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THE IMPACT OF THE CEO'S REMUNERATION ON FIRM PERFORMANCE DURING THE 2011/2012 FINANCIAL CRISIS – THE PORTUGUESE CASE

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Abstract

Chef Executive Officer (CEO) compensation has become a very interesting topic of debate in finance literature. More recently, this topic has attracted considerable public attention due to the latest corporate scandals observed worldwide.

The aim of this study will be to examine the impact of the CEO's remuneration on the company performance of Portuguese companies, in the crisis (2008-2013) and after crisis (2014-2016) periods.

This work addresses several research topics regarding executive compensation related to firm performance and it consists of four parts. In the first part, we review the literature on executive compensation and in the other three parts, we investigate a few critical questions in the executive compensation field. A panel data methodology is used to analyze the relationship between corporate performance and CEO compensation, in a sample composed by 37 Portuguese companies.

Our main findings lead us to conclude that, in Portugal, at the time of the recent financial crisis, the CEO's Remuneration is not determined by the Performance of the company and vice versa, since no empirical evidence has been found. According to the risk, we found that as CEO Remuneration increases, corporate risk decreases, that is, the risk variable does not significantly determine Remuneration. And finally, we also found that the remuneration increases with the increasing of CEO power, measured by Duality, Tenure and Equity Held.

Resumo

A remuneração do Presidente do Conselho Executivo, também conhecido como CEO, tem se tornado um tópico de debate muito interessante na literatura financeira. Recentemente, este tópico atraiu consideravelmente a atenção do público, devido aos últimos escândalos financeiros observados internacionalmente.

O objetivo deste estudo será examinar o impacto que a remuneração do CEO poderá ter no desempenho das empresas Portuguesas, durante a crise (2008-2013) e depois do período crise (2014-2016).

Este estudo aborda vários tópicos de investigação relativos à relação entre a remuneração executiva e o desempenho da empresa, sendo composto por quatro partes. Na primeira parte, é feita uma revisão de literatura em remuneração executiva, e nas restantes três partes, são estudadas com maior detalhe algumas questões de teor crítico, no campo desta mesma área de estudo. É usada uma metodologia de dados em painel de maneira a analisar a relação entre o desempenho da empresa e a remuneração do CEO, numa amostra composta por 37 empresas Portuguesas.

Os nossos principais resultados levam-nos a concluir que, em Portugal, no momento da crise financeira, a remuneração do Presidente do Conselho Executivo não é determinada através do desempenho da empresa, assim como, o contrário também não é verificado, uma vez que não é encontrada nenhuma evidência empírica. Relativamente à variável de risco, observámos que à medida que a remuneração do CEO aumenta, o risco da empresa diminui, o que implica que a variável do risco não determina significativamente a remuneração. E, por fim, também concluímos que a remuneração aumenta à medida que o poder do CEO também aumenta, sendo que o poder do CEO é medido através da dualidade de funções, do número de anos que este desempenha a função na empresa e, também, da quantidade de ações da empresa que possui.

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1. Introduction

The relationship between executive pay and firm performance is derived from agency theory (Hölmstrom (1979); Grossman and Hart (1983)) and it has been one of the most widely studied questions in the corporate governance literature (Frye (2004); Jensen and Murphy (1990); Murphy (1999)).

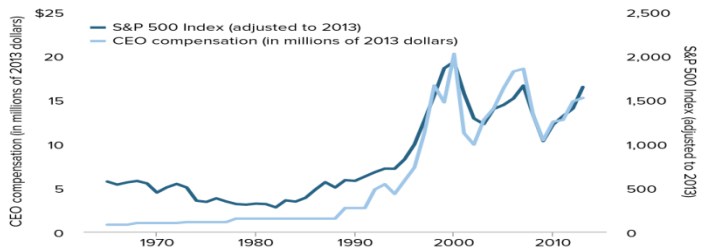
The problem of how best to compensate executives is a classic application of the principal – agent theory. The principal (the shareholder) desires the agent (the manager) to maximize shareholder value but cannot accurately know the executive's reaction function. However, the goals of the executives may be different from those of the shareholders. For instance, a manager may be more interested in amassing and defending personal power rather than pursuing profit maximizing strategies (Bebchuk & Fried Jesse, 2003). As the literature shows, this agency problem could be mitigated through well-structured compensation plans and that is the main focus of this research.

Portugal is one of the countries that has most felt the economic crisis in recent times, having had the need to request for a financial rescue (bailout program), in 2011, to the European Commission and to the International Monetary Fund (IMF).

Shortly after Portugal's departure from "junk" S&P, Fitch and DBRS[1] rating since September 2017 and the successive increases of the minimum wage, it is expected to be noted some changes in the compensation structures of the top management, so it becomes more and more important to study the extent to which high wages in the top positions will impact the company's performance in the future.

Executives constitute a larger group of workers than is commonly recognized, and the extraordinary pay increases received by CEOs of large firms had spillover effects in pulling up the pay of other executives and managers. Over the last

Figure 1 *– CEO Compensation and the S&P 500 Index (in 2013 dollars), 1965-2013*



Note: CEO annual compensation is computed using the "options realized" compensation series, which includes salary, bonus, restricted stock grants, options exercised, and long-term incentive payouts for CEOs at the top 350 U.S. firms ranked by sales.

Source: Authors' analysis of data from Compustat's ExecuComp database and Federal Reserve Economic Data (FRED) from the Federal Reserve Bank of St. Louis

Economic Policy Institute

[1] DBRS – Dominion Bond Rating Service, a Canadian rating agency.

three decades, CEO compensation grew faster than that of other highly paid workers. All of those factors build up the motivation for this study.

Thus, the present study aims to verify how the managerial compensation impacted on subsequent corporate performance and also how the managerial compensation structure affected a firm risk-taking behavior, in the crisis (2011-2013) and after crisis (2014-2016) periods, in companies that had a higher (management) compensation (in Euros) in the years before (2008-2010). To meet the goals, we will conduct an empirical research using the sample for testing the relationship between the performance of Portuguese traded companies and the remuneration structures, given to the top executives. The sample will be consisted of 47 Portuguese companies from 2008 to 2016.

The performance of each company will be measured by return on assets (ROA), defined as the ratio of EBIT to the book value of the firm's total assets. According to some authors, such as Murphy (1985) and Mehran (1995), accounting returns are highly important in determining executive compensation. On the other hand, risk will be measured as being related to firms' stock market returns, assuming that a firm's risk is associated with the variance of daily returns.

Although there are already previous studies about this theme, made specifically about Portugal, for example some master dissertations in FEP, I believe my proposal will produce a difference and complete an existing gap in the literature. The main contribution to the literature is the timeframe chosen and the hypotheses tested. From 2009 to around 2016, we witnessed the last big crisis in Portugal, being that a new important timeframe to study, which will make it possible to observe the impact of structural effects of the crisis on the relationship between the remuneration of the CEOs and the performance of the company.

It is also important to mention the endogeneity problem with which we are potentially dealing, when analyzing firm performance and remuneration. *"Endogeneity leads to biased and inconsistent parameter estimates that make reliable inference virtually impossible"*(Roberts & Whited, 2012*).* So, one of the concerns of this study is to mitigate the endogeneity issue using methodologies that will be explained later.

The structure of this study will be the following: the first section will present a literature review, followed by the hypotheses development. In section 3, we then present the data and methodologies used while the major empirical results are shown in section 4. The final section provides the major conclusions, the limitations of the study made and suggests a number of avenues for extending the research further.

2. Literature Review

2.1. Agency Problem – General Approach

The relationship between stockholders and management is one kind of agency relationship. Such a relationship exists whenever someone (the principal) hires another (the agent) to represent his or her interests. In all such relationships, there is a possibility of a conflict of interest between the principal and the agent, which is called an agency problem.

The agency problem could arise from different ownerships of the firm's common stock, for example of a high ownership concentration in a company, which may lead to the extraction of the firm's resources by the dominant owners at the expense of other shareholders; or from different time horizons (shareholders are concerned with the long-term cash-flows while managers are more focused on the cash-flows that are linked with their presence on the firm (CEO's tenure)[2]), and also because of different risk bearing by managers and shareholders (managers are portrayed as being risk –averse, so they may engage in activities which reduce the firm's risk[3], affecting consequently shareholder's wealth; and, on the other hand, shareholders are considered to be risk-neutral because they can diversify firm-specific risk simply by holding a diversified portfolio).

Agency Theory is the subject that addresses problems that arise due to differences between the goals or desires of a principal and an agent and is concerned with resolving problems that arise from this. The agency problems derived from these agency relationships could be mitigated through managerial incentive systems (that is considered an internal mechanism), which could also bring an agency problem itself, as it will be addressed later on.

2.2. Executive Compensation

2.2.1. Executive Compensation as an Agency Problem

Compensation of corporate executives continues to be a hot-button issue in Corporate Governance research.

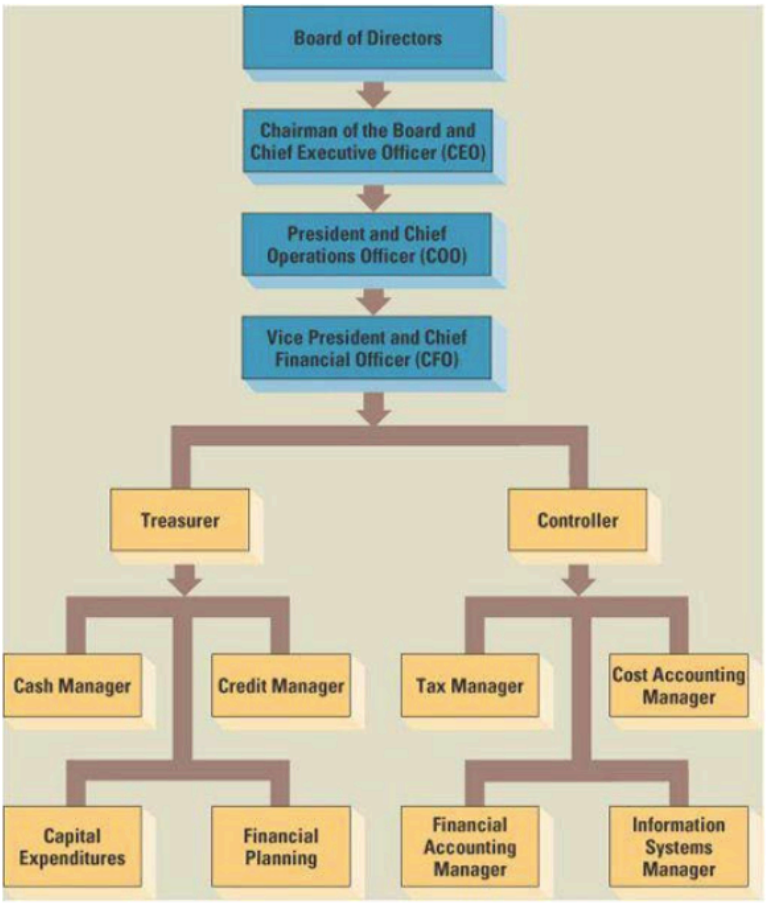
[2] This problem gets worse when managers' retirement gets closer, since they have short perspectives about investments, choosing projects with short-term returns, which could simply not maximize the firm value.

[3] See Jensen and Meckling (1976); Amihud and Lev (1981).

Boards are one of the most important corporate governance mechanisms that monitor and evaluate management – supervisory role -, make managerial decisions such as which projects to undertake and which employees to hire – managerial role -, and offer valuable advices – advisory role – which are especially important in certain types of firms (Fernandes *et al.*, 2017). The CEO is the individual ultimately responsible for the firm's investments, operating activities, human resources management, financing decisions and overall firm performance (Core & Guay, 2010). As a result, managerial compensation should be constructed not only to retain competent managers, but to align managers' interests with those of stockholders as much as possible, in a way that maximizes firm value.

Figure 2 - Hypothetical Organization Chart,

Ross, Stephen A., *Corporate Finance*



One of the main objectives of any manager is to have the highest remuneration possible for the exercise of his functions, regardless of his/her effort. Managers are the ones that take the toughest decisions in a company and their actions will affect the returns

of shareholders, so it is important to induce them to act in the best interests of the shareholders (Aggarwal & Samwick, 1999).

However, managerial compensation could be seen as an agency problem as there could exist conflicts of interests between managers and shareholders, since managers could manipulate the company results, in order to afford the maximum individual compensation, as showed by Holthausen *et al. (*1995).

According to agency theory, in publicly traded companies where ownership is separated from the management, managers are likely to use their power and discretion to pursue their self-interests, such as empire building, position entrenchment and enlargement of pay packages (Grabke-Rundell & Gomez-Mejia, 2002).

Baumol (1959) and Marris (1963) assert that a CEO is more concerned with the size or growth rate of the firm than with profitability. They claim a concern with size or growth occurs because compensation plans link pay to these characteristics and because greater prestige is associated with the management of a large firm.

According to Murphy (1985), agency problems result because managers have monopoly access to the information required to construct and administer compensation plans. These compensation plans ideally tie the self-interest of the managers to the interests of outside shareholders, but managers may withhold some relevant information from compensation committees when that information would attribute poor firm performance to bad management.

Core *et al. (*1999*)* found that firms with weaker corporate governance structures have greater agency problems; CEOs at firms with greater agency problems receive greater compensation; and firms with greater agency problems perform worse.

Efing *et al. (*2015*)* observe that executive pay could also be related to corporate governance problems and the weakness of shareholder rights. While excessive risk-taking may only manifest itself in the long run, short-run cash payouts can be enormous and performance measures may not properly account for long-term risks.

Sigler (2011) states that the components of executive compensation (cash bonus, incentive plans, stock options and restricted stock awards) may induce managers to engage in activities that produces problems for firm and, thus, creating agency problems. For example, cash bonuses may encourage undesired behavior as manipulation of the timing of revenues and expenses to maximize pay out. In addition, the stock options could

not reflect the executive's effort to improve company performance, given that, the stock price may rise or fall from external market forces and not from actions made company's executives. It could actually be a disincentive. In other instances, executives could be enticed to manipulate accounting numbers when they are about to exercise their options to give the appearance of superior firm performance to drive up the stock price.

2.2.2. Components of Executive Compensation

The form of compensation is what motivates managers to increase firm value, being an important factor of the success of a company. In this context, a well-structured remuneration package could be a good incentive to the top management, reducing or even eliminating the conflict of interests between shareholders and managers.

According to Sigler (2011), the components of executive compensation are: base salary; incentive plans; and, other benefits as golden parachute[4], retirement plans, life insurance and health insurance, car allowances, health-club membership, travel reimbursements, paid holidays and vacations.

The incentive plans are composed by: 1) cash bonuses upon reaching a preset goal, being designed to motivate the executive to focus on the bottom line of the company in order to increase his personal wealth; 2) executive stock options to motivate top management to work in the shareholders' best interests. It could reduce excessive risk aversion, by giving the executive incentives for accepting risky profitable projects instead of avoiding them, thus increasing firm risk; and, 3) Restricted stocks, which could have some limitations, in the way that, it requires a period of time (the so called vesting period, which is the amount of time before the restrictions are lifted from the sale of the stock) to pass or for a certain goal to be achieved before the executive can sell the stock.

The long-term incentives are used for motivating top executives to reach the goals of the company and could also prevent the top executives from going to work for other firms.

In the field of incentives contracts, Smith, Watts and Jensen (1985*),* stated three types of contract incentives: compensation unrelated to firm performance composed by salary, pension and insurance; compensation related to stock market firm performance

[4] Golden parachute is a lucrative benefit given to the top executives in the event that a company is taken over by another firm that results in the loss of their job. It could include stock options, bonuses and severance pay.

composed by stock options and phantom stocks; and compensation related to firm operating (accounting) performance composed by bonus and a percentage of earnings.

