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**The Officer- and Firm-Level
Determinants of CEO
Compensation in the USA
(2010-2020)**

Master's dissertation
prepared under the supervision of
Dr. Dmytro Osiichuk

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Student's statement of the Master's dissertation authorship

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Abstract

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Description:

CEO compensation is a multifaceted and dynamic area of study, englobing a wide range of factors that shape executive remuneration. This research examines the impact of firm-specific characteristics, CEO characteristics, and mergers and acquisitions (M&A) activities on CEO compensation structures from June 2010 to December 2020 in the United States. Analysing nearly 18,000 yearly observations of CEO and firm data alongside 2,621 M&A transactions, this study uncovers significant trends and shifts in CEO compensation over the decade.

From 2010 to 2020, CEO compensation underwent significant changes. Cash compensation remained relatively stable, driven mainly by rises in base salaries rather than cash bonuses. In contrast, equity-based compensation grew considerably, marked by a clear preference for restricted stock awards over stock options. This shift reflects a strategic alignment of CEO interests with long-term shareholder value, evident in the increasing dominance of equity-based compensation. By 2020, equity accounted for approximately 66.15% of total compensation, whereas cash comprised only 29.08%.

Using the natural logarithm of compensation components and employing fixed effects models to address skewness and endogeneity concerns, this study mitigated bidirectional causality between CEO compensation and firm and CEO characteristics, and mergers and

acquisitions activities. Key findings include the positive association between lagged stock returns and cash compensation, alongside the reinforcing effect of firm size on base salaries.

Furthermore, the analysis reveals that M&A activities significantly increase equity-based compensation, illustrating a strategic shift from cash incentives towards equity to better align CEO incentives with shareholder interests. However, near-retirement CEOs received less equity-based compensation, possibly due to higher risk aversion associated with age. CEO tenure emerged as a strong determinant of equity-based compensation, underscoring CEOs' bargaining power and firm-specific knowledge.

Despite robust findings, this research acknowledges limitations such as the absence of certain control variables and the grouping of M&A deals, which may impact the reliability of my results.

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1. Introduction and Motivation

As a management student at the school of economics and management of the university of Porto (FEP), I began to nourish a particular interest for finance when I started to delve into corporate finance and investment projects classes. This led me to pursue a master's degree in finance, and as I was really satisfied with the teaching staff at FEP, I decided to continue my studies there to further enhance my knowledge.

During the first year of my master's degree, I got the opportunity to delve in an international experience. Consequently, I decided to pursue a double degree at Kozminski University to further develop my academic skills. I hoped that exposure to different teaching methods would provide me with a level of proficiency in finance that was unattainable at my home university.

Although, when it came time to decide upon the theme of my master's dissertation, I remained adamant on exploring the topics that were discussed on the *Ethics and Company Governance* class, as it was the class I enjoyed studying the most. This class was taught by the professor Jorge Bento Ribeiro Barbosa Farinha, and it mainly explored the theoretical foundations and evolution of corporate governance, as well as the main corporate governance models and trends. Furthermore, the concept of agency theory, formalized by Jensen & Meckling (1976), particularly caught my interest during the class. However, one thing that was not brought up during the class that quickly appealed to my curiosity was the complexity of the CEO compensation structure and why was it usual to have a multichannel flow of income streams instead of a simpler contract. Driven by my curiosity, I decided to study and understand the relationship between every component of CEO compensation and how they align the interests of both CEOs and shareholders.

Another class that really interested me during my master's degree, was the *Mergers and Acquisitions* class, again taught by the professor Jorge Bento Ribeiro Barbosa Farinha. One topic that was addressed during the class that really connected with the *Ethics and Company Governance* class, was that sometimes CEOs engage in both mergers and acquisitions for their own benefit, even if that is not a decision that maximizes shareholder value. Hence, I knew that I wanted to study whether mergers and acquisitions present a significant relationship with any type of CEO compensation that would justify this behaviour.

Regarding the relevant theory, there is a significant disparity in the amount of available research between the European and American markets, with a greater number of studies focused on the American market. Despite this, I decided to analyse the American market because it offers a broader and more comprehensive set of valuable data that we can incorporate into our analysis. Thus, our **research goal** is to inquire the relationship between both firm characteristics, CEO characteristics and mergers and acquisitions activities with CEO compensation.

In this research, we begin by revising the concepts of agency theory and why they explain the need for a complex compensation structure. Next, we review the relevant literature for all our subjects of study and present our research questions based on this analysis. We then provide a thorough explanation of the data collection and cleaning process, detailing the databases used and the obstacles encountered. Following this, we calculate all the required variables for our analysis that were not readily available during data collection. We then present our sample through descriptive statistics and illustrate the yearly evolution of the main variables, explaining their progress over time. We explore the correlation between all variables within our sample, examining the need to remove any variable from our analysis. Subsequently, we elaborate on our research methodology, showcasing the rationale behind our decisions. We then conduct univariate tests, using the t-test to determine if there are significant differences between the means of two groups of relevant variables. Finally, we present and discuss our regression results, highlighting the different impacts of the studied variables on each type of compensation component.

2. Literature Review and Hypothesis Formulation

To gain a deeper insight into the key components of CEO compensation and their connection with firm performance, as well as mergers and acquisitions activity and CEO characteristics, I start by reviewing the pertinent academic literature concerning their interrelation.

Firstly, I analyse the agency theory problem, introduced by Jensen et al in 1976. This problem is fundamental for our research goal as it is the main driver for CEO compensation not being standardized, as well as justifying the use of multiple compensation methods.

Hence, I then revise the literature about the individual components of CEO compensation structure, defining each one and explaining the reasons for their usage. Furthermore, we divide the CEO compensation structure in cash compensation, where we explain salaries as well as cash bonuses and equity-based compensation, where we justify the usage of both stock options awards and stock awards.

Thirdly, I study the firm characteristics and how they affect CEOs wealth, as according to the relevant theory, firm characteristics, namely firm size, are usually the main differentiation factor between CEO compensations. Nonetheless, we also analyse whether accounting-based performance measures or market performance measures are most suited to our research goal.

Fourthly, I take a closer look at the individual CEO characteristics and how they shape the CEOs compensation structure. Hence, we revise if significant differences in age and tenure lead to divergent investment decisions which could justify discrepancies in the CEO compensation structure.

Lastly, I study the relevant literature on mergers and acquisitions and its relationship with firm performance and consequently CEO compensation. Upon the analysis of the related literature, I developed 11 hypotheses:

Table 1 - Hypotheses Overview. Source: Own Elaboration

<i>H1</i>	<i>There is a positive associative link between Firm Size and CEO Compensation</i>
<i>H2</i>	<i>There is a positive associative link between Accounting Performance Measures and CEO Compensation</i>
<i>H3</i>	<i>There is a positive associative link between Market Performance Measures and CEO Compensation</i>
<i>H4</i>	<i>There is a positive associative link between CEO Age and CEO Compensation</i>
<i>H5</i>	<i>There is a positive associative link between CEO ownership and CEO Compensation</i>
<i>H6</i>	<i>There is a positive associative link between CEO Tenure and CEO compensation.</i>
<i>H7</i>	<i>There is a negative associative link between Near Retirement age and CEO Equity-Based Compensation</i>
<i>H8</i>	<i>There is a positive associative link between the completion of a M&A and CEO Compensation</i>
<i>H9</i>	<i>There is a positive associative link between higher weight of Equity-Based Compensation and the number of completed M&A deals</i>
<i>H10</i>	<i>There is a negative associative link between in Cross-Industry M&A deals and CEO Compensation</i>
<i>H11</i>	<i>There is a positive associative link between Cross-Border M&A deals and CEO Compensation</i>

2.1 Agency Theory

Agency theory is one of the major theories associated with the development of corporate governance and has its roots in the work of Barnard (1938), “The Functions of the Executive”. The author introduced the idea that managers must be able to sense the organization as a whole and make decisions that align with the interests of shareholders. Nonetheless, he identified the moral hazard problem, in which both managers and employees should receive incentives to align their efforts to the overall performance of the firm.

This concept laid the foundation for the development of Agency Theory, which was later formalized by (Jensen et al., 1976), in which the authors identify the agency relationship where one party (the principal) delegates the work to another party (the agent). The authors then introduced the concept of agency costs, which refers to the costs incurred by the principal (shareholders) due to the actions of the agent (CEO) that do not align with the principal's interests.

According to (Berle, 1932; Jensen et al., 1976; Smith, 1838), the agency relationship arises directly from the separation between ownership and control, where managers may prioritize their own interests over those of the shareholders. This separation arises because of the formation of corporations with broad shareholder bases in industrialized countries with more developed financial markets, much fostered by common law environments (such as the United Kingdom and the United States of America) where minority interests are highly protected. As stated by Smith (1838), *“The directors of such companies (join stock companies) however being the managers rather of other people’s money than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance (as if it were their own)”*.

As such, two main agency problems arise from this relationship between shareholders and CEOs, as stated by (Eisenhardt & Bourgeois, 1988). Firstly, there is a divergence in goals between the CEO and shareholders, as the CEO's actions are often not fully observable by the shareholders, leading to potential moral hazard issues where the CEO may pursue personal benefits at the expense of shareholder value. Secondly, shareholders and CEOs often differ in their attitudes towards risk. Shareholders typically have diversified portfolios and prefer riskier investment strategies that promise higher returns, whereas CEOs, whose personal wealth and

job security are closely tied to the company, may prefer more conservative strategies to mitigate personal risk.

There are many ways to reduce these agency problems and align the interests of CEOs with those of shareholders, such as independent audits and board intervention. According to (E. F. Fama, 1980; Murphy, 1985) there is a positive relationship between CEO compensation and firm performance, which may indicate that CEOs are more likely to prioritize shareholder value when their compensation is tied to firm performance. According to (Tosi et al., 1997), since performance can be measured both by the actions and the results of these actions, the principal's first choice should focus on creating a balance between base compensation (based on behaviour) and additional incentives (based on results), thus maximizing the return on investment of shareholders.

2.2 CEO Compensation Structure

To reach the optimal compensation contract proposed by (Tosi et al., 1997), CEO compensation structure is designed to balance fixed and variable components to align the interests of the CEO with those of the shareholders, while also ensuring that the CEO is compensated for their effort and skill.

Thus, and following the CEO compensation structure presented in previous literature (Almeida, 2014; J. E. Core et al., 1999; Vogelaar, 2016), our research will mainly focus upon the following compensation components:

Table 2 - CEO Compensation Components. Source: (Vogelaar, 2016)

Components	Definition	Incentive
Cash Compensation		
Salary	Base Salary	Fixed
Bonus	Performance-Based Bonus	Short-Term
Equity-Based Compensation		
Restricted Stock	Stock Grants (Locked for 1+ Years)	Long-Term
Stock-Options	Stock-Option Grants (Vested for 1+ Years)	Long-Term
Other Compensation		
	Life Insurance, Tax Reimbursements, Travelling, Contribution Plans	Unrelated
Total Compensation		
	Salary, Bonus, Restricted Stocks, Stock-Options and Other Compensation	Both

2.2.1 Cash Compensation

Salary is the fixed component of CEO compensation, providing a stable income regardless of company and CEO's performance. This stability is crucial as it ensures that CEOs can manage the company without the constant pressure of financial insecurity, which might lead them to make overly risky decisions. The salary compensates the CEO for their day-to-day management roles (J. E. Core et al., 1999; Sonenshine et al., 2016). Typically, base salaries for CEOs are determined through competitive "benchmarking", based primarily on general industry salary surveys, and supplemented by detailed analysis of selected industry or market peers (Murphy, 1999). According to (Gerhart & Milkovich, 1990), the base salary has no significant impact on performance.

Bonus are a variable compensation component tied to short-term performance metrics like earnings or revenue growth, incentivizing achievement of specific goals and are usually paid based on a single-year's performance (Murphy, 1999). The bonus amount is calculated as a percentage of the CEO's salary, and the percentage can vary depending on the company's performance (J. E. Core et al., 1999). The bonus can be paid in cash or in the form of equity-based compensation, such as stock options or restricted stock units (Lambert & Larcker, 1987), but in this paper I separate and identify bonus as a short-term cash incentive, as a major part of bonus are cash-based (Lerner & Wulf, 2007). According to (J. E. Core et al., 1999; Guay, 1999), executives with higher cash compensation can invest more outside their firm, being more diversified, and consequently, less risk-averse, which would align both CEO and shareholder interests.

However, these short-term incentives face challenges stemming from managerial myopia or short-termism. This concept was analysed by (Narayanan, 1985) and (Jacobs, 1991), who suggest that pressure from financial markets may encourage managers to adopt a short-term perspective. The author argues that this bias is reinforced by compensation schemes that tie executive bonuses to annual profits. Another explanation is that stockholders want quick profits, and their short-term view is reflected in the managerial decisions. Consequently, it has been observed that when managers possess private information about their decisions, they may have incentives to make choices that generate short-term profits but are not aligned with the best interests of shareholders.

Thus, (J. E. Core et al., 1999; Lambert & Larcker, 1987; Murphy, 1999) identify long-term incentives, such as stocks and stock options, as better than bonuses for aligning the interests of shareholders and CEOs, as they directly tie the CEO's wealth to the company's stock performance and long-term value creation.

2.2.2 Equity Based Compensation

Equity Based Compensation is a form of remuneration that provides employees, particularly executives, with ownership interests or rights in the company. In this paper, I identify equity-based compensation as restricted stocks (RSUs), performance shares and stock options.

Stock options give employees the right to purchase company stock at a predetermined price after a certain period. Most authors argue that stock options shield CEOs from downside risk, due to their possibility of being used as a call option. This particularity impacts CEO behaviour, as CEOs who receive stock options are more likely to take on riskier projects, as their compensation is tied to the company's stock price, which may be inconsistent with the interests of shareholders (B. J. Hall & Viceira, 2000; Sanders & Hambrick, 2007). Nevertheless, (Jensen & Murphy, 1990) argue that this can lead to increased firm performance, as CEOs are incentivized to make decisions that increase the company's value. Sometimes there is a vesting period before options can be exercised which might incentivise managers to take the long-term perspective in their decisions (Henrique & Gonçalves, 2017).

Stock awards, including Restricted Stock Units (RSUs) and performance shares, are key components of equity-based compensation that play a significant role in influencing CEO behaviour and shaping executive compensation structures. RSUs are company shares given to an employee as part of their compensation, but they come with restrictions and vest over a period of time, typically contingent upon the employee's continued service to the company. Performance shares, on the other hand, are granted based on the achievement of specific performance criteria over a performance period, such as earnings per share targets or total shareholder return compared to a peer group.

This alignment between the interests of CEO and long-term value creation is intended to mitigate agency problems, as they encourage CEOs to remain with the company and focus on long-term strategies rather than short-term gains (Bebchuk & Fried, 2004). Moreover, performance shares, by their nature, tie rewards directly to strategic targets, reinforcing behaviours that are in direct alignment with corporate goals and shareholder expectations (Jensen & Murphy, 1990). This can lead to more prudent decision-making and risk management, as CEOs are aware that their ultimate compensation depends on meeting these

predefined targets. Furthermore, stock options and restricted stock entail no cash payout, enabling companies facing cash constraints to utilize these compensation types as substitutes for cash (Murphy, 1999). However, the vesting and performance conditions should be realistic, as overly ambitious goals might encourage risky behaviour, whereas easily achievable targets might not sufficiently motivate CEOs to excel (B. J. Hall & Murphy, 2003).

Furthermore, in a 1995 study, Mehran examined the executive compensation structure of U.S. companies concerning the effectiveness of equity-based compensation. Using ROA as a performance measure, the analysis unveiled a positive incentive effect of total compensation levels on the firms' ROA. Additionally, Mehran suggested that the type of compensation is pivotal in boosting CEOs' motivation to enhance shareholder value (Mehran, 1995).

Thus, equity-based compensation is a better approach to mitigate agency problems by aligning the interests of executives with those of shareholders, as cash compensation might not sufficiently motivate executives to prioritize long-term value creation (Bebchuk & Fried, 2003). These instruments directly tie the compensation of employees to the company's performance and stock price appreciation, fostering a sense of ownership and commitment to the company's success (Ofek & Yermack, 2000). In the same fashion, (Jensen & Murphy, 1990) found that while pay-performance sensitivity, is low on average, it is higher for CEOs with larger equity stakes in their firms, which suggests that increasing equity-based compensation could better align CEO incentives with shareholder interests and improve corporate governance.

