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CEO compensation as a mechanism to induce firm performance

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# **CEO compensation as a mechanism to induce firm performance**

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## **Abstract**

Over the past few decades, academic literature, specifically on agency theory and executive compensation, has argued that CEO compensation should be aligned to firm performance in order to increase shareholder value.

Nevertheless, some studies present the contrary idea, in which no link between performance and compensation can be established.

This thesis analyses the relationship between firm performance and CEO compensation regarding Portuguese listed firms in the period of 2008-2013. No statistical evidence was found linking firm performance and CEO compensation, even after introducing governance and financial control variables as well as performing small sampling analysis of the top performers.

**Keywords:** Executive compensation; Pay-performance relationship; Corporate Governance; Portugal;

**JEL Classification System:** G30; G34; J32; J33;

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## 1. INTRODUCTION

Over the past few decades, academic literature, specifically on agency theory and executive compensation, has argued that CEO compensation should be aligned to firm performance in order to increase shareholder value (e.g. Jensen and Meckling (1976), Banker and Datar (1989), Hall and Liebman (1998), Core, Guay and Larcker (2003), among others).

Nevertheless, some studies present the contrary idea, in which no link between performance and compensation can be established (e.g. Bebchuk and Fried (2004)). This is due essentially to 4 main reasons:

- 1) executive pay is too high;
- 2) CEO contracts do not provide enough incentives (too little pay for performance);
- 3) Options and other equity-based pay provide “windfalls”;
- 4) CEOs have too much freedom to unwind their incentives.

In Portugal, following several recent scandals of the CEO power over the board, firm bankruptcy and questioning over if pay for performance is not only a buzzword, some codes and laws have been put in place regarding corporate governance, some EU directives adopted and creation of laws mandating the specification of compensation packages, among others.

Moreover, new controls, mechanism of checks and balances and information transparency guidelines have been adopted recognizing the inherent value they bring to each firm.

One must ask if any of the 4 conclusions from Bebchuk and Fried (2004) is applicable to the Portuguese case. Is pay without performance evidenced in Portuguese listed firms?

At first glance, looking at the topic from this perspective (decoupling performance and compensation) and assuming it is a valid proposition, the conclusions might derive from:

- Performance incentives are not indexed to total CEO pay (e.g. in Portugal fixed salary component is commonly used as total CEO pay) and, therefore, firm performance is independent from CEO pay;
- Contracts are inefficient, as they do not incorporate enough risk-taking mechanisms to boost performance (e.g. incentives are not linked with risk taking decisions that act as a way to reward CEO when firm performance is good (carrot) but do not act like the stick when firm performance is bad);

- Risk aversion is a common trait, from CEOs to shareholders, which influences performance and therefore total CEO pay;

The main purpose of this thesis is to examine whether total compensation paid to CEOs in Portuguese firms explains firm performance and whether the perspective of pay without performance is not valid.

Two hypotheses are constructed around the concept of pay for performance:

- The first hypothesis aims to test if there might be a statistically significant relationship between firm performance and CEO compensation;
- Additionally, if there is a statistically significant relationship, it is intended to further test the following additional hypothesis: the higher the weight of the variable parcel in total compensation earned by the CEO, the better the firm's performance.

The thesis scope is the Portuguese listed firms for the 2008 – 2013 period.

## 2. CONTEXT

The CFA Institute (2012) defines Corporate Governance as “(...) *the system of principles, policies, procedures, and clearly defined responsibilities and accountabilities used by stakeholders to overcome the conflicts of interest inherent in the corporate form*”.

According to the OECD (1999), on the other hand, Corporate Governance addresses the creation of relationships between management, the board, the shareholders and other stakeholders and provides the structure through which the objectives are defined for the company as well as the means for their reach. Additionally, Corporate Governance should also develop incentives and an effective model and method for monitoring those relations as well as also encouraging firms to use their resources more efficiently.

Therefore, Corporate Governance, is the means through which different stakeholders connect to the firm.

This topic, as well as the topic of roles separation between shareholders and managers goes back to the twentieth decade in the XX century. In 1932, Berle and Means, casted light on the growing trend of roles separation between management and shareholders in listed firms, due to the fact that, as the role of the shareholder became more disperse and vast, more intense was the need for specific management roles. About 40 years later, Mace's work (1971), highlighted the misalignment between shareholders expectations versus management roles regarding goal definition as well as strategy and politics for the firm.

Corporate Governance is a multifaceted and vast theme (between performance, compliance, compensation, ...) where there is no shortage of topics to address. As such, it is acceptable that literature is also wide and vast. For the purpose and scope of this thesis I have compiled the relevant literature from a number of authors throughout the XX and XXI centuries, in a number of countries that will try to summarize Corporate Governance main topics, which will be presented onward.

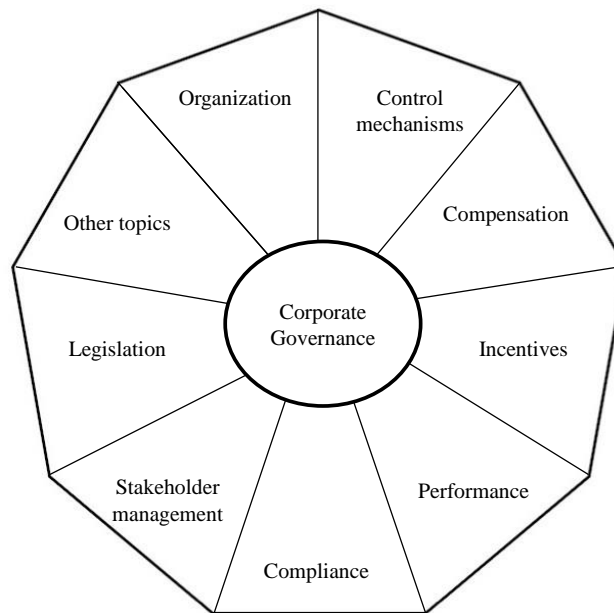


Figure 1 – Relevant themes in Corporate Governance

In the 80s decade of the XX century, the relevant research came from Baysinger and Butler (1985) narrating the effects on firm performance given changes on board composition as well as the work from Mintzeberg (1984) regarding the aspect of firm ownership.

In the 90s, one of the highlights was the extremely relevant work summarized in the Cadbury Report (1992) regarding the role of non-executive directors as well as the check and balance mechanisms necessary to mitigate abuse of power as well as protect shareholder rights. In this report, it was recommended the widespread presence of non-executive directors in the firm's committees, the creation of several committees (in particular the audit, nomination and compensation committees) and implementation of split responsibilities between chairman and CEO.

Specifically regarding compensation, one must emphasize the work from Sir Richard Greenbury (1995), which called out the need for full disclosure of paid compensation as well as sector independent best practice codes. Additionally, the report also stated the necessity for compensation committees to incorporate non-executive directors in order to achieve greater control on compensation packages (the board recommendation making mechanism).

The Turnbull Report (1999) is another milestone for Corporate Governance, specifically regarding the introduction of internal control mechanisms and their reporting standards on code adherence on the subjects of financial and operational risk management.

In the beginning of the XXI century, Sarbanes-Oxley (2002) brought to the table additional control procedures regarding the check and balance mechanisms and internal controls with the ultimate goal of achieving power segregation and bigger transparency on financial reporting.

The UK Combined Code (2003), also in the beginning of the century, compiled a list of recommendations and principles regarding independence, diligence, professional development and board evaluation.

In Portugal, the first highlights are the recommendations of the CMVM – Comissão de Mercado de Valores Mobiliários (1999 and 2003) as well as the White Book of Corporate Governance by the Instituto de Corporate Governance (2006).

Regarding Portuguese law, two codes, “Sociedades Comerciais” and “Valores Mobiliários” present a set of rules regarding firm management, shareholder rights and information duties which address some relevant Corporate Governance areas.

Additionally, specifically for listed firms, the “Código de Governo das Sociedades” (2007, rev. 2010) and CMVM Rule n.º1/2010 also apply.

In 2014 the “Código de Governo das Sociedades” was introduced by the Instituto Português de Corporate Governance, which as it itself describes *“embodies, as a means of promoting good corporate governance practices, the civil society response to the call of national companies and a broad community of stakeholders on matters of corporate governance that, in these areas, Portugal approached the international standard of self-regulation..”*

*In this context, the Portuguese Institute of Corporate Governance is committed to designing an alternative to the current striking feature, based on the centrality of the regulator in the production process of recommendations. and makes available to all companies an alternative to the CMVM Code, being its natural recipients, primarily, listed firms, particularly issuers admitted to trading on a regulated market. Founded on the rule of “comply or explain”, the Code aims to ensure IPCG easier firm compliance and meet the difficult goal of making it very adaptable to heterogeneous realities of its recipients<sup>12</sup>.”*

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<sup>1</sup> Translated from Portuguese by the thesis author.

<sup>2</sup> As described on IPCG website -

[http://www.cgov.pt/index.php?option=com\\_content&task=view&id=773&Itemid=1](http://www.cgov.pt/index.php?option=com_content&task=view&id=773&Itemid=1) (25-08-2014).

There are several developed codes throughout the world, which some have only been presented here. This is, naturally, not an exhaustive list. It only intends to present a part of the history developed so far from several studies and codes.

Regarding the several aspects of the relationship with stakeholders there are several theories and hypothesis.

Onward, I will be presenting the most relevant theories in the context of Corporate Governance with a bigger focus on Agency Theory, given its relevance for the thesis.

In summary, all the theories can be organized under different perspectives:

Economical	Legal	Organizational	Conceptual	Other
Agency Theory	Stewardship Theory	Resource Dependency Theory	Systems Theory	Psychological Theories
Transaction Cost Economics	(...)	(...)	(...)	Stakeholder Theory
(...)				(...)

Table 1 – Framework of different theories under several perspectives

### 3. LITERATURE REVIEW

#### 3.1. INTRODUCTION

On this chapter it will be presented a set of theories that address and contextualize Corporate Governance and the compensation theme, specifically, as well as firm performance and measurement variables.

#### 3.2. GENERAL CORPORATE GOVERNANCE THEORIES

##### 3.2.1 AGENCY THEORY

According to Smith (1776), Berle and Means (1932) or most recently Helm (1989), by the action of hedging investment risk, firm growth and management professionalization there is a progressive trend of role specialization between shareholders and firm managers. These reasons present coordination problems and enforces the creation of a number of incentives and a monitoring model for the action/decisions taken by the manager in order to guarantee their alignment with the interests of the shareholders (what is known as the agency dilemma).

One of the main theories to address the agency dilemma, the ability to monitor actions/decisions taken by the manager and the creation of incentives in order to align manager interests with the shareholder rights and maximization of firm value is the Agency Theory, written by Jensen and Meckling in 1976. This theory is both framed within Corporate Governance and Corporate Finance.

The theory was lately developed by other authors such as Fama (1980), Fama and Jensen (1983), Demsetz and Lehn (1985), Jensen (1986) and Williamson (1988).

The agency theory is built upon the premise that the separation between management (executed by managers) and firm control (assets owned by the shareholders) impacts the relationship between these two roles, which is then characterized by being an agency relationship, given that the principal hires the agent in which he delegates the firms decisions. Given that both roles are utility function maximizers this can lead to different goals, many of which are contradictory.

The rationale behind this concept is that it is plausible that managers/agents might not always perform/act in the shareholders/principals best interest.

Jensen and Meckling (1976) argue that it is virtually impossible that the agent always acts, in any given time or decision made, in the shareholders best interest.

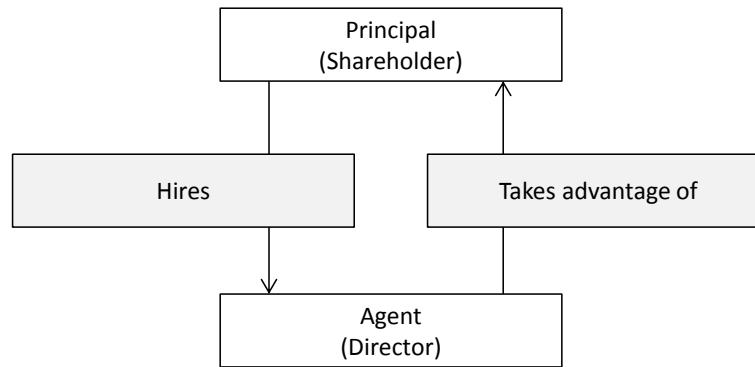


Figure 2 – Principal-agent relationship

The figure above is described as “The governance relationship”, adapted from “Corporate Governance Principles, Policies and Practices” by Bob Tricker, and provides a full insight over the principal and agent relationship.

The main factors that limit the ability to align shareholder and managers interests, among several others, are the ones which build up monitoring costs for performance control, namely:

- i) Information asymmetry;
- ii) Complexity of decisions;
- iii) Difficulty of establishing objective criteria for evaluating agent performance.

It is also important, to clearly define, what an agency relationship is. What this means is that we are in the presence of an agency relationship when 2 main conditions are fulfilled:

- The relationship between principal and the agent is based on a contract established on which the principal delegates/authorizes the agent to manage its assets;
- This relationship can be set between numerous interlocutors, i.e., there may be only 2 parties (one principal and one agent) – the simplest case - or a ratio of n to n interlocutors (more complex cases, e.g. limited liability firms);

Therefore, the greater the number of participants, the more complex the agency relationship becomes, given the heterogeneity of preferences and goals of several different principals and agents.

As a result of the existence of this contract between principal and agent, the existing information asymmetry between them and the conflicts of interest (as previously mentioned) a set of costs arise. These, consist, generally speaking, of three portions, namely:

- i) Monitoring costs, including all costs incurred by the principal to control the agent's behaviour (e.g. audits, contract termination costs, ...);
- ii) Cost of commitment/relationship, i.e., all costs that objectify the fulfilment of expectations of principal and ensure greater transparency of information (e.g. information disclosure, investor relations function on the firm, ...);
- iii) Residual loss, mostly residual costs of non-alignment of interests between managers and shareholders (conflicts of interest).

### **Sources of agency conflicts**

Also according to the work of Jensen and Meckling (1976), there are a number of sources of conflict between principal/shareholder and agent/manager. It is important to detail these in order to understand the impact of those on the relationship established between them:

- Moral hazard: related to the asymmetric information between the parties, it is a concept inherent to any kind of agreement between two (or more) parties. Corresponding to the change of behaviour by one (or more) of the parties, it is contrary to the expected result of the agreement, in order to obtain a certain advantage. (e.g. investment decisions for managing assets that promote the lock-in of the current management due to the specific knowledge about them, ...);
- Earnings smoothing, i.e., through the manipulation of cash flows in order to improve bonus or compensation payments or to make it easy to achieve results in not so favourable years;
- Earnings retention: by making discretionary decisions favouring investment by substitution of dividends;
- Risk aversion, via making funding decisions that minimize risk and, as such, penalize the performance and/or the value of the company. Might be indirectly linked to the remuneration package of managers and, therefore, decisions with less risk do not compromise the remuneration package of managers.

