed as a new CEO when the prevailing inflation is higher than the target rate of 2%. In P3, the results show that if the current inflation is above the target, a new CEO receives a 17.4% increased total compensation, while an 8.2% decrease if they are a new CEO irrespective of inflation level. The result for P3 supports Hypothesis 3 of new CEOs receiving higher compensation if inflation is above the 2% target. No significant results were found for the interaction term for the remaining subsets. CEOs in general, both new and incumbent, receive a positive

increase of 14.9% in compensation in P3 when the current inflation is higher than the target. However, this does not hold in P1 and P2 where the CEO experiences a decrease in their total compensation if the current inflation is above the target. The independent variable and remaining control variables illustrate similar coefficients as previous regression results.

When diving deeper into the impact on short-term and long-term compensation (Appendix D – Table D.2), the observed positive impact on both new and incumbent CEOs in times of high inflation persists for long-term compensation. Moreover, new CEOs, regardless of inflation level are suggested to receive an even larger decrease in their short-term compensation than their total compensation when appointed to their positions, compared to incumbent CEOs. However, the negative impact for new CEOs disappears if they are appointed in times of high inflation, with a positive increase in short-term compensation surpassing the negative one.

Appendix E, Table E.3, provides robustness for the positive impact found of being appointed a CEO when inflation is high, but with the alternative inflation metric of a one-year inflation expectation. The results support the findings that high inflation positively impacts new and incumbent CEO's compensation in P3 while negatively impact in P2. Nevertheless, no robustness for the positive coefficient was found in P1 nor was the negative coefficient identified for new CEOs in P3.

Table 8.7 - Regression 7. Firm fixed effect, industry interaction term

	Dependent variable:		
	lnTotComp		
	Manufacturing	Transportation	Financial
	(1)	(2)	(3)
InfUS_lag_2	-0.035***	-0.031***	-0.033***
	(0.007)	(0.005)	(0.005)
GDPGrowth	0.007**	0.007**	0.007**
	(0.003)	(0.003)	(0.003)
Interest_rate	-0.034***	-0.034***	-0.034***
	(0.003)	(0.003)	(0.003)
lnAsset	0.387***	0.386***	0.387***
	(0.010)	(0.010)	(0.010)
PriceChange	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)
ROA	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)
Leverage	0.0001	0.0001	0.0001
	(0.0004)	(0.0004)	(0.0004)
Age	-0.00004	-0.00002	-0.00003
	(0.001)	(0.001)	(0.001)
NEWCEO	0.014	0.014	0.014
	(0.025)	(0.025)	(0.025)
dGender	-0.092***	-0.092***	-0.092***
	(0.032)	(0.032)	(0.032)
lnTenure	0.049***	0.049***	0.049***
	(0.010)	(0.010)	(0.010)
InfUS_lag_2:Ind_Manufacturing	0.003		
	(0.010)		
InfUS_lag_2:Ind_Transportation		-0.014	
		(0.013)	
InfUS_lag_2:Ind_Financial			0.022
			(0.049)
Observations	7.512	7.512	7.512
R2	0.755	0.755	0.755
Adjusted R2	0.739	0.739	0.739
Residual Std. Error (df = 7059)	0.403	0.403	0.403

Note: *p<0.1; **p<0.05; ***p<0.01

The interaction term of lagged inflation and the manufacturing, transportation, and financial industries finds no significant coefficient for either of the industries on the FULL dataset. The regression fails to find the joint impact of inflation and industry on CEO compensation. The result can hence not aid in explaining Hypothesis 4. The independent variable and remaining control variables illustrate similar coefficients as previous regression results.

9. Discussion

The following section will discuss the results of the paper, the control variables, and their implications for the hypotheses and research question. Lastly, it touches upon the limitations of the study.

9.1 Discussion on results and hypothesis

Firstly, for the control variables, the firm size indicates a significant positive relationship to compensation supporting previous research (Zhou, 2000, Vemala et al., 2014, Newman & Bannister, 1998) which could be motivated by higher liquidity enabling firms to pay larger wages to retain talent and increased necessity for aligning interest to reduce agency problems (Hashmi et al., 2020). ROA has a small but significant positive impact on total CEO compensation supporting previous research of a positive correlation (Ye et al., 2023), with a positive impact found when interacting with inflation. The decrease in magnitude from P1 to P2 after the financial crisis is in line with previously found downward wage rigidity (Šilingienė et al., 2015). In contrast, the stock price change yields a rather low positive impact when found significant, with a negative joint impact found when combined with inflation decreasing the total impact of price change, therefore supporting the hypothesis of a downward rigidity when inflation harms performance. The results suggest that female CEOs receive higher compensation than their male counterparts, hence diverting from previous research on the gender gap and its disappearance when a female attains a CEO position (Adams et al., 2007, Bugeja et al., 2012). However, the disproportionate representation of males compared to females in the datasets may influence the observed significant results, hence encouraging future research.

Continuing to the impact of inflation on CEO compensation, investigated in Hypothesis 1, the two-year lagged inflation indicates a significant negative impact on CEO compensation in FULL and P1. Interestingly, in contrast to past research documenting a positive effect of inflation on average wage (Necșulescu & Șerbănescu, 2013), this does not seem to hold for CEO compensation in these datasets. The growth in CEO pay found by prior research (Bivens & Kandra, 2022, Hill et al., 2016) can hence not be attributed to growing inflation suggesting that CEOs are not paid excessively when inflation increases, consequently not thriving when inflation increases. The negative impact of the lagged inflation in FULL and P1 could be due to the previously found pay cuts as a signaling tool by CEOs and the social pressure to share the pain when firm performance is harmed (Hamm et al., 2015). As inflation worsens firm performance through increased operating costs that cannot always be passed through to customers (Gilchrist et al., 2017), by reducing CEO pay, the firm could share the pain with shareholders and employees in times when layoffs or lower stock price return is more likely.

Despite P1 being characterized by relatively milder fluctuations in inflation compared to the other periods, CEOs were more extremely impacted in absolute terms by inflation compared to the other subset

period. A downward rigidity in CEO pay was observed after the financial crisis with weakened pay-performance linkage when firms saw highly impaired results (Šilingienė et al., 2015), as well as during times of low levels of inflation (Holden, 2005). Hence, the pay-inflation relationship may weaken similarly in P2 and P3 suggesting a less extreme value in absolute terms compared to P1, partially indicated by the weak but lower extreme value in P3. With no significant values for P2, future research is needed to support this claim. However, this decreased linkage could result in agency issues due to the weaker linkage between CEO pay and their performance, and shareholder value.