2.3 Firm Performance and their Link to CEO Compensation

The relationship between firm performance and CEO compensation has been extensively explored. However, it's important to note that the pay-performance relationship can be assessed through two primary approaches: pay-performance sensitivity and pay-performance elasticity.

Firstly, pay-performance sensitivity was introduced by (Jensen & Murphy, 1990), and this measure calculates the dollar change in CEO compensation for a \$1,000 change in shareholder wealth, with shareholder wealth being measured as the rate of return on stocks multiplied by the market value of the firm. The authors show that the pay-performance sensitivity was low, with CEOs receiving only \$3.25 in additional compensation for every \$1,000 increase in shareholder wealth.

Secondly, pay-performance elasticity, initially introduced and subsequently utilized by (Rosen, 1990; Hall & Liebman, 1998), calculates the percentage change in CEO compensation for a 1% change in firm performance, typically measured by stock returns. Unlike pay-performance sensitivity, both authors discovered that CEO compensation demonstrates a strong responsiveness to firm performance. Moreover, a study by (Aaen & Lueg, 2022) revealed that the pay-performance elasticity has risen from the 1980s to the 2010s, implying that CEO compensation has increasingly aligned with shareholder value creation over the years.

Regarding the size of firms, in a small company, due to the limited number of units sold, a significant improvement in managerial efficiency does not necessarily lead to a substantial rise in overall profits. Conversely, in a large company, even a slight increase in profits per unit can result in a significant boost in total profits. Consequently, larger companies with greater sales volumes can afford to offer higher base salaries to their CEOs. Additionally, large companies are typically more operationally complex compared to small ones. Therefore, the size of a company serves only as a rough indicator of the managerial skills required, job complexity, and scope of control involved (Murphy, 1999).

According to the literature, firm size has a significant and positive relationship with CEO compensation, since by increasing firm size, executives can demand more compensation for managing a larger firm (Bliss, 2001; J. E. Core et al., 1999; Jensen et al., 1976; Jensen & Murphy, 1990). Specifically, Tosi et al. (2000), found that firm size explains around 40% of the

variance in total CEO compensation. Additionally, (Baker et al., 1988) found that executive compensation increases with firm size after an acquisition. Thus, I will test for the following hypothesis:

Hypothesis 1: There is a positive associative link between Firm Size and CEO Compensation.

To assess the financial aspect of firm performance, organizational researchers generally use either accounting-based measures of profitability such as return on assets (ROA), return on sales (ROS), and return on equity (ROE), or stock market-based measures such as Tobin's Q and market return (Gentry & Shen, 2010). According to (Venkatraman & Ramanujam, 1986), these measures can be unrelated because of the conflicts between achieving short-term and long-term goals, as market performance does not reflect the firm's fundamental value, but investors' perceptions of it (Thaler, 2004). Nevertheless, there are authors that suggest that the relationship between accounting and market measures is sufficiently high so that they can be treated as equivalent. Even though there are studies who present a relationship between them, their covariance is less than 10% and provides no evidence of convergence (Podsakoff et al., 2006).

Accounting performance measures are a critical indicator of how efficiently a company's management utilizes its assets to generate earnings, making it a direct measure of managerial effectiveness. Nevertheless, these measures are only able to reflect the management of assets in place during the previous year (Bushman et al., 1996), thus only allowing the evaluation of short-term decisions and performance. This may cause CEOs to focus on increasing short-term accounting profits at the costs of neglecting long-term value creation, leading to agency problems (Murphy, 1999). A major drawback from the accounting measures' backward looking characteristic, is that it does not consider all information, namely growth opportunities and the value of brands (Merchant & Otley, 2006). Therefore, I formulate the following hypothesis:

Hypothesis 2: There is a positive associative link between Accounting Performance Measures and CEO Compensation.

Market efficiency is a fundamental concept in finance, referring to the extent to which stock prices reflect all available information. The efficient market hypothesis (EMH), introduced in (E. F. Fama, 1970), suggests that in an efficient market, prices fully incorporate all known

information. Consequently, if I assume that the efficient market hypothesis holds in the real world, market-based financial performance measures, such as stock returns, are truly able to capture the investor's sentiment and their expectations of future performance, which could lead to unbiased evaluation of CEOs' output and consequently compensation. However, (Bettis, 1983) argues that even if the efficient market hypothesis holds, a firm's stock price does not necessarily reflect its fundamental value because it is influenced by the information managers choose to disclose to investors.

Despite the efficient market hypothesis being contested by many famous authors such as (Tobin, 1984), it is important to consider market-based financial performance measures, as many authors present significant advantages compared to accounting measures. According to (Lubatkin & Shrieves, 1986), market measures incorporate all relevant information, unlike accounting measures, which are only able to explain single aspects of firm performance. Furthermore, accounting measures are much more susceptible to be subject to managerial manipulation and distortions (Chakravathy, 1986). Some authors even assume that market measures better explain stock price variance compared to accounting-based measures (Muhammad & Scrimgeour, 2014).

Hypothesis 3: There is a positive associative link between Market Performance Measures and CEO Compensation.

Even though neither market nor accounting measures are perfect at assessing firm performance, most research accept them both as valid measures of firm financial performance (Hoskisson et al., 1999). In this research, I treat accounting measures as a reflection of past or short-term financial performance, and market measures as reflections of future or long-term financial performance, accordingly to previous literature (Hoskisson et al., 1994; Keats, 1988). Thus, firm financial performance is treated as a multidimensional construct, where both accounting and market-based performance measures represent distinct dimensions that have little empirical overlap.

2.4 CEO Characteristics and their Link to CEO Compensation

CEOs are pivotal to the strategic direction and performance of companies, as they have the ability to make key decisions, motivate employees and influence firm strategy decisions (Mackey, 2008). Since CEOs can shape a company trajectory, it is important to understand how each individual particularities that makes them important impacts the firms and consequently their compensation.

The age of a CEO can be a significant determinant of compensation due to the associated experience and perceived knowledge they bring to the company (Simsek, 2007). As CEOs get older, it is expected that both their acquired life and professional experiences translate to their work environment, which have the potential to influence various corporate decisions and outcomes, as highlighted by (Borgschulte et al., 2022). As noted by (Burney et al., 2021), “younger CEOs tend to adopt more aggressive Working Capital Management strategies and firms with younger CEOs use higher levels of trade-credit financing and carry lower levels of inventory.” This study, along with the findings of (MacCrimmon & Wehrung, 1986; Serfling, 2014), indicates a lower level of risk aversion among younger CEOs, which may stem from their desire to signal their abilities due to heightened career concerns.

Nevertheless, (D'Ewart & Brandon, 2015) have shown that CEOs in their 50s and 60s may receive higher compensation due to the positive abnormal returns they are likely to generate for the firm, showcasing indicates that there is a positive correlation between CEO age and compensation. Even though, older CEOs are often viewed as more experienced and capable of navigating complex challenges, which justifies higher pay, this trend can reverse as CEOs near retirement, potentially due to a perceived decrease in long-term commitment to the firm's future and reduced alternative employment options (Chulkov & Barron, 2023a). Contemplating all these findings, I develop our fifth hypothesis:

Hypothesis 4: There is a positive associative link between CEO Age and CEO Compensation.

Share ownership improves the principal-agent relationship because it links the CEOs' financial interests with the shareholders' needs of a long-term firm performance to increase shareholder wealth (Vogelaar, 2016). Thus, CEO share ownership serves as a valuable corporate governance tool, as evidenced by (Wu & Dong, 2020).

CEOs with higher ownership stakes have a greater incentive to align their interests with those of shareholders, leading to more efficient decision-making and better corporate governance, which suggests that CEOs with significant ownership stakes tend to lead firms that perform better than those with lower ownership levels (Morck et al., 1988). However, (E. H. Kim & Lu, 2011; Y. S. Kim et al., 2018; Morck et al., 1988) state that too much equity for the CEO can be harmful. Despite (Morck et al., 1988) stating that Tobin's Q increases by a large magnitude (0.3 on average) as board ownership increases from 0% to 5%, it falls as ownership rises. Thus, I will test for the following hypothesis:

Hypothesis 5: There is a positive associative link between CEO ownership and CEO Compensation.

This may explain why (Wu & Dong, 2020) highlight a negative relationship between CEO ownership and both return on assets (ROA) and market performance, when measuring the impact of changes in CEO ownership on long-term firm performance. These findings align with the managerial entrenchment hypothesis (Morck et al., 1988), which suggests that as CEO ownership increases, decisions that may be advantageous for the company but not for the CEO could be disregarded due to self-interest, leading to agency issues and diminished firm performance.

Similarly to age, CEOs with longer tenures might be rewarded for their sustained contribution to the firm's success, as their deep understanding of the company and its market can lead to better strategic decisions and, consequently, improved firm performance (Brochet et al., 2015). As CEO age and tenure increases his level of firm specific knowledge (experience) and therefore the greater the difficulty to replace him (Alves et al., 2016). For that reason, pay performance contracts are usually seen more generous for older CEOs and with a longer tenure (Florackis & Ozkan, 2009; Ryan & Wiggins, 2001).

However, (Brochet et al., 2015) note that "company performance declines over time the longer those CEOs stay in their positions," attributed to a combination of diminished learning capacity, accumulation of power, and decreasing engagement. This finding is corroborated by (Limbach et al., 1991), who observed an inverted U-shaped relationship between firm value and CEO tenure. Initially, firm value tends to increase with CEO tenure, but it typically begins to decline after around 14 years (Limbach et al., 1991), which may consequently lead to lower compensation. Nevertheless, longer tenure is associated with increased managerial power

(“capacity of individual actors to exert their will” (Finkelstein, 1992)), which would allow these executives to use their power to positively influence their boards, which can result in more favourable compensation packages for them (Hill et al., 2016). Considering this, my seventh hypothesis is:

Hypothesis 6: There is a positive associative link between CEO Tenure and CEO compensation.

When CEOs reach near retirement age, there are a lot of factors that the company takes into consideration, as for instance, these CEOs present a great level of knowledge and experience, but their remaining output is limited to a few more years, which many times leads to compensation structure adjustments. Wang & Yin (2021) state that more than 10% of S&P 1500 companies have hired CEOs near or over the conventional retirement age, and that these hirings are more likely when the company is in distress. Despite recognizing that retiring CEOs can be beneficial, the authors found that these CEOs receive lower total compensation, and that the compensation structure puts a higher weight on nonequity-based compensation. This adjustment aligns with the reduced risk and shorter time horizon associated with their remaining tenure, as companies do not need to use more equity-based compensation to incentivize older CEOs for proper risk taking. Despite these facts, some studies argue that younger CEOs are more risk-averse due to reputational concerns, as if a younger CEO makes a mistake, it is very likely to influence his further career (Zwiebel, 1995). Taking that into account, my eighth hypothesis is:

Hypothesis 7: There is a negative associative link between Near Retirement age and CEO Equity-Based Compensation.

2.5 Mergers & Acquisitions and their Link to CEO Compensation

Despite numerous studies on mergers and acquisitions, the underlying motives behind them remain largely inconclusive. Consequently, approximately 80% of mergers involve multiple motives, as both value-increasing and value-decreasing factors may coexist (Nguyen et al., 2012). Nonetheless, according to previous literature, the performance of mergers and acquisitions is usually low and reported between the 40 and 60 per cent range (Homburg & Bucerius, 2005). These results can normally be attributed and explained by poor strategic fit (Larsson & Finkelstein, 1999), or by poor integration (Haspeslagh & Jemison, 1991). Thus, executing mergers and acquisitions requires a comprehensive understanding of the market, specific needs of the involved companies, and precise potential synergies valuation from the CEO (Bauer & Friesl, 2022).

Furthermore, Mergers and Acquisitions represent one of the most prevalent strategies in corporate development, with CEOs playing a crucial role in these transactions. The global deal value for mergers and acquisitions reached \$3,200 billion in 2023 (Bain & Company, 2024), surpassing the nominal GDP of major countries like France, Italy, Brazil, and Spain (International Monetary Fund, n.d.).

For instance, Bliss (2001), show that CEO compensation and wealth typically increase after large bank mergers even after acquirors' stock price declines. Regarding bonuses, (Grinstein & Hribar, 2004), found that 39% of the acquiring firms in their sample compensate their CEOs for completing the deal, mainly in the form of cash bonuses, using an Acquisition Dummy variable that equals one if the firm did an acquisition in that year which deal was worth at least \$1 billion. The authors also conclude that acquiring CEOs who have more power to influence board decisions receive significantly larger M&A bonuses. However, the study notes a lack of a positive relationship between bonus compensation and deal performance, suggesting that these bonuses may not always be aligned with shareholder interests. (Conyon & Leech, 1994) used a sample with the highest paid CEOs from the United Kingdom, and found that acquisitions lead to a premium pay, in bonuses, despite the weak relationship between CEOs compensation and firm performance.

Even if (Grinstein & Hribar, 2004) do not directly discuss M&A's direct impact on CEOs base salary, it suggests that successful M&A deals can lead to company growth and expansion,

which may justify increases in base salary to reflect the increased size and complexity of the company's operations. However, the direct impact of M&A deals on base salary is less pronounced compared to bonuses and equity-based compensation.

Following the research developed by Harford & Li (2007), acquiring firm CEOs are richly rewarded for growth through acquisitions with substantial new stock and option grants. Similarly, (Bebchuk et al., 2013; Frydman & Jenter, 2010) suggest that M&A events can lead to significant restructuring of compensation packages, where performance-based equity compensation becomes more prevalent. This shift is indicative that M&A activities often lead to adjustments in executive compensation structures to incentivize CEOs to pursue and integrate acquisitions successfully and mitigate agency problems. Following the discussed literature, I develop my first hypothesis:

Hypothesis 8: There is a positive associative link between the completion of a M&A and CEO Compensation.

Furthermore, (Harford & Li, 2007) found that CEO's pay, and wealth are completely insensitive to poor post-acquisition performance, but CEO's wealth remains sensitive to positive post-acquisition performance. Nevertheless, Lehn & Zhao (2006) concluded that CEOs who make value destroying acquisitions are more likely to be replaced.

Moreover, the research by (Sirait, 2018) highlights that firms with higher levels of equity-based compensation are more likely to engage in M&A activities. This is consistent with the notion that CEOs may want to pursue growth through acquisitions, potentially increasing their personal compensation through higher equity valuations in the short run, even if these decisions do not enhance long-term firm value (Jensen et al., 1976). Based on this research, I conclude that there is a relationship between the weight of equity-based compensation and the number of completed deals, hence formulating my second hypothesis:

Hypothesis 9: There is a positive associative link between higher weight of Equity-Based Compensation and the number of completed M&A deals.

One of the multiple reasons for M&A activity is to bring enhancement through production efficiencies and increase market power, through corporate diversification. Through corporate diversification, companies hope to penetrate a new market or industry in which they do not operate, reach synergies and economies of scope by combining complementary resources and

know how, or reduce their risk by diversifying into different industries. In this regard, I will be focusing on cross-industry and geographical diversification. Nonetheless, the main objective is that after an acquisition, the value of the newly created entity should be greater than the value of the separate individual parts due to the synergies realized from the merger or acquisition (Bauer & Friesl, 2022).

Cross-industry mergers and acquisitions refer to deals where the acquiring and target firms operate in different industries or sectors. This allows firms to diversify their product portfolios and enter new markets, as well as enhancing the risk-return profile of home-region firms, depending on the degree of product diversification (Kling et al., 2014). Nevertheless, Zhang et al. (2018), using data of listed Chinese pharmaceutical firms from 2008 to 2016, stated that value-chain-extension and technology-seeking M&As are positively related to firms' performance in emerging economies, while diversifying M&As have a negative impact. Thus, I elaborate an additional hypothesis:

Hypothesis 10: There is a negative associative link between in Cross-Industry M&A deals and CEO Compensation.

Cross-border mergers and acquisitions refer to the process where companies from different countries merge into a single entity or one company takes over another across national boundaries. By engaging in these types of mergers or acquisitions, companies aim to overcome the limitations of the domestic market. They gain access to additional resources and skills unavailable locally, enhance the efficiency of their operations both domestically and internationally, and discover new growth opportunities (Bertrand & Betschinger, 2012; Shimizu et al., 2004).

