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Executive Compensation and Company Performance: Evidence for S&P500 Index Companies

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Biographical Note

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His professional career began as an accountant at Enes & Araújo – Contabilidade e Gestão, Lda. Since July 2017 he has been working in the company Rhenus Transitários e Logística, Lda. as Invoicing Department Manager.

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Abstract:

The opening of the companies' share capital led to an increasing attempt to attract investment, which resulted in the separation of ownership and control of companies. This phenomenon, reflected in the Agency Theory by Jensen and Meckling (1976), evidenced conflicts of interest between capital holders and managers.

This work aims to analyze the relationship between the company's performance and the compensation of executive directors. At the same time, verify if the characteristics of the company, of the CEO's, of the board of directors, of the shareholders and the capital holders influence the compensation of the executives.

To this end, the Execucomp and Datastream databases were used, collecting a sample of companies included in the Standard & Poor's 500 (S&P500) group, in the period between 2010 and 2020.

The results obtained demonstrate a positive and significant impact of the company's performance on executive compensation, and this relationship is stronger in the first years of the analysis (2010-2012). Similarly, we demonstrate that the characteristics of the company, of the CEO's, the board of directors, shareholders and capital holders influence the executive's level of compensation.

Keywords: Chief Executive Officer; Compensation; CEO's Characteristics; Performance; Corporate Governance

Resumo

A abertura do capital social das empresas levou a uma tentativa cada vez maior de captação de investimento, o que resultou na separação entre propriedade e controlo das empresas. Este fenómeno, refletido na Teoria da Agência de Jensen and Meckling (1976), evidenciou os conflitos de interesses entre detentores de capital e os gestores, sendo, assim, importante estudar este tema.

Este trabalho tem como objetivo analisar a relação existente entre a performance da empresa e a remuneração dos administradores executivos. Concomitantemente, verificar se as características da empresa, dos CEO's, do conselho de administração, dos acionistas e dos detentores de propriedade influenciam o nível de remuneração dos gestores de topo.

Para tal, são utilizadas as bases de dados Execucomp e Datastream, recolhendo uma amostra das empresas inseridas no grupo Standard & Poor's 500 (S&P500), no período compreendido entre 2010 e 2020.

Os resultados obtidos demonstram um impacto positivo e significativo da performance da empresa na remuneração dos executivos, sendo que essa relação é mais forte nos primeiros anos da análise (2010-2012). De igual modo, demonstramos que as características da empresa, dos CEO's, do conselho de administração, dos acionistas e dos detentores de propriedade influenciam o nível de remuneração dos executivos.

Palavras-chave: Chief Executive Officer; Remuneração; Características do CEO; Performance; Corporate Governance

Abbreviations List

CEO – Chief Executive Officer

EGLS – Estimated Generalized Least Squares

GEM – Growth Enterprise Market

NASDAQ – National Association of Securities Dealers Automated Quotations

NYSE – New York Stock Exchange

OLS – Ordinary Least Squares

RLS – Recursive Least Squares

ROA – Return on Assets

ROE – Return on Equity

SIC – Standard Industrial Code

S&P500 – Standard & Poor's 500

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1. Introduction

Since the beginning of the last century, we have seen the topic of "Executive Compensation" receiving increased attention from academics.

The opening of companies' share capital made that progressively more companies tried to capture investment, and to both attract the best management professionals and align their incentives with shareholders, using attractive compensation packages. Such behavior is evidenced in the Agency Theory (Jensen and Meckling, 1976)[1].

According to Kyle Peterdy, a "*Chief Executive Officer (CEO) is the top-ranking individual employee within an organization. They are an employee in the sense that they work for the firm (as opposed to being elected by shareholders)* …" and *"…they have considerable responsibility and influence within the firm.*" The primary responsibility of the CEO is to make corporate major managerial and executive decisions, and to act as the main point of communication between the board of directors and corporate operations. In this sense, this clearly proves to be one of the engines of the enterprise proceeding to leverage the organization's overall performance order to fulfill not only its objectives in professional terms, but additionally to meet the goals of the organization stipulated withinside the assignment and imaginative and prescient of the organization (Koenig, 1964).

The CEO's intention is to achieve the goals outlined in the short and long term and, therefore, it is natural that his compensation is influenced by the company's results. In this manner, their compensation can be short-term –salary and bonuses – or long-term – equity-based options (Frydman, 2009).

From a theoretical point of view and supported by the Agency Theory, the causal link between CEO compensation and performance is well-known, allowing two aspects to be distinguished. If, on one hand, it is foreseen that the higher the company's performance, the higher the compensation of the CEO, we can say that the inverse relationship may be valid.

[1] According to Jensen and Meckling (1976) an agency relationship is an agreement below which one or greater persons (the primary(s)) interact with every other person (the agent) to carry out a few carriers on their behalf which entails delegating a few decision-making authorities to the agent.

In other words, managers who have a higher compensation from the start will run the business better to achieve higher results.

Thus, the empirical contribution of this research is to analyze the impact that the company's performance represents on the CEO's compensation. We analyzed how the specific characteristics of the company, of the CEO's, of the Board of Directors, of the shareholders, and the capital holders influence the CEO's compensation level. The main contribution to the existing literature is that this dissertation is a pioneer in the elaboration of a period analysis regarding the significance of the company's performance in executive compensation. This period analysis is initially performed in two periods of analysis (2010-2015 vs 2016-2020) and is subsequently extended to three (2010-2012 vs 2013-2016 vs 2017-2020).