P3 differs from the other subsets with a positive impact of inflation on CEO pay, supported by the 1-year inflation expectations as an alternative measure for inflation (Appendix E - Table E.2). The positive influence hence indicates a gain for CEOs when inflation increases and supports the documentation by Pattanaik (2020) that inflation expectations may have a spillover effect on wages. Delving deeper into the macroeconomic state of P3, which is characterized by an overall downward trend in lagged inflation and begins with low inflation expectations to end with an increase, the growth in compensation might be a response to the anticipated increase in the cost of living. However, in contrast to P1 where the inflation expectation stays consistently above the target inflation rate for the whole period, one would expect a price-wage spiral in this period as past research has found that the passthrough of wage growth on inflation is more likely in times of above-country average inflation or inflation expectations rates (Boranova et al., 2021). Nevertheless, due to insignificant results, no conclusion can be drawn on the impact in P1.

With the tight link of CEO pay to the state of the economy and the Philips curve indicating that an increase in inflation reduces unemployment rates and results in higher wages, CEOs should receive higher pay due to competition for managerial talents, potentially explaining the positive results in P3. Especially with a more extreme correlation from inflation to labor markets in times of higher inflation (Donayre & Panovska, 2018) which was observable in the last years of P3. However, with the negative impact found in the other periods, one could suggest support for previous studies finding that the labor market situation is less important as a determinant for CEO pay (Newman & Bannister, 1998) or due to the observed lag from inflation to labor market changes (Jo et al. 2023) and cannot help in explaining the observed findings.

Moreover, differences in employee characteristics are indicated by the results to impact CEO compensation. The positive impact of age on short-term compensation and the negative impact on long-term compensation supports previous findings that with a higher age comes a preference for short-term pay (Ye et al., 2023). Tenure has a positive significant impact on the total and long-term compensation in line with previous findings (Johnston, 2002).

Hypothesis 2 examines the difference in impact between short- and long-term compensation. The FULL dataset indicates a decrease in compensation if inflation increases. This decline may be attributed to pay-performance linkage as it is expected that CEOs receive lower compensation when an increase in

inflation could potentially harm the prospects of the firm and thereby the shareholder value. When compared to the results for total compensation, the long-term component is indicated to be more sensitive to changes in inflation than when it is combined with salary and bonus. Nevertheless, with mostly insignificant results for long- and short-term compensation in the subsets, difficulties arise in drawing conclusions on Hypothesis 2 and impact development over time, hence encouraging future research.

The joint impact of being a new CEO in a high-inflation period on compensation, hypothesis 3, suggests that newly appointed CEOs are likely to receive a 17.4% higher pay in P3 when current inflation is above 2%, also supported by the result in Appendix E, Table E.3. Similarly, incumbent, alongside new CEOs, experience an increase in compensation of 14.9% when inflation is high, indicating that CEOs benefit in these market conditions. The results in the third subset suggest that aside from experience and other employee-based attributes of the CEO, the current cost of living is presumably used as a negotiation point when setting the CEO compensation package. Furthermore, the positive coefficient of the interaction term is supported by previous findings that newly appointed CEOs receive higher compensation than their predecessor due to their bargaining power (Carpenter, 2011, Elsaid & Davidson, 2009) or additional one-time payments in the first year (Murphy, 2002). Moreover, CEOs with previous experience in the same industry or with a previously held role in the same firm also tend to receive higher compensation (Banker et al., 2013), potentially suggesting that CEO characteristics contribute to the positive impact. However, this only holds in P3 for the interaction term, possibly to compensate for the additional risk of managing a financially distressed firm or to retain and attract managerial talent when current inflation is high (Chang et al., 2015, Sonenshine et al., 2016), as observed in the sharp inflation hike of the last years in the subset that diverts from other subset trends. With inconsistent results in the interaction term for the long-term compensation, a comparison between short-term and long-term compensation becomes difficult.

In contrast, in P3 new CEOs irrespective of inflationary level receive a lower short-term and total compensation than incumbent CEOs suggested by the negative coefficients of NEWCEO, supporting previous findings that new CEOs receive lower pay (Sonenshine et al., 2016) with the short-term component decreasing (Murphy, 2002). The interaction term indicates a positive impact on the short-term component which outweighs the noted negative effect on new CEOs. This indicates that in general, new CEOs will experience a decrease in the short-term component but if they are appointed during a period of high inflation, potentially the cost of living can be leveraged to negotiate higher compensation.

The interaction term and InfHigh coefficient suggest that when the economy faces inflation above the target rate, there is an amplifying effect of inflation on compensation. In an economic cycle such as P1 and P2, both incumbent and new CEOs experience a significant decline in their total compensation when the inflation is above 2%, adding to the already negative impact of percentage increases in inflation. The opposite impact is found in P3 where the CEOs are likely to receive a higher increase in pay when inflation

surpasses the target, adding to their already positive impact in pay from inflation increases. Furthermore, the positive impact of InfHigh on long-term compensation in P3 could be explained by the CEO's long-term component increasing in times of turnaround, such as in the COVID-19 pandemic, due to financial distress risk and increased need to align interest between CEO and shareholders to reduce agency problems (Chang et al., 2015). Moreover, during the pandemic, pay-performance linkage increased for CEOs at the same time as salaries were cut due to reputational risks (Bedford et al., 2023, Carter et al., 2022), further motivating the mentioned findings.

Due to insignificant results for the joint impact of inflation and industry (Table 8.7), no conclusion can be drawn on the difference across industries and the impact on total compensation for hypothesis 4.

9.2 Limitations

Insignificance and inconsistencies between regressions are found, resulting in difficulties in concluding the hypotheses and research question. Several limitations of the study have hence been identified.

Firstly, there is a problem of data availability and missing data points in the samples. Due to firms being formed in different years or facing bankruptcy, and missing data points for certain years, some firms were dropped. Additionally, the possibility that partial first-year compensation is reported by firms can distort the results and impact the reliability of the coefficient of the variable for new CEOs.