### **Agency theory criticism**

According to Bob Tricker – Corporate Governance (2009), the main criticisms facing the agency theory may fall into 4 categories:

- The theory presents a reduced scope of theoretical analysis, since it only studies the scope of the contractual relationship between the principal and the agent and does not contemplate a "*set of group dynamics, personal behaviour and political games*" that should also be addressed;
- Muth and Donaldson (1997) say that there is a direct positive relationship between the degree of compliance and governance performance;
- Other critics consider the basic assumption is simplistic and general, presenting relevant examples, such as fund involvement as shareholders of firms or conglomerates, where managers are unaware of who is the shareholder;
- Philosophically speaking, since the intrinsic nature of man cherishes selfishness and not selflessness, the argument focuses precisely in the impossibility of fully ensure the best interests of shareholders.

### **Mechanisms for controlling the agency problem**

Minimizing the agency problem can only present superior and consistent effects through an integrated approach that includes three vectors (Matos, 2009):

- i) Clear definition of the goals to be achieved by the manager, all previously known;
- ii) Keeping the shareholder informed allowing it to monitor the status of how goals will be/are being pursuit;
- iii) Creating incentives that bring together the interests of the agent and principal, including the value and form of remuneration.

Besanko, Dranove and Shanley (1996) refer that, only via hiring - where the agent gets paid by the principal for its services, associated, for example, with obtaining successful results against the defined goals - it is guaranteed that the main objective of the shareholder (the maximization of their wealth), is likely to be aligned with agent behaviours.

The design of efficient contracts should always be safeguarded by three cumulative conditions:

- i) *A priori*, no withholding of any information by the agent always allowing the principal to know the actions to be taken and the expected results;
- ii) *A posteriori*, visibility and tangibility about the results of decisions taken by the principal;
- iii) As a result of the actions described above, implemented mechanisms for reducing risk for agents in order to achieve the agreed remuneration.

However, it appears to be common place the existence of incomplete contracts in which, in turn, the principal requires the payment of premiums since there is not a full alignment between the agent's actions and the former's expectation of wealth maximization. Additionally, given the difficulty of measuring performance (since some goals set in the contract may not be directly and easily measurable and, when it is possible to measure the performance it can also be a function of exogenous factors and, therefore, possible to be influenced) this becomes another reason for the premiums collection by the principal.

Moreover, given the risks presented previously (e.g. asymmetric information, moral hazard, ...) that might maximize changes in the agent's behaviour against the one desired by the principal, it becomes necessary to increase the level of information and observability of the relationship between them (e.g. using clear, known and shared objectives by both, properly safeguard a wide view over the target, its mechanism of evaluation and measurement form or by increasing the fairness of the vote to the agent).

The issue of executive compensation will be extensively examined later in this thesis.

### **3.2.2 TRANSACTION COST ECONOMICS**

Coase (1937) - The Nature of the Firm, refers that the firms can reduce costs internalizing activities rather than outsource them. However, as businesses grow the decision to internalize changes in favour of outsourcing. Williamson (1975 and 1988), argues that it is possible to overcome diseconomies of scale through the choice of governance structures that are favourable to the firm. Thus, this theory focuses on governance structures and the cost of the mechanisms of checks and balances. It argues that these costs must be incurred until a moment when total costs are equal to the reduction of potential loss due to non-compliance.

According to Bob Tricker – Corporate Governance (2009), although in this theory it is considered that the individualistic behaviour of Top Management is equal to the agency

theory, the "*focus concerns the governance structures and mechanisms of check and balances as opposed to the Agency Theory which sees the company as a set of contracts*".

### **3.2.3. STEWARDSHIP THEORY**

In the particular case of the Stewardship Theory, it focuses on the legal relationship between the company and the relationship between the shareholder and manager. According to Barn and Hesterly (2008), it theorizes that managers will act as guardians of the assets they manage. This theory is an alternative view to the Agency Theory, in that it first assumes that managers will not act altruistically (but in their own interest) at the expense of shareholders.

Thus, managers are nominated and elected by the shareholder, the former having a fiduciary duty to protect the interests of the latter. This is a classic view of Corporate Governance, since it assumes that managers are reliable from the shareholder's point of view.

In Agency Theory, contrary to the assumption of altruism of the Stewardship Theory, a set of mechanisms that reduce the loss of agency are specified, including executive compensation and benefits as well as incentive schemes for managers. According to Donaldson and Davis (1991) this can be achieved by financial rewards or by stock that align the financial interests of executives with the ones of the shareholders in order to motivate them for improving business performance

### **3.2.4. RESOURCE DEPENDENCY THEORY**

This theory was formalized in 1970 with the publication of the book "*The External Control of Organizations: A Resource Dependence perspective* (Pfeffer and Salancik, 1978)."

Several other authors have studied and developed this theory, namely Salancik (1979), Boyd (1990), Hayward and Boeker (1998), Pfeffer,(1982), Scott (2003).

The Resource Dependency Theory studies how external resources of organizations affect the behaviour of the organization. From the point of view of this theory, capturing external funding plays a vital role in strategic and tactical management for any business. In the view of Resource Dependency Theory, attracting external resources has direct implications on the firms on a number of levels (e.g. from production strategies to the recruitment of employees across the supply chain and with impact on the internal organizational alignment).

The theory's postulate can be summarized as follows:

- Organizations rely on internal and external resources, which are originated from the environment around an organization. The environment may contain other organizations;
- Resources are a necessity for organizations and are scarce. These are often entrenched in other organizations;
- Influence and resource dependence are directly linked. The influence of an organization A over the organization B is based on the degree of dependence on resources provided by the organization B to the organization A. The more dependent A is over B the larger the power of B over A is;
- Influence is therefore relational, situational and potentially mutual.

Corporate Governance is, therefore, the pendulum on which managers are organized as contact points between organizations and their decisions.

Recently, Resource Dependency Theory has been under increased scrutiny from several studies (e.g. Hillman et al (2009), Davis and Cobb (2010), Drees & Heugens (2013), Sharif and Yeoh (2014)). All of these studies discuss the importance of this theory to explain the decisions taken by organizations, through the formation of networks, alliances, joint ventures, mergers and acquisitions, on which organizations seek to minimize/overcome addictions and improve their autonomy (e.g. vertical integration, ...). Although the resource dependence theory is within the scope of theories that characterize organizational behaviour, it is not a theory that explains performance.

### **3.2.5. SYSTEMS THEORY**

Systems Theory postulates that the various perspectives described above do not represent a complete picture and are, therefore, limited in scope of analysis and in the vision they translate. This complete picture, the theory argues, is only achieved through an integrated view of the phenomenon, interpreting and classifying it as a hierarchy of systems. This theory uses three criteria to identify a system:

- The limits of the system (the central system and its environment) in order to consider what belongs to it and what belongs to the environment;
- The system's abstraction level (perception and detail);
- The purpose of the system (what occurs between inputs and outputs).

In the specific case of Corporate Governance, there is no academic consensus on what are the limits of the system based on the extensive literature reviewed. As Bob Tricker – Corporate Governance (2009) indicates, there are different views on what is the scope of Corporate Governance (principles and best practices versus relations between shareholders and firms - exercise of power versus the company as a promoter of social responsibility vehicle). Thus, it is difficult to construct a theory relating to Corporate Governance systems that can be general enough to encompass all possible perspectives through observation of the phenomenon and explaining it through its decomposition and classification.

As Bob Tricker – Corporate Governance (2009) points out “*The creation of a general theory of Corporate Governance is certainly premature and probably over-optimistic...*”.

### **3.3. COMPENSATION AND INCENTIVES THEORIES**

According to Geiler and Renneboog (2011), the biggest issue on executive compensation focuses on its ability to stimulate the rational decisions of managers towards maximizing the value of the company while simultaneously preventing the excessively withdrawal of income from the firm.

Underlying this idea is the principle of pay for performance, i.e., indexing the income earning by the manager to the company's performance. Logically, this component is not included in the fixed component of the overall compensation.

Given the shareholder structure, Holderness and Sheehan (1988) discovered that CEOs who are majority shareholders in listed firms are compensated with higher salaries than other non-majority shareholders CEO. Along with this rationale, Allen (1981) also concluded that the level of CEO compensation is a decreasing function of the percentage of equity held by the CEO (and his family). Additionally, Lambert et al. (1993) found evidence that CEO compensation is comparably less when there is a member of the board with a percentage higher than 5% in equity, than in the other cases.

Also Core (1997), reports that CEO compensation increases when the control of voting rights is greater and is lower with share value reduction.

Core, Holthausen and Larcker (1998), found empirical evidence testing the agency model and report that the level of compensation is an increasing positive function of the level of performance of the firms.

Following the concept of optimal contracting by Core, Guay and Larcker (1999), the compensation poured on an optimal contract should be the one that maximizes the net economic value of the company after the cost of transactions and payments to employees, i.e., when hiring minimizes agency costs. However, it is necessary to distinguish between "optimal contracting" versus "perfect hiring", according to Jensen and Meckling (1975), where optimal is the "first best efficient", contrarily to the theoretical lack of restrictions of a perfect hire.

Independently of the level of compensation, when typically hiring, crossing the variable time period with the nature of component it will be possible to fit a set of compensation types that compose the overall compensation of the manager. According to Cadman et al (2009), firms can use only the components they deem to be most appropriate in the context of hiring for wealth diversification:

Time period	Component	
	Fixed	Variable
Short term	<ul style="list-style-type: none"> <li>• Fixed salary</li> <li>• Current expense (ex. Credit card, health insurance, life insurance, )</li> <li>• (...)</li> </ul>	<ul style="list-style-type: none"> <li>• Annual bonus</li> <li>• (...)</li> </ul>
Long term	N/A	<ul style="list-style-type: none"> <li>• Stock options</li> <li>• Long Term Incentive Plans</li> <li>• Restricted Stock</li> <li>• Supplemental Executive Retirement</li> <li>• Severance Pay/ Golden Parachutes</li> <li>• Deferred bonus</li> <li>• (...)</li> </ul>

Table 2 – Compensation framework according to time and nature

The short-term component of a manager’s compensation is the sum of his base salary with current expenses and the annual bonus depending on achieving annual goals defined by

previously established metrics (e.g. financial indicators -. EBITDA, ... - or operational indicators) .

Typically, the base salary is set by the remuneration committee with reference to the seniority, experience, goals and benchmarks. Murphy (1999) found a strong statistical relationship between base salary and company size.

Note that, according to Conyon and Murphy (2000) the overall salary as a percentage of the overall remuneration package presents a downward trend which shows managers are increasingly more prone to comply with the will of the shareholder (complying with the principle of pay for performance).

The long-term component includes the use of a broader set of instruments that define various compensation alternatives. In addition, as mentioned by Frydman and Saks (2007) the weight of this component in overall total compensation has increased over years.

Although they belong to the long-term component, each tool serves a different purpose, namely:

- *Stock options*: An instrument that gives the buyer the right but not the obligation, to buy (call) or sell (put) a share at an agreed price within a certain period or on a specific date. The aim is to create shareholder value through the decision to make investments with a higher degree of risk;
- *Restricted stock*: firm stock that is not fully transferable until certain conditions (vesting) have been met. These are used as a means of maintaining the manager over a given time period or until a set of goals is achieved.
- *Long-term Incentive Plans (LTIPs)*: incentive programs that offer potential significant premium in addition to the base Salary and annual bonus, covering periods exceeding one year performance. This component presents two sub-categories, i) multi-annual plans, with a fixed period of three to five years and ii) based on career plans where benefits are accumulated throughout the professional career and paid on retirement.
- *Supplemental Executive Retirement Plans (SERPs)*: retirement plans (usually not discriminated in yearly management reports), which is a mechanism to serve the purpose of increasing job security for taking decisions with a higher degree of risk.

- *Golden Parachutes*: similar to the SERPs purpose, ensure the incentive for risk-taking in order to maximize the company's value.

### **Mechanisms for setting CEO compensation**

Following best practices, according to Bob Tricker – Corporate Governance (2009) and the Greenbury Report (1995), the remuneration committee should be the one to set the compensation package for the manager. This committee should be composed mainly of independent directors and must have a proactive role in making recommendations to the board on remuneration packages, including all the components described above, as well as reviewing the criteria for allocation of remuneration packages.

There are essentially two views to define the remuneration package:

- Market-based mechanism - the level of remuneration and incentives is set based on benchmarking (e.g. market signalling) and must be approved internally by the remuneration committee to safeguard misalignments in favour of the manager;
- Self-service approach – for reasons inherent in the management of their own image, managers may attempt to condition/increase their remuneration packages (e.g. use of company jets, firm's credit card, ...).

In Portugal, as mentioned by the “Código das Sociedades Comerciais (article 399º)”, fixing the manager's compensation should be in the field of influence (or a competence) of the Shareholders General Meeting or a commission named by it for this purpose, and subsequently subject to its approval.

In firms with a two-tier model, this same competence fits the powers of the General Council or Supervisory Board or the committee appointed by it. If the articles of association set it, this falls under the General Assembly competence or in a committee appointed by it (as defined in art. 429º CSC).

Also under Articles 319, n.1 and 320<sup>th</sup> n.1 of the Código das Sociedades Comerciais, the allocation of share purchase plans (when involving treasury shares) must be decided by the Shareholders General Meeting.

Onward will be transcribed examples of the most relevant transposition of EU directives, Portuguese national laws relating to the theme, Bank of Portugal notices, among others.

The Directive 2010/76 of the European Union addresses the issue of remuneration from the perspective of excessive risk-taking. Thus, the Directive indicates that *"Excessive and imprudent risk-taking in the banking sector has led to the failure of individual financial institutions and systemic problems in Member States and globally. (...) Remuneration policies which give incentives to take risks that exceed the general level of risk tolerated by the institution can undermine sound and effective risk management and exacerbate excessive risk-taking behaviour. (...)"*

Therefore it *"requires credit institutions to have arrangements, strategies, processes and mechanisms to manage the risks to which they are exposed."*

It also recommends the creation of mechanisms that act in pay to avoid excessive risk-taking, as well as firm's internal mechanisms of checks and balances (e.g. remuneration committee, limiting the weight of the variable compensation in total compensation, annual and multiannual performance evaluations, principles of say on pay, ...) as well as external (e.g. disclosure and transparency of information, establishment of mechanisms of enforcement and monitoring for the national authorities, among others).