The interest in study chosen for the elaboration of the dissertation arises from various aspects, in particular the importance of evaluating the capacity that the company's performance induces in the executive's compensation.

In our tests the dependent variables are the accounting performance indicators, namely the ROA ratio (quotient between Net Income and Total Assets) and the ROE ratio (quotient between the Net Income and Total Equity).

Using panel data, the estimation will be conducted through EGLS based on a fixed sample of 212 companies belonging to the U.S. capital market that are on the S&P 500 Index, listed on the stock exchange, specifically on the NYSE or NASDAQ. The data on compensation is extracted from the Execucomp database whereas firm level data is retrieved from the Datastream database (period 2010-2020).

The main conclusions of this study convey a positive and significant impact of the company's performance (measured by ROA and ROE) on executive compensation, and these results are consistent with the existing literature.

Some robustness tests were also performed due to heteroskedasticity issues in the cross-section, and the results obtained are in accordance with the previous conclusions, and thus can be considered robust.

This study is organized as follows: Chapter 2 reviews the existing literature on the theme of executive compensation, paying special attention to the agency problem and the relationship

between it and executive compensation. In chapter 3, the study hypotheses that are related to the company's performance, the characteristics of the companies, the characteristics of the CEO's, the characteristics of the board of directors and the characteristics of the shareholders and capital holders will be presented and substantiated. In the following chapter, i.e., chapter 4, the methodology of the analysis is presented, which indicates the database that was used to prepare the sample of companies belonging to the S&P 500 index during the period 2010 to 2020. Chapter 5 presents the variables used in this study, making a distinction between dependent and independent variables. In chapter 6 is presented the specification of the regression model proposed for the investigation. Chapter 7 covers, in a first part, the analysis of the dependent variable and the independent variables, in a second part additional robustness tests are conducted, and in a third phase, a period analysis of several periods of analysis is elaborated. Finally, chapter 8 contains the main conclusions of the dissertation, with emphasis on the results achieved.

2. Literature Review

2.1. The Agency Problem

Agency costs were first addressed in Adam Smith's work, "Wealth of Nations", in 1776. However, it was only in the article by Jensen and Meckling (1976) that the agency theory was truly highlighted.

These problems arise from the separation between ownership and management in modern organizations (Jensen and Meckling, 1976; Fama, 1980) summarizing the difference between the right to claim cash-flows (shareholders' rights) and the right to dispose of cash-flows (management rights).

The agency relationship, according to Jensen and Meckling (1976), is assumed as a contract under which an entity (principal) entrusts another entity (agent) to develop an activity or perform a function on its behalf, which involves delegating some decision-making capacity to the latter.

Both parties in this relationship, the principal and the agent, which are, respectively, the shareholder and the administrator in charge of executing the management, will act in order to maximize their individual utility, as postulated by the microeconomic theory. Thus, although the manager is mandated by the shareholder, he will act to maximize his own interests, and so there is the risk of the agent making decisions and adopt certain behaviors that do not correspond to the interests of the shareholder (Jensen and Meckling, 1976).

Aware of such conflicts, Jensen & Meckling (1976) claim that business enterprise expenses are incurred in any courting regarding cooperative efforts amongst two or more occasions with a purpose to mitigate the situation. For this reason, they define business enterprise expenses due to the fact the sum of three tranches: the expenses of monitoring thru manner of method by the principal (with a purpose to make sure that the agent does not make alternatives decisions that harm the principal), the expenses of linking the agent (as a manner of aligning the pursuits of every occasions) and, finally, the residual loss due to the bargain of the principal's welfare due to the misadjustment of mind that still resists after implementation monitoring and linking system.

There are then several ways in which they provide or can provide the alignment of interests between the principal and the agent. First, as a way of encouraging the alignment of interests, we have the selling part of the company to the agent. This incentive scheme consists in handing over to the agent the powers of appropriation of the resources he manages, losing the principal in compensation what he earns in certainty that the agent receives as much incentive as possible to comply since the agent will be remunerated for the fullness of his results, and therefore, in direct reason for his efficiency. In essence, it is a form of payment depending on the results achieved. This form of incentive has, however, its limitations in terms of effectiveness quite as an alignment of interest. The truth is that the agent will, for the most part, refuse this compensation system given his aversion to risk. In this type of compensation, the agent is fully responsible for the risk (Tosi, Katz & Gomez-Mejia, 1997).

Therefore, the optimal compensation contract is related to minimizing agency costs and it is certain that the principal intends to obtain maximum effort on the part of the CEO so as not to compromise the short and long-term objectives set by the company.

Agency theory continues to give rise to several studies, including the study by Vitolla, F., Raimo, N., & Rubino, M. (2020) in which the results confirm expectations regarding the role of the board of directors as a virtuous governance mechanism. The characteristics of the board of directors, particularly the size, independence, diversity, and level of activity, if properly weighted, favour a reconciliation of the expectations of shareholders and stakeholders and feed a more transparent and quality disclosure.

Similarly, the work of Raimo, N., Vitolla, F., Marrone, A., & Rubino, M. (2021) found a positive effect of the size of the audit committee's meeting on integrated reporting quality and a non-significant effect of financial expertise.