Regarding the impact of diversification on CEO compensation, agency costs may arise when managers have incentives to exploit shareholders by diversifying in ways that enhance their own personal wealth. Firstly, CEOs of companies with excess cash flows tend to pursue expansion, increasing the firm's size and thereby enhancing their own expected utility or influence (Jensen, 1986). This growth can result in higher compensation for CEOs due to the increased job complexity associated with managing a larger firm (Murphy, 1999). This behavior, known as empire building, is an agency problem that can lead to value-decreasing acquisitions (Marulini, 2018). Additionally, Amihud & Lev (1981) argue that diversification motivates CEOs to pursue M&A deals to increase their personal benefits, even when the

synergies are not positive (Henrique & Gonçalves, 2017; Thijssen, 2008). Regarding cross-industry diversification, Rose & Shepard (1997) state that executives of diversified firms receive, on average, a 13% higher salary and bonus compared to managers of undiversified firms.

Hypothesis 11: There is a positive associative link between Cross-Border M&A deals and CEO Compensation.

3. Data Collection and Variable Construction

3.1 Sample Collection

The initial data collection stemmed from the Refinitiv Eikon database spanning from June 2010 to 2020, as I only considered mergers that happened at least one year after the 2008's recession (Federal Reserve History, 2013). While the aim was to gather information on both M&A activities and executive compensation using this database, several challenges emerged. Primarily, Refinitiv Eikon restricted the download capacity to 1,000 M&A deals per day, with a maximum of 200 deals at once, thus significantly extending the anticipated data collection period. Considering this limitation and my intention to examine the preceding decade comprehensively, I selected the start and end dates accordingly.

Moreover, only public companies from the United States were included, with a minimum deal value of \$50 million US dollars, to prevent the results from being skewed by smaller M&A deals unlikely to have significant predictive power (Derrien et al., 2018). Additionally, M&A deals involving financial institutions were excluded due to their unique regulatory scrutiny, complexity, and inherent risk aversion compared to other sectors (Sur, 2024). Furthermore, as stated by (Del Bo et al., 2017), deals involving state-owned enterprises may “deviate from the benchmark of deals involving private firms” due to the specific objectives and risks faced by governments. The dataset ultimately comprised 5,204 M&A deals completed within the specified sample period.

Another challenge encountered while using Refinitiv Eikon was its limited resources regarding executive compensation, particularly CEOs'. Refinitiv Eikon defines "Salary Gap" as the CEO's total salary (or the highest salary) divided by average salaries and benefits. This metric, though not exhaustive, provides the sole valuable insight into CEO compensation, acknowledging that other executives within the organization may potentially earn more than the CEO. To better understand the impact of CEO compensation on M&A activity, additional data was collected from Compustat's ExecuComp database, which includes 52,137 individual CEO compensations, as well as simplified firm-specific data for S&P 1000 firms from 1992 to 2021.

Subsequently, all data samples were merged by the company's ticker and year, resulting in 2,634 matches. Filtering for the considered data in the M&A Deals data sample (2010-2020) yielded 22,140 yearly individual CEO compensations, along with the corresponding M&A deal information for the years in which they occurred as well as companies' financial information.

Afterwards, it became imperative to exclude data pertaining to companies in the financial sector, such as banks and insurance firms, as these were not part of our analysis comprising 5,204 M&A deals. Furthermore, due to missing values, all entries for years where yearly sales were either missing (701 observations) or zero (35 observations) were omitted.

To construct the Industry Dummy variables, a manual process of reclassification and grouping into appropriate macro-sectors was undertaken. This step was essential since the original database contained 157 distinct industries, which were consolidated into 19 new industry groups. The respective grouping of industries followed the subsequent structure:

Table 3 - Macro Industry Groups. Source: Own Elaboration.

New Industry Group	Previous Industry Groups
Airlines & Aerospace	Aerospace & Defense; Airlines
Automotive	Auto Parts & Equipment; Automobile Manufacturers; Automotive Retail; Motorcycle Manufacturers
Chemicals & Materials	Agricultural Products; Aluminum; Commodity Chemicals; Copper; Diversified Chemicals; Fertilizers & Agricultural Chemicals; Specialty Chemicals; Tires & Rubber
Construction & Building Materials	Building Products; Construction & Engineering; Construction Machinery & Heavy Trucks; Construction Materials; Homebuilding
Consumer Electronics & Appliances	Consumer Electronics; Electrical Components & Equipment; Electrical Components & Equipment; Electronic Equipment & Instruments; Home Furnishings; Home Improvement Retail;

	Homefurnishing Retail; Household Appliances; Household Products; Housewares & Specialties
Education Services	Education Services
Energy & Utilities	Electric Utilities; Gas Utilities; Independent Power Producers & Energy Traders; Integrated Oil & Gas; Multi-Utilities; Oil & Gas Drilling; Oil & Gas Equipment & Services; Oil & Gas Exploration & Production; Oil & Gas Refining & Marketing; Oil & Gas Storage & Transportation; Water Utilities
Entertainment & Leisure	Casinos & Gaming; Home Entertainment Software; Hotels, Resorts & Cruise Lines; Interactive Home Entertainment; Interactive Media & Services; Leisure Facilities; Leisure Products; Movies & Entertainment; Residential REITs
Financial Services	Financial Exchanges & Data; IT Consulting & Other Services; Multi-Sector Holdings; Research & Consulting Services
Food & Beverage	Brewers; Distillers & Vintners; Food Distributors; Food Distributors; Packaged Foods & Meats; Soft Drinks; Tobacco
Healthcare & Pharmaceuticals	Biotechnology; Drug Retail; Health Care Distributors; Health Care Equipment; Health Care Facilities, Health Care Services, Health Care Supplies, Health Care Technology; Life Sciences Tools & Services; Managed Health Care ; Personal Products; Pharmaceuticals
Manufacturing & Industrial	Agricultural & Farm Machinery; Electronic Manufacturing Services; Forest Products, Heavy Electrical Equipment; Industrial Conglomerates; Industrial Gases; Industrial Machinery; Metal & Glass Containers; Paper Packaging; Paper Products; Steel; Textiles

Media & Broadcasting	Advertising; Broadcasting; Publishing
Metals & Mining	Coal & Consumable Fuels; Diversified Metals & Mining; Gold; Silver
Real Estate	Diversified Real Estate Activities ; Diversified REITs; Health Care REITs; Hotel & Resort REITs; Industrial REITs; Office REITs; Real Estate Services; Real Estate Development; Residential REITs; Retail REITs; Specialized REITs
Retail & Consumer Goods	Apparel Retail; Apparel, Accessories & Luxury Goods; Department Stores; Footwear; General Merchandise Stores; Hypermarkets & Super Centers; Specialty Stores
Services & Support	Commercial Printing; Data Processing & Outsourced Services; Diversified Commercial & Professional Services; Diversified Support Services; Environmental & Facilities Services; Human Resource & Employment Services; Office Services & Supplies; Security & Alarm Services; Specialized Consumer Services
Shipping & Logistics	Air Freight & Logistics; Distributors; Marine; Railroads; Trading Companies & Distributors; Trucking
Technology & Telecommunications	Alternative Carriers; Application Software; Cable & Satellite; Communications Equipment; Computer & Electronics Retail; Computer Storage & Peripherals; Integrated Telecommunication Services; Internet & Direct Marketing Retail; Internet Services & Infrastructure; Internet Software & Services; Semiconductor Equipment; Semiconductors; Specialized Finance; Systems Software; Technology Distributors; Technology Hardware, Storage & Peripherals; Wireless Telecommunication Services

Removed	Asset Management & Custody Banks; Consumer Finance; Diversified Banks; Insurance Brokers; Mortgage REITs; Investment Banking & Brokerage; Life & Health Insurance; Multi-line Insurance; Other Diversified Financial Services; Property & Casualty Insurance; Regional Banks; Reinsurance; Thrifts & Mortgage Finance
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In cases where individual companies underwent multiple M&A deals within a given year, the database generated duplicated rows wherein only the respective M&A deal information differed. As part of the focus of this research is to examine the impact of M&A deals on CEOs compensation rather than the deals themselves., it was decided to aggregate all the specific details of individual deals into a single analysis in order to avoid duplicated data. This involved creating variables such as *Total Deal Value*, *Total Cash*, *Total Debt*, *Total Stock*, and *Total Other* by summing the values of all individual deals, as well as the corresponding cash, debt, stock, and other payment methods associated with those deals for a particular company in a given year. It is noteworthy that in 911 instances, *Total Other* was adjusted to include the remaining value of Total Deal Value when it did not match the sum of the individual components (Total Cash, Debt, Stock, and Other), and subsequently revised to 0 in 139 instances where it fell within the range of \$-1 to \$1 due to rounding errors.

3.2 Variable Construction

To test my hypotheses, I began constructing variables for the regression analysis, dividing the dependent and independent variables into three main groups, CEO Characteristics, Deal Characteristics and Firm Characteristics. The subsequent sections provide detailed explanations of the variable construction process for each group of characteristics.

3.2.1 CEO Characteristics

To begin, I calculated the cash compensation for a CEO each year (*CC*) by summing their salary and bonus. Additionally, I computed the value of equity-based compensation (*EBC*), which comprises the sum of restricted stock awards and stock option awards. Total Compensation (*TC*) was derived by adding *cash compensation (CC)* and *Equity Compensation*, along with *Other Compensation*, which encompasses all other forms of compensation such as life insurance premiums, gross-ups, tax reimbursements, and discounted share purchases.

$$TC_{i,t} = CC_{i,t} + EBC_{i,t} + OC_{i,t}$$

$$CC_{i,t} = Salary_{i,t} + Bonus_{i,t} \quad ^1$$

$$EBC_{i,t} = Restricted\ Stock\ Awards_{i,t} + Stock\ Options\ Awards_{i,t}$$

Where *TC/CC/EBC* are the CEOs' i total compensation/cash compensation/equity-based compensation in year t. It is noteworthy to state that Long-term incentive plans were excluded from this analysis as they lacked any available data.

Following the approach developed by (Vogelaar, 2016), I constructed the variables CEO_SHAR, CEO_TEN and CEO_TURN.

The CEO share ownership (*CEO_SHAR*) was calculated by dividing the number of shares owned by CEOs (*SHROWN_TOT*) by the total common shares outstanding in the firms (*CSHO*), with both values found on the Execucomp database.

¹ Bonus = Cash Bonus + Non-Equity Incentives

$$CEO_SHAR_{i,t} = SHROWN_TOT_{i,t} / CSHO_{i,t}$$

Where CEO_SHAR is the percentage of the total common shares outstanding owned by the CEO i in year t .

The variable age (AGE) was not computed as it was readily available in the Execucomp database.

Following this, CEOs' tenure was calculated by subtracting the year in which a CEO commenced their position within a particular company ($BecameCEO$) from the fiscal year in question (FY). However, it is important to note that this variable does not consider the CEOs' past experiences on other companies.

$$CEO_TEN_{i,t} = FY_{i,t} - BecameCEO_{i,t}$$

Where CEO_TEN is the tenure of the CEO i in fiscal year t . FY is the fiscal year t for company i . $BecameCEO$ is the fiscal year t , in which the CEO i started as a CEO for the company.

Traditionally, Social Security's full-benefit retirement age was 65, and early retirement benefits were first available at age 62, with a permanent reduction to 80 percent of the full benefit amount. Currently, the full benefit age is 66 years and 2 months for people born in 1955, and it will gradually rise to 67 for those born in 1960 or later (National Academy of Social Insurance). Similarly to Wang & Yin (2021), I choose the retirement age as 63 years old for our dummy variable which signals if a CEO is near or past the retirement age. I did so because there are clear sharp changes in the investment patterns for CEOs above that age (Cline & Yore, 2016; Jenter & Lewellen, 2015).

$$Retirement_{i,t} = 1 \text{ if CEO is 63 or older in year } t, Retirement_{i,t} = 0 \text{ otherwise}$$

3.2.2 Deal Characteristics

Firstly, I proceeded to construct the dummy variable, *Merger_Activity*, which signals if a specific company incurred in M&A activity, using the *Deal_Value* data from Eikon Refinitiv, which represents the total transaction amount involved on the transaction. It is noteworthy to point out that, similarly to (Harford & Li, 2007), *Meger_Activity* does not take the value 1 for deals that were inferior to \$50 million dollars in order to focus on economically significant transactions, as to avoid issues with smaller deals that may be subject to different motivations and different compensation structures (Datta et al., 2001).

$$Merger_Activity_{i,t} = 1 \text{ if } Deal_Value_{i,t} > 0, Merger_Activity_{i,t} = 0 \text{ otherwise}$$

Similarly, other variables were constructed, such as *Num Deals*, which represents the number of M&A deals a company *i* had in year *t*.

$$NumDeals_{i,t} = count(DealValue_{i,t})$$

Where *NumDeals* is the number of M&A deals (over \$50 million dollars) that a company *i* had in year *t*, and *DealValue* is the total dollar amount of all M&A deals a company *i* had in year *t*.

To analyze the degree of diversification in mergers and acquisitions (M&A) deals, I created two dummy variables using data from the Refinitiv Eikon database, as it was the sole database containing information on both the acquiring and target firms. Firstly, I created a variable to identify deals involving companies from different sectors or industries (*Cross_Sector*). Following this, I developed a variable to indicate deals involving companies from different countries (*Cross_Border*).

$$Cross_Sector_{i,t} = 1 \text{ if } AcquirorMacroIndustry_{i,t} \neq TargetMacroIndustry_{i,t}$$

$$Cross_Sector_{i,t} = 0 \text{ otherwise}$$

$$Cross_Border_{i,t} = 1 \text{ if } AcquirorNation_{i,t} \neq TargetNation_{i,t}$$

$$Cross_Border_{i,t} = 0 \text{ otherwise}$$

3.2.3 Firm Characteristics

Initially, I computed the Return on Assets (ROA) using the standard formula, dividing EBITDA by Total Assets for a given year. This approach was chosen because EBITDA offers a more accurate metric for evaluating a company's operational efficiency, free from the influence of financing decisions or tax regimes, as highlighted by (Conings & Vatrenjak, 2018). As noted by (Sui, 2017), Net Income can be affected by tax liabilities and assets that may not directly relate to operational performance, along with one-time events that can distort a company's true profitability. While EBIT is closer to operating performance than Net Income, "EBITDA provides a clearer picture of a company's operating performance before the impact of capital structure and capital expenditures," as emphasized by (Conings & Vatrenjak, 2018).

$$ROA_{i,t} = EBITDA_{i,t} / ASSETS_{i,t}$$

Consistent with previous studies such as (Yazdanfar & Öhman, 2014) and (Coles et al., 2006), I employed the natural logarithm of sales as a proxy for firm size. This approach is justified by the positive association between sales and firm size, reflecting the strong correlation between sales and assets in many companies, as evidenced by (Cortés et al., 2021).

$$FS_{i,t} = \ln(Sales_{i,t})$$

The two common measures of firm size are sales volume (Coles et al., 2006; Yazdanfar & Öhman, 2014) and total assets (Sridharan, 1996). Firm size is generally measured by assets, but sales can also be used to determine firm size. Even though firm size is generally measured by assets, sales volume is also considered a measure of firm size because CEOs earn profit for the company through the volume of sales; the higher the sales volume sold, the higher the firm profit.

Following this, annual stock returns were computed (RET), considering the fiscal year-end stock prices. Employing the methodology introduced by (E. Fama, 1980), yearly stock returns were calculated as the natural logarithm of the ratio between the year-end stock price and the preceding year's stock price. This calculation yields continuously compounded returns, as logarithmic returns are favoured in financial research due to their time-additive nature, facilitating continuous compounding of returns over time (Dissanaike & Lim, 2010).

Additionally, logarithmic returns are more likely to adhere to the assumption of normality in statistical models, thereby enhancing the validity of regression analyses (Bali & Cakici, 2008).

$$RET_{i,t} = \ln(CPF_{i,t} / CPF_{i,t-1})$$

Where *RET* is the continuously compounded stock returns for company *i* in year *t*, and *CPF* is the fiscal year-end stock prices for a company *i* in year *t*.

4. Descriptive Statistics and Analysis

4.1 Descriptive Statistics

After the data collection and variable construction, I first look at the descriptive statistics of all winsorized constructed variables to obtain valuable insights for further analysis. Secondly, I observe the evolution of all CEO compensation components, as well as firm and mergers and acquisitions development through the considered period. Finally, I analyse the correlation between the variables so I can better specify our model.