On the other hand, notices from the Bank of Portugal, are built upon an approach of comply or explain different from EU Directives. The Notice of Bank of Portugal No 10/2011, this concept refers precisely:

*"In this context, the Bank of Portugal published in early 2010, Notice No. 1/2010 and Circular Letter No. 2/2010 / DSB, focusing on two distinct domains of the remuneration policy of the institutions subject to its supervision. On one hand, the Notice defines a set of mandatory rules on the disclosure of information relating to remuneration policy and, on the other hand, the aforesaid Circular Letter defined several recommendations to adopt a perspective of "comply or explain" about the remuneration policy of the members of the administrative and supervisory bodies.*

*These requirements complemented the duties established in Law 28/2009, June 19<sup>th</sup>."*

*"It was later published Directive 2010/76 / EU of the European Parliament and of the Council, imposing new requirements for credit institutions and investment firms to require the adoption of remuneration policies and practices that are consistent with sound and prudent risk management in order to ensure that the remuneration structure does not encourage excessive risk-taking and are consistent with the long-term interests of the credit institutions."*

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*"Therefore, this notice updates the rules on general principles on remuneration policies and practices in order to ensure that the remuneration structure does not encourage excessive and imprudent risk taking and is compatible with the long-term interests of institutions, and defines the requirements for disclosure of information required in this field, revoking the Notice of Banco de Portugal No 1/2010 and Circular Letter No. 2/2010 / DSB."*

*"This notice regulates the principles and rules which should govern the remuneration policy of credit institutions, investment firms and branches in Portugal of credit institutions and investment firms based outside the European Union, hereinafter referred to as institutions.*

*2 - This Notice also sets out the duties of disclosure of the remuneration of the members of the administrative and supervisory institutions policy and their employees who, even though are not members of those bodies, comply with any of the following criteria:*

*a) Performing duties with responsibility for risk-taking on behalf of the institution or its clients with a material impact on the risk profile of the institution;*

*b) Total compensation places them on the same level of remuneration that members of the administrative or supervisory board; or*

*c) carry out control functions set out in the Notice of Banco de Portugal No 5/2008."<sup>3</sup>*

Regarding other Portuguese entities who address the issue of compensation, the Decree of Portugal's Republic President No. 57/2011 *"aims, firstly, to impose new requirements for credit institutions and investment firms, to require the adoption of compensation policies and practices that are consistent with a sound and prudent risk management.*

*For this reason, to ensure that the pay structure of employees whose activities have a significant impact on the risk profile of the institution does not encourage excessive risk-taking and are consistent with the long-term interests of credit institutions, this law specifies some general principles on remuneration policies for those employees.*

*The establishment of such principles is not intended to prescribe the amount and form of compensation to the extent that the definition and implementation of the remuneration policy remain with the institutions competing at the Bank of Portugal supervision of such policies.*

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<sup>3</sup> Translated from Portuguese by the thesis author

*Still within the specification of the remuneration principles in order to minimize incentives for excessive risk-taking sets was found that the variable component of remuneration of employees alluded should be a balanced proportion of total remuneration, institutions should ensure that the total variable remuneration does not limit their ability to strengthen its capital base.*

*Additionally, to ensure adequate transparency of remuneration structures and the associated risk, it is also determined that credit institutions and investment firms should disclose detailed information on their remuneration policies and practices."<sup>4</sup>*

*Additionally, Portuguese law n.28/2009, "establishes the rules for approval and disclosure of the remuneration of the members of the administrative and supervisory bodies of public policy and revise the sanctions regime for the financial sector in criminal and administrative offenses.*

*Defines the procedures for the approval and disclosure of the remuneration policy and the penalties for not complying with the defined policies."<sup>5</sup>*

This law also defines the duty of submission to the Shareholders General Meeting of a statement on the remuneration policy of the management members as well as the duty of annual public disclosure of the amount of remuneration paid on individual and in an aggregate basis.

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<sup>4</sup> Translated from Portuguese by the thesis author

<sup>5</sup> Translated from Portuguese by the thesis author

### **Optimal compensation level**

Identify an optimal level of compensation is understandably difficult, given the mix of incentives that can be used, as well as variables that can and should be used to set the level of remuneration (e.g. time period, degree of immediacy of compensation, ...).

Additionally, the same level of compensation package for different CEO's can be perceived differently (overpaid or underpaid) and may not be in accordance with desired by the shareholder without voting rights. Core and Guay (1999) address the issue of compensation and the benchmark required for the attempt with a high degree of difficulty in finding an optimal level of incentives and hence the remuneration.

### **Using the different components in optimal hiring**

As Core, Guay and Verrecchia (1999) report, it is important to consider all components of the CEO compensation in an optimal contract. This conclusion is precisely demonstrated by Lambert and Larcker (1987) in measuring the weight of the salary and bonus in the overall annual compensation of CEOs of large firms from the US, measuring it within the range of 80-90% in the 80 versus Hall and Liebman (1998) placing it in 52% in 1994. This is explained by the growing importance of the annual payment in stock options in total CEO compensation.

Banker and Datar (1989) also report that, in contracting, the company should hire optimally, i.e., the contract between the firm and CEO includes compensation and penalties necessary to drive for the performance desired, motivating risk averse behaviours and pro-activity in the decision making process of the CEO in order to increase the average value of the company.

According to Hall and Liebman (1998) CEOs are motivated by changes in all sources of their wealth, not only of his annual payment expressed in fixed and variable components, but also the wealth component, which provides substantial incentives to increase the stock price. Also according to Core and Guay (1999) an increase in equity-based incentives is a major reason for the CEO to receive shares and options forcing the appearance of vesting periods in order to retain the incentives.

### 3.4. THEORIES FOR PERFORMANCE VARIABLES DEFINITION

According to Bodie, Kane and Marcus – Investments (2010), the profitability measures that better enable comparability between sectors are Return on Equity (hereinafter ROE) and Return on Assets (ROA hereinafter).

The ROE measures the return for shareholders regarding capital invested in the firm through the ratio net income/book value of equity, while the difference for ROA lies only in the denominator (net income divided by total assets).

$$ROE_n = \frac{\text{net income}_n}{\text{book value of shareholder equity}_n}$$

$$ROA_n = \frac{\text{net income}_n}{\text{book value of total assets}_n}$$

As these measures are expressed in percentages they allow quick comparison between sectors and firms.

However, there are a number of factors that influence these measures of profitability of the firm (e.g. funding policies, accounting classification criteria, investments, ...).

As an example, the financing policy of a firm can influence the return (measured by ROE or ROA, since it is possible to influence the net income of the company by increasing debt). It should also be mentioned that a policy of aggressive financing increases the risk of the investor.

Decomposing ROE by Dupont analysis, this ratio can be the result of numerous factors, from tax, financing policy, the company's operation and efficiency of the use of company assets to generate results:

$$ROE_n = \text{Tax Burden}_n \times \text{Interest Burden}_n \times \text{Margin}_n \times \text{Turnover}_n \times \text{Leverage}_n$$

Eventually, it is possible to calculate ROA from ROE:

$$ROE_n = \text{Tax Burden}_n \times \text{Interest Burden}_n \times ROA_n \times \text{Leverage}_n$$

given,

$$ROA_n = \text{Margin}_n \times \text{Turnover}_n$$

Therefore, ROA is the result from 2 ratios:

$$ROA_n = \frac{EBIT_n}{Sales_n} \times \frac{Sales_n}{Assets_n}$$

Thus, the first factor measures the operating margin resulting from the company's core business while the second factor measures the degree of efficiency in the company's assets generating sales. These two ratios parcels of ROA do not depend on the financing policy of the firm.

ROA addresses the question of management, i.e., the higher the ROA the better the management. However, the more capital intensive the firm becomes more difficult to achieve a high ROA, so it is also necessary to examine with caution this indicator. The difference between a capital intensive business and a service business is essentially based on the fact that in case of default of both, an only capital intensive company can more easily convert assets into cash which, ultimately, provides for payment to creditors.

While ROA focuses on total assets and, therefore, includes components such as receivables and deposits, is a ratio that is more appealing to managers than to shareholders. The latter are show greater interest for the return on capital invested in the firm, focusing its analysis on the ROE.

Both indicators are easily used to compare the company against its primary competitors and therefore beyond the internal analysis on the company that generate, they also serve as a benchmark to guide the management team and shareholders in positioning the company against its peers.

This thesis follows Core, Holthausen and Larcker (1998) assumptions regarding the measurement of business performance through variable Return on Assets (measured by the ratio of earnings before interest and taxes divided and the company's assets) and Return on Equity.

## 4. APPROACH

### 4.1. CONTEXT

The scope of the thesis focuses on identifying/testing the existence of a relationship between compensation paid and the performance of firms. Previously it was identified that the mechanism of compensation stems from the process of hiring a manager, a process that theoretically should minimize (eliminate at most) the agency problem.

Thus, reminding the introduction chapter, the first hypothesis precisely aims to address the relationship between compensation and performance of the firms:

- Hypothesis #1: There is a statistically significant relationship between performance of firms and the compensation of the CEO

Additionally, if there is a statistically significant relationship, it is intended to further test the following additional hypothesis:

- Hypothesis #2: The higher the weight of the variable parcel in total compensation in total compensation earned by the CEO the better the performance of firms.

### 4.2. METHODOLOGY USED FOR DATA ANALYSIS AND TESTING

The methodology designed to test the hypothesis is comprised of 7 steps.

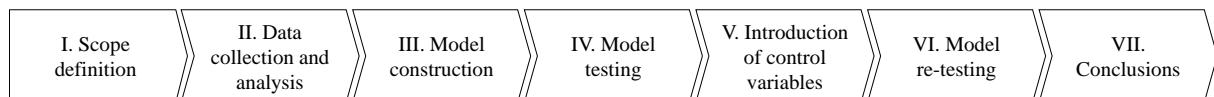


Figure 3 – Methodology used

Steps V and VI are optional and will only be used if the results derived from model testing (step IV) result in statistical insignificance of the model.

### 4.3. SCOPE DEFINITION

The universe of analysis focuses on firms that make up the “PSI Geral” index.

Number	Equity title	Designation
1	ALTR PL	Altri
2	BANIF PL	Banif
3	BCP PL	Millennium BCP
4	BES PL	Banco Espírito Santo
5	BPI PL	Banco BPI

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6	CFN PL	Cofina
7	COMAE PL	Compta
8	COR PL	Corticeira Amorim
9	CPR PL	Cimport
10	EDP PL	EDP – Energias de Portugal
11	EDPR PL	EDP Renováveis
12	EGL PL	Mota Engil
13	ESF PL	Espírito Santo Financial Group
14	ESO PL	Estoril Sol SGPS
15	FCP PL	Futebol Clube do Porto
16	GALP PL	Galp
17	GLINT PL	Glintt
18	GPA PL	Imobiliária Construtora Grão Pará
19	IBS PL	Ibersol SGPS S.A.
20	INA PL	INAPA
21	IPR PL	Impresa
22	JMT PL	Jerónimo Martins
23	LIG PL	Lisgráfica
24	MAR PL	Martifer
25	MCP PL	Media Capital
26	NBA PL	Novabase
27	ORE PL	Orey
28	PTC PL	Portugal Telecom
29	PTI PL	Portucel
30	RAM PL	F. Ramada Investimentos
31	RED PL	Reditus
32	RENE PL	REN
33	SCOAE PL	Soares da Costa
34	SCP PL	Sporting Clube de Portugal
35	SCT PL	Toyota Caetano Portugal
36	SEM PL	Semapa
37	SLBEN PL	Sport Lisboa e Benfica
38	SNC PL	Sonaecom
39	SON PL	Sonae
40	SONC PL	Sonae Capital
41	SONI PL	Sonae Indústria
42	SUCO PL	Sumol Compal
43	SVA PL	SAG Gest
44	TDSA PL	Teixeira Duarte
45	VAF PL	Vista Alegre
46	ZON PL	ZON

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Table 3 – Scope of firms analysed

The argument for choosing this set of firms is based on the greater availability of disaggregated information regarding compensation paid to the CEO in the respective management reports or Corporate Governance reports available.

It seems, however, that it is only after 2008, for the vast majority of firms in the list above, that the information relating to the compensation of the CEO is broke down from the block "compensation of the Board of Directors" or "compensation of Executive Committee"- based on the governance model chosen. Therefore, only after 2008 it is possible to compile information on the CEO compensation individually. This breakdown stems from the adoption of firms regarding Law n.28/2009 as previously shown.

Thus, it can also be concluded that the time interval of the data compiled regards the period 2008-2013, comprising years of Portuguese crisis. It is, therefore possible, that the performance of firms is possibly influenced by factors external to the same.

If we look at the firms from a sector point of view for the 2008 - 2013 period, it is possible to find that some sectors were top performers (communications, retail, and energy) throughout the crisis and somewhat indifferent. As expected, real estate and construction are on the bottom quartil of performance and technology also struggled.

Sector	Industry	ROA average (%)	ROE average (%)	# of firms (#)
Communications	Media	0,22	18,8	3
	Telecom	4,63	28,7	3
Consumer Discretionary	Distributors – Discretionary	-0,12	-0,31	1
	Gaming, Lodging & Restaurants	1,51	3,21	2
	Home & Office Products	-3,37	-3,65	2
	Recreation Facilities & Svcs	-8,04	N/A	3
	Retail - Discretionary	-0,22	-12,1	3
Consumer Staples	Retail - Consumer Staples	4,39	20,37	2
Energy	Oil, Gas & Coal	3,47	10,88	1
	Banking	0,61	-3,06	6
Financials	Real Estate	-6,54	-21,92	1
	Engineering & Construction Svcs	1,49	3,32	8
Industrials	Industrial & Commercial Services	1,12	N/A	1
Materials	Construction Materials	0,00	-7,10	3
Technology	Technology Services	0,34	-16,27	4
Utilities	Utilities	2,16	9,47	3

Note that some information is not available because some observations are lacking for the year 2008. Simple average is used for ROA and ROE.

#### 4.4. DATA COLLECTION METHOD

Regarding the method of data collection, there are a set of topics that must be first addressed in order to properly collect and compile data.

According to Green (1993), data sources can be broken down between primary (eg. Questionnaires, interviews, observation and focus groups) and secondary (statistics, databases, economic indicators, ...). The definition of a secondary data source comes from the fact that the appraiser is not responsible for collecting and compiling the data directly (as opposed to primary data source, i.e., that are generated by the evaluation itself).