According to Mehran (1995), equity-based compensation belongs to the stock-market based compensation kind. This type of compensation is non-cash remuneration that translates into ownership in the firm. This can take many forms, including options, restricted stock and performance shares. Equity compensation allows the employees of the firm to share in the profits via appreciation and can encourage retention, particularly if there are vesting requirements. It is more common among outside directors. Thus, it has been said that a board composed by outside directors (those who do not work for the company) are more independent from top management and may thus better represent the interests of shareholders than do inside directors. However, according to Mehran (1995), there is no significant relationship between firm performance and board composition.

Smith and Watts (1983) present evidence indicating that the value of stock options held by a manager at the beginning of a year gives him/her an incentive to act in ways which can maximize stockholder wealth throughout that year.

Stock-based performance measures often are argued to be superior to accounting-based measures because accounting rules and conventions preclude accounting-based performance measures from reflecting the entire value relevant information set that is impounded in price. For example, while accounting returns may represent a reasonable measure of a CEO's current management of assets in place, they do not reflect the benefits of a CEO's current strategy planning, growth opportunities identified, business initiatives or investments in the discovery and development of new products or technologies with deferred returns. However, the stock price itself may not fully reflect or may inadequately reflect valuable contracting information because managers may have better information than investors about how their activities and efforts are being directed to increase firm value in the long run (Bushman et al., 1996).

Notwithstanding, Coughlan and Schmidt (1985) state that pay packages based exclusively on stock price performance are inefficient methods for compensating risk-averse executives, since stock price variation is influenced by factors such as monetary policy, tax laws, or other political events outside the executive's control. Risk-averse executives would demand pay premiums to compensate for the windfall gains and losses in pay that would be caused by these events.

Murphy (1985) presents evidence that executive compensation is strongly positively related to corporate performance as measured by shareholder return and growth in sales. Consequently, tying managers' compensation to current performance, entrepreneurial ability, managerial responsibility, firm size and past performance may motivate them to make more value-maximizing decisions. And, according to Coughlan and Schmidt (1984), by linking pay and sales growth, a board can tie pay to measurable results in a manner that protects the CEO from the effects of outside events on stock price.

Compensation changes and management changes (M&A, takeovers) are methods to control top management. For example, M&A may result in the rewriting of managers compensation contracts, so those changes are avoided by managers because they fear losing their jobs, status, power or/and prestige. However, this could be very good to increase firm performance, so it's important to design some good management compensation procedures (Jensen & Ruback, 1983).

Moreover, Bebchuk *et al. (*2011*)* investigated the relationship between the CEO pay slice (CPS) and the value, performance and behavior of public firms. They find a negative correlation between CPS and firm performance, which could be justified by an optimal selection problem. Since the optimal level of CPS or the importance of the CEO could be higher for lower value firms and the identified pattern could be due to the tendency of such firms to choose high CPS levels or by an agency problem explanation, where high excess CPS could reflect agency and governance problems.

While some authors may claim that the incentives of the manager and the firm's owners remain divergent, the existence of competition in capital markets makes the survival of corporations depend on the construction of incentive arrangements which encourage top management to act in the shareholders' interest. Firms which fail to compensate managers in this way will face higher costs and thus will not compete successfully with firms whose managers act in the shareholders' interest.

There are two approaches to design incentive schemes: the Arm's Length approach and the Managerial Power approach.

The Arm's Length approach, also known as Optimal Contracting theory, is when executive compensation is designed by board of directors at arm's length with proper incentives to create value to the shareholders and to the firm. There is a positive

relationship between pay and performance (Duffhues & Kabir, 2008). Executive compensation is used as a remedy to the agency problem (Kuo *et al.*, 2014).

The Managerial Power approach is when managers with some level of control tend to influence their own compensation arrangements; the manager uses his influence to "force" the board to pay him more. In this case, managerial entrenchment and moral hazard could occur. According to this theory and taking into account the study of Bebchuk and Fried Jesse (2003), there is a negative relationship between pay and performance . The evidence shows that pay is higher when executives have more controlling power; pay is also higher when the CEO is simultaneously the chairman of the board, when the corporate governance mechanisms are less effective and when the board is larger, older and subject to CEO's control *(*Core *et al.*, 1999); and, there exists pay for luck – less pay for luck in periods of bad luck (when pay for luck reduces compensation) than in periods of good luck (Garvey and Milbourn, 2006). In addition*,* Campbell and Thompson (2015) also find that CEOs are rewarded with higher pay for good luck and minimally penalized with lower pay for bad luck. Pay-for-luck relationship could be due to powerful CEOs who influence the compensation contracting process (Garvey and Milbourn, 2006).

Amzaleg *et al.* (2014) find that when CEO has high control power vis-à-vis the board of directors, he might use his controlling power to push for higher pay-performance sensitivity and for a lower pay-performance sensitivity when expecting a tough period. However, it is not obvious if this adversely affects the firm or not. On one hand, this allows CEO to take a higher pay and thus comes at the expense of the firm. On the other hand, if the CEO can have positive impact on the firm's profits by exerting more effort and the sensitivity of the firm's performance to the CEO's effort is higher in good periods than in bad periods, it could be beneficial to the owners of the firm, as this provides more incentives to the CEO to exert effort when such effort is more important.

Core and Guay (2010) state that CEO compensation can be thought of as the sum of four separate components: 1) compensation for ability (minimum amount necessary to attract the CEO to the job and persuade him to forgo his next most attractive opportunity), 2) a payment that increases with the level of effort required of the CEO, 3) a premium for risk stemming from performance-based incentive risk, and 4) any excess pay (any portion that could not be explained by the other 3 components).

Hill *et al. (*2016*)*, in order to find whether or not CEO compensation is excessive, using an extension of the model of Core and Guay (2010)[5], find that there are components of CEO compensation that are not economically justified being therefore considered excessive and consistent with the Managerial Power approach.

Beyond shadow of doubt, one may conclude that it is not possible to design a complete incentive package. Otherwise there would not exist agency risks and, consequently, agency costs. In reality, we cannot predict all kinds of situations, especially the opportunistic ones, which makes it difficult to ensure optimal contracts.

2.2.3. Executive Compensation and Firm Performance

Executive compensation and firm performance relationship is based on the agency theory, which assumes that individuals are rational, risk adverse and prone to taking actions that maximize personal welfare and minimize effort (Jensen & Meckling, 1976).

To emphasize this, Core and Guay (2010*)* assume that CEOs like wealth, dislike effort and dislike risk. So, it could be an optimal situation, if the executive compensation was combined with the performance measures of the company, using a compensation scheme that rewards (penalizes) the CEO for increases (decreases) in shareholder value. This feature of the compensation plan commonly referred to as "pay-for-performance".

Gabaix and Landier (2008) predict that CEO's equilibrium pay is increasing with both the size of his firm and the size of the average firm in the economy. In addition, according to Rayton (2003), managers will maximize firm value if they receive net increases in utility from such behavior, and the magnitude of the link between pay and performance is commonly interpreted as a measure of these incentives.

When we have the goals of shareholders and managers aligned, the agency costs will be lower, so it would be important to relate the remuneration package with performance measures, in order to achieve such alignment. As Rayton (2003) concludes, companies that better link the pay of employees to performance, will experience less agency costs and, consequently, exhibit better performance.

High remuneration focuses on changes in the marginal productivity of corporate leadership in a competitive labor market for executives (Gabaix and Landier, 2006).

Philippon and Reshef (2012) argue that increased wages in the financial industry may simply reflect changes in the working environment, including an increase in skill intensity, job complexity and earning risks. Some recent literature, such as Efing *et al. (*2015*),* suggests that there is a competition for talented workers, which could be the explanation to high salaries. Moreover, companies seem to raise their executives' pay after losing executives to other firms (Gao *et al.*, 2013).

2.3. Executive Compensation and Risk Taking

It has been often argued that remuneration and incentive systems have played a key role in influencing risk-taking.

It is important to study the field of risk-taking behavior as Governors of the Federal Reserve System, in 2011, stated: "*Risk-taking incentives provided by incentive compensations arrangements in the financial services industry were a contributing factor to the financial crisis that began in 2007*" (p.1)

The recent financial crisis demonstrated the dangers associated with managerial compensation schemes that create asymmetries between the optimal risk for the firm and the risk that the incentive schemes encourage managers to take (Amzaleg *et al.*, 2014).

The Senior Supervisors Group (2008, p.7) noted that

> *"an issue for a number of firms is whether compensation and other incentives have been sufficiently well designed to achieve an appropriate balance between risk appetite and risk controls, between short run and longer run performance, and between individual or local business unit goals and firm wide objectives".*

Francis *et al. (*2015*)* observe that change in competition combined with change in managerial compensation captures significantly more of the increased risk in firm value and shareholder-equity.

In quantitative risk management, the focus lies on how to improve the measurement and management of specific risks such as liquidity risk, credit risk and market risk (Aebi *et al.*, 2012).

Fahlenbrach (2008) shows that firms with weak corporate governance structures, such as CEO/chair duality, more employee directors and little monitoring by large shareholders, tend to allow contracts with larger pay-for-performance components, since it can allow CEOs to unduly influence their compensation contracts. Yet, weak

governance could also influence the quality of risk management and thus impact firm risk-taking and crisis performance more directly.

DeYoung *et al.* (2013) find larger systematic and idiosyncratic risk for corporations with more performance-sensitive CEO compensation and Hagendorff and Vallascas (2011) show that they are more likely to engage in risk-inducing mergers.

Bolton *et al. (*2015*)* find that it is useful to integrate CDS (credit default swaps) in compensation contracts, because CDS provide a market price for risk, which, when weighted correctly in a compensation contract that includes an equity component, can provide first-best risk incentives. It could also reduce agency costs and is thus cheaper for shareholders.

2.3.1. Stock Options Role

Stock ownership provides one of the most direct links between shareholder and CEO wealth (Murphy, 1999).

Aggarwal and Samwick (1999) state that managerial compensation will be correlated with the total return to shareholders, typically through ownership of the firm's stock or options on the firm's stock. This variable component of executive compensation is measured through performance measures and will induce the manager to act in the way of maximizing the firm value.

Gormley *et al. (*2013*)* study how boards adjust incentives in response to firms' risk and how these incentives affect managers' risk-taking. They find that, after left-tail risk increases, boards reduce managers' exposure to stock price movements and that less convexity from options-based pay leads to greater risk-reducing activities. Specifically, managers with less convex payoffs tend to cut leverage and R&D, stockpile cash and engage in more diversifying acquisitions.

Stock options provide managers with incentives to take risks because managers share in the gains but not all the losses *(*Jensen and Meckling (1976) and Myers (1977), C. W. Smith and Stulz (1985), and C. W. Smith and Watts (1992). Because options contain a leveraged position in the firm's equity, options also have the potential to magnify a risk-averse manager's exposure to the firm's risk and thus reduce the manager's appetite for risk taking (Lambert *et al.*, 1991).

Stock-option plans are viewed as a means by which CEOs can (inefficiently) increase their own compensation under the camouflage of (efficiently) improving

incentives and thus without encountering shareholder resistance (Gabaix and Landier, 2008).

According to Aggarwal and Samwick (1999*),* pay-performance sensitivity for executives at firms with the least volatile stock prices is an order of magnitude greater than the pay-performance sensitivity for executives at firms with the most volatile stock prices. Executives in firms with more volatile stock prices will have less performance-based compensation, because the pay-performance sensitivity will be decreasing in the riskiness or variance of the firm's performance (Garen, 1994). Similar previous studies were conducted in this subject – principal-agent model and the relative performance evaluation[6], but the conclusion reached by Aggarwal and Samwick (1999) is that the pay-performance sensitivities of both CEOs and other executives are decreasing in the variance of their firms' stock returns for a variety of measures of compensation. Omitting the variance of a firms' stock returns leads to downward-biased estimates of the pay-performance sensitivity. Relative performance evaluation considerations are not incorporated into executive compensation contracts, but it could be good because of strategic interactions between managers at rival firms.

Fahlenbrach and Stulz (2011) report that the incentive effects of options depend on the CEO's shareholdings, because they would be diluted in the CEO's portfolio if he had large holdings. When the CEO's portfolio of options is composed mostly of in-the-money options, the incentive effects of options do not differ much from the incentive effects of common stock holdings. Additionally, keeping the CEO's wealth constant, greater sensitivity of this wealth to increases in the volatility of his firm's stock return brought about by greater stock option holdings would increase the CEO's incentives to take risks as long as these options are not too much in the money. But, generally, granting options also affects the CEO's wealth, which can change his willingness to take risks (Ross, 2004).

According to Coles *et al.* (2006)*,* higher sensitivity of CEO wealth to stock volatility implements riskier policy choices, including relatively more investment in R&D, less investment in property, plant and equipment, more focus and higher leverage. Moreover, riskier policy choices generally lead to compensation structures with higher vega (stock volatility) and lower delta (stock price).

[6] It is suggested to see Garen (1994), Lambert and Larcker (1987) and Janakiraman et al. (1992).

The sensitivity of CEO wealth to stock price (delta) is seen as aligning the incentives of managers with the interests of shareholders. Higher delta can mean that managers will work harder or more effectively because managers share gains and losses with shareholders. Higher delta can also expose managers to more risk. It is possible that managers will forgo some positive net present value (NPV) projects if those projects are very risky, providing a strong incentive to decrease R&D expenditures, increase capital expenditures and decrease leverage.

On the other hand, higher stock volatility leads to riskier policy choices. In particular, higher stock volatility implies significantly higher R&D expenditures, less investment in property, plant and equipment and an increased focus as measured by both the *Herfindahl* index (for sales across segments) and the number of business segments. Higher stock volatility is also associated with higher book leverage and market leverage.

2.4. Executive Compensation and the Financial Crisis

The 2007-2008 financial crisis has been described as the most serious crisis since the Great Depression with important effects in the real economy.

The financial crisis following the subprime meltdown in the US has led to a further growing awareness and need for appropriate risk management techniques and structures within organizations around the world.

As KPMG said:

> *"(…) Recession related risks as well as the quality of the company's risk intelligence are two of the major oversight concerns for audit committee members. But there is also concern about the culture, tone and incentives underlying the company's risk environment, with many saying that the board and/or audit committee needs to improve their effectiveness in addressing risks that may be driven by the company's incentive compensation structure".*

It is important to have in mind that, in a situation of crisis, with some existing agency problems, the increase of corporate risk levels may cause bankruptcies and severe damage to long-term companies' value and job creation (Díez-Esteban *et al.*, 2016).