Table 4 presents the descriptive statistics of the various characteristics that determine and influence the CEOs compensation structure. On average, total compensation is \$6,500,000, with cash compensation averaging \$2,189,000, equity-based compensation averaging \$4,000,000, and other forms of compensation averaging \$217,000. Consistent with (Vogelaar, 2016), the average CEO age in our sample is 56 years, with an average tenure of 7 years. Notably, CEO age and tenure span a wide range, with the youngest CEO being 28 years old and the oldest 92 years old. The CEO with the longest tenure has served for 61 consecutive years at the same company. Additionally, the average CEO share ownership is 0.02% and there are 3,199 (17.93%) observations where the CEOs are near or over the standard retirement age.

In terms of firm characteristics, the average firm size in our sample is \$7.46 billion, which expresses the dimension of the S&P firms. The average yearly stock returns were 12.02% while the yearly return on assets (ROA) was 12.32%. Thus, accounting-based and market-based performance measures were relatively similar which can be interpreted as an indicator of possible future multicollinearity problems.

Regarding the deal's characteristics, and according to table 6, which presents the summary statistics for deal related variables, there were 2.641 completed M&A deals over \$50 million for the considered time. These deals were completed by 1.376 and 912 distinct CEOs and companies, respectively. The biggest completed M&A was 2013 Verizon Communications Inc (Verizon) acquisition of the remaining 45% stake, which it did not already own, in Verizon Wireless Inc (Verizon Wireless), a basking-based provider of wireless telecommunication services, from its joint venture partner Vodafone Group PLC (Vodafone), for \$130 billion. Additionally, the smallest completed M&A was Cognizant Technology Solutions Corp

acquisition of CoreLogic Global Services, a Bangalore-based provider of information, technology and business services, a wholly owned subsidiary of CoreLogic Inc, for \$50 million. The average deal completed involved a total transaction of \$269 million. Furthermore, there were 707 and 576 cross-industry and cross-border transactions, respectively.

Table 4 - Summary Statistics. Source: Own Elaboration.

	Mean	p25	Median	p75	SD	Min	Max
Total Compensation	6500	2523	4870	8618	5750	209	31683
Cash Compensation	2189	1000	1707	2766	1820	0	10900
Salary	831	588	800	1001	364	0	2002
Bonus	1351	362	918	1762	1562	0	9240
Equity-Based Compensation	4000	1033	2704	5470	4303	0	23935
Restricted Stock	2987	531	1890	4193	3452	0	18288
Stock-Options	935	0	0	1235	1710	0	10098
Other Compensation	217	17	59	189	522	0	3927
CEO Characteristics							
Share Ownership	0,021%	0,00%	0,01%	0,02%	0,05%	0,00%	0,34%
Age	57	52	56	61	7	28	96
Tenure	7,44	2	5	10	7,34	0	61
Firm Characteristics							
ROA	12%	8%	12%	17%	10%	-31%	42%
Firm Size	7,47	6,36	7,43	8,54	1,64	3,22	11,66
Market Return	12%	-13%	8%	30%	42%	-71%	207%

Cash Compensation, Salary, Bonus, Equity-Based Compensation, Restricted Stock, Stock-Option and Other Compensation are in \$1000s. Sales is in \$mil. The sample period is June 2010-2020, and there are 17.844 CEO-year observations in total. All variables, except Age, Share Owners and Tenure are winsorized at the 1st and 99th percentile.

Table 5 - Near Retirement Frequency. Source: Own Elaboration

Near Retirement	Freq.	Percent	Cum.
0	14645	82.07	82.07
1	3199	17.93	100.00
Total	17844	100.00	

Table 6 - M&A Summary Statistics. Source: Own Elaboration

	Mean	Median	SD	Min	Max	N
Number of Deals	1,23	1	0,57	1	8	2621
Cross-Industry	0,27	0	0,44	0	1	707
Cross-Border	0,22	0	0,18	0	1	576
Deal Value	1004	375	2862	50	5032	2621

The table represents the summary statistics for those observations which present a Merger_Activity equal to 1, i.e, those companies who completed a merger or acquisition within a given year. Cross-Industry and Cross-Border values correspond to the 2621 observations where Merger_Activity = 1. Furthermore, Deal Value is winsorized at the 1st and 99th percentile.

4.2 Evolution of CEO Compensation Structure

The table 7 and figure 1 showcase the evolution of the different components of CEO compensation structure, as well as firm and mergers and acquisitions characteristics throughout the considered period in our analysis. It is important to note that I used sales as a proxy for firm size as I previously explained on point 3.2.1. This table allows us to observe time patterns within our sample, which is vital to discuss before the regression analysis.

Relatively to cash compensation, I can see that it has been similar throughout our 10-year time period, with a small annual compound growth rate of 1,09%. Most of this increase in cash compensation can be attributed to base-salary rather than cash bonuses. Base level salaries increased, on average, from the initial \$754.000 in 2010 to \$872.000 in 2020. As firm size also increased throughout the same period, this is a clear indication that CEOs are compensated for managing bigger companies, due to the increased perceived operational complexity associated with firm size (Bliss, 2001; J. E. Core et al., 1999; Jensen et al., 1976; Jensen & Murphy, 1990), since base level salary is not related to performance goals.

In table 7, I can see that bonus were, similarly to cash compensation, relatively similar from 2010 to 2020, increasing, on average, 0,93% per year from \$1.303.000 in 2010 to \$1.429.000 in 2020. Nevertheless, it is important to note that as we previously reported on 3.2.1, I treat Bonus as the sum between cash bonus and non-equity incentives. Thus, when analysing these variables individually, I can see a clear difference between their evolution, as even though non-equity incentives increased, on average, 1,4% per year from 1125 in 2010 to 1293 in 2020, cash bonus decreased, on average, 2,66% in the same period. Additionally, if I discard the 2020 bonus value, as it showcases a unique outlier in year-to-year increase, the cash bonus levels decreased 40,45% from \$178.000 in 2010, to \$106.000 in 2009. This is a clear demonstration that cash bonuses have become less used over the sample period.

Nonetheless, cash bonuses seem to have been continuously substituted by equity-based compensation as the way companies try to align the CEOs interests with the shareholders. According to the table 7 and figure 1 I can clearly see a prioritization of equity-based compensation as the main source of CEO wealth throughout the sample period, increasing on average, 6,52% per year, from \$2.816.000 in 2010 to \$5.296.000 in 2020, which is almost six times higher than the average cash compensation growth for the same period. In 2010, the mix

between cash and equity-based compensation for CEOs was relatively similar, with 54,54% of the compensation being paid in cash and 40,44% in equity (with the remaining 5,02% being paid in other compensation). By 2020, this balance had shifted significantly, with nearly 66,15% of the overall compensation being delivered in the form of equity, while only 29,08% in the form of cash.

This shift towards equity-based compensation can mostly be attributed to restricted stocks rather than stock options. This can be explained by stock options downside risk, as they can be used as a call option, leading CEOs who receive stock options to more likely endeavour in riskier projects, which might be inconsistent with interests of shareholders (B. J. Hall & Viceira, 2000; Sanders & Hambrick, 2007). Thus, restricted stock awards have become more popular, due to their perceived alignment with shareholder value being closer (Conyon, 2006), as they encourage CEOs to remain with the company and focus on long-term strategies rather than short-term gains (Balsam, 2002), and often tie rewards directly to strategic targets, leading to more prudent decision-making and risk management (Murphy, 1999). This is visible throughout the considered time period, as restricted stock awards grew on average, 9.08% per year, from \$1.816.000 in 2010 to \$4.330.000 in 2020, which represents a total growth of 138% for the period. Nevertheless, stock options awards decreased, on average, 1.55% per year, from \$966.000 in 2010 to \$826.000 in 2020.

All these individual indicators lead total compensation to increase, on average, 4.48% per year. This represents a 55,06% average increase in total compensation from \$5.163.000 in 2010 to \$8.006.000 in 2020. This evolution might have been influenced by the increased total shareholder return, that was seen in the markets throughout the considered period (Bout et al., 2024). This increase was followed by a similar significant increase in firm size, which was 44.28% for the same period. Nonetheless, this showcases that even though there is a strong relation between CEO compensation and firm size, it is not the sole factor explaining the changes in CEO compensation (Tosi et al., 2000).

Regarding the mergers and acquisitions deals, I pay little interest to 2010's values, as they did not include the activities that were undertaken during January and June, as it was decided that I would only include data from one year after the ending date of the 2008's recession (Federal Reserve History, 2013). Hence, I can see that the number of distinct companies who underwent M&A deals remained somewhat constant throughout the considered

period, with a significant decline in 2020, which can be attributed to the COVID-19 pandemic. Similarly, the same happened for the average number of individual deals that companies underwent, as well as the average deal value.

Table 7 - Variables Evolution. Source: Own Elaboration. Source: Own Elaboration.

Compensation Structure	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Annual Compound Growth
Cash Compensation	2088	2047	2023	2066	2147	2177	2196	2345	2410	2360	2328	1,09%
		-(1,96%)	-(1,17%)	(2,13%)	(3,92%)	(1,40%)	(0,87%)	(6,79%)	(2,77%)	-(2,07%)	-(1,36%)	
Salary	754	777	789	811	827	842	851	871	885	904	872	1,46%
		(3,05%)	(1,54%)	(2,79%)	(1,97%)	(1,81%)	(1,07%)	(2,35%)	(1,61%)	(2,15%)	-(3,54%)	
Bonus	1303	1233	1202	1231	1289	1305	1320	1449	1500	1426	1429	0,93%
		-(5,37%)	-(2,51%)	(2,41%)	(4,71%)	(1,24%)	(1,15%)	(9,77%)	(3,52%)	-(4,93%)	(0,21%)	
Bonus	178	155	150	123	126	116	98	105	110	106	136	-2,66%
		-(12,92%)	-(3,23%)	-(18,00%)	(2,44%)	-(7,94%)	-(15,52%)	(7,14%)	(4,76%)	-(3,64%)	(28,30%)	
Non Equity Incentives	1125	1078	1052	1108	1163	1189	1222	1344	1390	1320	1293	1,40%
		-(4,18%)	-(2,41%)	(5,32%)	(4,96%)	(2,24%)	(2,78%)	(9,98%)	(3,42%)	-(5,04%)	-(2,05%)	
Equity-Based Compensation	2816	3192	3212	3587	3858	4026	4149	4597	4961	5032	5296	6,52%
		(13,35%)	(0,63%)	(11,67%)	(7,56%)	(4,35%)	(3,06%)	(10,80%)	(7,92%)	(1,43%)	(5,25%)	
Restricted Stock	1816	2106	2228	2491	2838	3050	3200	3553	3901	4089	4330	9,08%
		(15,97%)	(5,79%)	(11,80%)	(13,93%)	(7,47%)	(4,92%)	(11,03%)	(9,79%)	(4,82%)	(5,89%)	
Stock-Options	966	1036	928	982	937	932	887	945	939	859	826	-1,55%
		(7,25%)	-(10,42%)	(5,82%)	-(4,58%)	-(0,53%)	-(4,83%)	(6,54%)	-(0,63%)	-(8,52%)	-(3,84%)	
Total Compensation	5163	5527	5538	5979	6342	6481	6658	7251	7695	7723	8006	4,48%
		(7,05%)	(0,20%)	(7,96%)	(6,07%)	(2,19%)	(2,73%)	(8,91%)	(6,12%)	(0,36%)	(3,66%)	
Sales	5310	5928	6112	6338	6601	6519	6670	7228	7788	8092	7661	3,73%
		(11,64%)	(3,10%)	(3,70%)	(4,15%)	-(1,24%)	(2,32%)	(8,37%)	(7,75%)	(3,90%)	-(5,33%)	
CEO Share Ownership	0,026%	0,026%	0,025%	0,022%	0,022%	0,021%	0,020%	0,019%	0,018%	0,017%	0,015%	-5,31%
		-(3,21%)	-(1,76%)	-(11,08%)	-(2,15%)	-(3,94%)	-(3,27%)	-(5,74%)	-(8,16%)	-(2,84%)	-(10,37%)	
Distinct CEOs	1790	1755	1734	1719	1717	1671	1620	1570	1515	1463	1290	
Deal Value	525	684	679	811	756	888	829	895	1032	805	1090	
Number of Deals	184	306	355	315	379	376	322	283	323	222	162	
N	148	251	287	245	307	298	254	235	253	192	150	

Cash Compensation, Salary, Bonus, Equity-Based Compensation, Restricted Stock, Stock-Option and Other Compensation are in \$1000s. Sales is in \$mil. The intra-year growths are in parentheses. N represents the number of unique companies that engaged in mergers or acquisitions for each year. The column 'Annual Compound Growth' corresponds to the compound growth from 2010 to 2020. All variables are winsorized at the 1st and 99th percentile.

Figure 1 - Compensation Weights Evolution. Source: Own Elaboration

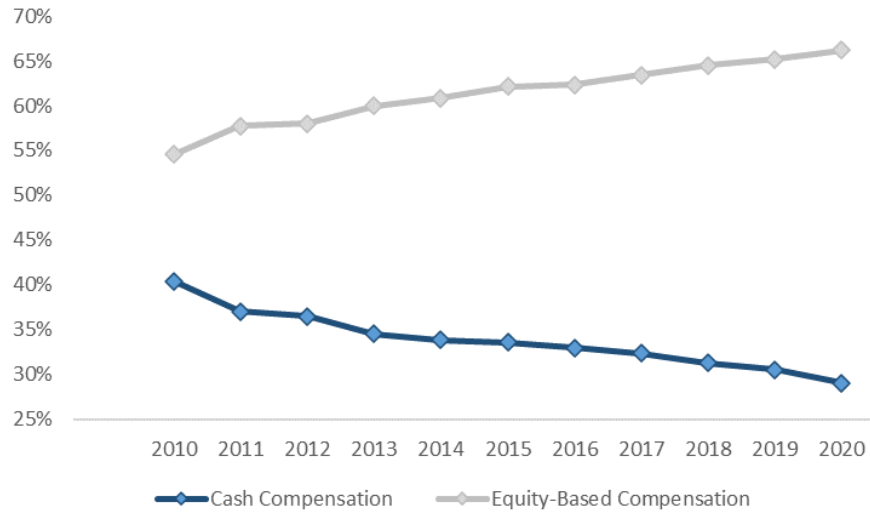
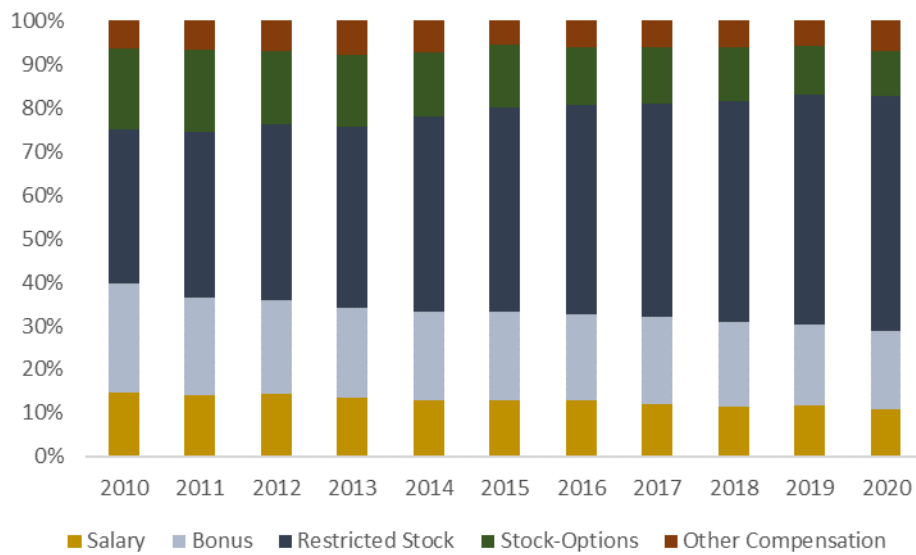


Figure 2 - Individual Compensation Components Weights Evolution. Source: Own Elaboration



4.3 Correlations

Regarding the relationship between compensation and our analysed components in table 8, firm size showcases the largest positive correlation with CEO compensation, at 0.615 for total compensation. This correlation indicates that firm size is the largest determinant of CEO compensation in our sample, similarly to the findings of Tosi et al. (2000). Both firm performance metrics, RET and ROA, show a positive but yet small positive correlation with the main compensation structures, i.e., total, cash and equity-based compensation. The second largest positive correlation with CEO compensation is merger activity, which indicates that companies compensate their CEOs higher for completing mergers and acquisitions. Both near retiring CEOs and age show a small yet positive correlation with the main compensation structures, except near retiring CEOs and equity-based compensation, which indicates that companies see equity-based incentives as less useful in aligning the long-term interest of shareholders with those of the CEO. Lastly, the CEO's ownership in the company has a negative correlation of -0.154 with total compensation,

According to Farrar & Glauber (1967), there can be a multicollinearity problem when the correlation between two explanatory variables is 0.7 or higher, which would force us to drop one of the correlated variables from the regression. Nevertheless, age presents a positive correlation of 0.697 with near retirement. As age also presents a positive correlation of 0.431 with tenure, I decided to remove age from our regressions.