Secondly, there might be endogeneity problems due to omitted or unobservable variables. These could be CEO characteristics that partially determine the CEO compensation, for example education, leadership skills, or reputation. Moreover, previous studies have identified board size and CEO duality as important determinants of CEO compensation (Ozkan, 2011). Nevertheless, with the availability of CEO duality and board size data only from 2002 as well as a high percentage of observations that are missing data points, these variables were not possible to consider to the extent desired, only as a robustness test for two of the sample periods with weak or insignificant findings (Appendix E – Table E.6).

Thirdly, there is low representation amongst gender and industries in the dataset, with disproportionate presence leading to difficulty in assessing their differences in the regression. Especially for the findings of male CEOs receiving lower compensation than their female counterparts as not consistent with previous research. The limited number of observations could further lead to Type II errors, affecting the statistical powers of the results. Additionally, unobserved or omitted variables, such as education, which may correlate with the gender variable, have the potential to influence the coefficients. Hence, further research is needed to increase the understanding of the gender impact on CEO compensation.

Lastly, since there are differences in which firms are followed between the subsets, as well as the chosen periods facing different economic shocks, this might complicate the possibility of comparing the

identified coefficients between the subsets and how the inflationary impact on CEO compensation has developed over time. It could further explain some of the inconsistencies and insignificant results found.

10. Conclusion

This study aimed to find the impact of inflation on CEO compensation by analyzing American firms in 1994-2022 with three additional subsets of different inflationary characteristics. This paper finds that lagged inflation influences CEO compensation negatively, suggesting that inflation is not the reason for the increase in CEO compensation and the diversion in wage growth trends from typical workers. However, levels of current inflation above the target of 2%, seem to have an amplifying effect of the lagged inflation, with the negative impact becoming even more negative, while the positive impact increases further. The diversion of the positive impact in the last years can possibly be explained by the recent year's pandemic and geopolitical events, which boosted the compensation for CEOs, both new and incumbent. CEOs appointed during periods of above-target inflation appear to exert a positive influence on their compensation, possibly indicating a stronger bargaining power allowing them to thrive in times of high inflation. Opposite to new CEOs in periods of lower inflation which observe a decrease in their compensation when appointed.

Additionally, the impact of inflation is found to vary across periods with differences in inflationary characteristics and the cycle of the economy. In times of low levels of lagged inflation as in 2014-2022, the absolute impact of inflation becomes smaller, suggesting that the inflationary sensitivity for CEO pay is reduced with downward wage rigidity. The impact is largest in absolute terms in the period of 1994-2003 when inflation was fluctuating close to the Federal Reserve's target inflation.

Furthermore, both the short and long-term compensation are influenced negatively by changes in inflation. Although the significance differs across subsets, the findings suggest that there is an increased sensitivity to inflation for the long-term component that is affected to a larger extent than the total compensation. Lastly, although there may be differences in how various industries are affected by inflation, this study does not find any significant result on how that may affect compensation across industries.

The findings in this paper contribute to the current literature by providing insight into the sensitivity of CEO compensation from inflation. With the negative impact of inflation identified, CEOs do not thrive in times of inflation. Nevertheless, the answer to the research question changes when inflation surpasses the target inflation rate in the last years with especially newly appointed CEOs gaining in increased pay, potentially suggesting a pay increase that is not economically justifiable in line with shareholder wealth.

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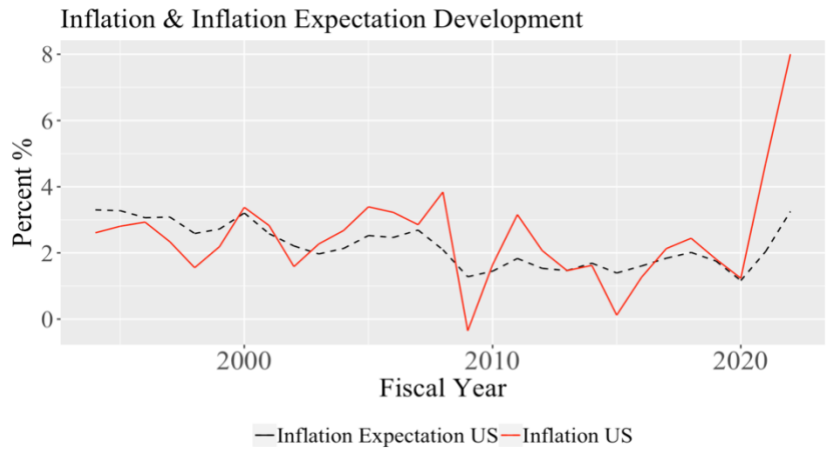
Appendix

A. Background Complements

Graph: A.1 – Development of inflation and one-year inflation expectations in the United States



B. Data Overview

Table B.1 – Definition and descriptive of the industries in the FULL dataset

SIC code	Industry	Number of firms	Percentage
10-14	Mining	18	3.96%
15-17	Construction	9	1.98%
20-39	Manufacturing	243	53.52%
40-49	Transportation	76	16.74%
50-51	Wholesale	20	4.41%
52-59	Retail	29	6.39%
60-67	Finance, insurance and real estate	9	1.98%
70-89	Services	47	10.35%
91-99	Public admin.	3	0.66%

Table B.2 – Descriptive statistics for 1994-2003 data sample (P1)

	Min	Max	Mean	Median	Variance	Std	Skewness	Kurtosis
Age	35	81	58	58	37	6	0	2
TotComp	0.20	90.82	5.56	3.50	53.10	7.29	5.48	47.57
Asset	105.14	104 457	8 651	4 094	193 878 800	13 924	4	19
ROA %	-8.55	74.42	16.31	15.03	75.28	8.68	1.55	6.27
Leverage %	15.40	155.65	60.51	61.05	296.84	17.23	0.50	3.16
Tenure	0	32	8	6	51	7	1	1
GDPGrowth %	0.95	4.79	3.37	3.90	1.50	1.22	-0.72	-0.78
Interest_rate %	1.13	6.24	4.40	5.14	2.72	1.65	-0.98	-0.43
PriceChange %	-71.40	229.12	8.17	5.65	1 397.33	37.38	1.05	2.99

Table B.3 – Descriptive statistics for 2004-2013 data sample (P2)