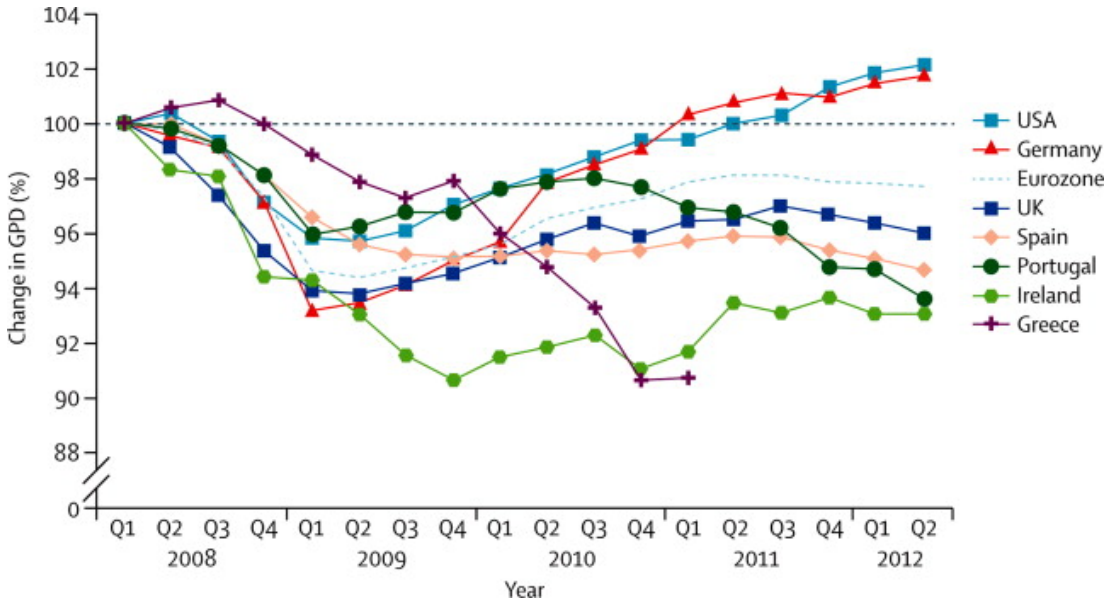
This 2007-2008 financial crisis not only resulted in the collapse of well-known financial institutions such as Lehman Brothers, but also halted global credit markets and required unprecedented government intervention worldwide (Erkens *et al.*, 2012).

Regarding the particular case of Portugal, a country that suffered a bailout after the financial crisis 2007-2008 from the International Monetary Fund (IMF) and the European Commission, in the first half of 2011, it becomes important to verify the links between compensation and performance (testing the theories of Arms' Length and Managerial Power) and also how the managerial compensation structure affected firm risk-raking behavior, during and after the crisis of 2011/2012, in companies that had a higher (management) compensation in the years before (2009-2010).

Even though, in times of economic and financial crisis, it is common for companies to show a decrease in the values of their financial statements and main economic indicators, it is important to clarify, with this study, the question whether the relation between pay and performance became weaker or stronger during the crisis.

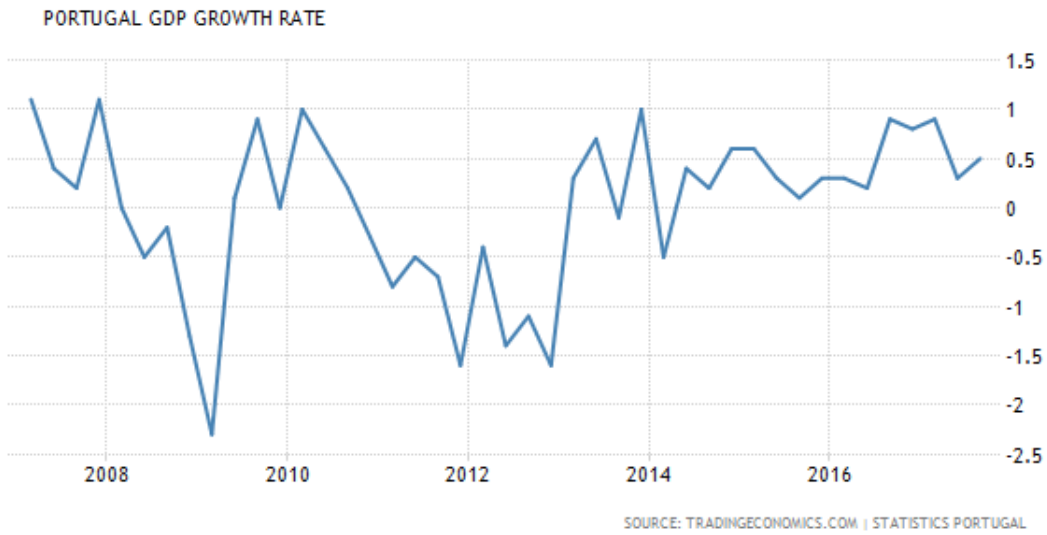
Figure 3 – Changes to GDP in selected countries, 2008-2012,

Karanikolos et al. (2013)[7]



[7] GDP in Q1, 2008=100%.
Source: Organization for Economic Co-operations and Development database.
GDP = gross domestic product.
Q = quarter.

Figure 4 – Changes to GDP in Portugal, 2007-2017



Fahlenbranch and Stulz (2011) analyze the influence of CEO incentives and share ownership on bank performance and find no evidence of a better performance of banks in which the incentives provided by the CEO's pay package are stronger (i.e., the fraction of equity-based compensation is higher). In fact, their evidence rather points to banks providing stronger incentives to CEOs performing worse in the crisis. A possible explanation for this finding is that CEOs may have focused on the interests of shareholders in the build-up to the crisis and took actions that they believed the market would welcome. Ex post, however, these actions were costly to their banks and their shareholders when results turned out to be poor. Moreover, their results indicate that bank CEOs did not reduce their stock holdings in anticipation of the crisis and the CEOs did not hedge their holdings. Hence, their results suggest that bank CEOs did not anticipate the crisis and the resulting poor performance of the banks as they suffered huge losses themselves.

Erkens *et al.* (2012) investigate the relation between corporate governance and performance of financial firms during the credit crisis of 2007/2008 using an international sample of 296 financial firms from 30 countries. They find that firms with more independent boards and higher institutional ownership experienced worse stock returns during the crisis. They argue that firms with higher institutional ownership took losses during the crisis period. Moreover, firms with more independent boards raised more equity capital during the crisis, which led to a wealth transfer from existing shareholders to debtholders.

According to some conclusions of Aebi *et al.* (2012), banks were pushed by their boards to maximize shareholder wealth before the crisis and took risks that were understood to create wealth but later turned out poorly in the credit crisis.

They also conclude that banks, to be better prepared to face the next financial crisis, have to significantly improve the quality and profile of their risk management function, but also embed the appropriate risk governance having CEO and CRO at the same level, ideally both reporting to the board of directors. This, however, may come at the cost of a lower performance in a normal market environment (i.e., Non-crisis).

Fernandes *et al. (*2017) examine whether and to what extent do board's characteristics influence their performance in crisis and they find evidence that banks' performance during the financial crisis is a function of their board's characteristics.

3. Hypotheses Development

Executive compensation and firm performance relationship is based on Agency Theory, having been proposed by Jensen and Meckling (1976). The authors noted that the empowerment may generate conflicts of interests, so that the manager can pursue objectives that do not necessarily lead to the maximization of the firm value and the shareholder wealth.

Thus, one way of minimizing agency risk could be the inclusion of the pay-for-performance methodology (Core and Guay, 2010).

With the first hypothesis of **Erro! Autorreferência de marcador inválida.**, it is expected that, if better management decisions can be achieved through higher relative variable component of compensation, the subsequent performance of firms paying more should be superior to the performance of firms paying less. So, assuming that there is a clear relationship between CEO compensation and firm performance, we expect a positive relationship between those two variables during and after the financial crisis. Following Mehran (1995), a good measure capable of valuing the performance of a company is the Return on Assets (ROA). To perform this hypothesis, we will use a dummy variable (CrisisD) that equals to one when we are in the crisis period (2008-2013) and zero when we are in the after-crisis period (2013-2016).

According to the Senior Supervisors Group (2008), it is important to have an appropriate balance between risk appetite and risk controls, between short run and longer run and between firm wide objectives. The literature on Agency Theory (for example, Aggarwal and Samwick (1999)) shows that the risk-averse managers tend to prefer more fixed remuneration levels, while less risk-averse managers tend to "demand" a higher weight of the variable component (seen as a way of rewarding the good performance of the company).

So, one of the main objectives of this study, as it is presented in the second hypothesis of **Erro! Autorreferência de marcador inválida.**, is also to understand if the fact that the CEOs in Portugal receive higher remunerations will influence the likelihood of engaging in risk-inducing actions, which could also bring some benefits to the company. In this hypothesis, the variable risk will be measured as the standard deviation of the weekly returns of the company shares and there are no defined expectations in the final values, since there is no consensus among the literature. Some authors, such as

Amzaleg *et al.* (2014) and Aebi *et al.* (2012) argue that larger variable component of remuneration will increase managers' risk appetite. However, authors such as Lambert *et al.* (1991) argue that if compensation structures include stock options, they may even reduce managers' risk appetite, since options contain a leveraged position in the firm's equity, thus, increasing risk-averse manager's exposure to the firm's risk. And, also, if the volatility is higher, the firm can reward the CEO with stock options and less cash incentives because the value will increase with stock return volatility.

Still in this study, and as the last hypothesis of **Erro! Autorreferência de marcador inválida.**, we will analyze the power of the CEO in Portuguese companies and whether this will influence the received remunerations throughout his top management. According to the literature, for example Amzaleg *et al.* (2014), our expectations point to a positive relationship between power of the CEO and high remunerations since, and according to Hill *et al.* (2016), more powerful CEOs can influence their own compensation, To measure the CEO power, we will use three variables: duality, tenure and pay slice. Duality is when the CEO holds the dual roles of CEO and Chairman of the Board. Tenure measures the years that a CEO stays in the same position in a company. Lastly, we consider the ratio of CEO compensation compared to the total compensation for the executives of the Board (pay slice).

Table 1- *Hypotheses Development*

Hypothesis	Measurement of Variable	Expected Signal	Authors
1. Higher CEO's variable remuneration prior the financial crisis increases firm performance during financial crisis. CEO's variable remuneration will be measured in absolute terms (log) and relative terms.	• **Performance:** measured by return on assets (ROA), measured by the ratio of EBIT to the book value of the firm's total assets. Due to the 2SLS regression analysis, this variable is used as dependent and independent variable.	**(+)**	Bebchuk *et al.* (2011) Core and Guay (2010) Rayton (2003)
2. Higher CEO's total remuneration prior the financial crisis increases appetite for risk during financial crisis.	• **Risk:** variance of weekly returns. It is used as independent variable.	**(+/-)**	Gormley *et al.* (2013) Francis *et al.* (2015) Aggarwal and Samwick (1999) Sigler (2011)
3. More powerful CEOs are more likely to receive higher remunerations than are less powerful CEOs during the financial crisis.	• **CEO Power:** measured by the duality, tenure, equity held or CEO pay slice. They are used as independent variables. CEO pay slice is also used as	**(+)**	Hill *et al.* (2016) Amzaleg *et al.* (2014) Aebi *et al.* (2012) Adams *et al.* (2005)

	dependent variable due to 2SLS regression analysis.		

4. Methodology and Data Collection

4.1. Data Collection

According to the European Transparency Directive (Directive 2004/109/EC), all the listed companies on the European regulated markets have the obligation to provide information for investors through a regular flow of disclosure of periodic and on-going regulated information and the dissemination of such information to the public. The aim of these amendments is to establish an increase in transparency at the capital markets and in investor protection to meet information deficits in a developing financial market environment.

In addition, the Portuguese stock market regulator (CMVM) also obliges firms to disclose information such as the financial reports (Annual Reports), information on major holdings of voting rights and Corporate Governance Reports.

To perform this study, the collection of the data was done directly through the Annual Reports of the companies of the sample collected on their company sites, as well as through some well-known databases, such as Eikon Thomson Reuteurs and Amadeus.

The sample consists of 37 different companies listed in the Portuguese stock market – Euronext Lisbon (of the initial sample of 47 companies, three were dropped because of non-matching fiscal years, four companies were deleted because of missing data and, finally, three were excluded from the sample because they were financial institutions and these were not the main focus of this study), for 8 years (2008-2016). Only companies that provide information on the number of managers and their remuneration were considered in the analysis.

The main objective of this study is to verify what is the relationship between CEO's remuneration and performance of the company. With this purpose, data was collected from companies' financial and corporate governance reports.

The CEO's remuneration is divided into two parts: fixed and variable, this last one being, according to the Agency Theory principles, the one that most represents the participation on the performance of the company and is able to potentially align the interests between managers and shareholders, leading to the maximization of the value of the company. The variable component of remuneration may also include stocks and options. In this sense, we sought to obtain detailed information about the percentage of the share capital of the company owned by the CEO. At the same time, we looked for information on whether companies had stock and options plans, as their existence may have an impact on performance.

Thus, the data collection will be focused not only on the remuneration part but also on those factors that characterize the company in an operating and accounting way that could be impacting the CEO's remuneration, such as operating results, firm's size, stock returns, risk and CEO power.

In each Annual Report we attempt, through a very rigorous analysis, to obtain detailed information about the earned remuneration by each top manager, particularly by the Chief Executive Officer (CEO) and also the possible existence of duality[8] in the company. However, we observed a qualitative improvement in the information provided by the Annual Reports of the Portuguese companies that make up this study over the years, whereby in the early years (2008, 2009 and 2010) of this study, there was a greater difficulty in obtaining the exact data of the remuneration of CEOs, since the opinion of most companies was that the individual disclosure of the compensation did not translate into a more faithful view of the company, in addition to potentially violating the privacy of each executive. In the companies where this was observed, we used a proxy for the true remuneration of the CEO: were computed, in the last years where the data is available, the ratio between CEO pay and other members average pay and it was used this ratio to estimate CEO pay in the initial years; this method was individualized for each company of the sample.

So, in summary, we collected the following items for the years in study (2008-2016): (1) net income, (2) total assets, (3) weekly returns (computed), (4) the name of the firm's CEO (5) the name of the firm's Chairman, (6) existence of CEO duality, (7) tenure of the CEO, (8) fixed remuneration of the CEO, (9) variable remuneration of the CEO,

[8] When the CEO also holds the position of the chairman of the board.

(10) total remuneration of the CEO, (11) total remuneration of the executives of the Board, (12) percentage of the variable remuneration to the total remuneration, (13) percentage of CEO's pay slice[9], (14) number of shares held by executives, (15) number of top managers employed by the firm, (16) number of non-executives members of the board, (17) number of independent non-executives members of the board, (18) number of members that composed the Remuneration Committee, (19) intangible assets, (20) long-term debt.

4.2. Dependent and Independent Variables

Although the theme of this study is the relationship between remuneration of CEOs and performance, there are many other variables included in this study, in order to better control the factors that may help to isolate the impact of the CEO's remuneration on the firm performance in Portugal, from 2008 to 2016.

The firm size is measured by the **total assets** of the companies of the sample. According to this measure, the sample is stratified according to the definition adopted by the European Commission, in 2003 (Commission Recommendation 2003/361/CE). Thus, a company that presents a value of total assets of less than or equal to 10 million euros, will be considered a small-sized company; a company that presents a value of total assets of more than 10 million euros and less or equal to 43 million euros, will be considered a medium-sized company; and, finally, a company with a value of total assets of more than 43 million euros, will be considered a large-sized company. These are ordinal variables used to stratify the sample.

Following the specification used by Euronext Lisbon, the companies of the sample were divided according their activity sector – Industrials, Consumer Services, Basic Materials, Technology, Consumer Goods, Utilities and Telecommunications. This is a nominal variable used to stratify the sample.

The proxy for firm performance is the return on assets (**ROA**), measured by the ratio of **EBIT** to the book value of the firm's **total assets,** as measured on a study performed by Core *et al. (*1999). An argument for using ROA is that accounting returns are highly important in determining executive compensation, in the way that they provide information to the board about the value added to the firm by the CEO. Therefore,

[9] The mean of this variable is explained later in the chapter.

executives have incentives to make major corporate decisions and/or report income in such way as to affect ROA and, thus, their compensation (Mehran, 1995).