2.2. Executive Compensation and the Agency Problem

Executive compensation has long attracted the attention from economists. The increase in academic research on CEO compensation in the 1990s appears to have outpaced the notable increase in overall CEO compensation during that period (Murphy, 1998). Much research has focused on how executive compensation schemes can help alleviate the agency problem in publicly traded companies. To adequately understand the landscape of executive compensation, it is necessary to recognize that compensation schemes are also partly a product of this same agency problem.

Agency theory posits that one of the viable solutions to ease the agency conflict between managers and shareholders involves incentive contracts that can be designed to align the interests of both parties (Jensen and Zimmerman, 1985; Eisenhardt, 1989; Sloan, 1993; Shleifer and Vishny, 1997).

An adequate compensation policy for managers can potentially reduce the conflict of interests between them and the shareholders, by defining compensation packages that encourage managers to act in favor of maximizing the company's value and is also an indispensable instrument to attract the most competent managers.

In organizations where ownership and control are segregated, management power is likely to have a significant impact on the structure of executive compensation, according to both theoretical and empirical evidence. Thus, it is possible to study executive compensation both as a form of resolving the agency problem brought on by the separation of ownership and control and as a component of the agency problem itself. The finding that management influence and rent seeking have a considerable impact on CEO salary has crucial ramifications for corporate governance. But it is vital to remember that in this case, public acknowledgment of the issue can actually help to solve it. The degree to which market participants, particularly institutional investors, are aware of and on alert against the issues we have mentioned will determine the extent to which management influence might shift pay arrangements away from optimal contracting results. By examining how far present compensation practices depart from those recommended by optimal contracting, financial economists can significantly improve compensation arrangements and, in turn, shareholder value.

Mehran (1995) examined the executive compensation structure of 153 manufacturing firms in the 1980s, concluding that the value of firms does not depend on the level of compensation, but rather on the way executives receive their compensation. The author found that firm performance is positively related to the percentage of capital held by directors and the percentage of compensation that is equity-based. Furthermore, the results on firm performance indicate that both Tobin's Q[2] and return on assets are positively related to the percentage of total executive compensation that is equity-based and the percentage of stock held by top managers.

For Frydman and Jenter (2010), the relative importance of the compensation elements has changed considerably over time, and for these authors, managers' compensation packages are essentially broken down into five segments: salary, annual bonus, long-term incentive plan payments, restricted option grants and restricted stock grants. In addition, they mention that CEOs usually receive contributions to retirement plans, various bonuses and, in case of dismissal, severance pay.

We can also have compensation divided into short-term and long-term compensation. Short-term compensation includes base salary, as well as any bonus plans based on the previous year's performance. Long-term compensation, on the other hand, includes stock options, restricted stock, and long-term incentive plans (Goergen & Renneboog, 2011; Faria, Martins, & Brandão, 2014).

Even though there is a broad literature on performance in the business Richard, P. J., Devinney, T. M., Yip, G. S., & Johnson, G. (2009) admit that the definition of organizational performance remains open due to its complexity, eventually encompassing several areas. Thus, they consider that this concept comprises financial performance - which includes profits, return on assets, and return on investment - as well as the market performance of the product and the return to shareholder, and by market performance the authors refer to sales and market share as some points that denote such information.

[2] Tobin's Q is the variable used as a proxy for market performance since the compensation rate can consider the market performance and not of the company itself. This variable is obtained through the sum between the market value of equity, short and long-term debt as well as preferred stock, and is subsequently divided by the total asset (Chung & Pruitt's, 1994).

The study of Sheikh, M. F., Shah, S. Z. A., & Akbar, S. (2018) examines the effects of firm performance and corporate governance on chief executive officer compensation in an emerging market, Pakistan. Using a variety of model specifications, including a dynamic panel model that also accounts for dynamic adjustment of dependent variables and control for endogeneity issues, they found that a company's financial performance for the current and previous years has a significant positive impact on the CEO compensation. Overall, these findings suggest that firms' accounting performance is an important determinant of CEO compensation.

Rosoava (2019) found that the pay-performance association is evident when using both accounting and market performance measures providing support for the optimal contracting theoretical perspective, although the study cannot reject an alternative theory such as managerial power theory in setting executive pay arrangements.

This subject was also studied by Dias, A., Vieira, V. and Figlioli, B. (2020) and investigated how different executive compensation structures were related to the firm's performance. This research found, as well, that the firm performance is positively correlated with the variable incentives of executive compensation, especially the long-term incentives.

Chen, C. and Hassan, A. (2022) studied the discussion of executive compensation and firm performance by investigating the relationship between executive pay, gender diversity in management, and firm financial performance in the growth enterprise market (GEM) listed companies in China. The results show that the firm performance is not significantly correlated with the executive cash pay, while, in the other hand, the executive equity-based compensation is significantly positively correlated with firm performance.

Bhuyan, R., Butchey, D., Haar, J. and Talukdar, B. (2022) investigated the relationship between the CEO compensation and a firm's financial performance in the insurance industry to determine CEO pay policies that are more effective in promoting specific financial corporate goals. The authors found out that the insurance industry has experienced significant changes in post-crisis executive compensation packages. The CEO's compensation was primarily based on bonuses before the crisis, but the average bonus level was cut to one-third of the level, equity bonuses and non-equity incentives doubled his increased by almost 70% in the post-crisis period. It is also clear that the CEOs work

experience and the company's financial performance play a key role in determining CEO compensation. Stock and options rewards replace cash bonuses as CEOs gain experience.