In this thesis, secondary data sources (Bloomberg, historical data for stock value compiled from bolsapt.com website, direct collection of data in the reports of Government and Management offered by several firms) were used. A database regarding the performance of firms and the remuneration of the CEO on an annual basis in particular, "Return on Assets", "Return on Equity" and "Compensation of the CEO", hereinafter referred to as ROA, ROE and Remuneration respectively, has been compiled, as well as regarding other control variables.

#### 4.5. DEFINITION OF THE STUDY VARIABLES

The variables Return on Assets (ROA) and Return on Equity (ROE) were defined according to the literature previously detailed. Note the definition of Bloomberg for these variables. According to the definition, some of the observations made in the compilation, cannot be presented.

For **Return on Equity**, according to Bloomberg:

- *“Stocks and Industrial Securities*
  - *The Return on equity (in percentage) is calculated as the net income of 12 consecutive months (loss) less preferred dividends for 12 consecutive months box, divided by the average of total common equity, multiplied by 100.*
  - *Total common equity = Total Capital stock and additional paid-in capital + Retained earnings*
  - *Additional paid Capital = Premium on issue of shares*

- *The average refers to the average of the beginning balance and the ending balance*
  - *If the initial or final common equity is negative, the ROE will not be calculated*
  - *Banks*
    - *The Return on equity (in percentage) is calculated as the net income of 12 consecutive months (loss) less preferred dividends for 12 consecutive months box, divided by average total common equity, multiplied by 100*
    - *Total common equity = Total Capital stock and additional paid-in capital + Retained earnings*
    - *Additional paid Capital = Premium on issue of shares*
    - *The average refers to the average of the beginning balance and the ending balance*
    - *If the initial or final common equity is negative, the ROE will not be calculated*
  - *Financial services*
    - *The Return on equity (in percentage) is calculated as the net income of 12 consecutive months (loss) less preferred dividends for 12 consecutive months box, divided by average total common equity, multiplied by 100*
    - *Total common equity = Total Capital stock and additional paid-in capital + Retained earnings*
    - *Additional paid Capital = Premium on issue of shares*
    - *The average refers to the average of the beginning balance and the ending balance*
  - *Insurance*
    - *The Return on equity (in percentage) is calculated as net income of 12 consecutive months (loss) less preferred dividends for 12 consecutive months box, plus the surplus of policyholders of 12 consecutive months divided by average total assets common, multiplied by 100*
    - *Total common equity = Total Capital into shares + Additional paid in capital + retained earnings + Net assets of the insured*
    - *Additional paid Capital = Premium on issue of shares*
    - *The average refers to the average of the beginning balance and the ending balance*
    - *If the initial or final common equity is negative, the ROE will not be calculated*
-

For **Return on Assets**, from Bloomberg definition:

- *Banking / Financial / Manufacturing / Insurance / Public Services / Real Estate*
  - *The return of assets (ROA in percentage) is an indicator of the profitability of a company relative to its total assets. ROA gives an idea of management efficiency in using assets to generate earnings. calculated as:*
  - *(net revenues for the past 12M / Average total assets) \* 100, where "net revenues for the past 12M is RR813, TRAIL\_12M\_NET\_INC" and "Total assets Average" is the average of the initial and final BS035, BS\_TOT\_ASSET balance "."*

Regarding CEO compensation, the measure of CEO total compensation used is similar to the one used by Antle and Smith (1986), Jensen and Murphy (1990), Hall and Liebman (1998) and Core, Holthausen and Larcker (1998). The total compensation of the CEO is then divided into three components, namely:

- Fixed: the fixed compensation earned in the year;
- Variable: *i)* variable compensation for the year in question and paid in the current year, *ii)* bonuses granted in the year and paid in the same year, *iii)* shares and bonds paid in the year (which may have been granted in previous years and usually discriminated against the value given in payment), *iv)* other variable remuneration awarded in previous years (but paid in the current year);
- Wealth: variation of the equity value of the CEO firm's portfolio expressed by the total number of shares multiplied by current value when reported, options and bonds fairly valued at price reported in management report;

This type of variable, composed of a broad range of components allows the identification of changes in the wealth of the CEO on an annual basis, regarding total payments made by the firm. Other changes in the CEO portfolio not directly linked to the firm were not accounted for.

Thus, the total compensation is the sum of the change (positive or negative) in the various identified components.

This variable provides a broader view of the total compensation (which has not been traditionally used in academic literature as explained Abowd and Kaplan (1999)). However, as Core, Guay and Verrecchia (1999) report, it is important to consider all components of the remuneration of the CEO since there are many other components that are incorporated in the optimal contract between the shareholder and the CEO, other than base salary and bonus. In fact, the weight of base salary and bonus is being reduced in overall compensation as it is demonstrated by Lambert and Larcker (1987), which measured the weight of the salary and bonus in the overall annual compensation of CEOs of large firms from the US, placing it within the range of 80-90% in the 80 versus Hall and Liebman (1998) placing the same weight by about 52% in 1994.

Banker and Datar (1989) also report that, in contracting, the company should hire optimally, i.e., the contract between the firm and CEO includes compensation and penalties necessary to drive for the performance desired, motivating risk averse behaviours and pro-activity in the decision making process of the CEO in order to increase the average value of the company.

According to Hall and Liebman (1998) CEOs are motivated by changes in all sources of their wealth, not only of his annual payment expressed in fixed and variable components, but also the wealth component, which provides substantial incentives to increase the stock price. Also according to Core and Guay (1999) an increase in equity-based incentives is a major reason for the CEO to receive shares and options forcing the appearance of vesting periods in order to retain the incentives.

#### 4.6. COLLECTED DATA ANALYSIS

Regarding the ROE variable, 243 observations were collected, having been observed the following descriptive statistics:

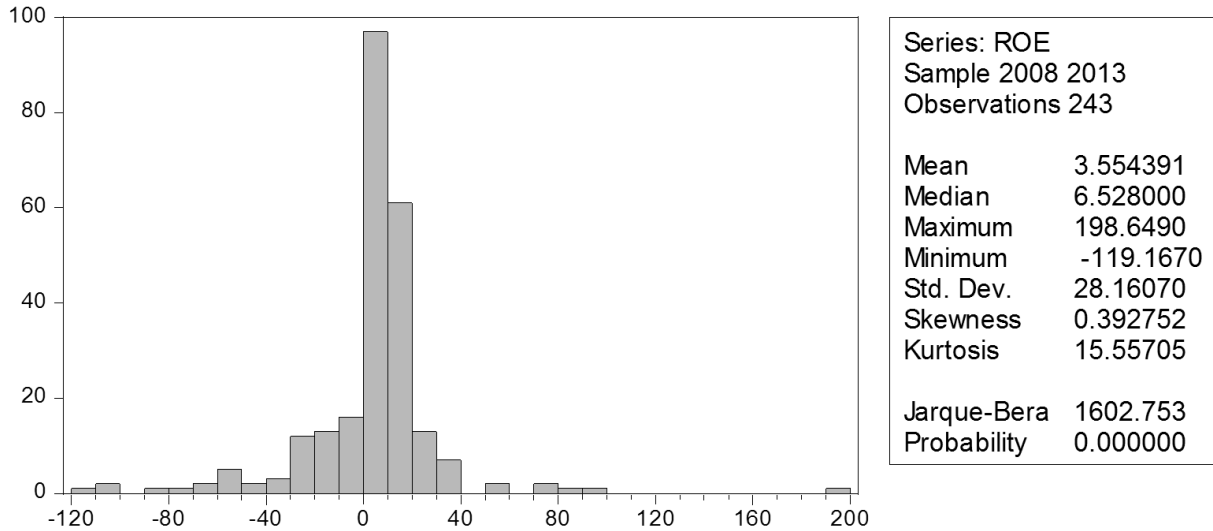


Figure 4 – ROE descriptive statistics

To be noted that such distribution is more concentrated than a normal distribution. It is possible to conclude that the probability function is leptokurtic, namely that the distribution has heavy tails. Likewise, looking at Jarque-Bera it is possible to conclude that, since the value of JB is high, we accept the hypothesis of normal distribution of random errors.

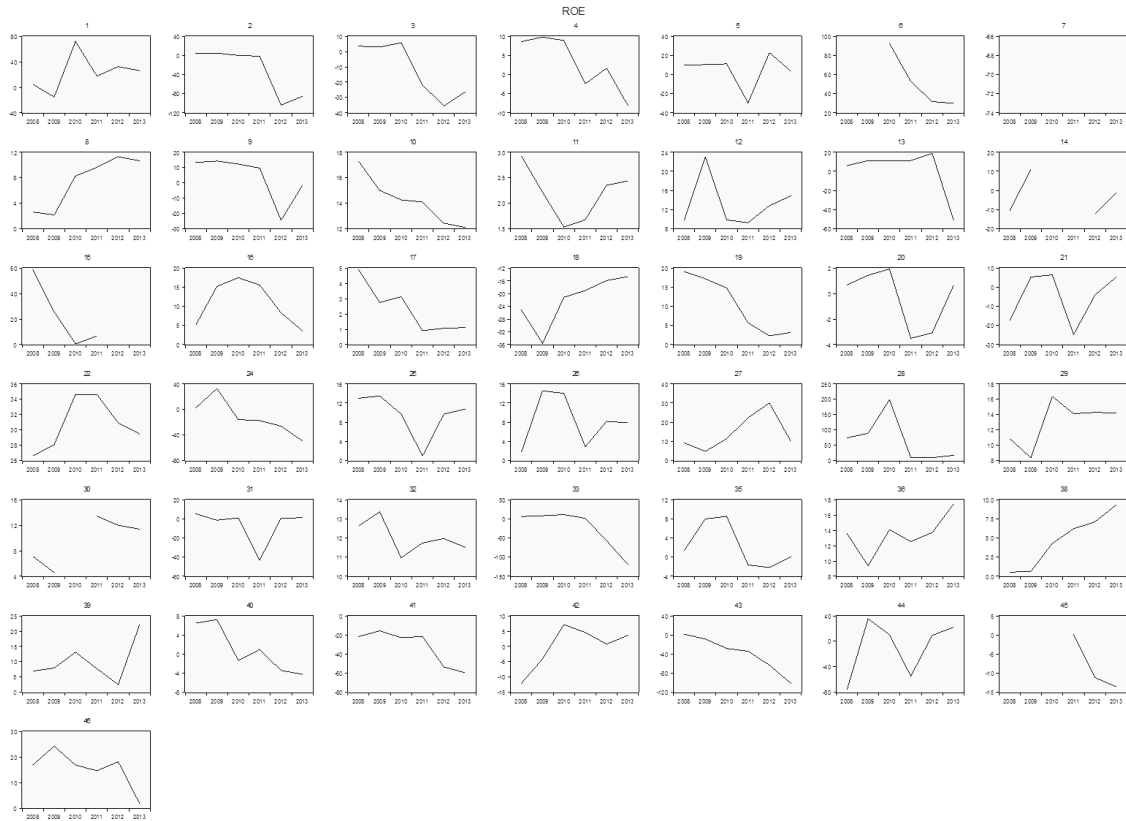


Figure 5 – Graphical representation of the behaviour of ROE for each of the firms

The graphical representation of the behaviour of the ROE variable does not show a clear pattern between the various firms, although there are some firms that behave more differently from the average than others.

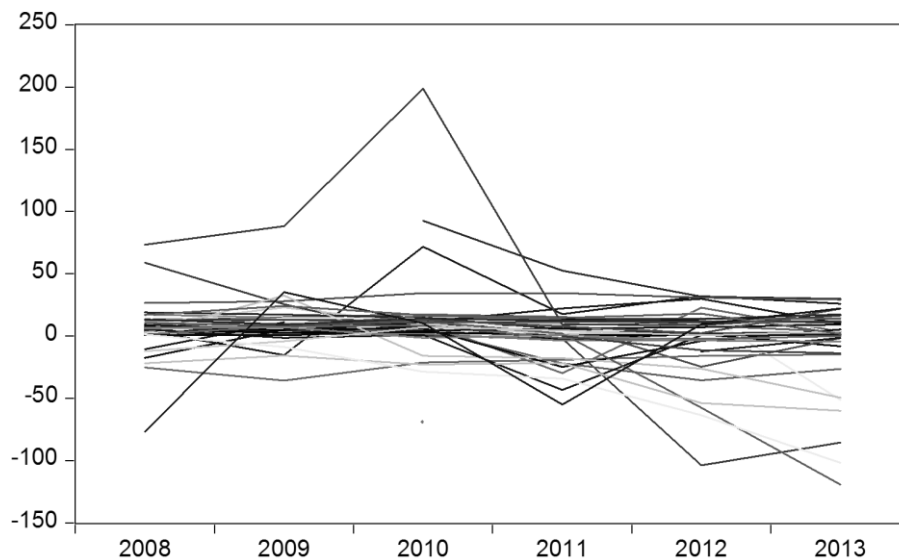


Figure 6 – Graphical representation of the global trend of ROE

ROE variable autocorrelation is positive [0.013 – 0.424] for all 5 lags. The average of the autocorrelation is 0,1618. The trend (as expected) is the reduction of the autocorrelation along the 5 lags.