The **CEO remuneration** is based on three different measures of compensation: total compensation, fixed remuneration and variable remuneration. Fixed remuneration simply measures the component of compensation that is fixed, whereas the variable remuneration measures the component of compensation that is not fixed, that could include annual bonuses, stock options and stocks and performance plans. The total compensation is the sum of these two. In the hypotheses under study, it makes more sense to use the variable CEO's Variable Remuneration, since it is the part of the remuneration that is most linked to the changes in the company's performance. This variable will be computed in the logarithmic form.

The number of **members of the Board of Directors** is also an explanatory variable in our study, being split, according to the Portuguese Institute of Corporate Governance, between the number of **Executive members** (the ones whose actively perform management functions), the number of **Non-independent non-executive members** (the ones whose do not perform management functions and they are not linked to the company) and the number of **Independent Non-executive members** (the ones that are not associated to the company's interests and does not receive remuneration contingent upon the performance of the company).

There are also four variables that were created to measure the power of the CEOs of the sample, such as: the percentage of the capital held by the CEOs, pay slice, tenure and duality.

The **percentage of the capital held** by the CEOs of the companies of the sample, that is a ratio of the number of shares held over the total of shares of the company; the ratio of the percentage of the total compensation paid to the executives of the Board that belongs to the CEO (**pay slice**). Schleifer and Vishny (1997) refer that when a percentage of the capital of the company that is held by blockholders achieves 50%, the interests of maximization of the value of the company are met, in the way that these can have enough power to align the CEO's interests and the shareholders' interests.

CEO tenure is measured by the number of years the CEO has been in that position. It may by the case that the board of directors is better able to evaluate the leadership of a CEO, the quality of his strategic plans, his ability to identify growth

opportunities, and other qualitative aspects of his performance as his tenure increases without exclusively relying on corporate financial measures. Alternatively, it is possible that the longer the tenure, the more power the CEO exerts over the board (Bushman et al., 1996) and the greater the difficulty to replace him. In the light of these results, we expect a positive relationship between executive compensation and tenure because in the real world, we observe that more experienced CEOs command higher compensation. As Hill *et al.* (2016) used, CEO tenure will be a dummy coded one if the tenure of the CEO is greater than the median tenure for all CEOs of the sample and zero otherwise.

The **CEO duality** is a dummy variable that equals to one when the CEO also holds the position of the Chairman of the board and zero otherwise.

To analyze the relationship between **risk** and executive compensation, we used the standard deviation of the weekly returns of the companies. We used the standard deviation volatility calculated over 2008-2016. Although there is precedence in the literature for using variance of returns as a proxy for risk (e.g., Lambert and Larcker, 1991), no general consensus exists as to the best measure of contracting relevant risk. Some authors argue that the general movement of stock prices (i.e., systematic risk) represent events not under control of managers. But if a manager is responsible for the industries in which the firm invests, then all of this variability may not represent that relevant risk. Some also argue that variability of stock returns is an important consideration in the design of executive compensation arrangements because it proxies for growth opportunities. Smith and Watts (1992) suggest that variability of returns is an indicator of a firm's investment opportunity set with greater variability corresponding to greater investment opportunities.

4.3. Methodology

The hypotheses established in the previous section are tested through observations of multiple phenomena obtained over multiple time periods for the same firms, that is panel data.

Eq. (1) describes the model used to test the relationship between firm performance and variables for compensation structure.

Firm performance

= f (CEO's variable compensation, firm size, percentage of equity held by managers, percentage of outside directors, debt leverage)

Eq. (2) describes the model used to test the relationship between appetite for risk and variables for compensation structure and also to test relationship between compensation structure and powerfulness of CEOs.

CEO's variable compensation

= f (exposure to risk, firm performance, duality, tenure, pay slice)

With Eq. (1) and Eq. (2) we will perform a two-stage least squares (2SLS) regression analysis, which is a popular two step estimator for instrumental variables analysis.

4.4. Descriptive Statistics

In an initial stage of this study, the sample was analyzed in a descriptive way, in order to characterize the variables as well as the sample under study – the companies listed in Portugal for the period between 2008 and 2016. This analysis will be slip into two different time periods: the years from 2008 to 2013 will be considered the period during the crisis and 2014 to 2016 will be considered the period after crisis.

Table 2 *– Distribution of the Companies of the Sample by Size*

This table shows the division of the companies of the sample according to their size, measured by their total assets.

	%
Small	8,11%
Nº of Obs.	3
Medium	72,97%
Nº of Obs.	27
Large	18,92%
Nº of Obs.	7
Total	100,00%
Nº of Obs.	37

According to the **Table 2**, we can conclude that the sample is mainly composed of large and medium-sized companies, according to the definition adopted by the European Commission[10]. Thus, around 73% of the companies of the sample are considered medium-sized and, roughly 19% of the companies are considered large-sized.

[10] The European Commission's recommendation of 6 May 2003 assumes that: large-sized companies are composed by 250 or more employees, the turnover is over €50 million and the net assets and the net assets exceeds €43 million; the medium-sized companies are composed by fewer than 250 employees, the turnover does not exceed €50 million or the total annual balance does not exceed €43 million; and finally, small-sized companies are composed by less than 50 employees and the turnover or total balance sheet does not exceed €10 million.

Table 3 – Distribution of the Companies of the Sample by their Activity Sector

This table shows the division of the companies of the sample according to their activity sector.

Sector	%	Nº Obs
Industrials	32,43%	12
Consumer Services	29,73%	11
Basic Materials	2,70%	1
Technology	10,81%	4
Consumer Goods	5,41%	2
Utilities	10,81%	4
Telecommunications	8,11%	3
Total	100%	37

Table 3 allows to know the sample more deeply. Thus, we can conclude that around 32% of the companies of the sample belong to the Industrials sector and almost 30% of the companies of the sample belong to the Consumer Services sector. The sector with the lowest weight is the Basic Materials sector (2,70% of the companies of the sample), followed by the Consumer Goods sector (5,41% of the companies of the sample).

Table 4 - Descriptive Statistics for the Performance of the Companies

This table shows a summary of descriptive statistics for the performance of the companies of the sample, measured by the Return on Assets (ROA), that is the ratio of EBIT to the book value of the firm's total assets. This analysis is split into two different time periods: from 2008 to 2013 is considered the period during crisis and from 2014 to 2016 is considered the period after crisis.

	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	4,05%	4,26%	-46,44%	36,47%
Post-Crisis Period (2014 – 2016)	3,82%	2,69%	-29,85%	35,86%
Total	3,97%	4,25%	-46,44%	36,47%

From **Erro! A origem da referência não foi encontrada.** we can conclude that the performance of the companies of the sample, calculated by ROA, had a decrease in its value, in the last period of the study, which can be clearly explained by the presence of the financial crisis in the country, in the previous period. The economic and financial crisis that began in 2008 had a great repercussion in Portugal, affecting companies and global economy. And, according to these results, we can observe a possible gap between

the exact moment of the international crisis and the moment when its effects marked the Portuguese economy.

Table 5 *- Descriptive Statistics for the Board of Directors Composition*

This table shows a summary of descriptive statistics for the number of Board of Directors, as well as, the Board's composition between executives, non-executives and independent non-executives members and the existence of a Remuneration Committee.

	Total	Executives	Non Executives		Remuneration Committee
			Non - Independent	Independent	
Mean	9,25	4,07	3,25	1,93	2,63
Minimum	3	0	0	0	0
Maximum	25	9	8	10	4

According to the **Table 5**, we can observe that, for a total 37 Portuguese companies, the mean of non-executive members is superior to the mean of executive members per Board of Directors. A typical Board of Directors has, in average, four executive members, five non-executive members, where two of them are independent from the company. It is also common, the existence of a Remuneration Committee composed, on average, by three members. Another interesting factor is that 19% of the companies of the sample do not have any non-executive members on their Board of Directors, which could be explained by the fact that the majority of the companies follow the model Supervisory Board + Executive Committee.

Table 6 – *Descriptive Statistics for the Composition of the Board of Directors*

This table shows a summary of descriptive statistics for the number of the members of the Board of Directors, as well as for its composition of executives, non-executives and independent members and the existence of a Remuneration Committee. The analysis is split into two different time periods: from 2008 to 2013 is considered the period during crisis and from 2014 to 2016 is considered the period after crisis.

		Total	Executives	Non Executives	Independents	Remuneration Committee
Crisis Period (2008-2013)	**Mean**	9,40	4,29	5,12	1,80	2,60
	Minimum	3	1	0	0	0
	Maximum	25	9	18	10	4
Post-Crisis Period (2014-2016)	**Mean**	8,93	3,67	5,26	2,24	2,69
	Minimum	3	0	0	0	0
	Maximum	20	8	18	10	3

According to **Table 6**, we can conclude that the Board of Directors of a company in our sample can have a maximum of 25 members and a minimum of 3. In all of the studied years, on average, the number of non-executive members is always greater than the number of executive members of a Board of Directors, which is very common in most listed firms in developed markets (Bebchuk *et al*., 2010). There is no clear trend over the years, regarding the composition of the Board of Directors of the Portuguese companies, which could mean that there is a continuous concern to try to improve and achieve an ideal structure.

***Table 7** – Descriptive Statistics for the Total Remuneration (in €) of the CEO of a company*

This table shows a summary of descriptive statistics for the Total Remuneration of the Chief Executive Officer (CEO) of a company, in Euros (€). The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis

	Number of Observations	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	209	505078,78	357921,17	21199,00	2525093,00
Post-Crisis Period (2014 – 2016)	109	459628,27	355917,00	0	2039211,00
TOTAL	318	489928,61	355917,00	0	2525093,00

Analyzing the **Table 7**, it is possible to see that, in average, a CEO of a listed company, in Portugal, can earn approximately 489.928 Euros, per year.

The mean of Total Remuneration of a CEO reveals a downward trend in recent years since the last financial crisis (2008-2013). It is interesting that it is exactly in those years of crisis that the CEOs in Portugal seem to earn the most, which could be explained because of the gap between pay and lagged performance measures.

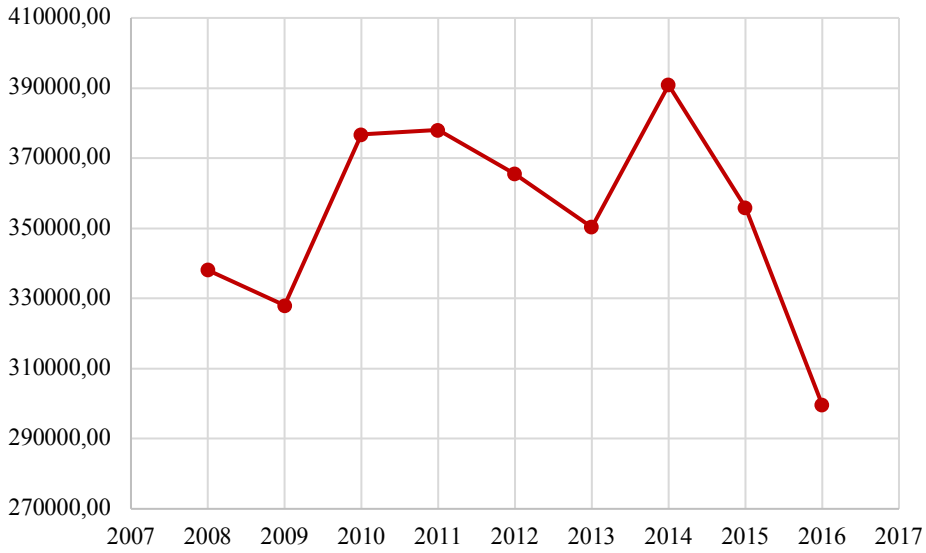
Since the Total Remuneration presents such a wide range of values, fluctuating between a minimum of 0 Euros[11] and a maximum of 2.525.093 Euros, it makes sense to

[11] This extreme value is possible as there one company in the sample, Imobiliária Construtora Grão-Pára, that, due to the company's economic and financial situation, it was decided to suspend the payment of the remuneration of their executives, since 2013 until the final date of this study.

analyze the median of the sample, since that it is not skewed so much by extremely large or small values, and so it may give a better idea of a "typical" value.

Figure 5 – CEO's Total Remuneration (in €)

This figure shows the Total Remuneration of the Chief Executive Officer (CEO) of a company, according to the median values.



Given this and analyzing the **Figure 5**, composed by the median values, we can observe a noticeable increase of the remunerations in 2014, which could suggest an attempt of improving market conditions driven by macroeconomic developments, but it was followed by a decrease of the same ones in the following years.

Table 8 – Descriptive Statistics for the Fixed Remuneration (in €) of the CEO of a company

This table shows a summary of descriptive statistics for the Fixed Remuneration of the Chief Executive Officer (CEO) of a company, in Euros (€). The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Number of Observations	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	209	327209,09	280343,96	0,00	1069600,00
Post-Crisis Period (2014 – 2016)	109	311069,24	279750,00	0,00	1069600,00
TOTAL	318	321829,14	280000,00	0,00	1069600,00

Figure 6 – CEO's Median Fixed Remuneration (in €)

This figure shows the Fixed Remuneration of the Chief Executive Officer (CEO) of a company, according to the median values.

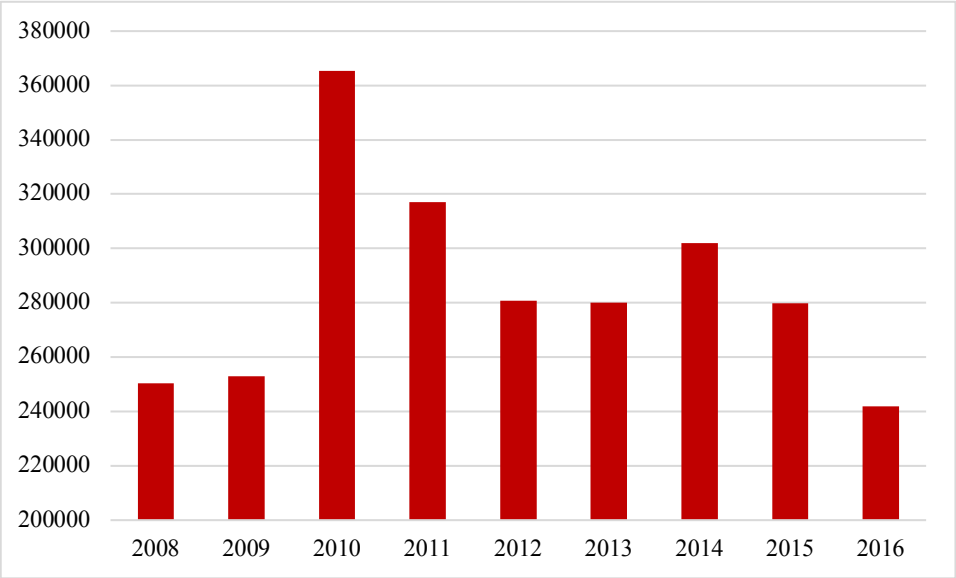


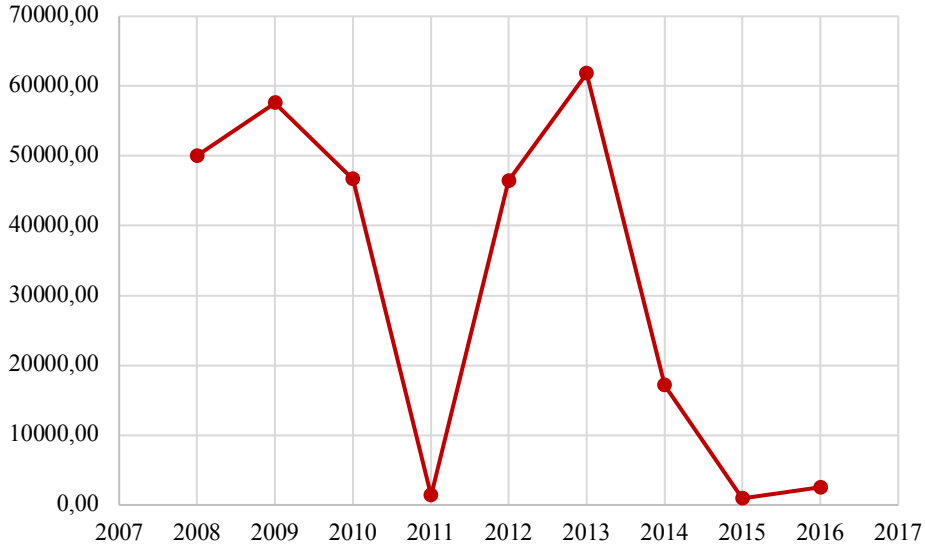
Table 9 - Descriptive Statistics for the Variable Remuneration (in €) of the CEO of a company

This table shows a summary of descriptive statistics for the Variable Remuneration of the Chief Executive Officer (CEO) of a company, in Euros (€). The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Number of Observations	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	209	177869,69	48340,77	0,00	1813507,00
Post-Crisis Period (2014 – 2016)	109	148559,04	2500,00	0,00	1578511,00
TOTAL	318	168099,47	46440,62	0,00	1813507,00

Figure 7 – CEO's Variable Remuneration (in €)

This figure shows the Variable Remuneration of the Chief Executive Officer (CEO) of a company, according to the median values.