3. Hypothesis

3.1. Executive compensation and company performance

According to the agency's theory, the CEO's compensation packages are designed to encourage the CEO to increase shareholder wealth (Jensen and Murphy, 1990).

According to previous studies, such as Murphy (1985), Mehran (1995) and Zandi, G., Mohamad, S., Keong, O. C., & Ehsanullah, S. (2019), there is evidence that the companies' performance has a positive influence on the CEOs compensation. Meaning that there is a positive pay-performance ratio when we use the Return on Assets (ROA) ratio, and, as mentioned above, the compensation levels are determined by the current and previous performance level.

On the other hand, there is evidence that there is a strong and positive relationship between executive compensation and the companies' performance when measured through Return on Equity (ROE) (Finkelstein & Hambrick, 1989).

Thus, based on the literature and with the objective of verifying the relationship between the CEOs compensation and the performance of the company, the hypothesis to be tested is as follows:

H1: The compensation level of the CEOs is a function of the company's level of accounting performance.

3.2. Executive compensation and company characteristics

According to Yang, Singh & Wang (2020), there is a positive relationship between the size of the company and CEO compensation. For example, large companies have greater growth opportunities and observe more complex operations, which leads them to look for higher quality managers, and providing a higher level of compensation (Core, J. E., Holthausen, R. W., & Larcker, D. F., 1999).

Burney (2021) conducted a study on the number of employees of the company, since it is the primary driver of the CEO Pay Ratio and concluded that it is positively and significantly correlated with executive compensation. Similarly, Nourayi, M.M., & Daroca, F.P. (2008) conducted a study with the objective of understanding whether the compensation of executives is sensitive to the number of employees used by the company and concluded that executive compensation depends positively on the number of employees. Thus, a positive relationship is expected between the total number of employees and the level of CEO compensation.

The use of debt financing and the level of dividends paid to shareholders also have an impact on CEO's compensation. According to Jensen (1986) debt is beneficial in the way it reduces the agency's costs of free cash-flows. The higher the level of free cash-flow generated by the company, the greater the conflict of interest between shareholders and managers. However, the use of debt financing requires managers to pay future cash flows, thereby reducing the cash flow available for discretionary expenses by managers. This mechanism reduces the CEO's ability to extract extra income, and a negative relationship is expected between the use of debt financing and CEO earnings.

H2: The level of compensation of the CEOs is a function of the specific characteristics of the companies.

3.3 Executive compensation and their characteristics

It is expected that the age and tenure of the CEO increase their specific level of knowledge about the company and its experience. Therefore, greater is the difficulty that the company encounters in replacing him, which influences his level of compensation. For this reason, wage performance contracts are generally seen more generously for older CEOs and with a longer tenure, suggesting that there is management's entrenchment in the company. Considering these results, a positive relationship between the age and tenure of the CEO and the CEO's earnings is expected to be found (Ryan and Wiggins, 2001; Florackis and Ozkan, 2009).

H3: The level of compensation of the CEOs is a function of their specific characteristics.

3.4. Executive compensation and the characteristics of the board

Concerning the size of the board of directors, it is expected that the larger the size of the board of directors, the greater the total compensation level of the CEO (Core, Holthausen & Larcker, 1999). Also, the higher the activity of the board of directors, measured as the total number of board meetings held during the year, the greater the frequency of monitoring of results by the Board of Directors. It is expected, therefore, to find a positive relationship between the total number of meetings of the Board of Directors and the level of compensation of the CEO. Similarly, the presence of a supervisory board, compensation committee and audit committee are expected to have a positive influence on the CEO's level of compensation.

H4: The level of compensation of the CEOs is a function of the characteristics of the board of directors.

3.5. Executive compensation and the characteristics of the shareholders and capital holders

Listed companies that own a more dispersed property are more likely to have greater control, so the CEO is less likely to have enough power to manipulate their income (Core *et al.*, 1999; Gosh and Sirmans, 2005). It is expected, therefore, to find a negative relationship between the level of dispersion of capital and the level of compensation of the CEO.

According to Kuo, H. C., Wang, L. H., & Lin, D. (2014), CEOs with a larger shareholder stake, present stronger incentives to increase the value of the company's shares, leading to less efforts through compensation, to align their interests with those of other shareholders. Thus, a negative relationship is expected between the percentage of shares held by the CEO and the level of compensation of the CEO.

Finally, Voting Cap simplifies the participation of minority shareholders, thus reducing the power of the main shareholders who normally select the management team, hoping to obtain

a positive relationship between Voting Cap and the CEO's compensation level (Bebchuk *et al.*, 2002).

H5: The level of compensation of the CEOs is function of the characteristics of shareholders and capital holders.

4. Methodology

4.1 Data

This study aims to analyze the companies that are part of the S&P 500 index. This index is composed by the five hundred leading listed companies in the United States of America. More precisely, companies that are members of the NYSE (New York Stock Exchange) or NASDAQ (National Association of Securities Dealers Automated Quotations).

To collect the sample's data, we used the Execucomp database, which has been providing annual executive compensation data since 1992, and the Datastream database in a complementary way to extract information for the remaining variables.