Table 8 - Pairwise Correlation. Source: Own Elaboration

Variables	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15
(1) TC	1.000														
(2) CC	0.708	1.000													
(3) Salary	0.648	0.723	1.000												
(4) Bonus	0.667	0.985	0.600	1.000											
(5) EBC	0.932	0.474	0.523	0.427	1.000										
(6) Stock Awards	0.810	0.431	0.482	0.387	0.872	1.000									
(7) Stock Options	0.539	0.291	0.320	0.263	0.561	0.131	1.000								
Independent variables															
(8) Merger Activity	0.155	0.130	0.129	0.120	0.142	0.119	0.102	1.000							
(9) Merger Activity $t-1$	0.160	0.118	0.142	0.104	0.156	0.135	0.106	0.180	1.000						
(10) Near Retirement	0.004	0.048	0.053	0.040	-0.029	-0.028	-0.026	-0.014	-0.020	1.000					
(11) Age	0.062	0.113	0.155	0.092	0.017	0.022	-0.007	-0.006	-0.009	0.697	1.000				
(12) Tenure	-0.029	0.001	-0.001	-0.003	-0.052	-0.073	-0.010	-0.026	-0.035	0.380	0.431	1.000			
(13) Share Ownership	-0.154	-0.115	-0.169	-0.095	-0.163	-0.188	-0.051	-0.046	-0.059	0.189	0.164	0.402	1.000		
(14) ROA	0.120	0.157	0.143	0.149	0.090	0.061	0.093	0.041	0.027	-0.005	0.027	0.002	-0.003	1.000	
(15) RET	0.028	0.058	-0.043	0.078	0.011	-0.009	0.030	0.003	0.000	-0.015	-0.027	0.005	0.025	0.057	1.000
(16) Firm Size	0.615	0.579	0.671	0.515	0.531	0.495	0.308	0.182	0.204	-0.015	0.081	-0.098	-0.189	0.259	-0.043

5. Methodology

Regarding our dependent variables, I opted to calculate the components of CEO compensation, (cash compensation, equity-based compensation and total compensation) using the natural logarithm (elasticity), following the method outlined by (Conyon, 2006; Conyon et al., 2019; Murphy, 1999; Vogelaar, 2016) rather than using absolute compensation values (sensitivity). I decided to do so as there are specific problems associated with studying executive compensation. For instance, as I can observe in the figure 3, which contains histograms of the winsorized CEO compensation components, all variables have a skewed distribution. Furthermore, all compensation variables in our sample are positively skewed, which violates the normality assumption of the ordinary least squares model (Brooks, 2008).

Thus, natural logarithms were used to account for this problem, resulting in the logarithm of total compensation (*Log_TC*), cash compensation (*Log_CC*), *equity-based compensation* (*Log_EBC*), and all their individual components (salary (*Log_Salary*), bonus (*Log_Bonus*), stock options (*Log_Options*), restricted stock (*Log_Stock*)).

Additionally, there might possibly be bidirectional and reverse causality links between CEO compensation and firm performance, as better performing companies could afford higher CEO compensation and higher levels of compensation might positively impact performance (Olaniyi, 2019). Similarly to previous literature (Carneiro et al., 2023; Murphy, 1999; Vogelaar, 2016), I include lagged independent variables in our regression to minimize endogeneity problems. It is noteworthy to note that, similarly to previous literature, I include firm size and performance measures (both market and accounting) as control group variables to obtain unbiased estimates (Hoskisson et al., 1999; Keats, 1988; Tosi et al., 2000).

Our dataset consists of panel data, featuring varying observations for each variable, from a fluctuating number of companies and CEOs who join and leave the market at different times, resulting in an unbalanced panel. The simplest way to deal with such data would be to estimate a pooled regression, using the OLS. Nevertheless, this presents several limitations as it implicitly assumes that the average values of the variables and the relationships between them are constant over time and across all the cross-sectional units in the sample (Brooks, 2008).

The usual approach to analyse these data structures in past CEO compensation literature is to use the *fixed effects model* (Coles et al., 2006; J. Core & Guay, 1999; Henrique & Gonçalves, 2017; Jensen & Murphy, 1990; Vogelaar, 2016). However, in order to accurately decide which model is best suited, I firstly need to compare the suitability of *random effects model*. The key difference between these models is the way in which they approach unobserved effects, which consequently can lead to *omitted variable bias*.

The *random effects model* treats the unobserved entity-specific effects as random and uncorrelated with the explanatory variables. Thus, the flexibility makes the model more suitable for datasets where the unobserved effects are assumed to be random and not correlated with the independent variables. Nonetheless, the *fixed effects model* assumes that the unobserved individual-specific effects are correlated with the observed explanatory variables (Schmidheiny, 2023), thus removing the impact of time-invariant characteristics.

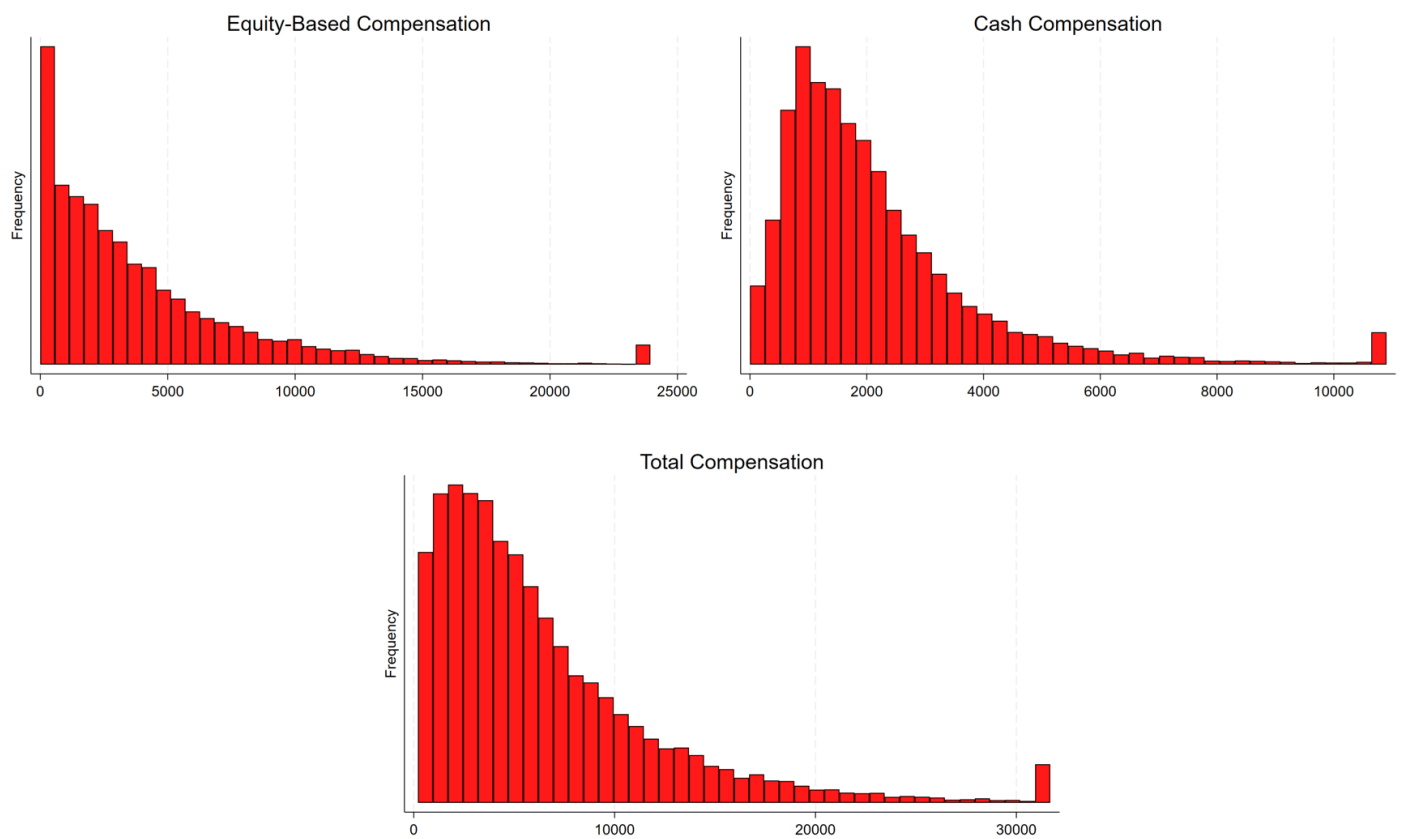
Thus, the main differences between the models relies in their treatment of the unobserved effects, with the *fixed effects model* assuming that these effects are correlated with the independent variables while the *random effects model* assumes they are uncorrelated. As such, I performed the Hausman test to understand which model is best suited for our model. All three dependent variables presented a significant p-value of 0.000, hence, rejecting the null hypothesis which states that the difference in coefficients is not systematic. Therefore, the fixed effects model is more suitable for controlling omitted variable bias in our sample.

Despite the correlation analysis between the individual variables, it is still necessary to evaluate the possible presence of heteroskedasticity in our model. Henceforth, I performed the modified Wald test for groupwise heteroskedasticity in *fixed effects model*. All CEO compensation components regressions showcased a significant p-value of 0.000, thus indicating the presence of heteroskedasticity. For this reason, I used cluster-robust standard errors clustered at the firm level, to ensure that our standard errors are robust to heteroskedasticity and serial correlation within firms.

To ensure that our estimators did not suffer from multicollinearity biases, I conducted the variance inflation factor tests for each individual component of the CEO compensation structure. Furthermore, no particular test showcased a mean variance inflation factor over 2.19,

thus indicating a low level of multicollinearity among the independent variables within our analysis.

Figure 1 - Compensation Distribution. Source: Own Elaboration



6. Univariate Tests

This section reports the empirical relationships between CEO compensation, mergers and acquisitions (M&A), CEOs near retirement and age, and diversification characteristics in our 2010–2020 sample, based on univariate tests and data visualization. I analyse M&A separately due to its complexity and the multiple areas it both affects and is affected by. Additionally, I examine age and diversification characteristics, as these factors will not be further developed in the regression analysis in Section 5.1. Furthermore, I used the t-test to determine if there are significant differences between the means of two groups, for all the variables, in which:

$$H_0 = \text{No Differences in Means}$$

$$H_1 = \text{Significant Differences in Means}$$

6.1 Mergers and Acquisitions and its Impact on Compensation

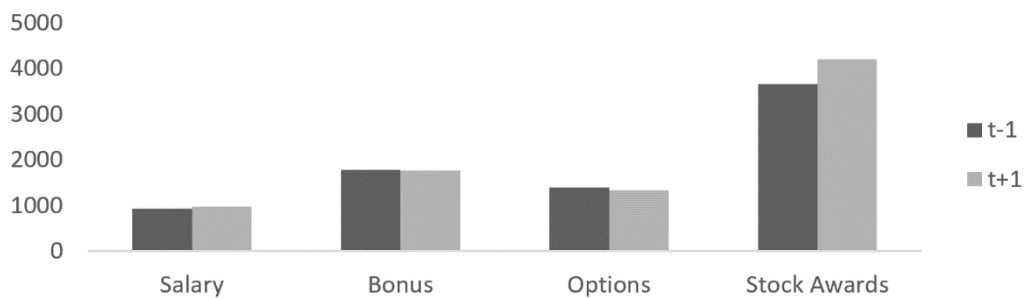
In this section, I aim to analyse the relationship between M&A activity and CEO compensation using data visualization and univariate tests. However, it's important to note that this analysis doesn't replace the regression results I will discuss later. To start, I've created a graph comparing the average CEO compensation components in the year preceding the M&A announcement date with those one year after the announcement.

According to the Figure 3, cash compensation stayed relatively similar, only increasing, on average, 1.22% after a merger and acquisition deal. Despite that, when looking at the individual components of cash compensation, I see that base salaries rose, on average, 5.48%. Even though base level salaries are not usually linked to firm performance (Gerhart & Milkovich, 1990), this increase is a clear indication that base level salaries can indirectly rise as companies engage in mergers and acquisitions, due to increases in firm size and the operational complexity associated with managing a bigger company (Jensen & Meckling, 1976; Jensen & Murphy, 1990; Murphy, 1999). Contrary to what was expected, as cash bonus are typically tied to performance measures, I observe an average decline of nearly 1% of cash

bonus, after a merger and acquisition deal. This can be an indication of poor synergies forecast and consequently below target performance, showcasing that CEOs might may pursue mergers and acquisitions activities for personal benefits at the expense of shareholder value (Eisenhardt & Bourgeois, 1988).

Regarding equity-based compensation, it increased 9.83%, on average, after a merger and acquisition deal. Despite this significant increase, stock options declined 4.15% on average. Even though stock-options became increasingly popular since 1992 as a mechanism to align the interest of managers and shareholders (Jensen & Murphy, 1990), there has been since 2001, a shift towards stock awards as they are a better governance mechanism, as discussed on the section 4.2 (Conyon, 2006; Vogelaar, 2016). Ultimately, this led to a significant increase of 15.15% in stock awards.

Figure 2 - M&A Impact on Individual Compensation Components. Source: Own Elaboration



Nevertheless, it is important to note that, according to tables 9 and 10, all individual CEO compensation components show a positive and statistically significant difference in mean scores between CEOs who engage in mergers and acquisitions (M&A) and those who do not. Thus, on average, CEOs involved in M&A activity receive higher compensation in all components, for an average difference of \$2.515.484 in total compensation. Comparing this with the results from figure 3, it is evident that while M&A activity seems to negatively affect changes in bonuses and stock options for these CEOs, pursuing such strategic decisions is typically only feasible for larger companies. This explains the disparity in all compensation components between companies that engage in M&A and those that do not.

Overall, the average CEO total compensation increased by 6.75% after a merger and acquisition deal, with stock awards changes explaining almost the entirety of this rise. Thus, it appears that companies see stock awards as the best governance mechanism to mitigate agency problems and align the interests of executives with those of shareholders, as these instruments directly tie the compensation of employees to the company's performance and stock price appreciation, fostering a sense of ownership and commitment to the company's success (Ofek & Yermack, 2000).

Table 9 - Merger Activity T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Cash Compensation				
Salary	Acquiror	2,621	2757	-17,46
	Non-Acquiror	15,223	2091	(0,00%)
Bonus	Acquiror	2,621	945	-17,39
	Non-Acquiror	15,223	812	(0,00%)
Equity-Based Compensation	Acquiror	2,621	5470	-19,13
	Non-Acquiror	15,223	3747	(0,00%)
Stock Options	Acquiror	2,621	863	-13,64
	Non-Acquiror	15,223	1353	(0,00%)
Stock Awards	Acquiror	2,621	3981	-16,07
	Non-Acquiror	15,223	2816	(0,00%)
Total Compensation				
	Acquiror	2,621	8646	-20,94
	Non-Acquiror	15,223	6131	(0,00%)

Moreover, as I previously reported on the mergers and acquisitions section 2.5, Sirait (2018) stated that CEOs with higher levels of equity-based compensation are more likely to engage in M&A activities. Thus, I tested for this hypothesis, by creating a new dummy variable *Higher EBC*, which takes the value 1 if equity-based compensation represents the highest compensation component of CEO *i* in year *t*. Following that, I evaluate if there are significant differences in the means of the number of mergers and acquisitions within a year between the two groups. It is important to note that I do not test for the natural logarithm of number of deals,

as this would exclude those CEOs who do not have equity-based compensation as the main compensation component who did not engage in mergers or acquisitions.