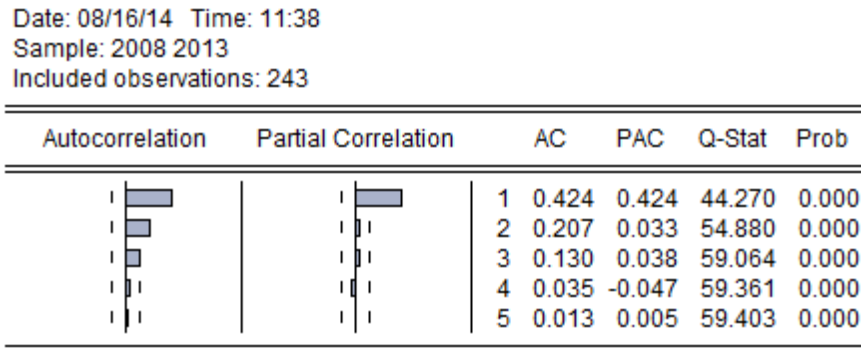


Figure 7 – Autocorrelation of ROE

Regarding the ROA variable, 269 observations were collected, having been observed the following descriptive statistics:

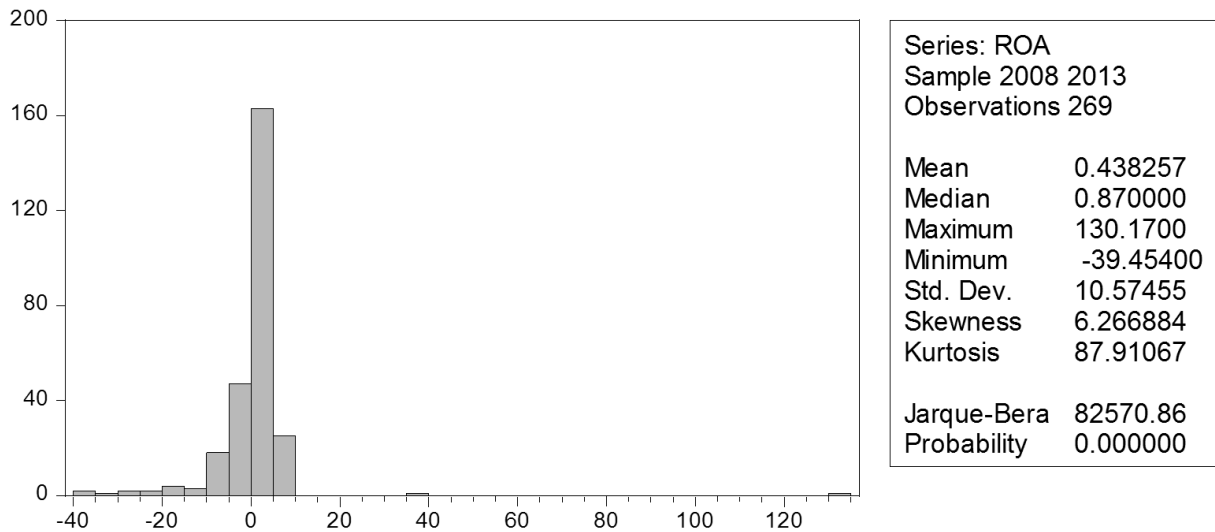


Figure 8 – ROA descriptive statistics

To be noted that such distribution is more concentrated than a normal distribution. It is possible to conclude that the probability function is leptokurtic, namely that the distribution has heavy tails. Likewise, looking at Jarque-Bera it is possible to conclude that, since the value of JB is high, we accept the hypothesis of normal distribution of random errors.

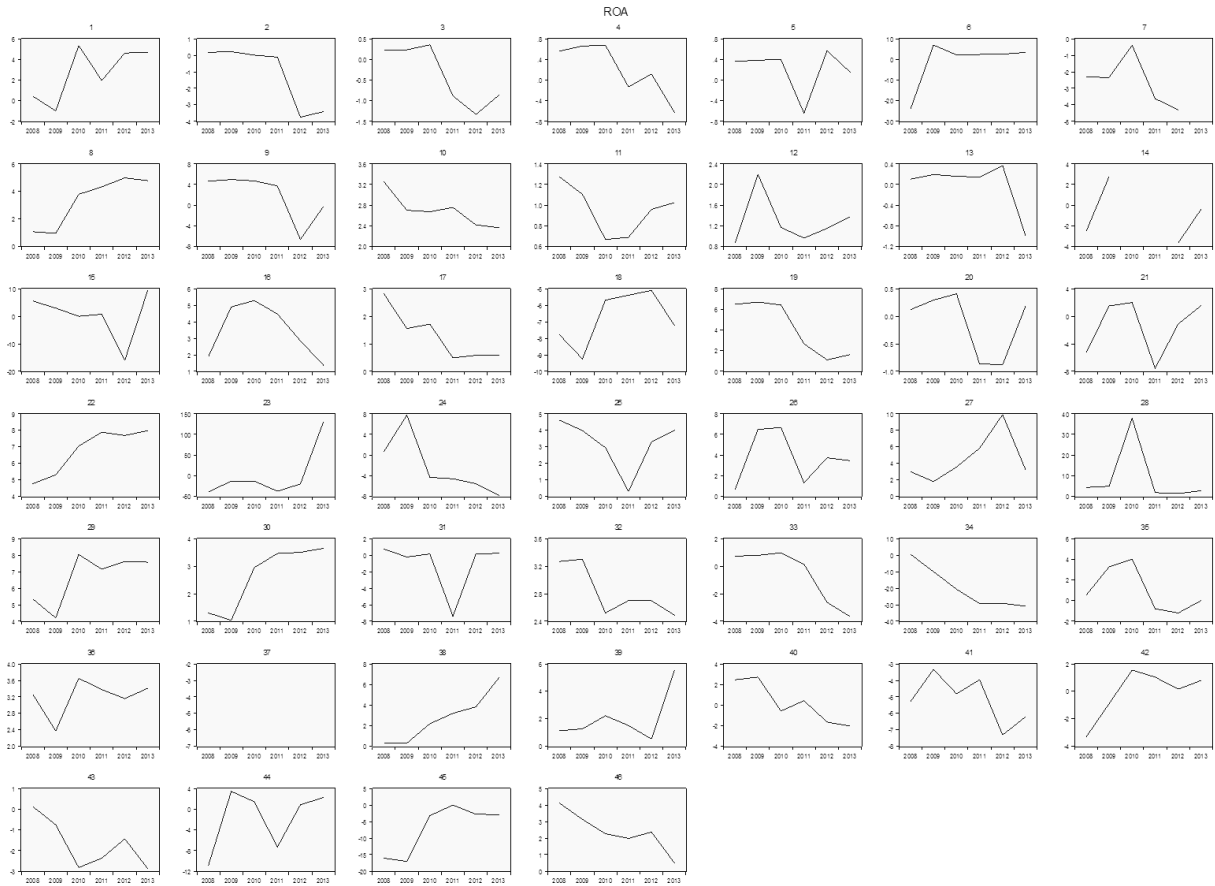


Figure 9 – Graphical representation of the behaviour of ROA for each of the firms

The graphical representation of the behaviour of the ROA variable does not show a clear pattern between the various firms, although there are some firms that behave more differently from the average.

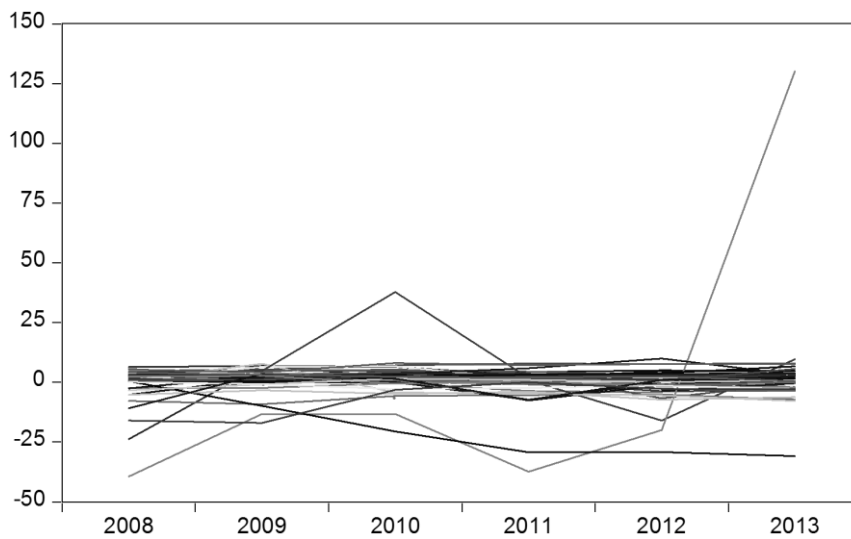


Figure 10 – Graphical representation of the global trend of ROA

ROA variable autocorrelation has no clearly defined signal [-0.165 – 0.132] for all 5 lags. The autocorrelation average is 0,0022. There is no clear trend regarding the reduction of autocorrelation, as in lags 2, 4 e 5 the autocorrelation is negative and in the remaining lags is positive.

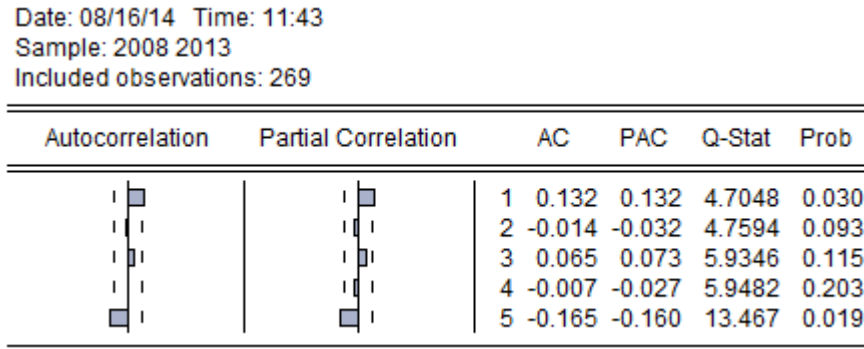


Figure 11 – ROA autocorrelation

Regarding the Total Pay variable, 222 observations were collected, having been observed the following descriptive statistics:

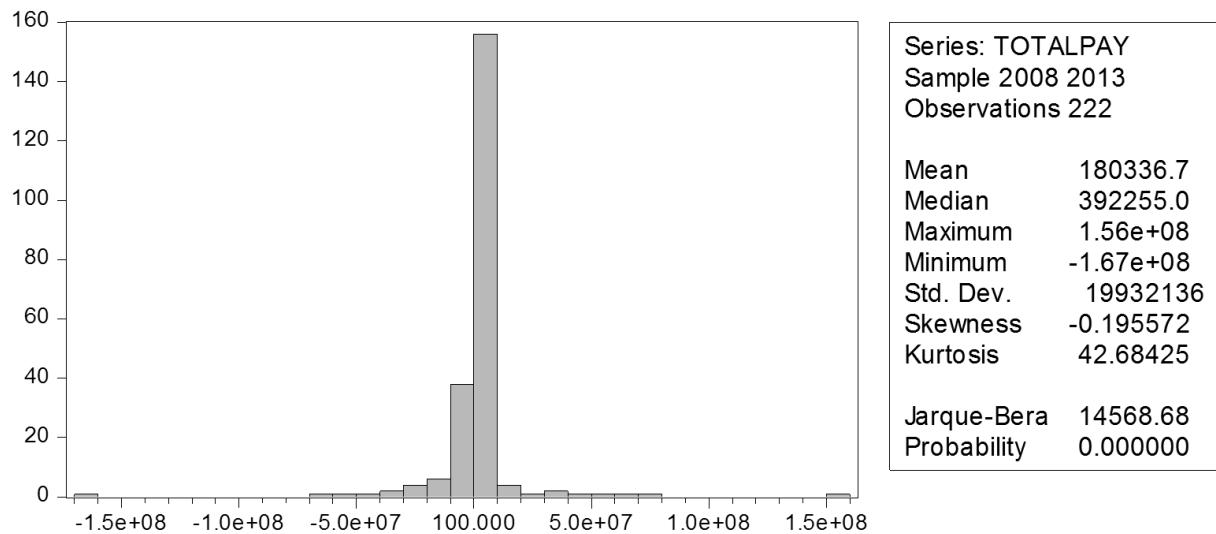


Figure 12 – Total Pay descriptive statistics

On average, for the time interval analysed, total pay is around 180.000€. Standard deviation is very high. Regarding kurtosis, to be noted that such distribution is more concentrated than a normal distribution, and so, it is possible to conclude that the probability function is leptokurtic, namely that the distribution has heavy tails. Likewise, looking at Jarque-Bera it is possible to conclude that, since the value of JB is high, we accept the hypothesis of normal distribution of random errors.

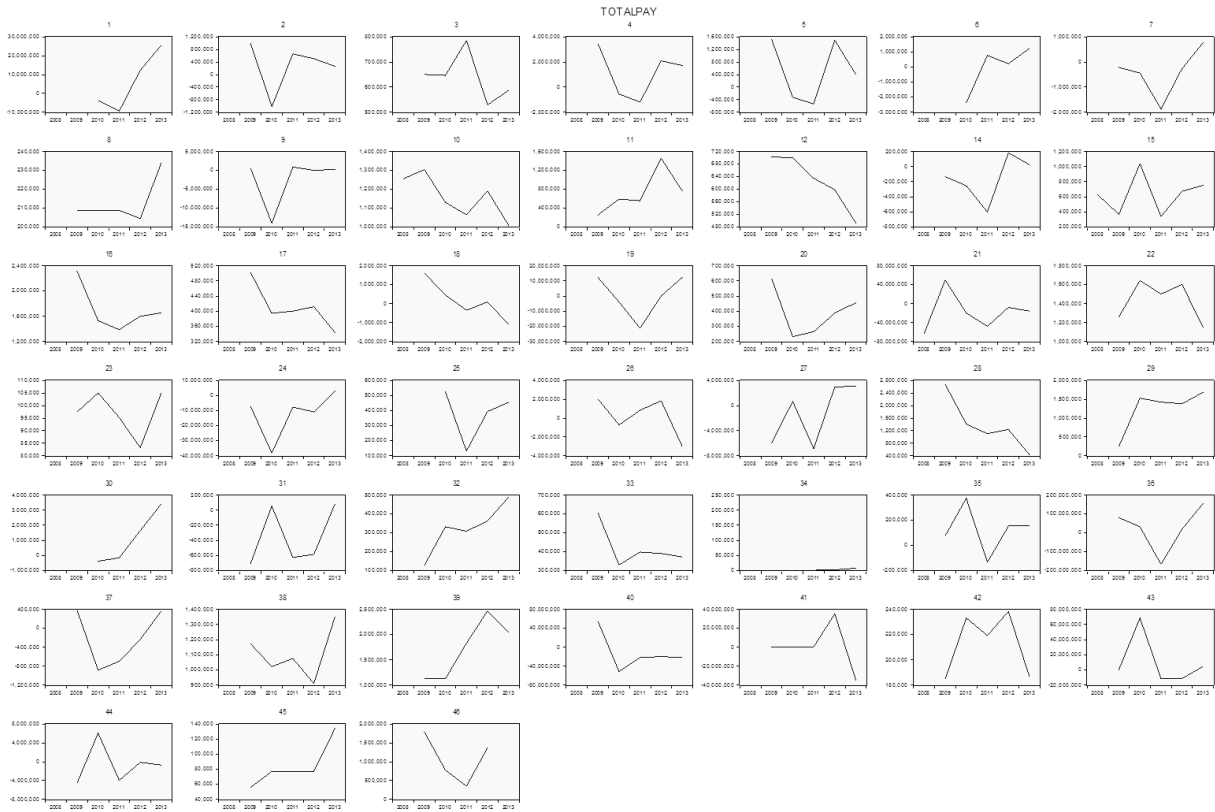


Figure 13 – Graphical representation of the behaviour of Total Pay for each of the firms

The graphical representation of the behaviour of the Total Pay variable also demonstrates the lack of a clear pattern between the various firms.