The period of focus goes from 2010 to 2020, with the objective of performing an analysis with new data, as the most recent data available in the databases is used. Since we employ a fixed sample, we consider 11 years of data to make sure we have as many companies as possible to support the results obtained.

We started by creating a database with the various inbound and outbound flows of the companies integrated in the S&P 500 index.

This database was then confronted with the companies listed in the Execucomp database. We were able to match 4700 observations. Subsequently, companies that did not have observations for the 11 years of the analysis, and companies belonging to the financial sector (CODES SIC 4900-4999) and to the utilities sector (SIC codes 4900-4999) were excluded, since they have special regulatory environments.

Based on these changes and considering the analysis period, the final sample totals a pool of 212 companies listed in the S&P 500 index and 2332 observations.

5. Variables

5.1. Dependent Variables

The dependent variable used was extracted from the Execucomp database, and is the TOT_SEC, encompassing the following parameters: Salary, Bonus, Non-Equity Incentiveplan Compensation, Fair Option Premium Value, Fair Stock Premium Grant Amount, Deferred Compensation Gains Reported as Compensation and Other Compensation. It is the most complete measure of compensation available.

5.2. Independent Variables

Based on the literature, we use as proxies for the company's performance, based on accounting performance, the ROA, obtained through the quotient between Net Income and Total Assets, and the ROE, obtained through the quotient between Net Income and Equity[3].

Regarding the characteristics of the company, we use the variable Employees (the total number of employees as reported by the company in the annual financial report), TOT_ASSETS, the DEBT_ASSET (percentage of total debt in relation to the total assets) and DIV_YIELD (the annual dividends per share paid by companies divided by the year's final stock).

The variables related to the CEO's characteristics are AGE (the age, in years, of the CEO from the end of the fiscal year) and TENURE (The total number of years in which the CEO is in this position in the company at the end of the year).

The variables used as proxies of the characteristics of the Board of Directors are the BOARD_SIZE (the total number of directors on the company's board of directors. If the company has supervisory and management boards, this is the total number of members of

[3] Tobin's Q is also a very well-known proxy of performance. The problem with Tobin's Q is that it works as a stock, that reflects decisions of current and past periods. Especially, throughout the period under study, most companies under analysis showed a positive trend in their Tobin's Q due to consistent increases in market value. This market success may be the result of good executive decisions, from most of the CEOs, but also the outcome of general market conditions. For instance, the 2010s seen the longest bull run ever. That is way using Tobin's Q is likely to bear some problems.

both boards of directors), BRD_MTNG (total number of annual board meetings), CMPST_CMT (Total number of members of the compensation committee board), CP_GOV_CMT (Total number of members of the board of directors of the compensation committee) and AUDIT_CMT (Total number of members of the Audit Committee).

Finally, regarding to the characteristics of shareholders and capital holders, we use the variables SHRTOT_PCT (percentage of capital held by the CEO), FREE_FLOAT (Percentage of the company's shares that are freely traded and are calculated as the total number of shares not held by shareholders with more than 5% of the capital divided by the total number of shares outstanding) and VOT_CAP (The inverse of the percentage of voting limit - maximum percentage of capital allowed to vote at shareholder meetings).

6. Model

Regarding the analysis model, the existing literature is not consistent, so it differs in terms of the regression model to be adopted.

According to the objectives for this study, it is necessary to estimate the regression that relates the executive's compensation with the various proxies of performance measures, the specific characteristics of the company, the characteristics of the CEO's, the specific characteristics of the Board of Directors and the characteristics of shareholders and capital holders, to increase the explanatory capacity of the model.

Therefore, the equation to be addressed is as follows:

(1) $$Ln(TOT\_SEC) = \alpha + \beta_1(Performance) + \beta_2(Firm\ Characteristics) + \beta_3(CEO\ Characteristics) + \beta_4(Characteristics\ of\ the\ Board\ of\ Directors) + \beta_5(Characteristics\ of\ shareholders\ and\ capital\ holders) + \varepsilon_{i,t}$$

Where β are the parameters to be estimated and the $\varepsilon_{i,t}$ is the term of disturbance.

It is important to note that the dependent variable is in the form of logarithm, since in previous studies it was found that it allows to reduce the asymmetry related to the distribution of total compensation (Murphy, 1985; Core, Holthausen & Larcker, 1999; Zhu & Tian, 2009). And that for independent variables, the data is presented for company i in year t.

Since the data collected is longitudinal data, the estimated regressions will be based on panel data models. On our baseline tests, all variables are winsorized at the 5th and 95th percentile to manage the impact of potential outliers. We applied the White Test which indicated the presence of heteroskedasticity in the crosse-section. Also, the Durbin Watson pointed towards the existence of serial correlation. To address these issues, the baseline model is estimated with EGLS (white cross-section) to deal with heteroskedasticity in the cross-section and a period SUR (seemingly unrelated regressions) to correct for general correlation of observations within a cross-section, where the model includes time fixed effects.

7. Results

7.1 Baseline Tests

Table 1 shows the baseline tests. This table presents the results of two estimations with different explanatory variables, although the dependent variable corresponds to the logarithm of total compensation in each estimation. Thus, the first and second columns report to the results where the company's performance is included (ROA and ROE, respectively), along with the control variables.