According to the table 11, CEOs whose equity-based compensation represents the highest compensation component, do in fact, engage in a higher number of mergers and acquisitions. This is consistent with the notion that CEOs may want to pursue growth through acquisitions, potentially increasing their personal compensation through higher equity valuations in the short run, even if these decisions do not enhance long-term firm value (Jensen et al., 1976).

Table 10 - Merger Activity (Ln) T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Ln(Cash Compensation)				
Ln(Salary)	Acquiror	2.605	7,57	-9,23
	Non-Acquiror	15.097	7,30	(0,00%)
Ln(Bonus)	Acquiror	2.605	6,64	-4,38
	Non-Acquiror	15.071	6,53	(0,00%)
	Acquiror	2.398	7,20	-14,98
	Non-Acquiror	13.182	6,82	(0,00%)
Ln(Equity-Based Compensation)				
Ln(Stock Options)	Acquiror	2.470	8,32	-19,83
	Non-Acquiror	13.724	7,83	0,00
Ln(Stock Awards)	Acquiror	1.404	7,47	-13,08
	Non-Acquiror	7.040	7,05	(0,00%)
	Acquiror	2.331	8,02	-15,66
	Non-Acquiror	12.612	7,63	(0,00%)
Ln(Total Compensation)				
	Acquiror	2.617	8,74	-17,34
	Non-Acquiror	15.200	8,31	(0,00%)

Table 11 - Equity-Based Compensation and Number of Deals T-Test. Source: Own Elaboration

	N	Mean	t-statistic	p-value
Number of Deals			-11,19	0.00
Smaller EBC	6097	0,12		
Higher EBC	11747	0,21		

6.2 CEOs Near Retirement Age and its Impact on Compensation

As I addressed in Sections 2.4 and 3.2.1, I identified CEOs as near or over the retirement age if they were 63 years old or older, as there are notable changes in the investment patterns for CEOs above that age (Cline & Yore, 2016; Jenter & Lewellen, 2015). Given that older CEOs possess a significant level of knowledge and experience, it is important to understand how this influences their compensation structure, especially considering their limited remaining tenure. Therefore, I conducted a t-test to determine if there are significant differences in the means of all CEO compensation components between near-retirement CEOs and younger ones.

According to the tables 12 and 13, near-retirement CEOs exhibit statistically significant and lower equity-based compensation than younger CEOs. Younger CEOs are more likely to increase firm risk and make aggressive decisions, as they are driven by their focus on short-term objectives and desire to build a reputation (Beber & Fabbri, 2012), and as they are also more risk-tolerant (Graham et al., 2013). Despite these facts, some studies argue that the higher volatility is caused by uncertainty about the younger replacement CEOs' contribution to firm value, rather than changes to risk-related corporate policies (Trabert, 2023). Thus, due to older CEOs investing characteristics and risk-profile, the usefulness of equity-based mechanisms as a governance mechanism is diminished when comparing with younger CEOs, which justifies their smaller average value.

Regarding cash compensation, near retirement CEOs only present a statistically significant difference at both tables 12 and 13 at bonuses levels. As I previously reported, near-retirement CEOs may prioritize stability and safety over risk-taking and growth, justifying the increase levels of cash compensation for them to maintain a stable income (Chulkov & Barron, 2023b). Even though I only find a significant difference of base salary in table 12, McKnight (2000) argues that older CEOs are expected to present an higher salary, to reflect their acquired experience and need for financial stability near retirement.

I find similar results than those of (Wang & Yin, 2021), specifically regarding near retirement age CEOs earning higher levels of cash compensation in deterioration of equity-based compensation. Nevertheless, even though I find that in our sample, near-retirement CEOs appear to earn a higher level of total compensation on average, this difference in means is not statistically significant when using natural logarithms.

Overall, older CEOs have less incentive to undertake risky investments and are often compensated with higher base salaries to ensure stability and align their interests with the long-term goals of the company (McKnight, 2000). This compensation structure is setup in a way to mitigate the potential problems associated with the CEOs age, as if there was a higher representation of equity-based compensation, CEOs might had engaged in short-term opportunistic behaviour, in order to achieve higher performance bonuses, even if that was not align with shareholder value maximization (Bhabra et al., 2016; Jensen & Meckling, 1976).

Table 12 - Near Retirement T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Cash Compensation				
	Near Retirement	3199	2375	-6,39
	Pre-Retirement	14645	2148	(0,00%)
Salary				
	Near Retirement	3199	873	-9,70
	Pre-Retirement	14645	822	(0,00%)
Bonus				
	Near Retirement	3199	1486	-7,13
	Pre-Retirement	14645	1322	(0,00%)
Equity-Based Compensation				
	Near Retirement	3199	3734	3,86
	Pre-Retirement	14645	4058	(0,01%)
Stock Options				
	Near Retirement	3199	839	3,47
	Pre-Retirement	14645	955	(0,05%)
Stock Awards				
	Near Retirement	3199	2779	3,76
	Pre-Retirement	14645	3033	(0,02%)
Total Compensation				
	Near Retirement	3199	6712	-0,59
	Pre-Retirement	14645	6441	(55,56%)

Table 13 - Near Retirement (Ln) T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Ln(Cash Compensation)				
	Near Retirement	3.146	7,36	-0,86
	Pre-Retirement	14.556	7,33	(38,78%)
Ln(Salary)				
	Near Retirement	3.137	6,54	-0,07
	Pre-Retirement	14.539	6,55	(94,10%)
Ln(Bonus)				
	Near Retirement	2.669	6,92	-2,04
	Pre-Retirement	12.911	6,87	(4,12%)
Ln(Equity-Based Compensation)				
	Near Retirement	2.727	7,78	6,33
	Pre-Retirement	13.467	7,93	(0,00%)
Ln(Stock Options)				
	Near Retirement	1.302	7,08	1,36
	Pre-Retirement	7.142	7,13	(17,35%)
Ln(Stock Awards)				
	Near Retirement	2.451	7,62	3,23
	Pre-Retirement	12.492	7,70	(0,12%)
Ln(Total Compensation)				
	Near Retirement	3.187	8,39	5,35
	Pre-Retirement	14.630	8,27	(0,00%)

6.3 CEO Age and its Impact on Compensation

As I just mentioned in the near retiring CEOs section, there are significant differences in both risk-tolerance and investment decisions between younger and older CEOs, with are more risk-averse (Graham et al., 2013). Additionally, I decided to study whether this difference in CEO characteristics due to age impact their compensation structure. According to the table 14, the youngest CEO in our sample is 28 years old while the oldest is 92 years old. Furthermore, the average age is 56.63 years old. Thus, I constructed the dummy variable *Age.Above.Average*, which takes the value 1 for CEOs over 56 years old, and 0 otherwise. I believe that this is the most suited way to divide our sample in two groups for evaluating the impact of age, as additionally, there are only over 1000 observations for the age group of 54, 55, 56, 57 and 58, with a close number of 949 and 998 for 53- and 59-year-old CEOs.

According to the tables 15 and 16, the CEOs above 56 years old, present significant and higher values for all the components of the compensation structure. This is a clear indication that companies value the accumulated experience and knowledge acquired throughout the career of the CEOs, as they increased the likelihood of abnormal positive returns (D'Ewart & Brandon, 2015; Simsek, 2007). Thus, older CEOs may receive higher compensation as they are often viewed as more experienced and capable of navigating complex challenges

However, just like I stated in the near retirement section, it appears that this trend can reverses as CEOs, potentially due to a perceived decrease in long-term commitment to the firm's future and reduced alternative employment options (Chulkov & Barron, 2023a).

Table 14 - Age Summary Statistics. Source: Own Elaboration.

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	17.838	56,63	7,24	28	96

Table 15 - Age T-Test. Source: Own Elaboration.

		N	Mean	t-statistic	
Cash Compensation					
	Salary	Younger	8982	1978	-15,68
		Older	8862	2403	(0,00%)
	Bonus	Younger	8982	778	-20,04
		Older	8862	886	(0,00%)
		Younger	8982	1196	-13,44
		Older	8862	1509	(0,00%)
Equity-Based Compensation					
	Stock Options	Younger	8982	3828	-5,38
		Older	8862	4174	(0,00%)
	Stock Awards	Younger	8982	903	-2,51
		Older	8862	967	(1,20%)
		Younger	8982	2856	-5,11
		Older	8862	3120	(0,00%)
Total Compensation					
		Younger	8982	6049	-10,59
		Older	8862	6958	(0,00%)

Table 16 - Age (Ln) T-Test. Source: Own Elaboration.

		N	Mean	t-statistic
Ln(Cash Compensation)				
	Younger	8974	7,23	-9,38
	Older	8843	7,44	(0,00%)
Ln(Salary)				
	Younger	8974	6,48	-6,90
	Older	8843	6,61	(0,00%)
Ln(Bonus)				
	Younger	8974	6,78	-11,43
	Older	8843	6,99	(0,00%)
Ln(Equity-Based Compensation)				
	Younger	8974	7,88	-3,20
	Older	8843	7,94	(0,14%)
Ln(Stock Options)				
	Younger	8974	7,07	-4,27
	Older	8843	7,18	(1,20%)
Ln(Stock Awards)				
	Younger	8974	7,65	-5,11
	Older	8843	7,74	(0,00%)
Ln(Total Compensation)				
	Younger	8974	8,31	-6,60
	Older	8843	8,43	(0,00%)

6.4 Diversification of the Companies' Operations and its link to CEO Compensation

Similarly to what was discussed on section 2.3, I identified two possible corporate diversification strategies, cross-border, usually for geographical diversification and overcoming domestic limitations (Bertrand & Betschinger, 2012; Shimizu et al., 2004), and cross-industry mergers and acquisitions, usually for diversifying their product portfolios and enter new markets (Kling et al., 2014).

6.4.1 Cross-Industry Mergers and Acquisitions

According to tables 17 and 18, there is a significant difference in the means of equity-based compensation, specifically stock awards, and total compensation between CEOs involved in cross-industry mergers and acquisitions and those conducting mergers and acquisitions within the same industry. CEOs engaged in cross-industry mergers and acquisitions receive lower values in these compensation components.

Furthermore, as industries mature and converge, it is foreseeable that same-industry mergers and acquisitions will continually increase in price due to the dwindling number, and larger dimensional of the remaining potential targets, which is consistent with our observations in 19. Additionally, companies exhibit greater confidence in forecasting synergies when engaging in mergers and acquisitions within the same sector, which justifies their willingness to undertake higher deal values. This confidence stems from the reduced presence of unobservable and unexpected variables compared to cross-industry deals. Consequently, CEOs managing companies involved in same-industry M&A deals, which tend to be larger, are likely to receive higher stock awards. This trend, along with the increased popularity of this compensation component noted in Section 4.1, leads to higher overall compensation for these CEOs.

Table 17 - Cross-Sector T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Cash Compensation				
	Cross-Sector	700	2686	1,05
	Same Industry	1921	2784	(29,25%)
Salary				
	Cross-Sector	700	930	1,20
	Same Industry	1921	950	(23,14%)
Bonus				
	Cross-Sector	700	1744	1,01
	Same Industry	1921	1825	(31,45%)
Equity-Based Compensation				
	Cross-Sector	700	4926	3,44
	Same Industry	1921	5669	(0,06%)
Stock Options				
	Cross-Sector	700	1267	1,27
	Same Industry	1921	1384	(20,60%)
Stock Awards				
	Cross-Sector	700	3597	2,99
	Same Industry	1921	4121	(0,28%)
Total Compensation				
	Cross-Sector	700	8007	3,00
	Same Industry	1921	8880	(0,28%)

Table 18 - Cross-Sector T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Ln(Cash Compensation)				
	Cross-Sector	695	7,54	0,52
	Same Industry	1.910	7,58	(60,55%)
Ln(Salary)				
	Cross-Sector	695	6,64	0,06
	Same Industry	1.910	6,65	(95,16%)
Ln(Bonus)				
	Cross-Sector	630	7,15	1,36
	Same Industry	1.768	7,22	(17,54%)
Ln(Equity-Based Compensation)				
	Cross-Sector	662	8,21	3,35
	Same Industry	1.808	8,36	(0,08%)
Ln(Stock Options)				
	Cross-Sector	387	7,32	3,47
	Same Industry	1.017	7,53	(0,05%)
Ln(Stock Awards)				
	Cross-Sector	628	7,92	3,25
	Same Industry	1.703	8,06	(0,12%)
Ln(Total Compensation)				
	Cross-Sector	700	8,77	2,70
	Same Industry	1.917	8,77	(0,71%)

Table 19 - Cross-Sector Deal Value T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Deal Value	Cross-Sector	700	789	4,76
	Same Industry	1921	1083	(0,00%)

6.4.2 Cross-Border Mergers and Acquisitions

According to the table 20, CEOs whose companies engage in cross-border mergers and acquisitions activities, showcase higher and statistically significant values of all cash compensation components, as well as stock options, than the CEOs whose companies only engage in mergers and acquisitions with companies from the United States of America.

Firstly, base level salary is not supposedly tied to performance (J. E. Core et al., 1999; Sonenshine et al., 2016), which contradicts our initial findings. Thus, this explains why according to the table 21, I find no statistically significant differences in means when using natural logarithms, except for bonuses. Additionally, since base-level salaries are usually related to firm size (Bliss, 2001; J. E. Core et al., 1999; Jensen et al., 1976; Jensen & Murphy, 1990), I decided to test the significance of the difference in firm size means between companies that engaged in cross-border mergers and acquisitions and those that only did it domestically. Furthermore, according to table 22, companies involved in cross-border mergers and acquisitions are significantly larger, with an average sales volume that is \$2,394,470 higher. Although bonuses are dependent on firm performance, they are typically calculated as a percentage of the base salary (J. E. Core et al., 1999). This can justify why CEOs of companies involved in cross-border M&A, which tend to be larger, receive higher bonus levels.

Table 20 - Cross-Border T-Test. Source: Own Elaboration

		N	Mean	t-statistic	
Cash Compensation					
	Salary	Cross-Border	571	2933	-2,26
		Same Country	2050	2708	(2,37%)
	Bonus	Cross-Border	571	976	-2,26
		Same Country	2050	936	(2,36%)
		Cross-Border	571	1948	-2,15
		Same Country	2050	1763	(3,16%)
Equity-Based Compensation					
	Stock Options	Cross-Border	571	5523	-0,29
		Same Country	2050	5456	(77,39%)
	Stock Awards	Cross-Border	571	1529	-2,27
		Same Country	2050	1304	(2,35%)
		Cross-Border	571	3877	0,71
		Same Country	2050	4010	(48,04%)
Total Compensation					
		Cross-Border	571	8928	-1,15
		Same Country	2050	8568	(25,02%)

Table 21 - Cross-Border T-Test. Source: Own Elaboration

		N	Mean	t-statistic	
Ln(Cash Compensation)					
	Ln(Salary)	Cross-Border	568	7,65	-1,41
		Same Country	2.037	7,55	(15,99%)
	Ln(Bonus)	Cross-Border	568	6,70	-1,08
		Same Country	2.037	6,63	(28,11%)
		Cross-Border	525	7,27	-1,75
		Same Country	1.873	7,18	(7,97%)
Ln(Equity-Based Compensation)					
	Ln(Stock Options)	Cross-Border	536	8,37	-1,47
		Same Country	1.934	8,30	(14,08%)
	Ln(Stock Awards)	Cross-Border	346	7,49	-0,36
		Same Country	1.058	7,47	(72,08%)
		Cross-Border	504	8,04	-0,45
		Same Country	1.827	8,02	(65,12%)
Ln(Total Compensation)					
		Cross-Border	571	8,76	-0,59
		Same Country	2.046	8,73	(55,57%)

Table 22 - Cross-Border and Sales T-Test. Source: Own Elaboration

		N	Mean	t-statistic
Sales	Cross-Border	571	13475	-2,20
	Same Country	2050	11080	(2,77%)

7. Results of Multivariate Regression Analysis

In the methodology section, I first mentioned that I proceeded to do multiple tests of our regression in order to avoid biased estimates. The pay-performance elasticity model's regressions that was used is:

$$\ln(\text{CEO Compensation})_{i,t} = \alpha + \beta_1 \text{Merger Activity}_{i,t-1} + \beta_2 \text{Near Retirement}_{i,t} + \beta_3 \text{Tenure}_{i,t} + \beta_4 \ln(\text{Share Ownership})_{i,t} + \beta_5 \ln(\text{ROA})_{i,t-1} + \beta_6 \ln(\text{RET})_{i,t-1} + \beta_7 \ln(\text{Firm Size})_{i,t-1} \mu_t + \varepsilon_{i,t}$$

Where CEO Compensation corresponds to all the compensation structure components, i.e, total compensation (TC), cash compensation (CC), salary (Salary), bonus (Bonus), equity-based compensation (EBC), stock options (Stock Options) and stock awards (Stock Awards), ε is the error term for company i in year t and μ are the year fixed effects dummies.