When analyzing the Remuneration of CEOs, it is observable that the fixed component of remuneration (**Table 8**) has a greater weight than the variable component of remuneration (**Table 9**). Therefore, 66% of the Total Remuneration earned by the CEOs is fixed, while only 34% is variable. Examining the median values, the fixed component acquires an even higher weight on the Total Remuneration.

On average, each CEO earn, annually, approximately 321.829 Euros of Fixed Remuneration and approximately 168.099 Euros of Variable Remuneration.

According to the **Figure 6**, it is possible to observe that the fixed part of the remuneration presents an increase from 2009 onwards, always showing higher values than those presented in 2008 and 2009. This appreciation of the Fixed Remuneration may explain a possible protection post-crisis of the CEOs to the changes of the performance of the company since the remuneration oscillates according to the changes in the productivity and performance of the company. Given this and analyzing the **Figure 7**, as expected, it shows a fall in the value of the Variable Remuneration from 2009 to 2011, presenting an increase in the years of 2012 and 213, and returning to a downward trend to the present day.

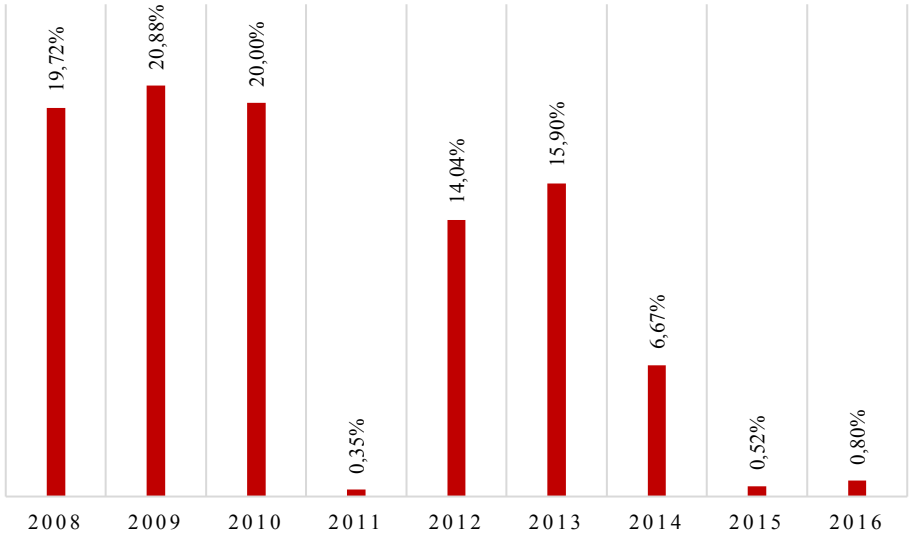
***Table 10** – Descriptive Statistics for Percentage of Variable Remuneration of the CEO*

This table shows a summary of descriptive statistics for the percentage of variable remuneration of the CEO. The analysis is split into two different time periods: The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	22,86%	17,81%	0,00%	100,00%
Post-Crisis Period (2014 – 2016)	19,11%	0,80%	0,00%	77,41%
TOTAL	21,61%	14,04%	0,00%	100,00%

***Figure 8** - Percentage of Variable Remuneration of the CEO*

This figure shows the Percentage of Variable Remuneration of the Chief Executive Officer (CEO) of a company, according to the median values.



According to **Table 10**, we can observe the mean value of the percentage of variable remuneration over total compensation, that a CEO usually receives is, approximately, 22%.

The variable remuneration is the set of different forms of reward offered to employees, complementing fixed remuneration and liking factors such as attitudes, performance and others with perceived value. The remuneration according to the results of the company (usually referred as "pay-for-performace" (Core and Guay, 2010)) and the share ownership are two forms of variable remuneration and they are linked to performance. Individual performance can be rewarded by a rewards system, and team performance can be recognized through performance pay.

The "pay-for performance" strategy is far from being the optimal solution to the problems of low performance in the companies, however it facilitates the alignment of the interests of the employees to the interests of the company, resulting in an agreement that will favor the generation of positive and sustainable results over time (Murphy, 1985 and Core and Guay, 2010).

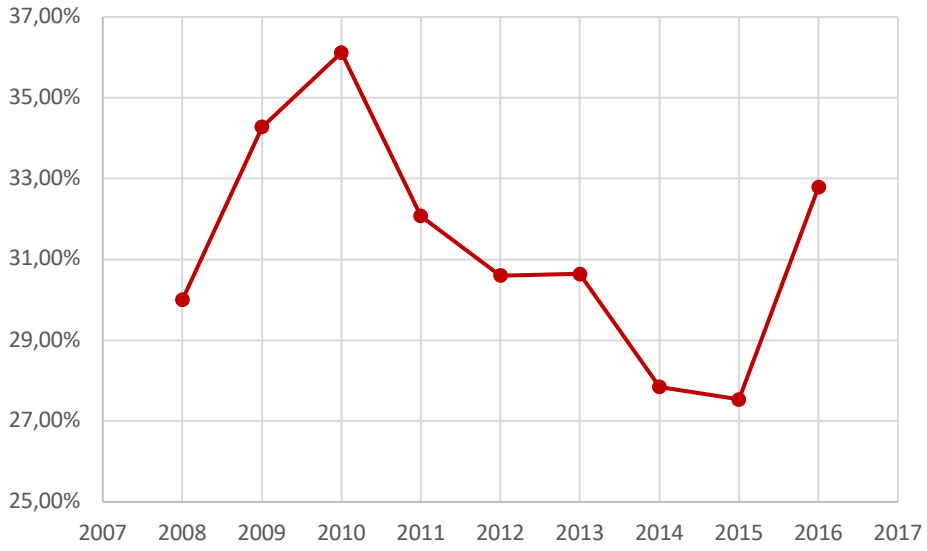
Table 11 *-Descriptive Statistics for the CEO's pay slice*

This table shows a summary of descriptive statistics for the percentage of the total compensation paid to the CEO over the total compensation paid to the executives of the Board. The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	35,33%	31,36%	0,54%	86,58%
Post-Crisis Period (2014 – 2016)	33,33%	27,85%	0,00%	100,00%
TOTAL	34,67%	30,64%	0,00%	100,00%

Figure 9 *– The CEO's Pay Slice*

This figure shows the CEO's Pay Slice, according to the median values.



According to the values of the **Table 11**, we can infer that around 30% of the total compensation paid to the executives of a Board of Directors of a company goes to the Chief Executive Officer.

In relation to the extreme values in the second period of the study, the 0% (minimum of 2014, 2015 and 2016, see Appendix, **Table 31**) in the table is explained by those companies of the sample that decided to suspend the payment of the remuneration

to their executives and the 100% (maximum of 2016, see Appendix, **Table 31**) is explained by a company that is composed by only one executive member in its Board.

Through the **Figure 9**, it is possible to observe that in the years following the crisis, the CEO lost some power among the Board of Directors, which is in line with lower remunerations in those years. In this way, the percentage of the remuneration of the Board of Directors that goes to the CEO became more diluted with the remuneration of the remaining executives.

It is also noticeable that in recent years, the CEO is again acquiring the power lost in previous years.

Table 12 *– Descriptive Statistics for the Proportion of Capital of the company held by the CEO*

This table shows a summary of descriptive statistics for the percentage of the number of shares held by the CEO of a company. The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	4,28%	0,04%	0,00%	79,39%
Post-Crisis Period (2014 – 2016)	4,32%	0,00%	0,00%	77,50%
TOTAL	4,29%	0,01%	0,00%	79,39%

On average, the share ownership held by the top executive manager of a company is around 4,3%. It is important to mention that, since 2008, the percentage of shares of a company held by the CEO increased slightly, having its peak value during the financial crisis (2011-2012) and then decreasing a little bit, remaining constant throughout some years. Recently, in 2016, we are seeing this percentage increasing once again.

Table 13 *– Descriptive Statistics for the Tenure of the CEO*

This table shows a summary of descriptive statistics for the number of years that a CEO remains in his job. The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	7,13	4	0	50
Post-Crisis Period (2014 – 2016)	6,69	5	0	26
TOTAL	7,04	5	0	50

From **Table 13,** on average, we can observe that a CEO remains in that position for at least seven years. These results are associated with the tendency for the existence of family companies in Portugal. Family groups tended to manage the succession process of executives quite actively and are usually able to provide renewal by offering opportunities to retiring/replaced executives either in other parts of the group or via new business initiatives.

***Table 14** – Descriptive Statistics for the Duality of the CEO*

This table shows a summary of descriptive statistics for the duality of a CEO. The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	0,50	0	0	1
Post-Crisis Period (2014 – 2016)	0,50	0	0	1
TOTAL	0,50	0	0	1

From the **Table 14**, we can observe that, on average, a Portuguese company has in charge a CEO that is, at the same time, the Chairman of the Board. Establishing a unity of command at the head of the firm allows the firm to send a reassuring message to shareholders. However, it is also easier for the CEO to assert control of the board and consequently make it more difficult for shareholders to monitor and discipline the management (Core *et a*l., 1999).

***Table 15** – Descriptive Statistics for the Standard Deviation of Weekly Returns*

This table shows a summary of descriptive statistics for the standard deviation of weekly returns of the companies. We used the natural logarithm of the standard deviation volatility calculated over 2008-2016. The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Nº Obs	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	203	0,171	0,050	0,014	13,142
Post-Crisis Period (2014 – 2016)	108	0,084	0,053	0,017	1,409
TOTAL	311	0,142	0,050	0,014	13,142

The standard deviation is used as an indicator of market volatility and therefore of risk. The larger the variance and standard deviation, the more volatile the company

stocks and the greater the risk. This type of measuring risk is been used by several authors among the literature, such as, Aggarwal and Samwick (1999) and Sigler (2011). According to the **Table 15**, we can observe that the period during crisis presents a higher standard deviation value, as would be expected.

Table 16 - *Descriptive Statistics for the Debt Ratio*

This table shows a summary of descriptive statistics for the Debt Ratio of the companies. This ratio was computed as the sum of long-term and short-term debt over total assets. The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Nº Obs	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	221	23,63%	23,68%	0,00%	90,71%
Post-Crisis Period (2014 – 2016)	106	22,00%	16,52%	0,00%	76,39%
TOTAL	327	23,09%	23,26%	0,00%	90,71%

The higher this ratio, the more leveraged a company is, implying greater financial risk (Titman *et al*., 1988). However, leverage is an important tool that companies use to grow. It is also important to mention that debt ratios vary widely across industries, with capital-intensive businesses, such as utilities, having much higher debt ratios than other industries, such as the technology sector.

We can observe from the **Table 16** that this ratio is higher during the financial crisis than it is after the financial crisis. This difference is much bigger when talking about the median values.

Table 17 – *Descriptive Statistics for the Intangible Assets to Total Assets Ratio*

This table shows a summary of descriptive statistics for the Intangible Assets to Total Assets Ratio of the companies. The analysis is split into two different time periods: from 2008 to 2013 this is considered to be the crisis period and from 2014 to 2016 this is considered to be the after-crisis period.

	Nº Obs	Mean	Median	Minimum	Maximum
Crisis Period (2008 – 2013)	221	20,90%	13,00%	0,00%	87,00%
Post-Crisis Period (2014 – 2016)	106	14,96%	3,66%	0,00%	98,72%
TOTAL	327	18,92%	12,07%	0,00%	98,72%

The smaller this ratio the larger the portion of a firm's total assets is comprised of tangible assets, or material items the company can sell for monetary value. This ratio varies from industry to industry, so the definition of a "high" or "low" ratio should be made within the context. It is clear to conclude that this ratio is higher during the financial

crisis than it is in the post-crisis period. This decrease suggests that the companies of the sample have either written down some intangible assets or increased its tangible assets.

4.4.1. Correlation between Variables

Following the procedures of a statistical analysis, it was intended to ascertain the relationship between the different variables of the study, in order to measure the dependence/independence of the variables.

***Table 18** – Correlation between Variables of the 1st Equation*

This table shows the correlation between the variables of the first equation of the system.

TComp is the absolute value of the Total Remuneration of the CEO; VComp is the absolute value of the Variables Remuneration of the CEO; RemVar is the percentage of the Variable Remuneration of the CEO; ROA is the Return On Assets ratio that measures the performance of the company; Risk is the variance of the weekly returns; Duality is a dummy variable that equals to one when the CEO also holds the position of the Chairman of the board and zero otherwise; Tenure is the number of years that a CEO remains in his job; Payslice is the percentage of the total compensation paid to the executives of the Board that belongs to the CEO; TotAss is the absolute value of the Total Assets of the company; EqHeld is the percentage of the number of shares held by the CEO of a company; IndMembers is the number of Independent Members of the company; and, DebtRatio is the Debt Ratio of the companies.

	TComp	VComp	RemVar	ROA	Risk	Duality	Tenure	PaySlice	TotAss	EqHeld	IndMembers	DebtRatio
TComp	1,000											
VComp	0,860	1,000										
RemVar	0,539	0,749	1,000									
ROA	0,087	0,017	-0,005	1,000								
Risk	-0,096	-0,055	-0,003	-0,056	1,000							
Duality	-0,295	-0,230	-0,172	0,010	0,100	1,000						
Tenure	0,020	0,095	0,090	-0,045	0,259	0,195	1,000					
PaySlice	0,046	0,089	0,200	-0,049	0,116	0,009	0,233	1,000				
TotAss	0,132	0,186	0,117	0,025	-0,032	-0,023	-0,035	-0,105	1,000			
EqHeld	-0,160	-0,105	0,106	-0,020	0,088	0,308	0,189	0,319	-0,095	1,000		
IndMembers	0,182	0,239	0,266	0,155	-0,021	-0,274	-0,111	0,250	0,143	0,167	1,000	
DebtRatio	-0,087	-0,089	-0,129	-0,132	-0,077	-0,013	-0,096	-0,216	0,207	-0,204	0,009	1,000

***Table 19** – Correlation of the Variables of the 2nd Equation*

This table shows the correlation between the variables of the second equation of the system.