	Min	Max	Mean	Median	Variance	Std	Skewness	Kurtosis
Age	36	96	57	57	43	7	1	4
TotComp	0.00	46.22	6.72	5.06	34.77	5.90	1.70	3.70
Asset	58.96	797 769	18 248	3 732	3 400 688 639	58 315	9	108
ROA %	-22.87	52.66	14.42	13.45	58.12	7.62	0.46	2.18
Leverage %	5.30	194.31	55.94	56.02	456.60	21.37	0.63	2.56
Tenure	0	61	7	5	54	7	3	11
GDPGrowth %	-2.60	3.85	1.80	2.15	3.14	1.77	-1.35	1.18
Interest_rate %	0.10	5.02	1.72	0.76	3.64	1.91	0.78	-0.99
PriceChange %	-82.27	4 436.47	12.38	8.07	12 606.37	112.28	31.88	1 195.56

Table B.4 – Descriptive statistics for 2014-2022 data sample (P3)

	Min	Max	Mean	Median	Variance	Std	Skewness	Kurtosis
Age	36	85	58	58	36	6	0	2
TotComp	0.00	177.91	9.92	8.09	85.86	9.27	6.61	91.88
Asset	64.41	648 349	29 306	6 515	3 612 267 644	60 102	4	18
ROA %	-58.68	81.56	13.07	12.22	63.58	7.97	0.74	10.81
Leverage %	9.71	182.01	62.55	62.68	426.31	20.65	0.61	2.28
Tenure	0	45	7	5	50	7	2	6
GDPGrowth %	-2.77	5.95	2.15	2.29	4.43	2.10	-0.76	1.50
Interest_rate %	0.08	2.16	0.86	0.39	0.62	0.78	0.49	-1.44
PriceChange %	-86.34	2 599.09	11.43	6.49	6 579.51	81.11	21.35	609.80

Table B.5 – Pearson Correlation matrix for the FULL dataset

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	InfUS	1.00										
2	GDPGrowth	0.33***	1.00									
3	Interest_rate	0.25***	0.40***	1.00								
4	lnAsset	0.05***	-0.06***	-0.16***	1.00							
5	PriceChange	-0.08***	-0.03*	-0.07***	-0.02	1.00						
6	ROA	0.04***	0.07***	0.13***	0.02	-0.04***	1.00					
7	Leverage	0.01	-0.02*	-0.07***	0.38***	0.07***	-0.07***	1.00				
8	lnTenure	-0.01	-0.01	-0.03*	-0.13***	0.00	0.01	-0.11***	1.00			
9	Age	0.02	0.00	-0.04***	0.01	0.01	-0.02	-0.01	0.46***	1.00		
10	NEWCEO	0.01	0.02	0.02	0.04**	-0.02	-0.01	0.03**	-0.54***	-0.16***	1.00	
11	dGender	-0.01	0.02*	0.08***	-0.02*	0.01	0.00	-0.06***	0.04***	0.05***	-0.02*	1.00

Note: Significance of correlation expressed as *p<0.1; **p<0.05; ***p<0.01

Table B.6 – Pearson Correlation matrix for 1994-2003 data sample (P1)

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	InfUS	1.00										
2	GDPGrowth	-0.02	1.00									
3	Interest_rate	0.47***	0.56***	1.00								
4	lnAsset	-0.05	-0.10*	-0.13**	1.00							
5	PriceChange	0.13**	-0.00	-0.02	-0.07	1.00						
6	ROA	0.06	0.03	0.13**	0.13**	-0.09	1.00					
7	Leverage	-0.02	-0.05	-0.08	0.31***	0.08	-0.32***	1.00				
8	lnTenure	0.03	0.00	0.03	-0.20***	-0.04	-0.07	0.03	1.00			
9	Age	0.01	0.02	0.02	-0.05	-0.04	-0.09*	0.10*	0.40***	1.00		
10	NEWCEO	-0.02	-0.06	-0.07	0.09	0.01	0.00	0.01	-0.58***	-0.21***	1.00	
11	dGender											

Note: Significance of correlation expressed as *p<0.1; **p<0.05; ***p<0.01

No female CEOs in the dataset, hence no values for the dummy gender since all observations have a value of 1=MALE.

Table B.7 - Pearson Correlation matrix for 2004-2013 data sample (P2)

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	InfUS	1.00										
2	GDPGrowth	0.57***	1.00									
3	Interest_rate	0.54***	0.31***	1.00								
4	lnAsset	-0.04	-0.03	-0.06**	1.00							
5	PriceChange	-0.18***	-0.07**	-0.07**	-0.01	1.00						
6	ROA	0.08***	0.03	0.06**	0.07**	-0.03	1.00					
7	Leverage	-0.03	-0.01	-0.03	0.34***	0.09***	-0.05*	1.00				
8	lnTenure	-0.03	-0.04	-0.03	-0.19***	-0.00	-0.02	-0.15***	1.00			
9	Age	-0.03	-0.00	-0.05*	-0.10***	0.02	-0.07**	-0.04*	0.46***	1.00		
10	NEWCEO	0.04	0.03	0.00	0.04*	-0.02	0.03	0.03	-0.54***	-0.15***	1.00	
11	dGender	0.03	0.02	0.05*	0.05*	0.02	-0.02	-0.11***	0.06**	0.04	-0.04	1.00

Note: Significance of correlation expressed as *p<0.1; **p<0.05; ***p<0.01

Table: B.8 - Pearson Correlation matrix for 2014-2022 data sample (P3)

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	InfUS	1.00										
2	GDPGrowth	0.31***	1.00									
3	Interest_rate	0.35***	0.00	1.00								
4	lnAsset	0.07**	0.00	0.03	1.00							
5	PriceChange	0.00	0.10***	-0.05*	-0.03	1.00						
6	ROA	0.05*	0.03	0.06**	-0.00	-0.02	1.00					
7	Leverage	0.02	-0.01	0.02	0.30***	0.09***	-0.09***	1.00				
8	lnTenure	0.01	0.01	0.01	-0.16***	0.03	0.01	-0.10***	1.00			
9	Age	0.08***	-0.01	0.04	-0.04	0.02	-0.04	-0.03	0.50***	1.00		
10	NEWCEO	-0.01	-0.02	-0.00	0.03	-0.03	-0.03	0.04	-0.53***	-0.14***	1.00	
11	dGender	-0.03	-0.01	-0.01	-0.07**	0.00	0.00	-0.09***	0.03	0.02	-0.02	1.00

Note: Significance of correlation expressed as *p<0.1; **p<0.05; ***p<0.01

C. Lag Selection and Causality

Table C.1 - Optimal lag selection test for the United States inflation in the fixed effects model