First, looking in general at the signals obtained from the variables under analysis, it is possible to verify that there were no changes to the previously expected impacts and, as regards particularly the control variables, these were significant throughout the various estimates except for the variable that represents the size of the board of directors. This goes against the results pointed out by several studies, such as Yang, Singh & Wang (2020), Lambert, Larcker & Weigelt (1993), Matolcsy & Wright (2011) and Core, Holthausen & Larcker (1999).

The first regression presents the results of the relationship between the CEO's compensation and the company's performance. Regarding the first hypothesis test, it is concluded that the total compensation of the CEOs is positively related to the variable ROA and the variable ROE, both of which are statistically significant. Similarly, the r-squared coefficient value has a value of 17.39%, which means that the CEO's compensation is explained in part by the company's level of performance. This result is consistent with the literature (Murphy, 1985; Mehran, 1995; Zandi *et al.*; 2019) and validates the hypothesis H1 because CEO compensation depends positively on the firm's performance.

The variables LN(TOT_ASSETS) and LN(EMPLOYEES), both in regression 1 and in regression 2, show positive and statistically significant coefficients (Yang *et al.*, 2020). In the other hand, the variables DEBT_ASSET and DIV_YIELD have a negative relationship with the level of compensation of CEOs (Jensen, 1986). The H2 hypothesis is confirmed, meaning the level of compensation of the CEO depends positively on the characteristics of the company.

The variables AGE and Tenure are also positively related with the level of compensation of the CEO, which implies that the level of compensation of the CEOs depends on their specific characteristics, and so the hypothesis H3 is confirmed and consistent with previous studies (Ryan and Wiggins, 2001; Florackis and Ozkan, 2009).

Regarding the relation between the executive compensation and the characteristics of the board, we can find in both regressions that the coefficient of the BRD_MEETING and BOARD_SIZE variable is statistically significant and positively related to the compensation of the executives (Core, Holthausen & Larcker, 1999), which leads to corroborate the hypothesis H4, in which the level of compensation of the CEO depends on the characteristics of the board of administration.

Finally, regarding the relation between the level of compensation of the CEO and the characteristics of shareholders and capital holders, we found that the coefficients obtained in table 1 are in accordance with the literature, which means that the hypothesis H5 is not rejected. The FREE_FLOAT variable is negatively related to the level of compensation of the CEO (Kuo *et al.*, 2014; Core et al., 1999; Gosh and Sirmans, 2005), while the variable VOT_CAP is positively related, noteworthy is that both coefficients are not statistically significant (Bebchuk, L., Fried, J. and Walker, D., 2002).

Alternatively, and with the objective of limiting the values above and below, the variables were truncated to 5%/95%, instead of being winsorized. This allows to exclude potential outliers instead of just softening them, at the cost of less observations. Trimming data is useful to deal for instance with CEOs with low salaries whose company presents an extreme performance. These are exceptional cases, some of them well known to the public, which can have a potential significant impact in the estimations.

The results of this new estimation, are reflected in Table 2, being noteworthy that the sign of the coefficients is equal to the one on the previous estimation, that is, both the variables measuring performance are positively related to the level of compensation of CEOs, and that through this method, the variables ROA, ROE, DIV_YIELD, TENURE, BOARD_SIZE, BRD_MTNG, FREE_FLOAT and SHRTOT_PCT are statistically more significant - they have a higher p-value - than through the winsorization method.

All the estimates presented in Table 1 and 2, show a p-value of the overall F-statistic equal to zero, which translates the statistical significance of the regression considering that it is a test of global significance. Moreover, the coefficients of determination, the R-Squared, achieved in Table 2 is better than the one at Table 1.

Table 1 – Baseline Tests

	Expected Sign	(1) LN TOTAL_SEC	(2) LN TOTAL_SEC
C	+	5.0910***	4.8620***
		(0.3205)	(0.3171)
ROA	+	0.0031**	
		(0.0015)	
ROE	+		0.0023**
			(0.0005)
AGE	+	0.0126***	0.0130***
		(0.0023)	(0.0023)
LN(TOT_ASSETS)	+	0.1759***	0.1931***
		(0.0207)	(0.0210)
LN(EMPLOYEES)	+	0.0368*	0.0305*
		(0.020488)	(0.0200)
DEBT_ASSET	-	-0.0002	-0.0012
		(0.0009)	(0.0009)
DIV_YIELD	-	-0.0268***	-0.0271***
		(0.0104)	(0.0105)
TENURE	+	0.0095**	0.0090**
		(0.0039)	(0.0039)
BOARD_SIZE	+	0.0053	0.0074
		(0.0068)	(0.0068)
BRD_MTNG	+	0.0010	0.0008
		(0.0009)	(0.0009)
FREE FLOAT	-	-0.0006	-0.0008
		(0.0013)	(0.0013)
SHRTOT_PCT	-	-0.0503***	-0.0421***
		(0.0169)	(0.0173)
VOT_CAP	+	0.0009	0.0012
		(0.0018)	(0.0017)
R-Squared		0.1739	0.1883
Adjusted R-Squared		0.1627	0.1768
F-statistic		15.5320	16.4904
Prob(F-statistic)		0.0000	0.0000

*, ** and *** refer to significance at 10%, 5% and 1% levels, respectively.