Although I initially considered including industry dummy variables, they were omitted due to perfect collinearity with the firm fixed effects, as I used cluster-robust standard errors clustered at the firm level. This collinearity arises because each firm belongs to a single industry throughout the panel period, making the industry dummies redundant in the presence of firm fixed effects. Consequently, the firm fixed effects inherently control for any industry-specific effects, provided that firms do not switch industries over time.

Firstly, looking at cash compensation, according to the table 23, most explanatory variables show the expected relationship. Looking at our control variables, I can see that a 10% increase in lagged yearly stock returns result in a 0.36% in base level salaries, 1.83% rise in cash bonuses, and consequently a 1.29% rise in cash compensation. Strangely enough, a 10% increase in lagged return on assets leads to a 0.87% decrease in cash bonuses. This contradicts previous literature findings that suggest that lagged ROA is a significant determinant of compensation, such as Brick et al. (2006). Even though there is no statistically significant relationship between lagged ROA and cash compensation on our regressions, this is a clear indication that companies tend to place higher value on market results when attributing higher bonuses.

Although firm size does not present a statistically significant relationship with cash compensation, a 10% increase in firm size results in a 1,24 % increase in salary. Similarly to (Bliss, 2001; Jensen & Meckling, 1976; Jensen & Murphy, 1990) findings, this indicates that with firm size increases, executives can demand more compensation for managing a larger firm, which are typically more operationally complex (Murphy, 1999). Even though salaries tend to provide a stable income regardless of company and CEO's performance and compensate them for their day-to-day management roles (J. E. Core et al., 1999; Sonenshine et al., 2016), it appears that benefit those CEOs who are able to deliver positive market returns.

As I previously mentioned, base salaries for CEOs are typically based on general industry salary surveys and supplemented by detailed analysis of selected industry or market peers (Murphy, 1999). Furthermore, bonuses are a variable compensation component tied to short-term performance metrics, incentivizing achievement of specific goals and are usually paid based on a single-year's performance (Murphy, 1999). Thus, it was expected that other than firm size and market and accounting performance measures, no variables presented a statistically significance with any type of cash compensation.

Nevertheless, even though there is not a statistically significant relationship of both tenure and CEO ownership with cash compensation, there is one with bonuses. In this sense, a 10% increase in CEO' share ownership results in a 0.33% decrease in bonuses, while a one-year increase in CEO tenure leads to a 2.74% increase in bonuses. These findings are in line with (Mehran, 1995), who stated that firms with higher levels of CEO equity ownership tend to use less other forms of compensation (like bonuses and non-equity incentives) due to higher potential earnings from share ownership. Tenure seems to lead to higher compensation, as the longer CEOs stay within the company the more experience and knowledge they obtain (Murphy, 1999).

Regarding equity-based compensation, engaging in mergers and acquisitions activities showcases a statistically significant and positive relationship with every component of this compensation. In fact, engaging in at least one merger or acquisition results in a 3.79% increase of equity-based compensation. Additionally, if I look at the individual components of equity-based compensation, engaging in at least one merger or acquisition results in a 4.48% and 4.51% increase of stock options and stock awards, respectively. This demonstrates the previously discussed shift from cash bonuses to equity-based compensation as a more effective

governance mechanism for aligning the long-term interests of shareholders and CEOs (Bebchuk & Fried, 2003; Jensen & Murphy, 1990; Ofek & Yermack, 2000). Furthermore, these findings are consistent with our univariate tests which saw an after mergers and acquisitions increase in equity-based compensation, exclusively driven by increases in stock awards. Where these findings are inconsistent with our univariate tests is with stock options, which saw a slight decline from the year before to the year after the merger or acquisition.

Similarly to our univariate tests, near retirement CEOs present a statistically significant negative relationship with stock awards and equity-based compensation. In this fashion, being 63 years or older results in an 8.02% and 7.55% decrease in stock awards and equity-based compensation, respectively. Thus, this is clear evidence that the perceived usefulness of equity-based compensation as a governance mechanism is weaker for older CEOs, as if there was a higher representation of equity-based compensation, CEOs could endeavour in short-term opportunistic behaviour even if that was not align with shareholder value maximization, due to their limited remaining tenure (Bhabra et al., 2016; Jensen & Meckling, 1976). Additionally, older CEOs usually tend to manage in more mature industries with lower growth potential, which may explain this relationship.

The CEO experience, measured by tenure, shows a positive and statistically significant relationship with all forms of equity-based compensation. In fact, a 1-year increase in CEO tenure is associated with a 6.44%, 8.78% and 1.63 % increase in equity-based compensation, stock awards and stock options, respectively. Even though these compensation components are tied to performance, long-tenure CEOs may be able to draw higher values due to their increased bargaining power (Bebchuk & Fried, 2003).

Regarding our control variables, I can clearly see that, similarly to salaries, both market performance and firm size have the biggest statistically significant impact on all CEOs' equity-based compensation components. In this sense, a 10% increase in (lagged) firm size leads to a 3.13%, 2.79% and 2.99% rise in equity-based compensation, stock awards and stock options, respectively. Furthermore, a 10% increase in lagged market returns results in a 1.62%, 1.47% and 1.92% rise in equity-based compensation, stock awards and stock options, respectively. Additionally, the lagged return on assets showcases a small, yet statistically significant relationship with both equity-based compensation, with a 10% increase in ROA resulting in a 0.63% rise in equity-based compensation.

Now addressing the most important component of compensation, i.e., total compensation, all explanatory variables apart from the lagged return on assets show a statistically significant relationship with this compensation component. Nonetheless, market performance measures, measured by lagged RET, shows a higher explanatory value as well as a higher statistical significance not only for total compensation, but also for all the other components of the CEO compensation structure. This is a clear indication that market measures incorporate more relevant information, unlike accounting measures, which are only able to explain single aspects of firm performance, thus making market measures a better explainer of CEO compensation variance when compared to accounting-based measures (Muhammad & Scrimgeour, 2014). In this sense, for a 10% increase in lagged market returns, CEOs total compensation is expected to increase by 1.33%.

Similarly to what I have been observing throughout our analysis, firm size also presents the highest positive and statistically significant relationship with CEOs total compensation, with a 10% increase in firm size, measured by the lagged natural logarithm of sales, leading to a 2.41% increase in CEOs total compensation. As I previously mentioned, in a large company, even a slight increase in profits per unit can result in a significant boost in total profits, justifying why larger companies with greater sales volumes can afford to offer higher compensation to their CEOs. Furthermore, firm size can act as a proxy for the required managerial skills and job complexity, which explains that by increasing firm size, executives can demand more compensation for managing a larger firm (Murphy, 1999). Thus, similarly to (Bliss, 2001; J. E. Core et al., 1999; Jensen & Meckling, 1976; Jensen & Murphy, 1990; Tosi et al., 2000) findings, I perceive firm size as the main responsible for changes in CEO total compensation.

Regarding mergers and acquisitions deals, I show that, engaging in at least one merger or acquisition results in a 3.65% increase of CEO total compensation. As I previously reported, most of this increase can be attributed to the rise in equity-based compensation when companies engage in mergers and acquisitions, which is similar to (Harford & Li, 2007) findings. This can be explained by mergers and acquisitions leading to a restructuring of compensation packages, where equity-based compensation becomes more prevalent to incentivize CEOs to pursue and integrate acquisitions successfully and mitigate agency problems (Bebchuk et al., 2013; Frydman & Jenter, 2010). Additionally, as stated by Baker et al. (1988), firm size increases after an acquisition, which consequently leads to higher compensation values.

Differently than our univariate tests, near retiring CEOs show a negative and statistically significant relationship with CEO total compensation. In fact, being 63 years or older results in a 4.85% decrease in total compensation. As I previously reported, this is mainly due to the decrease in equity-based compensation caused by hitting this age threshold. As younger CEOs are more likely to endeavour in riskier projects, even if those are not maximisers of shareholders value (Beber & Fabbri, 2012), equity-based compensation is a better governance mechanism to align both the interests of shareholders and the CEOs. However, the same does not apply to older CEOs, who tend to be more risk-averse (Graham et al., 2013). Furthermore, putting a lot of weight on equity-based compensation can be hurtful for companies due to the shorter time horizon associated with older CEOs, due to incentivizing riskier behaviour. Nonetheless, according to previous literature, older CEOs are compensated for their reduced tenure and higher experience through increase base salaries (Chulkov & Barron, 2023a; McKnight, 2000), although I did not find statistically significant evidence regarding near retirement age impact on any form of cash compensation.

About CEO tenure, I see a substantial and statistically significant relationship with CEO total compensation, as a 1-year increase in CEO tenure results in 4.29% rise in CEO total compensation. This is a clear indication that companies highly compensate their CEOs for their loyalty and their sustained contribution to the firm's success (Brochet et al., 2015). Nonetheless, (Alves et al., 2016) suggests that this development of firm and industry specific knowledge due to higher tenures makes it harder for companies to replace the CEOs, thus justifying the higher compensation associated with long-tenure CEOs (Alves et al., 2016; Florackis & Ozkan, 2009; Ryan & Wiggins, 2001). Furthermore, previous literature suggests that longer tenure is associated with increase CEO managerial power, thus having more bargaining power within the board of directors or the remuneration committee (Hill et al., 2016). As such, this allows these CEOs to use their managerial power to positively influence their compensation.

Table 23 - Regression Results. Source: Own Elaboration.

Explanatory Variables	Dependent Variables (ln)						
	Salary	Bonus	Cash Compensation	Stock Options	Stock Awards	Equity-Based Compensation	Total Compensation
Constant	5,73 ****	5,91 ****	7,02 ***	4,58 ****	5,05 ****	5,12 ****	6,18 ****
Merger Activity	0,0055	0,0207	0,0093	0,0438 **	0,0441 ***	0,0372 ***	0,0359 **
Near Retirement	0,0311	-0,0203	0,0236	0,0229	-0,0836 ***	-0,0785 ***	-0,0497 *
Tenure	-0,0057	0,0274 ****	-0,0034	0,0163 **	0,0878 ****	0,0644 ****	0,0429 ****
Share Ownership (ln)	0,0109	-0,0325 **	0,0049	-0,0179	0,0092	0,0017	-0,0123
Control Variables							
ROA (ln)	0,0024	-0,0866 ***	-0,0068	-0,0277	0,0627 **	0,0380 *	0,0012
RET (ln)	0,0359 *	0,1833 ****	0,1293 ****	0,1921 ****	0,1469 ****	0,1623 ****	0,1333 ****
Firm Size (ln)	0,1241 **	0,0558	0,0523	0,2989 ****	0,2790 ****	0,3134 ****	0,2407 ****
N	9247	8114	9163	4313	8010	8527	9203
Year Dummies	☑	☑	☑	☑	☑	☑	☑
Firm Clusters	☑	☑	☑	☑	☑	☑	☑

All variables except Tenure and Dummy Variables are winsorized at the 1st and 99th percentile

N = Number of Observations

**** Significant at 0.001 level

*** Significant at 0.01 level

** Significant at 0.5 level

* Significant at 0.10 level

We use lagged values for Merger Activity, ROA, RET and Firm size. N represents the number of observations in the regression. All variables are winsorized at the 1st and 99th percentile, apart from Merger Activity, Near Retirement and Tenure.

Table 24 - Summary of Results. Source: Own Elaboration.

Hypotheses	Explanatory Variable	Dependent Variables	Expected Sign	Result Relationship	Results Dependent Variables
H1	Firm Size	TC/CC/EBC	+	+	TC/EBC
H2	ROA	TC/CC/EBC	+	+	EBC
H3	RET	TC/CC/EBC	+	+	TC/CC/EBC
H4	Age	TC/CC/EBC	+	+	TC/CC/EBC
H5	Ownership	TC/CC/EBC	+	None	TC/CC/EBC
H6	Tenure	TC/CC/EBC	+	+	TC/EBC
H7	Near Retirement	EBC	-	-	TC/EBC
H8	Merger Activity	TC/CC/EBC	+	+	TC/EBC
H9	Higher EBC	Number of Deals	+	+	Number of Deals
H10	Cross-Industry	TC/CC/EBC	-	-	TC/EBC
H11	Cross-Border	TC/CC/EBC	+	+	CC

Explanatory Variable refers to the variable we discuss in each of the Hypotheses, and their Expected Sign, where “+” represents a positive associative link and “-” represents a negative associative link with each of the variables in Dependent Variables. Result Relationship represents the observed relationship in both regression or univariate tests results with the variables in Results Dependent Variables.

8. Horse Racing

In order to assess whether our results and explanatory variables are consistent and stable, I decided to perform a *horse racing*, comparing six different regressions. Firstly, I used the same dependent variable for every regression, opting by the natural logarithm of total compensation, as it was the main focus of our research. Additionally, I maintain all our control variables throughout all the regressions, namely the lagged natural logarithm of sales as a proxy for firm size, and both lagged return on assets and lagged yearly stock returns as measures of accounting and market performance, respectively.

Our first regression represents the one used in table 24, which includes all the explanatory variables. Then I proceed to construct four different regressions, using a singular explanatory variable at a time. Alternatively, our regression number six includes two explanatory variables, the dummy variable near retirement, which signals those CEOs who are 63 years old or older, and tenure, as they both represent CEO's experience and knowledge.

According to table 25, all the explanatory variables that show a statistically significant relationship with the dependent variable in the primary regression also exhibit the same level of statistical significance for each of the newly constructed regressions. The exception is the dummy variable for near retirement, which is now statistically significant at the 5% confidence level in both regressions (3) and (6), whereas it was only significant at the 10% confidence level in regression (1). Additionally, all control variables maintain consistent statistical significance across all regressions in table 25. Thus, I can confidently confirm that our results are consistent and stable.

Table 25 - Horse Racing Regressions. Source: Own Elaboration.

Explanatory Variables	Dependent Variable: ln(TC)					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	6,183563 ^{****}	6,496415 ^{****}	6,514864 ^{****}	6,312539	6,399308 ^{****}	6,307073 ^{****}
Merger Activity	0,0358861^{**}	0,0335016^{**}	-	-	-	-
Near Retirement	-0,0497314[*]	-	-0,0549322^{**}	-	-	-0,057321^{**}
Tenure	0,042894^{****}	-	-	0,040628^{****}	-	0,0431719^{****}
Share Ownership (ln)	-0,0122621	-	-	-	-0,0130576	-
Control Variables						
ROA (ln)	0,001239	-0,0045275	-0,0060432	-0,0005744	-0,0041422	-0,0008926
RET (ln)	0,133298^{****}	0,1371214^{****}	0,1366469^{****}	0,1330393^{****}	0,1363438^{****}	0,1328955^{****}
Firm Size (ln)	0,2407316^{****}	0,2359462^{****}	0,2341838^{****}	0,233052	0,2414936^{****}	0,2321812^{****}
N	9203	9564	9564	9353	9406	9353
Year Dummies	☑	☑	☑	☑	☑	☑
Firm Clusters	☑	☑	☑	☑	☑	☑

All variables except Tenure and Dummy Variables are winsorized at the 1st and 99th percentile

N = Number of Observations

**** Significant at 0.001 level

*** Significant at 0.01 level

** Significant at 0.5 level

* Significant at 0.10 level

We use lagged values for Merger Activity, ROA, RET and Firm size. N represents the number of observations in the regression. All variables are winsorized at the 1st and 99th percentile, apart from Merger Activity, Near Retirement and Tenure.