TComp is the absolute value of the Total Remuneration of the CEO; VComp is the absolute value of the Variable Remuneration of the CEO; RemVar is the percentage of the Variable Remuneration of the CEO; ROA is the Return On Assets ratio that measures the performance of the company; Risk is the variance of the weekly returns; Duality is a dummy variable that equals to one when the CEO also holds the position of the Chairman of the board and zero otherwise; Tenure is the number of years that a CEO remains in his job; Payslice is the percentage of the total compensation paid to the executives of the Board that belongs to the CEO; TotAss is the absolute value of the Total Assets of the company; EqHeld is the percentage of the number of shares held by the CEO of a company; IndMembers is the number of Independent Members of the company; and, IATA is the Intangible Assets to Total Assets Ratio of the companies.

	TComp	VComp	RemVar	ROA	Risk	Duality	Tenure	PaySlice	TotAss	EqHeld	IndMembers	IATA
TComp	1,000											
VComp	0,860	1,000										
RemVar	0,539	0,749	1,000									
ROA	0,087	0,017	-0,005	1,000								
Risk	-0,096	-0,055	-0,003	-0,056	1,000							
Duality	-0,295	-0,230	-0,172	0,010	0,100	1,000						
Tenure	0,020	0,095	0,090	-0,045	0,259	0,195	1,000					
PaySlice	0,046	0,089	0,200	-0,049	0,116	0,009	0,233	1,000				
TotAss	0,132	0,186	0,117	0,025	-0,032	-0,023	-0,035	-0,105	1,000			
EqHeld	-0,160	-0,105	0,106	-0,020	0,088	0,308	0,189	0,319	-0,095	1,000		
IndMembers	0,182	0,239	0,266	0,155	-0,021	-0,274	-0,111	0,250	0,143	0,167	1,000	
IATA	-0,117	-0,167	-0,212	0,087	-0,050	-0,166	-0,010	-0,148	0,098	-0,190	-0,109	1,000

According to the analysis of the **Table 18** and the **Table 19**, there is a positive correlation between the percentage of the Variable Remuneration, the absolute value of the Total Remuneration and the absolute value of the Variable Remuneration (54% and 75%, respectively). Since these three variables are highly correlated, they are associated so we decided to run the regression in three different ways: (1) the dependent variables will be Percentage of the Variable Remuneration (RemVar) and Performance of the company (ROA), (2) the dependent variables will be the natural logarithm of absolute value of the Total Remuneration (LOGTCOMP) and Performance of the company (ROA), and (3) the dependent variables will be the natural logarithm of the absolute value of the Variable Remuneration (LOGVCOMP) and the Performance of the company (ROA).

Excluding the IATA and DebtRatio variables, all the other independent variables are common to the two equations of the system.

The company's performance can be evaluated by the Return-on-Assets ratio (ROA), which is positively related to the Total Remuneration (9%) and to the Variable Remuneration (2%). However, since the reward of the good performance is visible in the variable remuneration of the executive directors, this result allows us to foresee that, eventually, the remuneration will not be determined according to the performance of the company, since the ROA is more correlated with the Total Remuneration variable rather than the Variable Remuneration variable.

The obtained results, although preliminary, allowed to foresee some of the possible results obtained from the linear regressions. However, although it is still not possible to conclude from the analysis of correlation matrices, the knowledge of the behavior of the variables may be useful in later analyzes.

5. Regression Analysis

5.1. The 2SLS Regression

Under the 2SLS regression approach, and in the light of the studies conducted by Gao and Li (2015), in the first stage we run a linear probability regression to the CEO's compensation of a company, which is the Variable Compensation indicator variable (LOGVCOMP).

$$LOGVCOMP_{i,j} = \beta_0 + \beta_1 ROA_{i,j} + \beta_2 Risk_{i,j} + \beta_3 Duality_{i,j} + \beta_4 Tenure_{i,j} + \beta_5 PaySlice_{i,j} + \beta_6 LOGASSETS_{i,j} + \beta_7 EquityHeld_{i,j} + \beta_8 IndependentMembers_{i,j} + \beta_9 DebtRatio_{i,j} + \mu \quad (1)$$

Where the variable LOGVCOMP (the natural logarithm of the absolute value of the Variable Remuneration) will be replaced for other variables, such as: LOGTCOMP (the natural logarithm of the absolute value of the Total Remuneration), REMVAR (the percentage of the Variable Remuneration) and PaySlice (the percentage of the total compensation paid to the executives of the Board that belongs to the CEO), in order to understand the changes that the use of these variables as dependent variables could bring to the final results.

The **Debt Ratio** is a financial ratio that measures the extent of a company's leverage. We used the sum of long-term and short-term debt to the total assets, all data extracted from the financial data of the reports of each company of the sample. This variable is used with the purpose of having a variable that does not influence the ROA but that can influence the compensation, since a more leveraged firm will have more financial restrictions, becoming more difficult to pay higher remunerations to its managers (Titman *et al*., 1988).

In the second stage, we use the predicted CEO's variable compensation as the independent variable and examine how it influences the firm performance. For the purpose of identification, we need an instrumental variable (IV) that affects the CEO's variable compensation but does not affect the firm performance directly.

$$ROA_{i,j} = \gamma_0 + \gamma_1 LOGVCOMP_{i,j} + \gamma_2 Risk_{i,j} + \gamma_3 Duality_{i,j} + \gamma_4 Tenure_{i,j} + \gamma_5 PaySlice_{i,j} + \gamma_6 LOGASSETS_{i,j} + \gamma_7 EquityHeld_{i,j} + \gamma_8 IndependentMembers_{i,j} + \gamma_9 IATA_{i,j} + \vartheta \quad (2)$$

The IV used in the second equation is the intangible assets to total assets ratio (IATA). The **Intangible Assets to Total Assets Ratio** (IATA Ratio) is a ratio that measures how much goodwill (intangible assets) a company is recording compared to the total level of its assets.

This chapter of the study will analyze the determinants of the compensation of the Chief Executive Officer and the impact that they could have on the performance of the company.

This analysis will be controlled with a time dummy (CrisisD) and sector dummies.

5.1.1. Remuneration and Performance

In order to analyze the relationship between the remuneration of the CEO and performance of the company, we move forward with a 2SLS regression with the two equations listed earlier.

Table 20 *– The Complete Model*

This table shows the results of the impact of the Remuneration of the CEO on the Performance of the company on Panel A and the impact Perfomance of the company on the Remuneration of the CEO on Panel B.

LOGTCOMP is the natural logarithm of the absolute value of the Total Remuneration of the CEO; LOGVCOMP is the natural logarithm of the absolute value of the Variable Remuneration of the CEO; RemVar is the percentage of the Variable Remuneration of the CEO; ROA is the Return On Assets ratio that measures the performance of the company; Risk is the variance of the weekly returns; Duality is a dummy variable that equals to one when the CEO also holds the position of the Chairman of the board and zero otherwise; Tenure is the number of years that a CEO remains in his job; Payslice is the percentage of the total compensation paid to the executives of the Board that belongs to the CEO; LOGAss is the natural logarithm of the absolute value of the Total Assets of the company; EqHeld is the percentage of the number of shares held by the CEO of a company; IndMembers is the number of Independent Members of the company; IATA is the Intangible Assets to Total Assets Ratio of the companies; DebtRatio is the Debt Ratio of the companies;

*significant coefficient for a level of significance of 10%

** significant coefficient for a level of significance of 5%

*** significant coefficient for a level of significance of 1%

Panel A: Results of the Equation (1)

	Equation (1)			
	LOGVCOMP	LOGTCOMP	RemVar	PaySlice
Constant	6,533***	6,022***	57,521***	22,139**
	(0,000)	(0,000)	(0,000)	(0,045)
ROA	0,017	0,051***	0,599	-1,762**
	(0,606)	(0,007)	(0,551)	(0,032)
Risk	-0,047	-0,032	-0,694	-0,016

	(0,352)	(0,376)	(0,694)	(0,990)
Duality	-0,015	-0,231***	-7,766**	0,966
	(0,919)	(0,002)	(0,030)	(0,740)
Tenure	0,013**	0,005	0,419**	0,409***
	(0,050)	(0,165)	(0,026)	(0,007)
LOGAss	-0,192***	-0,082***	-5,080***	2,136*
	(0,000)	(0,000)	(0,002)	(0,099)
EqHeld	-0,009***	-0,002	0,092	0,206*
	(0,010)	(0,400)	(0,469)	(0,072)
IndMembers	0,378	0,119	25,179***	29,751***
	(0,231)	(0,549)	(0,015)	(0,003)
DebtRatio	0,061	0,298	-3,029	-29,163***
	(0,853)	(0,150)	(0,770)	(0,003)
Adj R2	0,093	-0,608	0,079	-0,207

Panel B: Results of the Equation (2)

Equation (2)

	ROA			
	(1)	(2)	(3)	(4)
Constant	0,892	-14,793	3,607	5,816
	(0,941)	(0,312)	(0,452)	(0,185)
LOGVCOMP	0,937			
	(0,582)			
LOGTCOMP		3,522		
		(0,116)		
RemVar			0,065	
			(0,150)	
PaySlice				0,108
				(0,345)
Risk	-0,177	-0,200	-0,361	-0,549
	(0,760)	(0,710)	(0,452)	(0,324)
Duality	3,303*	2,427***	2,458**	2,993**
	(0,011)	(0,021)	(0,025)	(0,033)
Tenure	-0,056	-0,041	-0,046	-0,069
	(0,467)	(0,484)	(0,464)	(0,396)
LOGAss	-0,533	-0,434	-0,485	-0,998*
	(0,372)	(0,403)	(0,364)	(0,066)
EqHeld	-0,046	-0,016	-0,046	-0,081
	(0,255)	(0,666)	(0,187)	(0,128)
IndMembers	6,352**	5,792**	6,228***	6,224**
	(0,024)	(0,021)	(0,017)	(0,036)
IATA	3,571	4,103**	5,235***	4,913**
	(0,178)	(0,028)	(0,011)	(0,021)
Adj. R2	0,019	0,033	-0,019	-0,047

According to the values of the **Table 20**, it is possible to conclude that only two of four regressions performed have consistency in R^2. In the results of Equation (1), Panel

A, only when we consider the Variable Compensation (LOGVCOMP) and the percentage of Variable Remuneration (RemVar) as dependent variables, we have the explained proportion of variation of the model positive, although low, presenting results of approximately 9% and 8%, respectively. Regarding the results of Equation (2), Panel B, R^2 is only positive when considering the Variable Compensation (LOGVCOMP) and Total Compensation (LOGTCOMP), presenting results of approximately 1% and 3%, respectively.

Regarding the performance of the company, measured by ROA, we can observe that it presents a positive coefficient in three regressions, being only significant, at a significance level of 1%, when we consider the Total Compensation (LOGTCOMP) as dependent variable (coefficient of 0,051 - **Table 20** – Panel A). These results lead us to conclude that Portuguese companies are compensating their CEOs according to their performance levels, since remunerations increase as when performance increases. These results are in agreement with several authors that rely on this type field, such as Rayton (2003) and Core and Guay (2010), for example. When we consider the CEO Pay Slice (PaySlice) we achieved a negative coefficient (coefficient of -1,762 - **Table 20** – Panel A), which leads us to conclude that everytime that the percentage of CEO remuneration increases in comparison with the total compensation paid to the executives of the Board of the company, the performance of the company tends to decrease, being related with agency problems. This result is in agreement with the study made by Bebchuk et al. (2011), that also find a negative correlation between the CEO Pay Slice and firm performance, which could be explained, for example, by an agency problem explanation, where high excess CEO Pay Slice could reflect agency and governance problems.

Risk is also one of the variables under study in this report. In three of four regressions made in this report, this variable has a negative coefficient. These results lead us to conclude that whenever the CEO's compensation increases, the risk of the company tends to decrease. The literature, such as Francis et al. (2015) and DeYoung et al. (2013) argue that when compensation plans are linked to the performance levels (Pay-for-Performance), CEOs are more willing to integrate riskier projects, which could bring better results to the company's performance. However, the results of this study do not find the same. One of the possible explanations is that CEOs want to protect their high

position and remuneration, and as they are decision-makers and risk could bring them instability, they choose to avoid risky situations.

With respect to the variable Tenure, it is presented positive coefficients, which means that the CEO's remuneration increases, as he stays longer in the same position. These results are in accordance with the Managerial Power approach, presented, for example, by Core et al. (1999).

Regarding the size of the company, measured by the Total Assets (LOGAss) and the analysis of the obtained results, it is concluded that only the CEO's Pay Slice (PaySlice) dependent variable is in line with what is said in the literature: as the size of the company increases, the percentage of total remuneration paid to the CEO increases. All the other dependent variables contradict what is said, for example, by Gabaix and Landier (2008), Murphy (1985), Baumol (1959) and Marris (1963), presenting a negative coefficient at a significance level of 1%, which indicates that as the company size decreases, the CEO remuneration increases. This can also be a sign of agency problems, since the smaller the company, the more power the CEO has, and he can earn a higher salary.

The variable that represents the Equity Held by the CEO (EqHeld) shows a negative coefficient on the first two regressions of the **Table 20** and a positive coefficient in the third and fourth regressions, presenting significance at a level of 1% when we consider the Variable Compensation (LOGVCOMP) as dependent variable (coefficient of -0,009 - **Table 20** – Panel A). The negative coefficient of the variable means that lower percentage of shares held by the CEO, the greater his/her remuneration. This correlation can be explained by the fact that this variable may be a type of compensation that is non-cash remuneration that translates into ownership in the firm (Mehran, 1995), so the more stock the CEOs have, the lower their cash compensation will be.

The variable that represents the number of independent members of the company (IndMembers) presents a positive coefficient in all four regressions made and significance in almost all of them. These results mean that the more independent members are on the Board of Directors of a company, the higher the CEO's compensation.

Although the results from the **Table 20** – Panel B, we can take some conclusions by the presented values. From the four regressions presented, it is when we use the Total

Compensation (LOGTCOMP) as independent variable (without being an instrumental variable) that we have a higher level of R^2.

Taking into account the relationship between pay and performance, we can conclude from the results that there is a positive relationship. These results are in accordance with the Panel A and with the Arm's Length approach (Duffhues & Kabir, 2008), which leads us to conclude that the executive compensation has been designed by the Board with proper incentives to create value to the shareholders and to the firm.

In the Risk side, it is presented a negative relationship between this variable and the performance of the firm (ROA), which means that a firm that engage in risky situations, it is not the firm that presents the better results in the end of the year. This is confirmed by Sigler (2011) when they say that this is related with agency problems. Sometimes managers are induced in engage in activities that produce problems for firms and, thus, creating agency problems; and firms with greater agency problems perform worse (Core *et al*., 1999).

As Bebchuk *et al*. (2011) concluded and in accordance with the results of the Panel A, in Panel B, we can see a negative correlation between the pay slice and firm performance, which could reflect agency and governance problems.

Analyzing the results from the **Table 20** – Panel B, it is possible to conclude that there is a significant relationship between firm performance (ROA) and the board composition (IndMembers). Since we achieved positive coefficients in this relationship, we can conclude that a higher number of independent members in the composition of the Board of a company brings a higher level of performance measured by ROA. The independents members act as mediators on the relationship between management and shareholders and they try to fulfill the information gap between the shareholders and executive managers, contributing for the resolution of agency problems. These conclusions are in accordance with what was said in the study of Mehran (1995) but contradicts his results, since he found no significant relationship between firm performance and board composition.