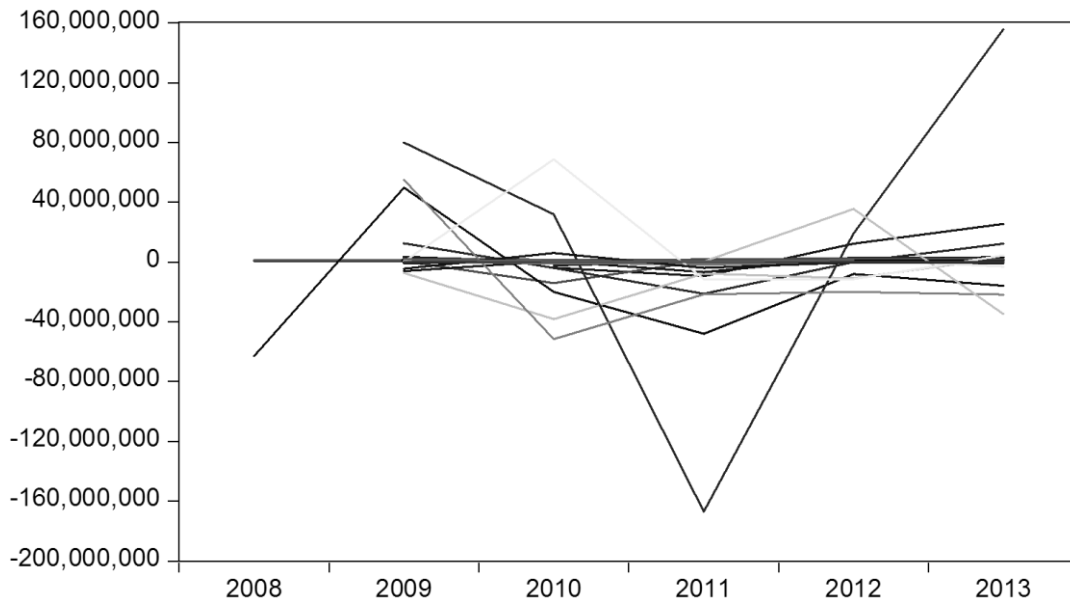


Figure 14 – Graphical representation of the global trend of Total Pay

Total pay autocorrelation, does not present a clear trend sign [-0.452 – 0.126] for all 5 lags. Autocorrelation average is -0,29. There is no clear trend regarding the reduction of

autocorrelation, as in lags 1 and 2 the autocorrelation is negative and in the remaining lags is positive.

Date: 10/07/14 Time: 16:56  
Sample: 2008 2013  
Included observations: 222











Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 -0.085	-0.085	1.6365	0.201
		2 -0.452	-0.463	47.892	0.000
		3 0.109	0.017	50.591	0.000
		4 0.126	-0.088	54.202	0.000
		5 0.012	0.098	54.232	0.000

Figure 15 – Total Pay autocorrelation

Note the omitted data in some of the listed firms on the various variables. This happens by lack of information available (e.g., there are no observations available on reports regarding the firm "Espírito Santo Financial Group" in the variable Total Pay), but also by the very definition of the variables according to the Bloomberg on "ROA" and "ROE", mentioned above.

The variable "Total Pay" includes equity component, as previously defined. Nevertheless, this component does not include dividends paid to shareholders.

The stock valuation held by the CEO (acquired or offered as compensation) was carried out by collecting the last share price at the year in question from historical data from BolsaPT<sup>6</sup> website. This also equals the last position reported by the company in relation to its shareholders and, as so, it is solid valuation of the total portfolio reported by the CEO. Measuring a point in time avoids the constant variations of the value of the portfolio over the period of one year and, therefore, it was possible to control the downside of measurement caused by changes in the portfolio of the CEO during the year by sales orders, purchase of shares, options exercise, etc.

Analysing the data collected regarding CEO compensation, one can see that the use of stock options and other incentives is not common among the list of Portuguese firms. Several yearly management reports only state, during the period, that the CEO only collected a fixed base salary with no incentives and no bonus. It is also not widely common, an implemented

<sup>6</sup> www.bolsapt.com

mechanism to defer payments of bonus. There are also a several number of cases of which the CEO possesses no equity of the firm, which once again, is a mechanism commonly used in other markets to align shareholder value with CEO compensation.

#### 4.7. MODEL CONSTRUCTION

Panel Data: Balanced panel data versus non balanced panel data

Following Park (2009), panel data are structured units, relating to individuals or businesses relating to a certain predefined time period. Thus it is possible to combine two dimensions, namely units and time.

In a balanced panel data, the number of periods (T) is equal to the same number of individuals (i). Conversely, if this equality is not respected, we are in presence of an unbalanced panel data. It is always desirable to obtain an equal number of observations in each subclass, as working with unbalanced data is much more complex and difficult to analyse and interpret.

In reality, most common panels are unbalanced due to a number of reasons. A common case for unbalanced panel data is the exclusion of observations with defects or by simple availability of information, which then originates different sample sizes in different groups. A practical example of this case relates to the Espirito Santo Financial Group whose lack of detailed information regarding CEO compensation requires the elimination of observations on the same. Another common case is linked precisely by the absence of data in ROA and ROE variables in some years for some firms, precisely for the reasons stated above by Bloomberg in its definition of the variables.

Thus, it is easily concluded that, despite the attempts to maintain a balanced panel, as it has been impossible to achieve so. Therefore the panel data to be used is unbalanced.

Still on data collection, according to Cameron and Trivedi - Microeconometrics using Stata (2010), panel data can be short (small number of periods and high number of individuals) or long (high number of periods and low number of individuals) or both (high number of periods and subjects). In this particular case, the panel type is short, since data only comprises 6 years (2008 - 2013) and 46 subjects.

To estimate the models with panel data there are several possible structures:

- By means of pooled regressions, where the individual effect is constant. Then Ordinary Least Squares provides consistent and efficient estimates of the common  $\alpha$  and the slope vector  $\beta$ ;

- By means of dynamic models, also fixed effects and random effects. The difference lies whether the individual effect is correlated or not with the included variables.
- By means of random parameters, the random effects model can be viewed as a regression model with a random constant term.

The chosen models for the thesis were the dynamic models, namely fixed and random effects.

For an analysis regarding the different types of models please see the appendixes.

#### 4.8. RESULTS: LINKING PERFORMANCE AND COMPENSATION WITHOUT CONTROL VARIABLES

Recalling the hypothesis previously stated, the intent of the thesis is to test the existence of a statistically significant link between performance and remuneration. The linearly-defined model for both the performance variables is:

$$ROE_{it} = \alpha + \beta Total Pay_{it} + \epsilon_{it}$$

$$ROA_{it} = \alpha + \beta Total Pay_{it} + \epsilon_{it}$$

Thus, regarding the first hypothesis “**Hypothesis #1:** There is a statistically significant relationship between performance of firms and the compensation of the CEO”

- The null hypothesis (H<sub>0</sub>) is there is a statistically significant relationship between performance of firms and the compensation of the CEO
- The alternate hypothesis (H<sub>1</sub>) is there is no statistically significant relationship between performance of firms and the compensation of the CEO

Variable	Fixed effects (Expected signs)	Random effects (Expected signs)
ROA	TOTAL PAY (+)	TOTAL PAY (+)
ROE	TOTAL PAY (+)	TOTAL PAY (+)

Table 4 – Fixed and random effects model expected signs

Additionally, if there is a statistically significant relationship, it is intended to further test the following additional “**Hypothesis #2:** The higher the weight of the variable parcel in total compensation in total compensation earned by the CEO the better the performance of firms.”

Therefore for this subtype, the null and the alternate hypothesis are:

- Null hypothesis (H<sub>0</sub>): The higher the percentage of variable compensation in the total compensation package earned by the CEO the better is the firm performance.
- The alternate hypothesis (H<sub>1</sub>): The higher the percentage of variable compensation in the total compensation package earned by the CEO the worst or null impact it has in the firm performance.

Variable	Fixed effects (Expected signs)	Random effects (Expected signs)
ROA	TOTAL PAY (+)	TOTAL PAY (+)
ROE	TOTAL PAY (+)	TOTAL PAY (+)

Table 5 – Fixed and random effects model expected signs

For hypothesis #1, the fixed and random models built were:

Variable	Fixed effects	Random effects
ROA	ROA = C(1)*TOTALPAY + C(2) + [CX=F], with substituted coefficients ROA = 9.02898001724e-09*TOTALPAY + 0.811892659666 + [CX=F]	ROA = C(1)*TOTALPAY + C(2) + [CX=R], with substituted coefficients ROA = 1.89996808069e-08*TOTALPAY + 0.810015424082 + [CX=R]
ROE	ROE = C(1)*TOTALPAY + C(2) + [CX=F], with substituted coefficients ROE = 4.67833517666e-08*TOTALPAY + 3.51081386919 + [CX=F]	ROE = C(1)*TOTALPAY + C(2) + [CX=R], with substituted coefficients ROE = 5.29124616936e-08*TOTALPAY + 3.29127861169 + [CX=R]

Table 6 – Fixed and random effects modelling

Dependent Variable: ROA  
 Method: Panel Least Squares  
 Date: 10/13/14 Time: 15:01  
 Sample: 2008 2013  
 Periods included: 6  
 Cross-sections included: 45  
 Total panel (unbalanced) observations: 216

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAY	9.03E-09	3.94E-08	0.229219	0.8190
C	0.811893	0.761950	1.065545	0.2881

Effects Specification

Cross-section fixed (dummy variables)			
R-squared	0.197033	Mean dependent var	0.813593
Adjusted R-squared	-0.015517	S.D. dependent var	11.11193
S.E. of regression	11.19781	Akaike info criterion	7.855759
Sum squared resid	21316.45	Schwarz criterion	8.574568
Log likelihood	-802.4220	Hannan-Quinn criter.	8.146160
F-statistic	0.926998	Durbin-Watson stat	1.686397
Prob(F-statistic)	0.606592		

Figure 16 – Estimation output for ROA fixed effects model

Dependent Variable: ROE  
 Method: Panel Least Squares  
 Date: 10/13/14 Time: 15:03  
 Sample: 2008 2013  
 Periods included: 6  
 Cross-sections included: 42  
 Total panel (unbalanced) observations: 197

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAY	4.68E-08	8.10E-08	0.577452	0.5645
C	3.510814	1.640946	2.139506	0.0340

Effects Specification

Cross-section fixed (dummy variables)			
R-squared	0.528616	Mean dependent var	3.520705
Adjusted R-squared	0.400056	S.D. dependent var	29.73367
S.E. of regression	23.03052	Akaike info criterion	9.301815
Sum squared resid	81682.36	Schwarz criterion	10.01845
Log likelihood	-873.2288	Hannan-Quinn criter.	9.591916
F-statistic	4.111841	Durbin-Watson stat	1.645129
Prob(F-statistic)	0.000000		

Figure 17 – Estimation output for ROE fixed effects model

Dependent Variable: ROA  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 09/29/14 Time: 23:44  
 Sample: 2008 2013  
 Periods included: 6  
 Cross-sections included: 45  
 Total panel (unbalanced) observations: 216  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAY	1.90E-08	3.78E-08	0.502757	0.6157
C	0.810015	0.761948	1.063086	0.2889

Effects Specification		S.D.	Rho
Cross-section random		0.000000	0.0000
Idiosyncratic random		11.19781	1.0000

Weighted Statistics			
R-squared	0.001194	Mean dependent var	0.813593
Adjusted R-squared	-0.003473	S.D. dependent var	11.11193
S.E. of regression	11.13121	Sum squared resid	26515.43
F-statistic	0.255798	Durbin-Watson stat	1.356050
Prob(F-statistic)	0.613542		

Unweighted Statistics			
R-squared	0.001194	Mean dependent var	0.813593
Sum squared resid	26515.43	Durbin-Watson stat	1.356050

Figure 18 – Estimation output for ROA random effects model

Dependent Variable: ROE  
Method: Panel EGLS (Cross-section random effects)  
Date: 09/29/14 Time: 23:59  
Sample: 2008 2013  
Periods included: 6  
Cross-sections included: 42  
Total panel (unbalanced) observations: 197  
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAY	5.29E-08	8.03E-08	0.659150	0.5106
C	3.291279	3.413101	0.964308	0.3361

Effects Specification		S.D.	Rho
Cross-section random		19.26128	0.4116
Idiosyncratic random		23.03052	0.5884

Weighted Statistics			
R-squared	0.002198	Mean dependent var	1.667458
Adjusted R-squared	-0.002919	S.D. dependent var	23.12289
S.E. of regression	23.16210	Sum squared resid	104614.2
F-statistic	0.429556	Durbin-Watson stat	1.284704
Prob(F-statistic)	0.512979		

Unweighted Statistics			
R-squared	0.002337	Mean dependent var	3.520705
Sum squared resid	172876.9	Durbin-Watson stat	0.777421

Figure 19 – Estimation output for ROE random effects model

Thus, to determine which model should be most suited to be used to study the regression, the Hausman test was used. The test allows checking which of the two models (fixed effects vs random effects) is the most appropriate according to Hausman (1978).

Correlated Random Effects - Hausman Test  
Equation: EQ02RANDROE  
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.313463	1	0.5756

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
TOTALPAY	0.000000	0.000000	0.000000	0.5756

Cross-section random effects test equation:  
Dependent Variable: ROE  
Method: Panel Least Squares  
Date: 10/13/14 Time: 16:00  
Sample: 2008 2013  
Periods included: 6  
Cross-sections included: 42  
Total panel (unbalanced) observations: 197

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.510814	1.640946	2.139506	0.0340
TOTALPAY	4.68E-08	8.10E-08	0.577452	0.5645

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.528616	Mean dependent var	3.520705
Adjusted R-squared	0.400056	S.D. dependent var	29.73367
S.E. of regression	23.03052	Akaike info criterion	9.301815
Sum squared resid	81682.36	Schwarz criterion	10.01845
Log likelihood	-873.2288	Hannan-Quinn criter.	9.591916
F-statistic	4.111841	Durbin-Watson stat	1.645129
Prob(F-statistic)	0.000000		

Figure 20 – Hausman test results for ROE

For the ROE model, as the Chi-Square statistic is 0.313463 and the probability is 57,56% (as so, above 5%), it is not possible to reject the null hypothesis, and therefore the most appropriate model is the random effects model.

For the ROA model, as the Chi-Square statistic is 0.805420 and the probability is 36,95% (as so, above 5%), it is also not possible to reject the null hypothesis, and therefore the most appropriate model is the random effects model.