9. Conclusion

Compensation is an intrinsically challenging study topic, as it englobes a multitude of factors that sometimes can even be unmeasurable. Hence, in this research, I study the impacts of both firm and CEO characteristics, as well as mergers and acquisitions activities on CEO compensation in order to better understand how the CEO compensation structure is defined. Thus, I analysed nearly 18 thousand yearly observations of both CEO and firm characteristics, as well as 2.621 mergers and acquisitions details for companies from the United States of America, from June 2010 to December 2020.

I observed that from 2010 to 2020, CEO compensation structures suffered significant changes and evolution. While cash compensation saw a modest annual growth of 1.09%, driven mainly by increases in base salaries rather than cash bonuses, equity-based compensation grew substantially, averaging 6.52% annually. This shift was marked by a preference for restricted stock awards over stock options, aligning CEO interests more closely with long-term shareholder value. Additionally, the CEO compensation mix moved from a near-even split between cash and equity in 2010 to a dominant equity focus by 2020. Total compensation increased by 4.48% annually, a 55.06% rise over the decade, largely influenced by enhanced firm size. Mergers and acquisitions activity remained somewhat constant, except for a notable decline in 2020 due to the COVID-19 pandemic.

To address the issues of skewed distributions and potential endogeneity in CEO compensation analysis, I opted to use the natural logarithm of compensation components, as this approach assists the normality assumption of the ordinary least squares model. Additionally, to mitigate bidirectional causality between CEO compensation and firm performance, lagged independent variables were included. Our dataset, an unbalanced panel due to varying observations and fluctuating market entries and exits of companies and CEOs, was analysed using the fixed effects model. This decision was validated by the Hausman test, which indicated significant p-values, confirming the fixed effects model's suitability over the random effects model. Moreover, the modified Wald test revealed heteroskedasticity, leading us to employ cluster-robust standard errors at the firm level. Variance inflation factor tests showed low multicollinearity, ensuring the robustness of our estimators.

Our main findings include a positive relationship between lagged stock returns and cash compensation components, while firm size also positively influences base salaries. Interestingly, lagged return on assets showed a negative relationship with cash bonuses, suggesting a preference for market results over accounting metrics in compensation decisions.

Furthermore, equity-based compensation significantly increased with mergers and acquisitions activity, indicating a shift from cash bonuses to equity to align CEO and shareholder interests. Near-retirement CEOs received less equity-based compensation, likely due to age characteristics and higher risk-aversion. CEO tenure showed a positive relationship with all forms of equity-based compensation, which can reflect CEOs increased bargaining power and firm-specific knowledge. Additionally, the data indicates that CEOs whose compensation is predominantly equity-based are more likely to engage in M&A activities, suggesting that such compensation structures incentivize CEOs to pursue growth strategies that may enhance their personal gains through higher equity valuations. These findings highlight the intricate dynamics between compensation structures and strategic corporate decisions, emphasizing the importance of aligning executive incentives with long-term shareholder value.

Moreover, total compensation results revealed that market performance measures, such as lagged stock returns, had a stronger explanatory power than accounting measures. Firm size emerged as the most significant determinant of total compensation, with mergers and acquisitions further boosting CEO pay. Near-retirement CEOs saw a decrease in total compensation, while longer-tenure CEOs enjoyed higher compensation due to their sustained contributions and increased bargaining power.

Nevertheless, this research faces some limitations due to the lack of numerous control variables that would enhance the reliability of our results. Furthermore, we did not include both liquidity and leverage ratios as this information was not available on our used databases. Similarly, I was not able to utilize the daily stock price volatility for the same reason. Additionally, I did not account for governance mechanisms such as board size and independent board members, as well as there is a lack of managerial power variables such as CEO duality. Moreover, it is important to note that I grouped all the individual M&A deals as if they were one, which may impact the validity of our observation that the total deal value of cross-sector M&A tends to be lower. I suggest that future research should include a higher number of control variables, in order to produce more robust and reliable estimates and results.

In conclusion, this research provides valuable insights into the complexities of CEO compensation structures and their evolution from 2010 to 2020, particularly influenced by firm and CEO characteristics, and strategic activities such as mergers and acquisitions. These findings are crucial for remuneration committees tasked with designing effective compensation packages that motivate CEOs to pursue strategic growth while safeguarding shareholder interests. Financial analysts and stakeholders interested in corporate governance mechanisms will find the analysis particularly illuminating, as it underscores the importance of robust methodologies in understanding the intricate dynamics between CEO compensation and corporate performance.

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Appendix

Table 26 - Hausman (1978) specification test - $\ln(TC)$.Source: Own Elaboration

	Coef.
Chi-square test value	224,212
P-value	0

Table 32 - Hausman (1978) specification test - $\ln(Salary)$.Source: Own Elaboration

	Coef.
Chi-square test value	32,852
P-value	0

Table 31 - Hausman (1978) specification test - $\ln(Bonus)$.Source: Own Elaboration

	Coef.
Chi-square test value	126,906
P-value	0

Table 30 - Hausman (1978) specification test - $\ln(Cash\ Compensation)$.Source: Own Elaboration

	Coef.
Chi-square test value	79,545
P-value	0

Table 29 - Hausman (1978) specification test - $\ln(Stock-Awards)$.Source: Own Elaboration

	Coef.
Chi-square test value	754,46
P-value	0

Table 28 - Hausman (1978) specification test - $\ln(Stock\ Options)$.Source: Own Elaboration

	Coef.
Chi-square test value	44,325
P-value	0

Table 27 - Hausman (1978) specification test - $\ln(Equity-Based\ Compensation)$.Source: Own Elaboration

	Coef.
Chi-square test value	484,708
P-value	0

Table 33 - Variance inflation factor - $\ln(\text{Total Compensation})$. Source: Own Elaboration

	VIF	1/VIF
L.merger dummy	1,054	0,949
near retirement	2,128	0,47
AGE	2,318	0,431
L.CEO TEN	1,324	0,755
L.CEO SHAR w	1,007	0,993
L.log ROA w	1,127	0,887
L.log returns w	1,161	0,861
L.FS w	1,169	0,856
2.IndustriesID	1,766	0,566
3.IndustriesID	1,499	0,667
4.IndustriesID	2,387	0,419
5.IndustriesID	2,244	0,446
6.IndustriesID	2,795	0,358
7.IndustriesID	1,299	0,77
8.IndustriesID	4,303	0,232
9.IndustriesID	2,881	0,347
10.IndustriesID	1,946	0,514
11.IndustriesID	2,253	0,444
12.IndustriesID	4,835	0,207
13.IndustriesID	3,346	0,299
14.IndustriesID	1,512	0,661
15.IndustriesID	1,291	0,774
16.IndustriesID	1,601	0,624
17.IndustriesID	2,69	0,372
18.IndustriesID	3,011	0,332
19.IndustriesID	2,113	0,473
20.IndustriesID	5,205	0,192
2013.YEAR	1,772	0,564
2014.YEAR	1,832	0,546
2015.YEAR	1,736	0,576
2016.YEAR	1,707	0,586
2017.YEAR	1,731	0,578
2018.YEAR	1,725	0,58
2019.YEAR	1,687	0,593
2020.YEAR	1,65	0,606
Mean VIF	2,117	.

Table 34 - Variance inflation factor - Ln(Cash Compensation).Source: Own Elaboration

	VIF	1/VIF
L.merger dummy	1,054	0,949
near retirement	2,116	0,473
AGE	2,299	0,435
L.CEO TEN	1,317	0,759
L.CEO SHAR w	1,007	0,993
L.log ROA w	1,123	0,89
L.log returns w	1,161	0,861
L.FS w	1,168	0,856
2.IndustriesID	1,787	0,56
3.IndustriesID	1,512	0,661
4.IndustriesID	2,414	0,414
5.IndustriesID	2,277	0,439
6.IndustriesID	2,842	0,352
7.IndustriesID	1,307	0,765
8.IndustriesID	4,391	0,228
9.IndustriesID	2,925	0,342
10.IndustriesID	1,971	0,507
11.IndustriesID	2,258	0,443
12.IndustriesID	4,923	0,203
13.IndustriesID	3,402	0,294
14.IndustriesID	1,525	0,656
15.IndustriesID	1,299	0,77
16.IndustriesID	1,58	0,633
17.IndustriesID	2,732	0,366
18.IndustriesID	3,065	0,326
19.IndustriesID	2,144	0,466
20.IndustriesID	5,308	0,188
2013.YEAR	1,771	0,565
2014.YEAR	1,832	0,546
2015.YEAR	1,735	0,576
2016.YEAR	1,706	0,586
2017.YEAR	1,729	0,578
2018.YEAR	1,721	0,581
2019.YEAR	1,684	0,594
2020.YEAR	1,644	0,608
Mean VIF	2,135	.

Table 35 - Variance inflation factor - $\ln(\text{Salary})$. Source: Own Elaboration

	VIF	1/VIF
L.merger dummy	1,054	0,949
near retirement	2,114	0,473
AGE	2,297	0,435
L.CEO TEN	1,317	0,759
L.CEO SHAR w	1,007	0,993
L.log ROA w	1,124	0,89
L.log returns w	1,16	0,862
L.FS w	1,168	0,856
2.IndustriesID	1,809	0,553
3.IndustriesID	1,527	0,655
4.IndustriesID	2,454	0,408
5.IndustriesID	2,308	0,433
6.IndustriesID	2,896	0,345
7.IndustriesID	1,316	0,76
8.IndustriesID	4,479	0,223
9.IndustriesID	2,98	0,336
10.IndustriesID	1,998	0,5
11.IndustriesID	2,294	0,436
12.IndustriesID	5,029	0,199
13.IndustriesID	3,463	0,289
14.IndustriesID	1,541	0,649
15.IndustriesID	1,307	0,765
16.IndustriesID	1,595	0,627
17.IndustriesID	2,783	0,359
18.IndustriesID	3,123	0,32
19.IndustriesID	2,176	0,459
20.IndustriesID	5,423	0,184
2013.YEAR	1,771	0,565
2014.YEAR	1,833	0,546
2015.YEAR	1,736	0,576
2016.YEAR	1,705	0,586
2017.YEAR	1,73	0,578
2018.YEAR	1,722	0,581
2019.YEAR	1,683	0,594
2020.YEAR	1,645	0,608
Mean VIF	2,159	.

Table 36 - Variance inflation factor - $\ln(\text{Bonus})$. Source: Own Elaboration

	VIF	1/VIF
L.merger dummy	1,052	0,95
near retirement	2,097	0,477
AGE	2,279	0,439
L.CEO TEN	1,418	0,705
L.CEO SHAR w	1,221	0,819
L.log ROA w	1,138	0,879
L.log returns w	1,161	0,861
L.FS w	1,202	0,832
2.IndustriesID	1,835	0,545
3.IndustriesID	1,569	0,637
4.IndustriesID	2,536	0,394
5.IndustriesID	2,417	0,414
6.IndustriesID	2,835	0,353
7.IndustriesID	1,321	0,757
8.IndustriesID	4,703	0,213
9.IndustriesID	2,919	0,343
10.IndustriesID	2,052	0,487
11.IndustriesID	2,331	0,429
12.IndustriesID	5,184	0,193
13.IndustriesID	3,55	0,282
14.IndustriesID	1,543	0,648
15.IndustriesID	1,338	0,747
16.IndustriesID	1,642	0,609
17.IndustriesID	2,687	0,372
18.IndustriesID	3,174	0,315
19.IndustriesID	2,203	0,454
20.IndustriesID	5,396	0,185
2013.YEAR	1,777	0,563
2014.YEAR	1,826	0,548
2015.YEAR	1,731	0,578
2016.YEAR	1,699	0,589
2017.YEAR	1,729	0,578
2018.YEAR	1,727	0,579
2019.YEAR	1,681	0,595
2020.YEAR	1,632	0,613
Mean VIF	2,189	.

Table 37 - Variance inflation factor - Ln(Equity-Based Compensation).Source: Own Elaboration

	VIF	1/VIF
L.merger dummy	1,054	0,949
near retirement	2,085	0,48
AGE	2,258	0,443
L.CEO TEN	1,308	0,765
L.CEO SHAR w	1,008	0,992
L.log ROA w	1,139	0,878
L.log returns w	1,17	0,855
L.FS w	1,186	0,843
2.IndustriesID	1,74	0,575
3.IndustriesID	1,504	0,665
4.IndustriesID	2,438	0,41
5.IndustriesID	2,247	0,445
6.IndustriesID	2,77	0,361
7.IndustriesID	1,28	0,782
8.IndustriesID	4,386	0,228
9.IndustriesID	2,751	0,363
10.IndustriesID	1,881	0,532
11.IndustriesID	2,145	0,466
12.IndustriesID	4,849	0,206
13.IndustriesID	3,363	0,297
14.IndustriesID	1,46	0,685
15.IndustriesID	1,296	0,772
16.IndustriesID	1,587	0,63
17.IndustriesID	2,584	0,387
18.IndustriesID	2,971	0,337
19.IndustriesID	2,114	0,473
20.IndustriesID	5,074	0,197
2013.YEAR	1,79	0,559
2014.YEAR	1,859	0,538
2015.YEAR	1,762	0,567
2016.YEAR	1,741	0,574
2017.YEAR	1,762	0,568
2018.YEAR	1,757	0,569
2019.YEAR	1,711	0,584
2020.YEAR	1,678	0,596
Mean VIF	2,106	.

Table 38 - Variance inflation factor - Ln(Stock Awards).Source: Own Elaboration

	VIF	1/VIF
L.merger dummy	1,053	0,949
near retirement	2,048	0,488
AGE	2,222	0,45
L.CEO TEN	1,292	0,774
L.CEO SHAR w	1,008	0,992
L.log ROA w	1,147	0,872
L.log returns w	1,173	0,852
L.FS w	1,173	0,852
2.IndustriesID	1,746	0,573
3.IndustriesID	1,541	0,649
4.IndustriesID	2,504	0,399
5.IndustriesID	2,274	0,44
6.IndustriesID	2,73	0,366
7.IndustriesID	1,286	0,777
8.IndustriesID	4,593	0,218
9.IndustriesID	2,735	0,366
10.IndustriesID	1,91	0,524
11.IndustriesID	2,137	0,468
12.IndustriesID	4,721	0,212
13.IndustriesID	3,432	0,291
14.IndustriesID	1,444	0,692
15.IndustriesID	1,308	0,764
16.IndustriesID	1,636	0,611
17.IndustriesID	2,66	0,376
18.IndustriesID	3,037	0,329
19.IndustriesID	2,133	0,469
20.IndustriesID	5,12	0,195
2013.YEAR	1,804	0,554
2014.YEAR	1,882	0,531
2015.YEAR	1,79	0,559
2016.YEAR	1,769	0,565
2017.YEAR	1,798	0,556
2018.YEAR	1,794	0,557
2019.YEAR	1,756	0,569
2020.YEAR	1,722	0,581
Mean VIF	2,125	.

Table 39 - Variance inflation factor - Ln(Stock Options).Source: Own Elaboration

	VIF	1/VIF
L.merger dummy	1,053	0,95
near retirement	2,045	0,489
AGE	2,268	0,441
L.CEO TEN	1,326	0,754
L.CEO SHAR w	1,017	0,983
L.log ROA w	1,113	0,899
L.log returns w	1,164	0,859
L.FS w	1,221	0,819
2.IndustriesID	1,761	0,568
3.IndustriesID	1,559	0,642
4.IndustriesID	2,998	0,334
5.IndustriesID	2,199	0,455
6.IndustriesID	3,213	0,311
7.IndustriesID	1,221	0,819
8.IndustriesID	3,028	0,33
9.IndustriesID	3,124	0,32
10.IndustriesID	1,784	0,56
11.IndustriesID	2,318	0,431
12.IndustriesID	6,489	0,154
13.IndustriesID	3,943	0,254
14.IndustriesID	1,45	0,69
15.IndustriesID	1,276	0,783
16.IndustriesID	1,203	0,831
17.IndustriesID	2,558	0,391
18.IndustriesID	2,955	0,338
19.IndustriesID	2,083	0,48
20.IndustriesID	4,945	0,202
2013.YEAR	1,735	0,576
2014.YEAR	1,765	0,567
2015.YEAR	1,647	0,607
2016.YEAR	1,626	0,615
2017.YEAR	1,598	0,626
2018.YEAR	1,582	0,632
2019.YEAR	1,515	0,66
2020.YEAR	1,467	0,682
Mean VIF	2,121	.