To the regression of the equations (1) and (2), it was introduced the variables related to activity sector and the moment of the financial crisis, in order to control the influence of the activity sector and the crisis on the problem of this study.

$$LOGVCOMP_{i,j} = \beta_0 + \beta_1 ROA_{i,j} + \beta_2 Risk_{i,j} + \beta_3 Duality_{i,j} + \beta_4 Tenure_{i,j} + \beta_5 LOGASSETS_{i,j} + \beta_6 EquityHeld_{i,j} + \beta_7 IndependentMembers_{i,j} + \beta_8 DebtRatio_{i,j} + \beta_{9,\dots,16} ActivitySector_{i,j} + \beta_{17} CrisisD_{i,j} + \mu \quad (3)$$

$$ROA_{i,j} = \gamma_0 + \gamma_1 LOGVCOMP_{i,j} + \gamma_2 Risk_{i,j} + \gamma_3 Duality_{i,j} + \gamma_4 Tenure_{i,j} + \gamma_5 LOGASSETS_{i,j} + \gamma_6 EquityHeld_{i,j} + \gamma_7 IndependentMembers_{i,j} + \gamma_8 IATA_{i,j} + \gamma_{9,\dots,16} ActivitySector_{i,j} + \gamma_{17} CrisisD_{i,j} + \vartheta \quad (4)$$

Table 21 *– The Complete Model – The Impact of the Crisis and the Activity Sector*

This table shows the results of the impact of the Remuneration of the CEO on the Performance of the company on Panel A and the impact Perfomance of the company on the Remuneration of the CEO on Panel B.

LOGTCOMP is the natural logarithm of the absolute value of the Total Remuneration of the CEO; LOGVCOMP is the natural logarithm of the absolute value of the Variable Remuneration of the CEO; RemVar is the percentage of the Variable Remuneration of the CEO; ROA is the Return On Assets ratio that measures the performance of the company; Risk is the variance of the weekly returns; Duality is a dummy variable that equals to one when the CEO also holds the position of the Chairman of the board and zero otherwise; Tenure is the number of years that a CEO remains in his job; Payslice is the percentage of the total compensation paid to the executives of the Board that belongs to the CEO; LOGAss is the natural logarithm of the absolute value of the Total Assets of the company; EqHeld is the percentage of the number of shares held by the CEO of a company; IndMembers is the number of Independent Members of the company; IATA is the Intangible Assets to Total Assets Ratio of the companies; and, DebtRatio is the Debt Ratio of the companies, CrisisD is the dummy variable of the moment of the crisis; ConsGoods means the companies that belong to the Consumer Goods Actitvity Sector; Utili means the companies that belong to the Utilities Activity Sector; ConServ means the companies that belong to the Consumer Services Activity Sector; Indus means the companies that belong to the Industrials Activity Sector; Tech means the companies that belong to the Tecnology Activity Sector; and, Telecom means the companies that belong to the Telecommunication Activity Sector.

*significant coefficient for a level of significance of 10%

** significant coefficient for a level of significance of 5%

*** significant coefficient for a level of significance of 1%

Panel A: Results of the Equation (5)

	Equation (5)			
	LOGVCOMP	LOGTCOMP	RemVar	PaySlice
Constant	7,180***	6,403***	86,255***	25,619*
	(0,000)	(0,000)	(0,000)	(0,092)
ROA	-0,028	0,022	-1,939	-2,231*

	(0,520)	(0,280)	(0,165)	(0,077)
Risk	-0,085**	-0,053**	-2,752	-0,557
	(0,070)	(0,053)	(0,171)	(0,759)
Duality	0,098	-0,239***	-8,022**	2,188
	(0,594)	(0,000)	(0,050)	(0,552)
Tenure	0,007	0,005**	0,399**	0,385**
	(0,256)	(0,043)	(0,043)	(0,030)
LOGAss	-0,208***	-0,068***	-6,055***	2,154
	(0,000)	(0,003)	(0,000)	(0,166)
EqHeld	-0,006*	-0,001	0,078	0,154
	(0,109)	(0,469)	(0,603)	(0,251)
IndMembers	-0,086	0,172	17,264	36,276***
	(0,804)	(0,611)	(0,196)	(0,003)
DebtRatio	-0,170	-0,089	-28,563**	-34,017***
	(0,605)	(0,655)	(0,040)	(0,007)
CrisisD	-0,012	-0,089**	-1,837	-0,809
	(0,923)	(0,037)	(0,558)	(0,775)
Utili	0,101	0,233*	-12,878	-1,315
	(0,674)	(0,102)	(0,199)	(0,884)
ConsGoods	0,379	0,156	5,136	-1,611
	(0,113)	(0,223)	(0,568)	(0,843)
ConServ	-0,402***	-0,241**	-21,387***	-2,672
	(0,017)	(0,027)	(0,002)	(0,663)
Indus	-0,435***	-0,231**	-17,815***	-3,575
	(0,006)	(0,030)	(0,007)	(0,546)
Tech	-0,326	-0,527***	-29,303***	0,086
	(0,173)	(0,000)	(0,000)	(0,989)
Telecom	0,580***	0,184*	16,673**	-6,937
	(0,008)	(0,106)	(0,036)	(0,333)
Adj R2	0,281	0,295	0,046	-0,527

Panel B: Results of the Equation (6)

Equation (6)

	ROA			
	(1)	(2)	(3)	(4)
Constant	-899,296	-1862,566*	-42,114	3,937
	(0,896)	(0,067)	(0,260)	(0,574)
LOGVCOMP	128,601			
	(0,895)			
LOGTCOMP		30,758**		
		(0,054)		
RemVar			0,604	
			(0,164)	
PaySlice				0,488**
				(0,058)
Risk	10,147	1,417	0,282	-1,056
	(0,897)	(0,266)	(0,816)	(0,213)
Duality	4,232	7,987**	9,276*	3,196**
	(0,761)	(0,024)	(0,099)	(0,058)

Tenure	-1,206	-0,178	-0,281	-0,226*
	(0,891)	(0,132)	(0,206)	(0,106)
LOGAss	24,267	1,928	2,643	-2,025**
	(0,899)	(0,239)	(0,331)	(0,034)
EqHeld	0,619	0,030	-0,157	-0,181*
	(0,902)	(0,627)	(0,170)	(0,054)
IndMembers	38,427	5,023	6,955	-0,975
	(0,880)	(0,233)	(0,202)	(0,870)
IATA	25,061	1,534	10,751*	10,341***
	(0,873)	(0,660)	(0,083)	(0,019)
CrisisD	9,924	2,969*	2,164	1,408
	(0,870)	(0,100)	(0,319)	(0,330)
Utili	-6,080	-7,712	6,308	-0,768
	(0,928)	(0,187)	(0,403)	(0,864)
ConsGoods	-41,073	-5,521	-6,401	-2,388
	(0,902)	(0,235)	(0,352)	(0,547)
ConServ	47,639	6,065	5,937	-5,409*
	(0,895)	(0,225)	(0,342)	(0,080)
Indus	58,206	6,100	6,308	-2,537
	(0,893)	0,210	(0,310)	(0,303)
Tech	38,392	15,246*	13,557	-4,023
	(0,893)	(0,085)	(0,195)	(0,262)
Telecom	-69,876	-6,211	-12,211	1,322
	(0,899)	(0,197)	(0,242)	(0,689)
Adj R2	-86,196	-1,239	-2,952	-1,127

Through the analysis of the **Table 21** – Panel A, we can verify that the introduction of the different activity sectors and the dummy related to the moment of the financial crisis felt in Portugal allowed a greater consistency in the adjusted R^2, compared to the previous regressions, and the proportion of variation explained by the model, when positive, is higher than 4,6% (considering the percentage of Variable Remuneration (RemVar)). The regression with the best adjusted R^2 is that in which the dependent variable used is the natural logarithm of the CEO's Total Remuneration (LOGTCOMP), and the proportion of variation explained by the model is approximately 30%.

By analyzing the estimated coefficients for the sectorial dummies, it can be noted that, for a significance level of 1%, the percentage of Variable Remuneration (RemVar) is higher in companies of the Telecommunications sector (coefficient of 16,673 - **Table 21**– Panel A). It is also possible to recognize that in the companies of the Utilities and Consumer Goods sectors, the estimated coefficients have little or no significance in all the four regressions made.

Regarding the estimated coefficients for the crisis dummy (CrisisD), we can realize that this control variable is only significant in the model, when considering the natural logarithm of the CEO's Total Remuneration (LOGTCOMP) as the dependent variable, for a significance level of 5%, being lower during the crisis period (coefficient of -0,089 - **Table 21** – Panel A).

Taking into account the remaining model variables, some changes can be observed after inserting these control dummy variables.

Regarding the company's performance, as measured by the ROA, it was no longer significant when considering the Total Remuneration (LOGTCOMP) as the dependent variable, and remain significant, for a significance level of 10%, when the CEO's Pay Slice (PaySlice) was considered the dependent variable (coefficient of -2,231 - **Table 21**– Panel A). These results lead us to conclude that a higher percentage of total remuneration of the Board paid to the CEO does not necessarily imply a better performance of the company.

The risk variable, after the changes, became significant when considering the Total Remuneration (LOGTCOMP) as the dependent variable (coefficient of -0,053 - **Table 21** – Panel A) and also when we considered the Variable Remuneration (LOGVCOMP) as the dependent variable (coefficient of -0,085 - **Table 21**– Panel A), for a significance level of 5%. These results lead us to similar conclusions: whenever the variable component of the remuneration increases, the risk of the company decreases.

Regarding the variables Duality and Tenure, after the introduction of the control variables, they became also significant when we considered the percentage of Variable Remuneration (RemVar) as the dependent variable, with a significance level of 10% and 5%, respectively. The variable Duality presents a negative coefficient, when we use Total Remuneration (LOGTCOMP) as dependent variable and a positive coefficient, when we use Variable Remuneration (LOGVCOMP) as dependent variable, which indicates that the variable component of the CEO's remuneration increases when CEO performs both functions, CEO and Chairman, possibly indicating agency problems. Regarding Tenure, positive coefficients are presented in the four regressions, which leads us to conclude what we already expected: the remuneration increases whenever the number of years that the CEO stays in the same position increases.

Regarding the size of the company, the results remain significant and the conclusions are similar to those that were said in the previous regressions, referring to equations (1) and (2).

The variable representing the equity held by the CEO (EqHeld) was no longer significant when considering the Total Remuneration (LOGTCOMP) as the dependent variable and became significant, for a significance level of 10%, when we consider the Variable Remuneration (LOGVCOMP) as the dependent variable (coefficient of -0,006 - **Table 21**– Panel A).

The variable that represents the Independent Members of the Board of Directors of the company (IndMembers) became only significant, for a level of significance of 1%, when we consider the percentage of the Total Remuneration of the Board paid to the CEO (PaySlice) as the dependent variable (coefficient of 36,276 - **Table 21**– Panel A).

According to the **Table 21**– Panel B, once again, we have no explanatory power on the regressions included in the model. However, we have some variables that show some significance throughout the regressions, such as when we use the natural logarithm of the CEO's Total Compensation (LOGTCOMP) or the CEO's Pay Slice (PaySlice) as independent variables (without being instrumental variables).

After we added the control variables, the relationship between pay and performance became positive. These results are in accordance with the Arm's Length approach that defends that the executive compensation is design with proper incentives to create value to shareholders and to the firm (Duffhues & Kabir, 2008).

6. Conclusions and Future Research

The influence of the CEO Remuneration on the recent financial crisis brings the issue of the Executive Compensation on the top of public debate as one of the most relevant at the economic and social level.

The present report was carried out in order to fill some gaps in the recent literature related to the Remunerations of the Chief Executive Officers (CEOs) of listed Portuguese companies on Euronext Lisbon.

This study has a sample composed of information of 37 Portuguese companies from 2008 to 2016. Several information was collected according to Corporate Governance of the company and also some accounting data, in order to respond to some hypotheses established in the beginning of this report.

The first hypothesis was to study the impact of the CEO's Remuneration on the performance of the companies. However, no empirical evidence has been found that, in Portugal, at the time of the recent financial crisis, the CEO's Remuneration is determined by the Performance of the company and vice versa, in other words, the company's Performance is not determined by the Remuneration of the CEO.

The second hypothesis was to ensure that high CEO's Remuneration would positively impact the risk appetite of CEOs, thereby causing corporate risk to increase as remunerations increase. It would be expected that companies that bet on riskier projects would better remunerate their managers. According to the study, what we conclude was exactly the opposite. In reality, as CEO Remuneration increases, corporate risk decreases, that is, the risk variable does not significantly determine Remuneration.

The third and last hypothesis tested deals with the power attributed to the figure of the CEO and the Remuneration of the same. Power was measured through variables such as duality, tenure and equity held. We tried to see if, as these variables increased, CEO Remuneration would increase, and the final conclusion goes against what has already been achieved by most of the literature: remuneration increases with increasing CEO power. A regression was also performed in which the variable CEO's Pay Slice would be the dependent variable. CEO's Pay Slice represents the percentage of the CEO's Remuneration over the total remuneration paid to the Board of Directors members and it was possible to conclude that as the power variables increased, the CEO's Pay Slice

variable also increased, as expected, because they both represent the power of the CEO in a company.

As concluded in previous studies, such as Nascimento (2009), we can conclude that preponderant factor for the determination of Remuneration does not necessarily pass through the Performance of the Company, but rather through its Dimension.

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8. Appendix

Table 22 *– Listed firms of the sample*

This table shows the list of all listed firms of the sample, containing information about the composition of their Board and the name of the CEO that was in charge on the beginning of this study (2008) and the one that was in charge in the end of the study (2016).

	Members of the Board[12] (2016)			CEO	
Corporation	**Executive**	**Non-Executive**		**2008**	**2016**
		Independent	**Non-Independent**		
1. ALTRI	4	0	3	Paulo Fernandes	Paulo Fernandes
2. BCP – MILLENIUM	-	-	-	-	-
3. BPI	-	-	-	-	-
4. Banco Santander	-	-	-	-	-
5. Benfica	-	-	-	-	-
6. Cofina	2	0	3	Paulo Fernandes	Paulo Fernandes
7. Compta	5	0	0	Armindo Monteiro	Armindo Monteiro
8. Corticeira Amorim	3	0	3	António Amorim	António Amorim
9. CTT Correios	5	6	1	Estanislau Costa	Francisco de Lacerda
10. EDP	7	0	0	António Mexia	António Mexia
11. EDP Renováveis	5	10	2	António Mexia	João Neto
12. Estoril Sol	4	0	7	Stanley Ho	Pansy Ho
13. F. Ramada	4	0	1	João de Oliveira	João de Oliveira
14. FCP	-	-	-	-	-
15. Galp	7	5	7	Manuel de Oliveira	Carlos da Silva
16. Glintt	5	1	8	Fernando Freire	Nuno Lopes
17. Ibersol	2	1	0	António Teixeira	António Teixeira
18. Imobiliária Construtora Grão-Pará	2	0	1	Abel Pinheiro	Abel Pinheiro

[12] According to the Instituto Português de Corporate Governance, there are three types of members of the Board: independents, executives and non-executives. The executive member is the one who actively performs management functions; the non-executive member is the one who does not perform management functions and he is not linked to the company; the independent member is the one who is not associated to the company's interests and he is not in a position to affect his exemption from analysis or decision.