	FULL		P1		P2		P3	
Lag	AIC	BIC	AIC	BIC	AIC	BIC	AIC	BIC
0	11467	11557	723	773	**2905	**2979	* 2458	* 2530
1	11532	11622	724	774	* 2903	* 2977	**2464	**2537
2	**11314	**11404	**655	**703	**2905	**2979	2466	2538
3	* 11094	* 11184	* 583	* 630	**2905	**2979	2468	2540

** Lowest AIC or BIC, ** Second lowest AIC or BIC, indicating the best fitted lag for the model*
AIC = Akaike Information Criterion
BIC = Bayesian Information Criterion

The optimal lag selection test indicates that using lag for inflation is the most fitting for the model when testing lags between 0 and 3. The lag of three years has the lowest AIC and BIC in the FULL and P1 datasets, indicating the best-fitted lag for the model used. Nevertheless, a two-year lag is first or second most optimal in three out of four datasets, hence indicating a possible optimal lag to use.

Table C.2 – Granger causality test for the optimal lag selected, the FULL dataset

H0: TotComp do not Granger-cause InfUS			
Lagged years	1	2	3
F-Test	5.9373	2.1366	3.8192
df1	1	2	3
df2	16644	16638	16632
p-value	0.01483	0.11810	0.00951

To determine which lag to use, a Granger test is furthermore conducted to understand if there is a reverse relationship between the variables. For the two-year lag, since the generated p-value is higher than the significance level of 0.05, the null hypothesis is rejected, indicating no Granger causality by the compensation variable to the lagged inflation. This supports the usage of lag on inflation to mitigate the problem of reverse causality. For the one-year lag and three-year lag, the hypothesis is supported by a reverse relationship with a p-value below 0.05. Therefore, the two-year lag of inflation will be used.

Table C.3 – Correlation matrix of the lagged inflation variables, the FULL dataset

	Variables	1	2	3	4
1	InfUS_lag_0	1.00			
2	InfUS_lag_1	0.34***	1.00		
3	InfUS_lag_2	-0.21***	0.11***	1.00	
4	InfUS_lag_3	-0.00	-0.13***	0.21***	1.00

Note: Significance of correlation expressed as *p<0.1; **p<0.05; ***p<0.01

D. Regression Extensions

Table D.1 – Interaction term between lagged inflation and gender dummy

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS_lag_2	-0.037	-0.174***	-0.002	0.037
	(0.024)	(0.056)	(0.031)	(0.040)
GDPGrowth	0.007**	0.002	0.013***	0.012***
	(0.003)	(0.022)	(0.004)	(0.003)
Interest_rate	-0.034***	-0.052**	-0.025***	0.030***
	(0.003)	(0.023)	(0.004)	(0.009)
lnAsset	0.387***	0.366***	0.267***	0.328***
	(0.010)	(0.073)	(0.026)	(0.027)
PriceChange	0.0001	0.0004	0.0001	0.0002**
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.005***	0.015***	0.010***	0.004***
	(0.001)	(0.005)	(0.002)	(0.001)
Leverage	0.0001	-0.003	-0.001	0.002***
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	-0.00004	0.008	-0.007***	0.010***
	(0.001)	(0.007)	(0.002)	(0.002)
NEWCEO	0.014	0.088	0.042	-0.026
	(0.025)	(0.117)	(0.039)	(0.037)
dGender	-0.101*		0.052	0.066
	(0.056)		(0.101)	(0.081)
lnTenure	0.049***	0.045	0.091***	0.032*
	(0.010)	(0.061)	(0.018)	(0.017)
InfUS_lag_2:dGender	0.005		0.005	-0.018
	(0.025)		(0.032)	(0.041)
Observations	7.512	416	2.086	1.961
R2	0.755	0.750	0.831	0.850
Adjusted R2	0.739	0.706	0.811	0.830
Residual Std. Error	0.403 (df=7059)	0.412 (df=354)	0.315 (df=1864)	0.296 (df=1730)
Note:				*p<0.1; **p<0.05; ***p<0.01

To observe if there are additional effects on compensation from gender, Regression 3 (Table 8.3) is expanded, to include an interaction term between gender and the two-year lagged inflation. No significant results are found for the interaction term with inflation, with the separate gender term having a similar impact in FULL of a 10.1% decrease in pay for male CEOs. Conclusions can hence not be drawn on the joint impact of inflation and gender on the compensation of CEOs. The independent variable and remaining control variables illustrate similar coefficients as in previous regression results.

Table D.2 – New CEO and above 2% inflation interaction, short- and long-term compensation, 2014-2022

	Dependent variable:		
	Short-term	Long-term	TotComp
	(1)	(2)	(3)
InfUS_lag_2	0.009	0.086**	0.088***
	(0.023)	(0.036)	(0.015)
GDPGrowth	0.006	0.008	0.0003
	(0.006)	(0.009)	(0.004)
Interest_rate	0.012	0.013	0.014
	(0.014)	(0.022)	(0.009)
lnAsset	0.049	0.434***	0.240***
	(0.045)	(0.072)	(0.029)
PriceChange	0.0001	0.0002	0.0002*
	(0.0001)	(0.0002)	(0.0001)
ROA	0.007***	0.008**	0.005***
	(0.002)	(0.003)	(0.001)
Leverage	-0.0005	0.003	0.002*
	(0.001)	(0.002)	(0.001)
Age	0.028***	0.005	0.008***
	(0.004)	(0.006)	(0.002)
NEWCEO	-0.242***	-0.106	-0.082*
	(0.069)	(0.109)	(0.044)
dGender	-0.011	0.086	0.047
	(0.078)	(0.123)	(0.050)
lnTenure	-0.097***	0.034	0.046***
	(0.026)	(0.041)	(0.017)
InfHigh	0.011	0.158***	0.149***
	(0.036)	(0.056)	(0.023)
NEWCEO:InfHigh	0.358***	0.190	0.174***
	(0.093)	(0.146)	(0.059)
Observations	1.961	1.961	1.961
R2	0.777	0.779	0.855
Adjusted R2	0.747	0.750	0.836
Residual Std. Error (df=1729)	0.455	0.716	0.291

Note: *p<0.1; **p<0.05; ***p<0.01

When inflation is above 2%, a CEO receives a 14.9% increase in total compensation and 15.8% in long-term compensation, at a significance level of 0.01. A new CEO will receive a 24.2% reduction in short-term compensation, with the negative impact also weakly supported in total compensation of an 8.2% reduction at a 0.1 significance level. In addition, if a CEO is new when current inflation is high, the short-term compensation will increase by 35.8%, indicating a larger sensitivity to short-term compensation than the total compensation which sees an increase of 17.4%. No conclusions can be drawn on the impact on

long-term compensation for new CEOs due to the low significance. Combined, a new CEO in high inflation will see an 11.6% (35.8%-24.2%) increase in short-term compensation, not including the general impact of high inflation on CEO pay due to insignificant results, supporting Hypothesis 3 of a positive impact from high inflation, while a 24.1% (17.4%+14.9%-8.2%) in total-compensation. The independent variable and remaining control variables illustrate similar coefficients as in previous regression results for P3.