Correlated Random Effects - Hausman Test  
Equation: EQ01RANDROA  
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.805420	1	0.3695

\*\* WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
TOTALPAY	0.000000	0.000000	0.000000	0.3695

Cross-section random effects test equation:  
Dependent Variable: ROA  
Method: Panel Least Squares  
Date: 10/13/14 Time: 17:40  
Sample: 2008 2013  
Periods included: 6  
Cross-sections included: 45  
Total panel (unbalanced) observations: 216

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.811893	0.761950	1.065545	0.2881
TOTALPAY	9.03E-09	3.94E-08	0.229219	0.8190

Effects Specification

Cross-section fixed (dummy variables)			
R-squared	0.197033	Mean dependent var	0.813593
Adjusted R-squared	-0.015517	S.D. dependent var	11.11193
S.E. of regression	11.19781	Akaike info criterion	7.855759
Sum squared resid	21316.45	Schwarz criterion	8.574568
Log likelihood	-802.4220	Hannan-Quinn criter.	8.146160
F-statistic	0.926998	Durbin-Watson stat	1.686397
Prob(F-statistic)	0.606592		

Figure 21 – Hausman test results for ROA

As result of the Hausman test, the focus from now on will be on the random effects models for ROA and ROE. Remembering the estimation outputs for both of the models:

Random effects	ROA Model	ROE Model
Estimation outputs	ROA = 1.89996808069e-08*TOTALPAY + 0.810015424082	ROE = 5.29124616936e-08*TOTALPAY + 3.29127861169
Total pay coefficient	1.89996808069e-08	5.29124616936e-08
t-statistic for the Total pay coefficient	0.502757	0.659150
Probability for the Total pay coefficient	0.6157	0.5106
R-squared	0.001194	0.002198

Table 7 – Main outputs for both the random and fixed effects models

Looking at R-squared, it is observable that the explanatory power of both the models is very low (less than 1%). It is also observable, referring to the probability for the Total Pay coefficient, that its value is very high – 61,57% and 51,06% - both above 5%, which means the coefficient has no statistical validity.

This can be thoroughly tested performing a Wald test on the coefficient, where the null hypothesis is if Total Pay coefficient is zero [ $H_0: C(1) = 0$ ].

Wald Test:  
Equation: EQ01RANDROA

Test Statistic	Value	df	Probability
t-statistic	0.502757	214	0.6157
F-statistic	0.252764	(1, 214)	0.6157
Chi-square	0.252764	1	0.6151

Null Hypothesis: C(1)=0  
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	1.90E-08	3.78E-08

Restrictions are linear in coefficients.

Figure 22 – Wald test results for the Total Pay Coefficient in the ROA model

Looking at the results of the test, particularly the probability value of the t-statistic, the null hypothesis cannot be rejected, which means there is probably no link between the total pay independent variable and the dependent ROA variable.

The same test and conclusion can also be demonstrated for the ROE model, as shown in the picture below.

Wald Test:  
Equation: EQ02RANDROE

Test Statistic	Value	df	Probability
t-statistic	0.659150	195	0.5106
F-statistic	0.434479	(1, 195)	0.5106
Chi-square	0.434479	1	0.5098

Null Hypothesis: C(1)=0  
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	5.29E-08	8.03E-08

Restrictions are linear in coefficients.

Figure 23 – Wald test results for the Total Pay Coefficient in the ROE model

#### 4.9. RESULTS: LINKING PERFORMANCE AND COMPENSATION WITH CONTROL VARIABLES

It is also important to perform other sensitivity analysis as well as tests to try to null other noises exogenous to the variables which might be affecting the model.

Therefore, in order to accomplish the sensitivity analysis, other control variables as well as performing small sample analysis will be introduced. This is valid for all firms (large sample) and for the top 15 firm performers (small sample), both for the ROA and ROE models. The top 15 firm performers for ROA and ROE were:

Model	List of firms
ROA	<ul style="list-style-type: none"> <li>Portugal Telecom, Jerónimo Martins, Portucel, Orey, Ibersol, Novabase, GALP, Corticeira Amorim, Semapa, Media Capital, REN, Sonaecom, EDP, Altri, F. Ramada Investimentos;</li> </ul>
ROE	<ul style="list-style-type: none"> <li>Portugal Telecom, Cofina, Jerónimo Martins, Futebol Clube do Porto, Altri, Orey, ZON, EDP, Semapa, Mota Engil, Portucel, REN, GALP, Ibersol, F. Ramada Investimentos;</li> </ul>

Table 8 – Top 15 performers

The additional control variables included were related to *i)* the firm corporate governance (TYPEOFBOARD – identifies if the board is unitary or two tier, PERCENTNONEXECDIR – identifies the percentage of non-executive directors on the board, PERCINDDIRETCOMPCO – identifies the percentage of independent directors on the compensation committee, OUTSIDECOMPADVISOR – identifies if there are known outside advisors on the firm’s compensation committee and APPOINTFROMWITHIN - detects if the CEO was appointed from within the firm) but *ii)* also in close link to economic performance, a set of firm level controls (ASSETGROWTH – compiles information regarding the firm’s asset growth, BOOKVALUEPERSHARE – compiles data regarding the book value per share).

APPOINTFROMWITHIN, OUTSIDECOMPADVISOR and TYPEOFBOARD are all three dummy variables. All the data for the control variables introduced was also extracted and compiled from Bloomberg, as well.

As a summary, the table below presents the results for all the analysis performed crossing the introduction of both the control variables as well as the small sample analysis.

Sample type	Model	Without control variables	With Control variables
Large sample analysis	ROA	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>Low explanatory power of the model (R squared is 0,1%)</li> </ul>	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>High R<sup>2</sup> due to number of observations and introduction of control variables</li> </ul>
	ROE	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>Low explanatory power of the model (R squared is 0,2%)</li> </ul>	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>Medium/low R<sup>2</sup> due to number of observations and introduction of control variables</li> </ul>
Small sample analysis	ROA	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>Low explanatory power of the model (R squared is 0,03%)</li> </ul>	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>Medium/low R<sup>2</sup> due to number of observations and introduction of control variables</li> </ul>
	ROE	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>Low explanatory power of the model (R squared is 0,03%)</li> </ul>	<ul style="list-style-type: none"> <li>Total pay coefficient non statistically relevant (p-value above 5%)</li> <li>Medium/low R<sup>2</sup> due to number of observations and introduction of control variables</li> </ul>

Table 9 – Summary of conclusions

Dependent Variable: ROA  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 09/29/14 Time: 12:53  
 Sample (adjusted): 2010 2013  
 Periods included: 4  
 Cross-sections included: 11  
 Total panel (unbalanced) observations: 34  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAY	-3.92E-08	6.06E-08	-0.647521	0.5234
TYPEOFBOARD	-1.308292	3.514222	-0.372285	0.7129
PERCENTNONEXECDIR	0.047751	0.097653	0.488990	0.6293
PERCINDIRECTCOMPCO	0.046471	0.027013	1.720306	0.0982
PERCENTINDIRECTORS	-0.014834	0.113896	-0.130239	0.8975
OUTSIDECOMPADVISO	-0.146831	3.614287	-0.040625	0.9679
APPOINTFROMWITHIN	9.164409	4.673970	1.960733	0.0616
ASSETGROWTH	-0.242983	0.047188	-5.149275	0.0000
BOOKVALUEPERSHARE	5.986701	0.938557	6.378621	0.0000
C	-21.13823	9.738437	-2.170597	0.0401

Effects Specification		S.D.	Rho
Cross-section random		6.188313	0.8263
Idiosyncratic random		2.837125	0.1737

Weighted Statistics			
R-squared	0.623779	Mean dependent var	0.486993
Adjusted R-squared	0.482696	S.D. dependent var	5.312907
S.E. of regression	3.820421	Sum squared resid	350.2947
F-statistic	4.421368	Durbin-Watson stat	1.444167
Prob(F-statistic)	0.001696		

Unweighted Statistics			
R-squared	-0.684744	Mean dependent var	1.903794
Sum squared resid	2804.645	Durbin-Watson stat	0.180374

Figure 24 – ROA model, large sample with introduction of control variables

Dependent Variable: ROE  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 09/29/14 Time: 12:53  
 Sample (adjusted): 2010 2013  
 Periods included: 4  
 Cross-sections included: 11  
 Total panel (unbalanced) observations: 34  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAY	2.65E-07	5.47E-07	0.484001	0.6328
TYPEOFBOARD	-5.021069	28.06325	-0.178920	0.8595
PERCINDIRECTCOMPCO	-0.097995	0.206471	-0.474618	0.6393
PERCENTNONEXECDIR	0.571156	0.795045	0.718394	0.4795
PERCENTINDIRECTORS	-0.152890	0.777293	-0.196696	0.8457
OUTSIDECOMPADVISO	-9.030263	28.26857	-0.319445	0.7522
LEVERAGE	0.512122	1.158983	0.441872	0.6625
APPOINTFROMWITHIN	41.59795	22.62829	1.838316	0.0784
BOOKVALUEPERSHARE	22.29601	6.809055	3.274464	0.0032
C	-99.86964	73.86980	-1.351969	0.1890

Effects Specification		S.D.	Rho
Cross-section random		23.88352	0.4599
Idiosyncratic random		25.88119	0.5401

Weighted Statistics			
R-squared	0.298575	Mean dependent var	4.130983
Adjusted R-squared	0.035541	S.D. dependent var	31.55316
S.E. of regression	30.97846	Sum squared resid	23031.97
F-statistic	1.135119	Durbin-Watson stat	1.995229
Prob(F-statistic)	0.377477		

Unweighted Statistics			
R-squared	0.151011	Mean dependent var	7.827647
Sum squared resid	42595.00	Durbin-Watson stat	1.078860

Figure 25 – ROE model, large sample with introduction of control variables

Dependent Variable: ROA  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 09/29/14 Time: 23:54  
 Sample (adjusted): 2009 2013  
 Periods included: 5  
 Cross-sections included: 10  
 Total panel (unbalanced) observations: 48  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAYROA	-2.89E-09	2.24E-08	-0.128918	0.8980
C	5.100265	0.799197	6.381735	0.0000

Effects Specification		S.D.	Rho
Cross-section random		0.000000	0.0000
Idiosyncratic random		5.517686	1.0000

Weighted Statistics			
R-squared	0.000377	Mean dependent var	5.091667
Adjusted R-squared	-0.021354	S.D. dependent var	5.342437
S.E. of regression	5.399176	Sum squared resid	1340.951
F-statistic	0.017357	Durbin-Watson stat	2.310731
Prob(F-statistic)	0.895758		

Unweighted Statistics			
R-squared	0.000377	Mean dependent var	5.091667
Sum squared resid	1340.951	Durbin-Watson stat	2.310731

Figure 26 – ROA model, small sample analysis

Dependent Variable: ROE  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 09/29/14 Time: 23:55  
 Sample: 2008 2013  
 Periods included: 6  
 Cross-sections included: 10  
 Total panel (unbalanced) observations: 46  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAYROE	-9.52E-09	1.28E-07	-0.074512	0.9409
C	28.25568	5.907976	4.782632	0.0000

Effects Specification		S.D.	Rho
Cross-section random		11.59709	0.1218
Idiosyncratic random		31.14296	0.8782

Weighted Statistics			
R-squared	0.000128	Mean dependent var	21.91975
Adjusted R-squared	-0.022596	S.D. dependent var	30.60547
S.E. of regression	30.89046	Sum squared resid	41985.70
F-statistic	0.005643	Durbin-Watson stat	1.647758
Prob(F-statistic)	0.940459		

Unweighted Statistics			
R-squared	0.000302	Mean dependent var	28.03696
Sum squared resid	47329.63	Durbin-Watson stat	1.461712

Figure 27 – ROE model, small sample analysis

Dependent Variable: ROA  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 10/15/14 Time: 11:44  
 Sample (adjusted): 2010 2013  
 Periods included: 4  
 Cross-sections included: 6  
 Total panel (unbalanced) observations: 19  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAYROA	6.79E-06	5.89E-06	1.152621	0.2698
ASSETGROWROA	-0.025264	0.110214	-0.229222	0.8223
BOOKVALUEROA	1.467908	1.752166	0.837768	0.4173
APPOINTFROMWINR...	9.457910	6.035491	1.567049	0.1411
PERCNONEXECROA	-0.318475	0.307155	-1.036854	0.3187
C	8.533527	19.31890	0.441719	0.6660

Effects Specification		S.D.	Rho
Cross-section random		0.000000	0.0000
Idiosyncratic random		8.241754	1.0000

Weighted Statistics			
R-squared	0.246602	Mean dependent var	5.810526
Adjusted R-squared	-0.043166	S.D. dependent var	8.103970
S.E. of regression	8.277031	Sum squared resid	890.6202
F-statistic	0.851032	Durbin-Watson stat	1.591612
Prob(F-statistic)	0.538141		

Unweighted Statistics			
R-squared	0.246602	Mean dependent var	5.810526
Sum squared resid	890.6202	Durbin-Watson stat	1.591612

Figure 28 – ROA model, small sample analysis with control variables (best case scenario)

Dependent Variable: ROE  
Method: Panel EGLS (Cross-section random effects)  
Date: 10/15/14 Time: 11:49  
Sample (adjusted): 2010 2013  
Periods included: 4  
Cross-sections included: 7  
Total panel (unbalanced) observations: 24  
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTALPAYROE	4.41E-05	2.84E-05	1.553197	0.1378
TYPEOFBOARDROE	40.12111	27.76951	1.444790	0.1657
ASSETGROWROE	-0.224427	0.484956	-0.462777	0.6491
BOOKVALUEROE	5.676238	6.897954	0.822887	0.4213
APPOINTFROMWINROE	12.03885	19.43341	0.619493	0.5434
C	-64.64865	36.07434	-1.792095	0.0899

Effects Specification		S.D.	Rho
Cross-section random		0.000000	0.0000
Idiosyncratic random		36.31727	1.0000

Weighted Statistics			
R-squared	0.311119	Mean dependent var	21.32917
Adjusted R-squared	0.119763	S.D. dependent var	38.21703
S.E. of regression	35.85558	Sum squared resid	23141.21
F-statistic	1.625864	Durbin-Watson stat	1.721187
Prob(F-statistic)	0.203858		

Unweighted Statistics			
R-squared	0.311119	Mean dependent var	21.32917
Sum squared resid	23141.21	Durbin-Watson stat	1.721187

Figure 29 – ROE model, small sample analysis with control variables (best case scenario)

On these top tier performance firms, some additional tests were performed to factor in other variables like PERCENTAGE OF FOREIGN CAPITAL (in order to check if firms with higher degrees of foreign ownership percentage produce better performance) and PERCENTAGE OF CEO OWNERSHIP (percentage of equity owned by the CEO). Theoretically, these variables should account for some degree of relationship with performance. The assumption here is that international shareholders demand for higher performance nevertheless other issues regarding national market performance. The next assumption here is that whenever CEO equity ownership is higher the better the performance of the company, as there is more incentive for the firm to produce results and reward the CEO, which is also a relevant shareholder.