19. Impresa	1	3	4	Francisco Pinto Balsemão	Francisco Pedro Pinto Balsemão
20. Inapa	4	4	0	José Morgado	Diogo Rezende
21. ISA - Intelligent Sensing Anywhere	-	-	-	-	-
22. Jerónimo Martins	1	3	7	-	Pedro Soares dos Santos
23. Lisgráfica	3	0	1	-	Luciano Patrão
24. Luz Saúde	4	4	0	Isabel Vaz	Isabel Vaz
25. Martifer	3	2	1	Carlos Martins	Jorge Martins
26. Media Capital	1	3	3	Manuel Polanco	Rosa Cullell
27. Mota Engil	8	3	6	Jorge Coelho	Gonçalo Martins
28. Nexponor - Sicafi	-	-	-	-	-
29. NOS	5	5	6	Rodrigo Costa	Miguel Almeida
30. Novabase	2	0	2	Luís Salvado	Luís Salvado
31. Orey Antunes	2	6	0	Duarte D'Orey	Duarte D'Orey
32. Patris	-	-	-	-	-
33. Pharol	2	4	5	Zeinal Bava	Luís Silva
34. Reditus	2	0	3	Frederico Rato	Francisco Ramos
35. REN	3	4	5	José Penedos	Rodrigo Costa
36. SAG Gest	-	-	-	-	-
37. SDC Investimentos	2	1	1	Pedro Gonçalves	António Henriques
38. Semapa	4	2	5	Pedro Pereira	Pedro Pereira
39. SONAE	2	7	0	Duarte de Azevedo	Duarte de Azevedo
40. SONAE Capital	3	2	2	Belmiro de Azevedo	Maria Cláudia de Azevedo
41. SONAE Com	2	7	7	Angelo Paupério	Angelo Paupério
42. Sporting	-	-	-	-	-
43. SUMOL+COMPAL	4	3	0	Duarte Pinto	Duarte Pinto

44. Teixeira Duarte	8	0	0	-	Pedro Teixeira Duarte
45. The Navigator	3	0	9	José Honório	Diogo da Silveira
46. Toyota Caetano	5	0	3	Salvador Caetano	José Ramos
47. VAA - Vista Alegre Atlantis	5	0	2	Bernardo Souza	Lázaro de Sousa

***Table 23** – Dependent and Independent Variables*

Name	Definition
LOGTCOMP	The natural logarithm of the absolute value of the Total Remuneration of the CEO.
LOGVCOMP	The natural logarithm of the absolute value of the Variable Remuneration of the CEO.
RemVar	The percentage of the Variable Remuneration of the CEO.
PaySlice	The percentage of the total compensation paid to the executives of the Board that belongs to the CEO.
ROA	The Return on Assets ratio that measures the performance of the company.
Risk	The variance of the weekly returns.
Duality	A dummy variable that equals to one when the CEO also holds the position of the Chairman of the board and zero otherwise.
Tenure	The number of years that a CEO remains in his job.
LOGAss	The natural logarithm of the absolute value of the Total Assets of the company.
EqHeld	The percentage of the number of shares held by the CEO of a company.
DebtRatio	The Debt Ratio of the companies.
IATA	The Intangible Assets to Total Assets Ratio of the companies.

***Table 24** - Descriptive Statistics for the Performance of the Companies per year*

This table shows a summary of descriptive statistics for the performance of the companies of the sample, measured by the Return on Assets (ROA), that is the ratio of EBIT to the book value of the firm's total assets.

	Mean	Median	Minimum	Maximum
2008	3,57%	3,47%	-19,63%	30,12%
2009	4,21%	4,52%	-25,63%	18,68%
2010	2,87%	4,47%	-46,44%	23,50%
2011	5,22%	4,25%	-6,39%	32,31%
2012	4,78%	4,28%	-14,82%	35,93%
2013	3,65%	4,05%	-39,05%	36,47%
2014	4,96%	4,81%	-10,00%	24,04%
2015	3,78%	2,69%	-7,20%	24,70%
2016	2,71%	1,94%	-29,85%	35,86%
TOTAL	3,97%	4,25%	-46,44%	36,47%

***Table 25** - Descriptive Statistics for the Performance according to the Benchmark per year*

This table shows a summary of descriptive statistics for the performance of the companies of the sample, measured by the Return on Assets (ROA), that is the ratio of EBIT to the book value of the firm's total assets, according to a benchmark. This benchmark was computed using a ratio: ROA of the company to the ROA of the activity sector of each company of the sample, in order to measure the performance of the companies, according to the sector in which they are inserted.

	Mean	Median	Minimum	Maximum
2008	-6,41%	33,44%	-1016,00%	217,51%
2009	50,21%	53,95%	-476,31%	263,81%
2010	38,91%	33,11%	-391,00%	267,80%
2011	107,21%	55,37%	-145,25%	970,59%
2012	101,93%	57,49%	-1073,76%	1473,97%
2013	12,15%	43,80%	-1525,32%	375,95%
2014	40,27%	50,06%	-198,33%	183,80%
2015	29,21%	28,42%	-259,15%	233,90%
2016	17,34%	18,21%	-356,67%	233,90%
TOTAL	43,43%	43,80%	-1525,32%	1473,97%

***Table 26 -** Descriptive Statistics for the Composition of the Board of Directors per year*

This table shows a summary of descriptive statistics for the number of the members of the Board of Directors, as well as for its composition of executives, non-executives and independent members and the existence of a Remuneration Committee, per each year in our study.

		Total	Executives	Non Executives	Independents	Remuneration Committee
2008	Mean	8,88	4,41	4,47	1,84	2,63
	Minimum	3	2	0	0	0
	Maximum	21	9	17	9	4
2009	Mean	9,15	4,41	4,68	1,59	2,52
	Minimum	3	2	0	0	0
	Maximum	25	9	18	10	3
2010	Mean	9,34	4,31	5,09	1,77	2,54
	Minimum	3	2	0	0	0
	Maximum	20	9	16	10	3
2011	Mean	9,53	4,42	5,11	1,61	2,69
	Minimum	3	2	0	0	0
	Maximum	24	9	17	8	3
2012	Mean	9,73	4,11	5,62	1,84	2,62
	Minimum	3	1	0	0	0
	Maximum	24	9	17	8	3

2013	Mean	9,78	4,05	5,73	2,16	2,59
	Minimum	3	1	0	0	0
	Maximum	21	9	14	9	3
2014	Mean	9,46	3,78	5,68	2,43	2,59
	Minimum	3	0	0	0	0
	Maximum	20	7	18	9	3
2015	Mean	8,81	3,59	5,22	2,16	2,76
	Minimum	3	1	0	0	0
	Maximum	19	7	12	9	3
2016	Mean	8,53	3,64	4,89	2,14	2,72
	Minimum	3	1	0	0	0
	Maximum	19	8	12	10	3

Table 27 - *Descriptive Statistics for the Total Remuneration (in €) of the CEO of a company per year*

This table shows a summary of descriptive statistics for the Total Remuneration of the Chief Executive Officer (CEO) of a company, per each year in our study.

	Number of Observations	Mean	Median	Minimum	Maximum
2008	32	428034,67	338169,46	34837,11	1534805,50
2009	34	521318,15	327975,91	33459,00	2525093,00
2010	35	519243,34	376750,00	59357,06	1532491,00
2011	35	550620,20	378017,00	59357,06	2355943,00
2012	36	501678,97	365522,33	59357,06	1794430,00
2013	37	509577,34	350320,00	21199,00	1770108,43
2014	37	435251,35	390850,00	0	1719000,00
2015	37	492648,90	355917,00	0	2039211,00
2016	35	450984,57	299687,00	0	1514246,00
TOTAL	318	489928,61	355917,00	0	2525093,00

	Mean (Log)
2008	12,97
2009	13,16
2010	13,16
2011	13,22
2012	13,13
2013	13,14
2014	12,98
2015	13,11
2016	13,02
TOTAL	13,10

Table 28 - *Descriptive Statistics for the Fixed Remuneration (in €) of the CEO of a company per year*

This table shows a summary of descriptive statistics for the Fixed Remuneration of the Chief Executive Officer (CEO) of a company, per each year in our study.

	Number of Observations	Mean	Median	Minimum	Maximum
2008	32	290395,67	250347,50	34837,11	700567,25
2009	34	322078,44	252950,00	33459,00	1069600,00
2010	35	362765,54	365400,00	49182,00	1069600,00
2011	35	342607,31	317166,09	0,00	1069600,00
2012	36	322235,70	280687,92	10500,00	1069600,00
2013	37	323171,90	280000,00	21199,00	1069600,00
2014	37	310357,26	301944,00	0,00	1069600,00
2015	37	319778,01	279750,00	0,00	972740,68
2016	35	303072,44	241800,00	0,00	983908,00
TOTAL	318	321829,14	280000,00	0,00	1069600,00

	Mean (Log)
2008	12,58
2009	12,68
2010	12,80
2011	12,74
2012	12,68
2013	12,69
2014	12,65
2015	12,68
2016	12,62
TOTAL	12,68

Table 29 - *Descriptive Statistics for the Variable Remuneration (in €) of the CEO of a company per year*

This table shows a summary of descriptive statistics for the Variable Remuneration of the Chief Executive Officer (CEO) of a company, per each year in our study.

	Number of Observations	Mean	Median	Minimum	Maximum
2008	32	137639,00	50019,55	0,00	834238,25
2009	34	199239,71	57582,00	0,00	1813507,00
2010	35	156477,80	46662,00	0,00	721921,00
2011	35	208012,89	1386,00	0,00	1660905,00
2012	36	179443,28	46440,62	0,00	1099392,00
2013	37	186405,44	61800,00	0,00	1339800,00
2014	37	124894,10	17118,29	0,00	778800,00
2015	37	172870,89	935,34	0,00	1578511,00
2016	35	147912,13	2500,00	0,00	1053546,00
TOTAL	318	168099,47	46440,62	0,00	1813507,00

	Mean (Log)
2008	11,83
2009	12,20
2010	11,96
2011	12,25
2012	12,10
2013	12,14
2014	11,74
2015	12,06
2016	11,90
TOTAL	12,03

Table 30 - *Descriptive Statistics for Percentage of Variable Remuneration of the CEO per year*

This table shows a summary of descriptive statistics for the percentage of variable remuneration of the CEO.

	Mean	Median	Minimum	Maximum
2008	22,09%	19,72%	0,00%	70,75%
2009	23,70%	20,88%	0,00%	71,82%
2010	20,31%	20,00%	0,00%	61,89%
2011	23,22%	0,35%	0,00%	100,00%
2012	23,56%	14,04%	0,00%	94,69%
2013	24,26%	15,90%	0,00%	75,69%
2014	17,82%	6,67%	0,00%	73,46%
2015	19,44%	0,52%	0,00%	77,41%
2016	20,06%	0,80%	0,00%	69,58%
TOTAL	21,61%	14,04%	0,00%	100,00%

Table 31 - *Descriptive Statistics for the CEO's pay slice per year*

This table shows a summary of descriptive statistics for the percentage of the total compensation paid to the executives of the Board that belongs to the CEO.

	Mean	Median	Minimum	Maximum
2008	35,94%	30,00%	6,35%	86,58%
2009	35,01%	34,28%	2,35%	77,36%
2010	34,59%	36,12%	0,54%	76,84%
2011	36,20%	32,08%	12,49%	85,23%
2012	35,09%	30,60%	12,25%	74,43%
2013	35,17%	30,64%	11,42%	79,89%
2014	30,97%	27,85%	0,00%	74,52%
2015	32,79%	27,54%	0,00%	82,52%
2016	36,25%	32,79%	0,00%	100,00%
TOTAL	34,67%	30,64%	0,00%	100,00%

Table 32 -– *Descriptive Statistics for the Proportion of Capital of the company held by the CEO per year*

This table shows a summary of descriptive statistics for the percentage of the number of shares held by the CEO of a company, per each year in our study.

	Mean	Median	Minimum	Maximum
2008	4,12%	0,05%	0,00%	74,62%
2009	4,05%	0,02%	0,00%	72,72%
2010	4,17%	0,07%	0,00%	73,42%
2011	4,52%	0,01%	0,00%	79,01%
2012	4,53%	0,06%	0,00%	79,39%
2013	4,27%	0,01%	0,00%	77,11%
2014	4,23%	0,00%	0,00%	77,11%
2015	4,25%	0,00%	0,00%	77,50%
2016	4,48%	0,01%	0,00%	77,50%
TOTAL	4,29%	0,01%	0,00%	79,39%

Table 33 *– Descriptive Statistics for the Tenure of the CEO per year*

This table shows a summary of descriptive statistics for the number of years that a CEO remains in his job.

	Mean	Median	Minimum	Maximum
2008	7,21	3	0	48
2009	7,31	3	0	49
2010	7,60	4	0	50
2011	6,78	4	0	29
2012	6,86	5	0	30
2013	7,03	6	0	31
2014	6,38	5	0	24
2015	7,00	6	0	25
2016	7,20	5	0	26
TOTAL	7,04	5	0	50

Table 34 - *Descriptive Statistics for the Duality of the CEO per year*

This table shows a summary of descriptive statistics for the duality of a CEO.

	Mean	Median	Minimum	Maximum
2008	0,56	1	0	1
2009	0,51	1	0	1
2010	0,49	0	0	1
2011	0,53	1	0	1
2012	0,49	0	0	1
2013	0,43	0	0	1
2014	0,51	1	0	1
2015	0,49	0	0	1
2016	0,49	0	0	1
TOTAL	0,50	0	0	1

Table 35 - *Descriptive Statistics for the Standard Deviation of Weekly Returns per year*

This table shows a summary of descriptive statistics for the standard deviation of weekly returns of the companies. We used the natural logarithm of the standard deviation volatility calculated over 2008-2016.

	Number of Observations	Mean	Median	Minimum	Maximum
2008	33	0,277	0,076	0,024	6,672
2009	33	0,068	0,050	0,020	0,394
2010	34	0,443	0,043	0,021	13,142
2011	34	0,084	0,054	0,014	0,437
2012	34	0,090	0,050	0,022	0,497
2013	35	0,066	0,049	0,022	0,270
2014	36	0,077	0,055	0,017	0,286
2015	36	0,072	0,053	0,029	0,388
2016	36	0,104	0,049	0,027	1,409
TOTAL	311	0,142	0,050	0,014	13,142

Table 36 - *Descriptive Statistics for the Debt Ratio per year*

This table shows a summary of descriptive statistics for the Debt Ratio of the companies. This ratio was computed as the sum of long-term and short-term debt to the total assets

	Number of Observations	Mean	Median	Minimum	Maximum
2008	37	24,12%	22,46%	0,00%	65,55%
2009	37	24,54%	23,26%	0,00%	77,44%
2010	36	23,49%	26,92%	0,00%	72,13%
2011	37	22,95%	24,10%	0,00%	72,49%
2012	37	20,63%	16,51%	0,00%	53,88%
2013	37	26,04%	27,08%	0,00%	90,71%
2014	37	24,66%	25,67%	0,00%	68,96%
2015	35	21,14%	16,52%	0,00%	76,39%
2016	34	20,18%	13,33%	0,00%	69,45%
TOTAL	327	23,09%	23,26%	0,00%	90,71%

Table 37 – *Descriptive Statistics for the Intangible Assets to Total Assets Ratio per year*

This table shows a summary of descriptive statistics for the Intangible Assets to Total Assets Ratio of the companies.

	Number of Observations	Mean	Median	Minimum	Maximum
2008	37	18,01%	8,95%	0,00%	84,16%
2009	37	20,86%	13,35%	0,00%	84,38%
2010	36	21,33%	12,65%	0,00%	78,01%
2011	37	21,31%	12,07%	0,00%	76,68%
2012	37	22,39%	14,69%	0,00%	83,12%
2013	37	21,47%	14,27%	0,00%	87,00%
2014	37	18,59%	10,83%	0,00%	83,50%
2015	35	13,32%	3,66%	0,00%	89,32%
2016	34	12,96%	2,11%	0,00%	98,72%
TOTAL	327	18,92%	12,07%	0,00%	98,72%