Table D.3 – Interaction term for selected control variables with inflation

	Dependent variable:				
			lnTotComp		
	Reg 3	Asset	ROA	Price	Leverage
	(1)	(2)	(3)	(4)	(5)
InfUS_lag_2	-0.033***	-0.040*	-0.059***	-0.031***	-0.022
	-0.005	-0.024	-0.01	-0.005	-0.014
GDPGrowth	0.007**	0.007**	0.007**	0.007**	0.007**
	-0.003	-0.003	-0.003	-0.003	-0.003
Interest_rate	-0.034***	-0.034***	-0.034***	-0.034***	-0.034***
	-0.003	-0.003	-0.003	-0.003	-0.003
lnAsset	0.387***	0.385***	0.388***	0.387***	0.387***
	-0.01	-0.012	-0.01	-0.01	-0.01
PriceChange	0.0001	0.0001	0.0001	0.001***	0.0001
	-0.0001	-0.0001	-0.0001	-0.0002	-0.0001
ROA	0.005***	0.005***	0.001	0.005***	0.005***
	-0.001	-0.001	-0.002	-0.001	-0.001
Leverage	0.0001	0.0001	0.0001	0.0001	0.0005
	-0.0004	-0.0004	-0.0004	-0.0004	-0.001
Age	-0.00004	-0.00003	-0.00005	0.00002	-0.00002
	-0.001	-0.001	-0.001	-0.001	-0.001
NEWCEO	0.014	0.014	0.014	0.015	0.014
	-0.025	-0.025	-0.025	-0.025	-0.025
dGender	-0.092***	-0.092***	-0.091***	-0.093***	-0.091***
	-0.032	-0.032	-0.032	-0.032	-0.032
lnTenure	0.049***	0.049***	0.049***	0.049***	0.049***
	-0.01	-0.01	-0.01	-0.01	-0.01
InfUS_lag_2:lnAsset		0.001			
		-0.003			
InfUS_lag_2:ROA			0.002***		
			-0.001		
InfUS_lag_2:PriceChange				-0.0002***	
				-0.0001	
InfUS_lag_2:Leverage					-0.0002
					-0.0002
Observations	7,512	7,512	7,512	7,512	7,512
R2	0.755	0.755	0.755	0.755	0.755
Adjusted R2	0.739	0.739	0.739	0.739	0.739
Residual Std. Error	0.403 (df=7060)	0.403 (df=7059)	0.403 (df=7059)	0.403 (df=7059)	0.403 (df=7059)

Note: *p<0.1; **p<0.05; ***p<0.01

When extending the fixed effects model for the FULL dataset to include interaction terms of the control variables with the lagged inflation, one can observe how some of the variables have a changed pattern. No significant results for assets or leverage are noticeable. However, the variable ROA increases by 0.2% with

each additional unit increase in percent. Nevertheless, no significance is found on the standalone impact of the variable on compensation in the dataset. For changes in price, the combined impact with inflation becomes negative with a 0.02% increase at a significance level of 0.01, hence decreasing the positive impact of price changes of 0.5% found of its standalone value. The negative impact of lagged inflation, positive from GDP growth, negative of interest rate, and positive tenure remains when including the interaction terms. No significant results found for age or NEWCEO.

E. Robustness Tests

Table E.1 – World inflation as an alternative inflationary measure

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(2)	(3)	(4)
InfW_lag_2	-0.033***	-0.049***	0.007*	-0.041***
	(0.003)	(0.013)	(0.004)	(0.014)
GDPGrowth	0.012***	0.014	0.013***	0.009***
	(0.003)	(0.022)	(0.004)	(0.003)
Interest_rate	-0.034***	0.010	-0.023***	0.007
	(0.003)	(0.017)	(0.004)	(0.011)
lnAsset	0.356***	0.325***	0.264***	0.323***
	(0.010)	(0.075)	(0.026)	(0.027)
PriceChange	0.0001	0.001	0.0001	0.0002**
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.006***	0.014***	0.011***	0.004***
	(0.001)	(0.005)	(0.002)	(0.001)
Leverage	-0.0004	-0.003	-0.001	0.002**
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	-0.0005	0.008	-0.007***	0.010***
	(0.001)	(0.007)	(0.002)	(0.002)
NEWCEO	0.024	0.092	0.041	-0.028
	(0.025)	(0.116)	(0.039)	(0.037)
dGender	-0.082***		0.063	0.039
	(0.032)		(0.067)	(0.050)
lnTenure	0.056***	0.045	0.090***	0.033*
	(0.010)	(0.060)	(0.018)	(0.017)
Observations	7.512	416	2.086	1.961
R2	0.758	0.753	0.832	0.851
Adjusted R2	0.743	0.711	0.812	0.831
Residual Std. Error	0.400 (df=7060)	0.409 (df=354)	0.315 (df=1865)	0.295 (df=1731)
Note:				*p<0.1; **p<0.05; ***p<0.01

Similar to the United States inflation, World inflation has a negative impact on CEO pay. At a 0.01 significance level, a 1% unit increase in world inflation results in a 3.3% decrease in total compensation in the FULL dataset, hence, a similar impact as on inflation in the United States. A negative impact is further identified in the subset P1 providing robustness of the negative impact of inflation in this paper. Nevertheless, the weak positive impact in P2 and significant negative impact in P3 contradict the findings in Regression 3, hence no robustness for the results provided for these two subsets. The remaining control variables illustrate similar coefficients as in previous regression results.