Nevertheless, as shown by the figures below, no significant statistical relationship can be established between either of these variables and performance variables.  $R^2$  is low and the  $\beta$  coefficient of the regression is not statistically relevant.

Dependent Variable: ROA  
Method: Panel EGLS (Cross-section random effects)  
Date: 11/16/14 Time: 18:49  
Sample: 2008 2013  
Periods included: 6  
Cross-sections included: 15  
Total panel (unbalanced) observations: 89  
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA_PERCENTCAPITAL	0.459719	1.807042	0.254404	0.7998
C	3.988633	0.680623	5.860272	0.0000

Effects Specification		S.D.	Rho
Cross-section random		0.919270	0.0467
Idiosyncratic random		4.154098	0.9533

Weighted Statistics			
R-squared	0.000751	Mean dependent var	3.613083
Adjusted R-squared	-0.010735	S.D. dependent var	4.111322
S.E. of regression	4.132689	Sum squared resid	1485.883
F-statistic	0.065394	Durbin-Watson stat	2.111780
Prob(F-statistic)	0.798769		

Unweighted Statistics			
R-squared	0.000754	Mean dependent var	4.104494
Sum squared resid	1551.588	Durbin-Watson stat	2.022353

Figure 30 – ROA model and percentage of foreign owned equity (best performant firms)

Dependent Variable: ROA  
 Method: Panel Least Squares  
 Date: 11/16/14 Time: 19:16  
 Sample: 2008 2013  
 Periods included: 6  
 Cross-sections included: 15  
 Total panel (unbalanced) observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA_CAPITALCEO	35.15102	30.79272	1.141537	0.2574
C	0.165380	3.478273	0.047547	0.9622

Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.200953	Mean dependent var	4.104494	
Adjusted R-squared	0.036765	S.D. dependent var	4.200593	
S.E. of regression	4.122652	Akaike info criterion	5.832244	
Sum squared resid	1240.727	Schwarz criterion	6.279639	
Log likelihood	-243.5349	Hannan-Quinn criter.	6.012576	
F-statistic	1.223921	Durbin-Watson stat	2.532154	
Prob(F-statistic)	0.274334			

Figure 31 – ROA model and percentage of equity owned by the CEO (best performant firms)

Dependent Variable: ROE  
 Method: Panel Least Squares  
 Date: 11/16/14 Time: 18:20  
 Sample: 2008 2013  
 Periods included: 6  
 Cross-sections included: 15  
 Total panel (unbalanced) observations: 85

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROE_PERCENTCAPITALESTR	-29.37016	30.92832	-0.949620	0.3456
C	27.01515	7.000802	3.858865	0.0003

Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.363697	Mean dependent var	20.80941	
Adjusted R-squared	0.225370	S.D. dependent var	26.30377	
S.E. of regression	23.15076	Akaike info criterion	9.289858	
Sum squared resid	36981.09	Schwarz criterion	9.749651	
Log likelihood	-378.8190	Hannan-Quinn criter.	9.474800	
F-statistic	2.629255	Durbin-Watson stat	2.115148	
Prob(F-statistic)	0.003443			

Figure 32 – ROE model and percentage of foreign owned equity (best performant firms)

Dependent Variable: ROE  
Method: Panel EGLS (Cross-section random effects)  
Date: 11/16/14 Time: 19:21  
Sample: 2008 2013  
Periods included: 6  
Cross-sections included: 15  
Total panel (unbalanced) observations: 85  
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROE_CAPITALCEO	-14.42101	19.73452	-0.730750	0.4670
C	22.93988	4.868892	4.711520	0.0000

Effects Specification		S.D.	Rho
Cross-section random		13.15228	0.2416
Idiosyncratic random		23.30087	0.7584

Weighted Statistics			
R-squared	0.006453	Mean dependent var	12.49763
Adjusted R-squared	-0.005518	S.D. dependent var	23.19833
S.E. of regression	23.19098	Sum squared resid	44639.18
F-statistic	0.539069	Durbin-Watson stat	1.737420
Prob(F-statistic)	0.464888		

Unweighted Statistics			
R-squared	0.013791	Mean dependent var	20.80941
Sum squared resid	57317.10	Durbin-Watson stat	1.353121

Figure 33 – ROE model and percentage of equity owned by the CEO (best performant firms)

Note that all the regressions were performed using information collected from CMVM and governance reports. Fixed effects models were also built but the random effects models, which was still the most suited model/ best fit regressions, is presented (as designated by the Hausman Test). Wald tests for the  $\beta$  coefficients were also performed and the results showed that there is no relation between variables.

## 5. CONCLUSIONS

The main purpose of this study is to examine whether the total compensation paid to CEOs in Portuguese firms explains its performance.

Recalling the hypothesis previously stated, the intent of the thesis is to test the existence of a statistically significant link between performance and remuneration. The linearly-defined model for both the performance variables is:

$$ROE_{it} = \alpha + \beta Total Pay_{it} + \epsilon_{it}$$

$$ROA_{it} = \alpha + \beta Total Pay_{it} + \epsilon_{it}$$

Recalling what was previously written, the first hypothesis was “**Hypothesis #1:** There is a statistically significant relationship between performance of firms and the compensation of the CEO”

Additionally, if there was a statistically significant relationship, it was intended to further test the following additional “**Hypothesis #2:** The higher the weight of the variable parcel in total compensation in total compensation earned by the CEO the better the performance of firms.”

Based on the analysis performed, it seems that CEO compensation does not induce firm performance, and therefore hypothesis #1 is not corroborated, which means there is no statistically valid link between performance and CEO compensation, i.e., results suggest that managerial compensation that are meant to align managerial interests with shareholder value, do not necessarily translate into performance of the firms.

This is an expected result, even when it is based on the most statistical “loose” case, without any control variables. Recalling the Introduction chapter, one of the common sense explanations for the lack of performance was risk aversion. This risk aversion explains the preference for “fixed pay” over performance pay in many cases.

Even when pushing for results and trying to study if the link was being affected by the economic Portuguese crisis, introducing control variables and small sampling (only the top 15 performers), it still was not possible to statistically create a valid link between performance

variables and CEO compensation. The small sample analysis is also valid to study if CEO compensation was hurt by the economic crisis, which, if looking at this from a capping perspective, CEO compensation is always low capped as there are not enough “whips” in the incentives to punish bad performance. Therefore small sampling allows for establishing a proxy to this matter and still no link was found (other conclusion detailed below also looks at the economic crisis from another perspective as influencing CEO compensation).

Additionally, as small sampling was introduced into the models, still no relation is possible to infer which means it is not possible to also conclude anything regarding hypothesis #2.

On top of, when crunching the numbers, and looking at CEO equity ownership as a proxy for shareholder risk aversion one can conclude that risk aversion is a trait not limited to CEO but also to shareholders.

The risk aversion case is also present as a conclusion derived from other restriction (even though not tested):

- As some specific governance variables were introduced to measure the possible influence of CEO on compensation (e.g. if the CEO was appointed from within its compensation package might be less than the market is offering, the presence of outside compensation advisors might positively influence the CEO compensation package, or even regarding the presence of a sufficient number of independent directors on the compensation committee or non-executive directors on the board to safe guarantee the implementation of checks and balances, among others) there might be other mechanisms through which the CEO might influence its compensation package (e.g. managerial power as stated by Bebchuk and Fried (2004) might be a valid point here as rent extraction might already be too high and therefore there are no incentives for risk taking decisions from the CEO which hurts firm performance);
- Given the years analysed, a recession period of the Portuguese economy, the economic performance of the firms might be affected by it, and as some of total pay is considered only on the year it has been paid and not on the year it was earned (past economic firm performance) this effect might influence the linear regression. This is also aligned with risk aversion and efficient contracting points detailed in the Introduction chapter, as if there are no incentives for risk taking decisions there is no

performance. Additionally, if rent extraction is high and there are no “whips” placed in the contract, risk aversion behaviour is enhanced;

- Core, Guay and Verrecchia (1999), also state that even if contracts are optimal, contracting models that are based on project selection might not be well explained by agency theory;
- Some of the CEO contracts currently in effect may lack an update, even though the CEO has been re-elected for another term (e.g. F. Ramada Investimentos, Lisgráfica, ...);

Analysing the data collected regarding CEO compensation, one can see that the use of stock options and other incentives is not common among the list of Portuguese firms. Several yearly management reports only state, during the period, that the CEO only collected a fixed base salary with no incentives and no bonus. It is also not widely common, an implemented mechanism to defer payments of bonus. There are also a several number of cases of which the CEO possesses no equity of the firm, which once again, is a mechanism to align shareholder value with CEO compensation.

Looking at the literature, one can only say that the subject is controversial. Several authors present their case stating that CEO compensation has no relationship with firm performance.

Contributing to this point of view, Jensen (1993) argues that boards are ineffective in setting the compensation for a number of reasons, among which stands out the reduced equity participation by the directors (executive and non-executive).

Crystal (1991) also argues that the board is ineffective in setting the appropriate remuneration. The idea behind his argument is that since managers are essentially hired by the CEO, he/she can exert high influence on them, so when it comes for the moment of CEO compensation definition this influence can result in the ineffectiveness of the act.

Additionally, Crystal (1991) also states that boards rely on external consultants for hiring the CEO, most of them advising also on the board or in the compensation committee, which may result in contracts that benefit only CEO and not the firm.

Core, Guay and Thomas (2005), on the other hand, address the issue of pay for performance rebating every misconception critics pose about four major concerns: *i*) executive pay is too high; *ii*) CEO contracts are not aligned to increase firm value; *iii*) options and other equity

based pay do not reflect good performance; and *iv*) CEOs have too much freedom to unwind their incentives.

Nevertheless a controversial aspect, based on the results achieved it seems that CEO compensation does not induce firm performance in the Portuguese listed firms. Even when control variables and small sampling were introduced, it was not possible to statistically create a valid link between performance variables and CEO compensation.

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## 7. APPENDICES

### 7.1. USED SOFTWARE FOR DATA ANALYSIS

The software used for building the models/ regressions was EViews (version 7).

According to the software's website, "*EViews (...) offers academic researchers, corporations, government agencies, and students access to powerful statistical, forecasting, and modeling tools through an innovative, easy-to-use object-oriented interface.*

*EViews blends the best of modern software technology with cutting edge features. The result is a state-of-the art program that offers unprecedented power within a flexible, easy-to-use interface.*

*Explore the world of EViews and discover why it's the worldwide leader in Windows-based econometric software and the choice of those who demand the very best."*

According to Agung (2008), the software is "*an excellent interactive program that provides an excellent tool to use in order to perform data analysis, especially when it comes to developing and evaluating models, perform analysis of residuals and hypothesis, univariate or multivariate test.*"

**7.2. FIXED EFFECTS VS RANDOM EFFECTS MODELS**

According to Marques (2000), there are 7 model specifications:

Type	Model details	Model coefficients	Advantages	Disadvantages
Simple regression model	Uniform behaviour for all individuals and over time All observations are homogeneous	1) $\beta_{it} = \beta$ 2) $u_{it} \sim IID(0, \sigma^2)$	Estimable by applying OLS	Specification error, it does not include any existing heterogeneity
Individual regression model	Cconstant coefficients over time	1) $\beta_{it} = \beta_i$ 2) $u_{it} \sim IID(0, \sigma_i^2)$	Addresses individual differences in behaviour	Produces a very large number of coefficients; Unreliability is higher; Does not include independence between individual decisions;
Seemingly Unrelated Regression Model	Contemplates the existence of individual interdependence	1) $\beta_{it} = \beta_i$ 2) $E(\mu_{it}) = 0, \forall_{i,t}$ $E(\mu_{it}\mu_{js}) = \sigma_{ij}, se\ t=s$ $E(\mu_{it}\mu_{js}) = 0, se\ t \neq s$	Individual interdependence contemplated	Inefficient estimation, as it requires several degrees of freedom
Fixed effects Model	Admits that all the $\beta$ coefficients are identical for all individuals, except for the independent term $\beta_{1i}$	1) $\beta_{kit} = \beta_k, \forall_{i,t},$ <i>except for <math>K = 1</math>, in which <math>\beta_{1it} = \beta_{1i}</math></i> 2) $u_{it} \sim IID(0, \sigma_i^2)$	Easy to estimate	
Random effects model	Individual random effects specification	1) $\beta_{it} = \beta$ 2) $v_{it} = \alpha_i + \mu_{it}$	Introduces heterogeneity in individual disturbance term	
Random coefficients model	Extension of randomness To all coefficients via inclusion of individual heteroscedasticity disturbances	1) $\beta_{kit} = \beta_k + \alpha_{ki}, \forall_{t,k},$ with fixed $\beta_k$ and random $\alpha_{ki}$ 2) $u_{it} \sim IID(0, \sigma_i^2)$	Easy to estimate	Big reduction on degrees of freedom
Time Series Cross Section Model	Incorporation of alternative structures for the variance and covariance matrix of the disturbance terms	1) $\mu_{it} = \rho_i \mu_{i,t-1} + \varepsilon_{it}$ 2) $E(\mu_{it}) = 0$ 3) $E(\mu_{it}^2) = \frac{\sigma_{it}}{1-\rho_i^2}$ 4)	More parsimonious specifications, and also robust in the face of specification errors	Most appropriate specification for long and narrow panels (small N and large T)

Table 10 – Regression models

The most used models for data analysis are fixed and random effects models.

### 7.3. HAUSMAN TEST SPECIFICATION

The test is based on the premise that if on the null hypothesis covariance is equal to zero than we are in the presence of random effects:

- $H_0$ :  $\text{Cov}(a_i, X_{it}) = 0$  (random effects model is appropriate)
- $H_A$ :  $\text{Cov}(a_i, X_{it}) \neq 0$  (fixed effects model is appropriate)

Under the null hypothesis, the estimators of the random effects model are consistent and efficient. Under the alternative hypothesis, the GLS estimators with random effects (and OLS) are not consistent, but the estimators with fixed effects are.

Hausman statistic is the following:

$$H = (b_{fe} - b_{re})' [Var(b_{fe}) - Var(b_{re})]^{-1} (b_{fe} - b_{re}) \sim \chi^2_k$$

- $b_{fe}$  is the vector of estimators of the model with fixed effects
- $b_{re}$  is the vector of estimators of the random effects model
- $Var(b_{fe})$  is the variance-covariance matrix of the estimators  $b_{fe}$
- $Var(b_{re})$  is the variance-covariance matrix of the estimators  $b_{re}$
- $k$  is the number of regressors

If  $H > \chi^2_k$  the random effects model is rejected. Therefore, the fixed effects model is the most appropriate.