7.2. Robustness Tests

Common least squares estimators are sensitive to the presence of non-norm observations for the regression model of interest, and this sensitivity can result in estimates of coefficients that do not accurately reflect the underlying statistical relationship. Thus, two tests were conducted to check if the method we use to manage potential outliers influences the results. Firstly, instead of winsorizing the variables we trimmed them using the same percentiles. Secondly, we applied the Robust Least Squares model (RLS) - along with the Period SUR method for autocorrelation. Independently of how we manage outliers (winsorization vs trimming), we still obtain the same conclusions, but the magnitude of the coefficients does change. That is why we also checked the outcome when we apply the robust least squares method.

As we can see in the table 2 and according to test 5, the coefficient for ROA increased from 0.0031 to 0.0060 when we compare the baseline test with this robustness test. Additionally, in test 6, with the RLS model combined with the Period Sur method, the coefficient of the variable ROE increased too from 0.0023 to 0.0031. So, our conclusion on the baseline test remains the same, regarding the positive relationship between performance and compensation.

Using the GLS model with cross-section weights, the ROA variable, as well as the variable ROE remain statistically significant. By using the GLS model we are addressing heteroskedasticity with a different method, showing that the results are not method dependent.

Table 2 – Robustness Tests

	Expected Sign	(3) Trimming Method	(4) Trimming Method	(5) RLS Method	(6) RLS Method	(7) GLS Method	(8) GLS Method
ROA	+	0.0049**		0.0060***		0.0040***	
		(0.0020)		(0.0015)		(0.0015)	
ROE	+		0.0040***		0.0031***		0.0027***
			(0.0007)		(0.0004)		(0.0005)
Adjusted R-Squared		0.3136	0.3435	0.3716	0.3853	0.5817	0.5937

*, ** and *** refer to significance at 10%, 5% and 1% levels, respectively.

7.3. Period Analysis

In order to understand the significance that the company's performance has been playing in the compensation of the Executives, a time analysis was conducted. This analysis consisted of separating the period under analysis into two equal parts, namely 2010-2015 and 2016-2020.

Table 3 – Period Analysis 2010-2015 vs 2016-2020

	(9)	**(10)**	**(11)**	**(12)**	**Difference 2016-2020 minus 2010-2015**
	2010-2015	**2010-2015**	**2016-2020**	**2016-2020**	
ROA	0.0071***		0.0009		0.0062**
	(0.0587)		(0.0018)		(3.5181)
ROE		0.0030***		0.0018***	0.0012**
		(0.0009)		(0.0006)	(2.0512)
Adjusted R-Squared	0.1674	0.1769	0.1915	0.2067	
F-statistic	11.1127	11.5589	10.8993	11.3156	
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	

*, ** and *** refer to significance at 10%, 5% and 1% levels, respectively.

Based on table 3, we can see that the coefficients of the variables measuring the company's performance are more significant in the first period, i.e., from 2010 to 2015.

The ROA coefficient goes from a value of 0.0071 to 0.0009, becoming statistically insignificant. The ROE variable also sees its significance reduced but its p-value remains lower than 10%. The coefficient for ROE went from 0.0030 to 0.0018. In the tests with ROA and ROE variables, the R-squared value increases as time goes by, going from 0.1840 to 0.2109 in the case of ROA variable, and went from 0.1937 to 0.2267 in the case of ROE variable. This may show that the company's performance has been losing weight in explaining executive compensation and that the remaining variables have seen their significance increase.

The column with the difference between each period was achieved with the t-test in which the null hypothesis is that the coefficients are equal.

According to table 3, the values obtained with the t-test for ROA and ROE are statistically significant (3.5181 and 2.0512, respectively), which means that the coefficient for ROA and

ROE are statistically different in the two periods under analysis. The relationship between performance and executive compensation is significantly stronger between 2010 and 2015.

In order to understand even more precisely the weight of company performance on executive compensation, a three-part time analysis was prepared: 2010-2012 vs 2013-2016 vs 2017-2020.

As shown in table 4, the results confirm with greater certainty the results obtained in table 3. The coefficients of the variables related with company's performance have seen, over time, their significance reduced in explaining executive compensation.

The ROA variable in the first period of analysis 2010-2012, shows a coefficient of 0.0086, passing to 0.0047 in the second period of analysis 2013-2016. In the last period of analysis 2017-2020 the coefficient even becomes barely negative, demonstrating that the ROA variable has no influence on executive compensation.

The ROE variable indicates the same evolution, since in the first period of analysis shows a coefficient of 0.0046, passing to 0.0020 in the second period of analysis. As the ROA variable, the ROE variable becomes less significant taking a coefficient of 0.0017, in the last period. In addition, we demonstrate that the difference in the coefficients between 2010-2012 and 2017-2020 are statistically significant. Overall, we show that the association between executive compensation and performance has been weakening.

Table 4 – Period Analysis 2010-2012 vs 2013-2016 vs 2017-2020

	(13) 2010-2012	(14) 2010-2012	(15) 2013-2016	(16) 2013-2016	(17) 2017-2020	(18) 2017-2020	Difference 2010-2012 minus 2017-2020
ROA	0.0086**		0.0047		-0.0002		0.0088***
	(0.0042)		(0.0036)		(0.0021)		(4.6583)
ROE		0.0046***		0.0020**		0.0017***	0.0029***
		(0.0012)		(0.0010)		(0.0006)	(4.1064)
R-Squared	0.2501	0.2648	0.1977	0.2035	0.2314	0.2490	
Adjusted R-Squared	0.2235	0.2381	0.1746	0.1799	0.2087	0.2255	
F-statistic	9.3858	9.9292	8.577	8.6069	10.1923	10.6068	
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

*, ** and *** refer to significance at 10%, 5% and 1% levels, respectively.