Table E.2 – 1-Year inflation expectations as an alternative inflationary measure

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(2)	(3)	(4)
InfExp1Y	0.039**	-0.146	-0.108**	0.043***
	(0.016)	(0.131)	(0.042)	(0.016)
GDPGrowth	0.010***	0.003	0.019***	0.006*
	(0.003)	(0.021)	(0.005)	(0.004)
Interest_rate	-0.049***	0.015	-0.002	0.012
	(0.005)	(0.036)	(0.010)	(0.010)
lnAsset	0.399***	0.487***	0.253***	0.314***
	(0.010)	(0.060)	(0.026)	(0.028)
PriceChange	0.0001	0.001	0.0001	0.0002**
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.005***	0.013***	0.011***	0.004***
	(0.001)	(0.004)	(0.002)	(0.001)
Leverage	0.0005	-0.001	-0.001	0.002**
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	0.0003	0.006	-0.007***	0.010***
	(0.001)	(0.007)	(0.002)	(0.002)
NEWCEO	0.008	0.095	0.044	-0.027
	(0.025)	(0.106)	(0.039)	(0.037)
dGender	-0.097***		0.071	0.041
	(0.032)		(0.067)	(0.050)
lnTenure	0.044***	0.049	0.091***	0.032*
	(0.010)	(0.054)	(0.018)	(0.017)
Observations	7.626	468	2.086	1.961
R2	0.752	0.734	0.832	0.851
Adjusted R2	0.737	0.694	0.812	0.831
Residual Std. Error	0.405 (df=7173)	0.414 (df=406)	0.315 (df=1865)	0.295 (df=1731)

Note: *p<0.1; **p<0.05; ***p<0.01

The one-year inflation expectations provide robustness for the impact of inflation found in Regression 3, with a negative impact of 10.8% in P2 and a positive impact of 4.3% in P3, at a significance level of 0.05 and 0.01 respectively. Nevertheless, the positive coefficient of 3.9% increase in compensation for each unit increase in inflation expectation in FULL contradicts previous findings in the paper. No significant result is found for the coefficient in P1. Hence, robustness is only indicated for P3 when using inflation expectation as an alternative measure for inflation. The remaining control variables illustrate similar coefficients as in previous regression results.

Table E.3 – New CEO and above 2% inflation expectation interaction

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(2)	(3)	(4)
InfUS_lag_2	-0.035***	-0.274***	0.002	0.017
	(0.005)	(0.072)	(0.006)	(0.011)
GDPGrowth	0.004	0.051	0.018***	-0.001
	(0.003)	(0.031)	(0.004)	(0.004)
Interest_rate	-0.043***	-0.131***	0.007	0.013
	(0.004)	(0.042)	(0.007)	(0.009)
lnAsset	0.385***	0.350***	0.204***	0.269***
	(0.010)	(0.073)	(0.028)	(0.028)
PriceChange	0.0001	0.001	0.00003	0.0002**
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.005***	0.014***	0.011***	0.004***
	(0.001)	(0.005)	(0.002)	(0.001)
Leverage	0.0001	-0.003	-0.001	0.002**
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	-0.0001	0.008	-0.008***	0.009***
	(0.001)	(0.007)	(0.002)	(0.002)
NEWCEO	-0.021	0.067	0.052	-0.047
	(0.032)	(0.194)	(0.052)	(0.041)
dGender	-0.093***		0.091	0.042
	(0.032)		(0.067)	(0.050)
lnTenure	0.050***	0.040	0.090***	0.041**
	(0.010)	(0.061)	(0.018)	(0.017)
InfHighExp	0.049***	0.288**	-0.167***	0.104***
	(0.014)	(0.132)	(0.028)	(0.019)
NEWCEO:InfHighExp	0.079**	0.042	-0.015	0.107*
	(0.040)	(0.198)	(0.062)	(0.064)
Observations	7.512	416	2.086	1.961
R2	0.755	0.753	0.835	0.853
Adjusted R2	0.740	0.709	0.815	0.834
Residual Std. Error	0.402 (df=7058)	0.411 (df=352)	0.312 (df=1863)	0.293 (df=1729)
Note:				*p<0.1; **p<0.05; ***p<0.01

For robustness, Regression 6 has been completed with inflation expectation instead of the current inflation for the InfHigh and interaction term. For the high inflation dummy, the results suggest a positive impact on CEO compensation in all datasets except for P2 which has a negative impact, similar to the results in Table 8.6. Nevertheless, the coefficient in P1 changes from negative to positive, hence not providing robustness of the dummy of high inflation. NEWCEO is insignificant in all periods. The interaction term is positive at a 7.9% increase in compensation for a new CEO when inflation expectations are above 2%, at a significance

level of 0.05 in the FULL dataset. This relationship is also weakly found in P3 with a 10.7% increase at a significance level of 0.1. The impact of the interaction term is hence robust to previously identified results in this paper. The remaining control variables illustrate similar coefficients as in previous regression results.

Table E.4 – Firm fixed effects regression, several lags of inflation, the FULL dataset

	Dependent variable:			
	lnTotComp			
	FULL	P1	P2	P3
	(1)	(3)	(4)	(5)
InfUS_lag_0	0.043***	1.068	0.0002	0.028***
	(0.004)	(0.907)	(0.009)	(0.006)
InfUS_lag_1	-0.036***	-1.214	-0.076***	-0.009
	(0.006)	(1.013)	(0.016)	(0.013)
InfUS_lag_2	-0.019***	1.893	-0.030***	0.038***
	(0.005)	(1.785)	(0.010)	(0.012)
InfUS_lag_3	-0.047***	-0.359*	-0.050***	-0.038**
	(0.005)	(0.189)	(0.012)	(0.016)
GDPGrowth	-0.013***	-0.485	-0.034***	0.004
	(0.003)	(0.538)	(0.011)	(0.004)
Interest_rate	-0.034***	0.440	0.011	-0.009
	(0.003)	(0.500)	(0.009)	(0.020)
lnAsset	0.340***	0.256***	0.227***	0.254***
	(0.011)	(0.087)	(0.027)	(0.029)
PriceChange	0.0001*	0.0004	0.0001	0.0002*
	(0.0001)	(0.001)	(0.0001)	(0.0001)
ROA	0.005***	0.017***	0.010***	0.004***
	(0.001)	(0.006)	(0.002)	(0.001)
Leverage	-0.001	-0.002	-0.001	0.002*
	(0.0004)	(0.003)	(0.001)	(0.001)
Age	-0.001	0.015*	-0.007***	0.009***
	(0.001)	(0.009)	(0.002)	(0.002)
NEWCEO	0.009	0.012	0.036	-0.015
	(0.025)	(0.127)	(0.039)	(0.037)
dGender	-0.070**		0.076	0.037
	(0.032)		(0.067)	(0.050)
lnTenure	0.053***	-0.012	0.088***	0.041**
	(0.010)	(0.069)	(0.018)	(0.017)
Observations	7.392	364	2.086	1.961
R2	0.763	0.765	0.833	0.853
Adjusted R2	0.747	0.715	0.813	0.834
Residual Std. Error	0.396 (df=6937)	0.411 (df=299)	0.313 (df=1862)	0.293 (df=1728)
Note:				*p<0.1; **p<0.05; ***p<0.01