8. Conclusion

The main objective of this study is to analyze the relationship between the companies' performance and executive compensation. Similarly, given the structure of the tests, we also address the relationship between CEO compensation and several factors, such as the characteristics of the company, the characteristics of the CEO's, the board of directors, the shareholders, and the capital holders.

To this end, the Execucomp and Datastream databases are used, collecting a sample of the companies included in the S&P500 group, in the period between 2010 and 2020. The sample consists of 212 companies over a period of 11 years, obtaining a total of 2332 observations.

The tests elaborated show that the results achieved are consistent with the predicted signal based on the existing literature, and that all variables are statistically significant to the exception of the variable that represents the size of the board of directors.

The main hypothesis is that the level of compensation of the CEO depends on the accounting performance of the company. Based on the results, we conclude that the compensation of the CEO is related with companies' performance – ROA and ROE – confirming the study by Murphy (1985), Mehran (1995) and Zandi *et al.* (2019).

The second hypothesis postulates that the level of compensation of the executives is a function of the specific characteristics of the company. The results obtained show that the variables that represent the size of the company and the number of employees is positive and significantly related to the compensation of the executives, and also that the variables representing debt financing and dividend yield are negatively related, so the second hypothesis is not rejected.

The results achieved with the third hypothesis's test, which argues that the CEO's compensation is a function of the specific characteristics of him, are consistent with the study by Ryan and Wiggins (2001) and Florackis and Ozka (2009). The variables AGE and Tenure are positively related to executive compensation, which is consistent with hypothesis 3.

Hypothesis 4 which postulates that the level of compensation of the CEO depends on the characteristics of the board of administration is also corroborated, as the results obtained are consistent with the study by Core, Holthausen & Larcker (1999). The coefficient of the variables that represent the board size and the total number of board meetings in both regressions is statistically significant and positively related to the compensation of the executives.

Finally, we found that the results obtained with the fifth hypothesis's test are in accordance with the literature. The coefficient of the variable representing the Free Float is negatively related to the level of compensation of the CEO (Kuo *et al.*, 2014; Core et al., 1999; Gosh and Sirmans, 2005), and the coefficient of the variable representing the Voting Cap is positively related (Bebchuk et al., 2002), which is consistent with the fifth hypothesis.

With the Period Analysis, we verified that the coefficient for ROA and ROE is statistically different between the older and the most recent years of the analysis. We conclude that the relationship between the firm performance and executive compensation is robust in the early years of the analysis and has been getting weaker ever since.

Throught the elaboration of this dissertation we found some limitations. We had some difficulty in obtaining information for certain variables, which can generate deviations in the results.

For future research, it would be important to study the impact of the pandemic Covid-19 in the relationship between the executive compensation and the firm performance.

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Annex

Table A1 - Dependent Variables Definition

Dependent Variables		
Total Compensation	**TOT_SEC**	**Total Compensation - As Reported in SEC Filings ($)**
Salary	SALARY	Dollar value of the base salary received by the Executive Director during the fiscal year (thousands)
Bonus	BONUS	Dollar amount of bonus received by the Executive Director during the fiscal year (thousands)
Non-Equity Incentive Plan Compensation	NEQ_INCENT	Amount in the year according to non-equity incentive plans being disclosed
Fair Option Premium Value	OPTION_AWD	Fair value of all options granted during the year, as detailed in the Prize table - according to FAS 123R. (thousands)
Fair Stock Premium Grant Amount	STOCK_AWD	Fair value of all shares awarded during the year, as detailed in the Prize table - according to FAS 123R. (thousands)
Other Compensation.	OTHCOMP	Other compensation received by the executive, including bonuses and other personal benefits, termination or change of control payments, life insurance premiums, etc. (thousands)

Table A2 - Independent Variables Definition

Independent Variables		
Return on Assets	ROA	Quotient between Net Income and Total Assets
Return on Equity	ROE	Quotient between Net Income and Total Assets
CEO's Age	AGE	CEO's age from the end of the fiscal year (years)
Company Size	TOT_ASSETS	Natural Total Asset Logarithm
Employees	EMPLOYEES	Number of employees during the fiscal year
Debt Assets Ratio	DEBT_ASSET	Percentage of total debt in relation to the total assets
Dividend Yield	DIV_YIELD	Annual dividends per share paid by companies divided by the year's final stock
Tenure	TENURE	Total number of years in which the CEO is in this position in the company at the end of the year
Board Size	BOARD_SIZE	Total number of directors on the company's board of directors
Board Meetings	BRD_MTNG	Total number of annual board meetings
Shares Owned	SHRTOT_PCT	Percentage of capital held by the CEO)
Free Float	FREE_FLOAT	Percentage of the company's shares that are freely traded and are calculated as the total number of shares not held by shareholders with more than 5% of the capital divided by the total number of shares outstanding
Voting Cap	VOT_CAP	The inverse of the percentage of voting limit

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