The regression indicates a difference in impact on compensation between the lags of inflation. For the FULL dataset, the current year's inflation has a positive impact on compensation, while the previous three years have a negative significant impact. Insignificant results were found for most of the coefficients in P1, the three-year shows a weak negative result of 35.9%. In P2, a negative significant impact is found for the lagged years. For P3, similar results are found, however with a positive influence of the 2-year lagged inflation variable. There is no consistency in which number of lagged years generates the largest absolute impact on compensation across the datasets. The results in FULL suggest robustness of a negative impact by inflation for different selections of years to lag, nevertheless to different extents of their influence. The remaining control variables illustrate similar coefficients as in previous regression results, except for GDP growth which impacts compensation negatively unlike previous regressions.

Table E.5 – Fixed effects regression, different lags of inflation, the FULL dataset

	Dependent variable:				
	lnTotComp				
	T-0	T-1	T-2	T-3	Joint
	(1)	(2)	(3)	(4)	(5)
InfUS_lag_0	0.030***				0.043***
	(0.004)				(0.004)
InfUS_lag_1		0.007			-0.036***
		(0.005)			(0.006)
InfUS_lag_2			-0.033***		-0.019***
			(0.005)		(0.005)
InfUS_lag_3				-0.034***	-0.047***
				(0.005)	(0.005)
GDPGrowth	0.005*	0.014***	0.007**	0.009***	-0.013***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Interest_rate	-0.047***	-0.043***	-0.034***	-0.037***	-0.034***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
lnAsset	0.379***	0.399***	0.387***	0.378***	0.340***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)
PriceChange	0.0001	0.00005	0.0001	0.0001	0.0001*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
ROA	0.005***	0.005***	0.005***	0.006***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.0003	0.0005	0.0001	-0.00001	-0.001
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Age	-0.00000	0.0004	-0.00004	0.00002	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
NEWCEO	0.008	0.008	0.014	0.009	0.009
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
dGender	-0.090***	-0.098***	-0.092***	-0.087***	-0.070**
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
lnTenure	0.047***	0.044***	0.049***	0.049***	0.053***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	7.626	7.626	7.512	7.392	7.392
R2	0.755	0.752	0.755	0.758	0.763
Adjusted R2	0.739	0.737	0.739	0.742	0.747
Residual Std. Error	0.403 (df=7173)	0.405 (df=7173)	0.403 (df=7060)	0.400 (df=6940)	0.396 (df=6937)

Note: *p<0.1; **p<0.05; ***p<0.01

The regression run for the FULL dataset with a different number of lagged years for the independent variable indicates a divergence in the impact of inflation on compensation. Zero lag has a positive impact of 3% for each percentage unit increase in inflation at a 0.01 significance level. For the lagged variables, this relationship turns negative at a significance level of 0.01 for two- and three-year lag, while no significance for the one-year lag. These differences in impact are consistent when running the variables

jointly. The largest absolute impact is found for a three-year lag when run separately and jointly for the FULL dataset. The different results for the separately run inflation coefficients generate inconclusive results for Hypothesis 1, with a zero lag not supporting the hypothesis and the lagged variables supporting it. Nevertheless, with the assumption of delayed effects of inflation and the use of lag to avoid reverse causality, the results suggest robustness of a negative impact by inflation for different selections of lagged years. The remaining control variables illustrate similar coefficients as in previous regression results.

Table E.6 – CEO duality and Board size, P2 and P3 with EIKON variables

	Dependent variable:	
	lnTotComp	
	P2_EIKON	P3_EIKON
	(1)	(2)
InfUS_lag_2	-0.006	0.014
	(0.013)	(0.026)
GDPGrowth	0.027***	0.009
	(0.008)	(0.008)
Interest_rate	-0.027***	0.075***
	(0.009)	(0.021)
lnAsset	0.209***	0.229***
	(0.062)	(0.056)
PriceChange	0.000	0.000
	(0.000)	(0.000)
ROA	0.014***	-0.008***
	(0.004)	(0.003)
Leverage	0.002	0.001
	(0.002)	(0.002)
Age	-0.008	0.012**
	(0.005)	(0.005)
NEWCEO	0.035	-0.019
	(0.070)	(0.091)
dGender	0.246	-0.033
	(0.148)	(0.093)
lnTenure	0.091***	0.040
	(0.034)	(0.033)
dDuality	-0.091	-0.039
	(0.059)	(0.075)
Board Size	0.013	-0.027*
	(0.012)	(0.015)
Observations	581	219
R2	0.664	0.825
Adjusted R2	0.619	0.792
Residual Std. Error	0.345 (df=578)	0.243 (df=219)
Note:		*p<0.1; **p<0.05; ***p<0.01

When using a subset of the 2004-2013 and 2014-2022 datasets for the firms that have available data on CEO duality and board size in EIKON, no significant results are identified for the CEO duality coefficient limiting the possibility of concluding its impact on compensation. Nevertheless, board size in P3 suggests a negative impact of 2.7% on compensation for every increase in number of people on the board, at a 0.1 significance level. This weak coefficient suggests a contradicting impact compared to previous literature that has found a positive relationship. With the loss of observations due to missing values, this could prove an area of future research when more observations are available to further assess the relationships. The remaining control variables illustrate similar coefficients as in previous regression results. With the insignificant coefficient of lagged inflation in P2 and P3, robustness cannot be stated of the results in Regression 3 when including these additional control variables. This could however be due to the low data availability and small sample. Variables were not added to the P1 subset since variables were only reported from 2002 by EIKON.