

**MASTER**  
*FINANCE AND TAXATION*

# **CEO Compensation and Family Firms Heterogeneity**

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CEO COMPENSATION AND FAMILY FIRMS HETEROGENEITY

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**Index**

Index of Tables ..... iv

Abstract .....v

Introduction.....1

1. Literature Review and Hypotheses Development.....3

1.1. Guiding Theories .....3

1.1.1. Agency Theory .....3

1.1.2. Stewardship Theory .....5

1.2. Family Firms .....8

1.2.1. Family Firms Heterogeneity.....8

1.3. The Relation Between the Heterogeneity of family Firms and CEO Compensation .....10

1.3.1. The Generational Stage of the Firm .....10

1.3.2. The Level of Family Representation on the Board of Directors .....11

1.3.3. The Family Status of the CEO.....12

1.4. Research Hypotheses .....13

1.4.1. Founder–Lone vs. Founder–Multiple .....14

1.4.2. Descendant–Lone vs. Descendant–Multiple.....15

1.4.3. Family CEO vs. Professional CEO.....15

2. Methodology .....17

2.1. Sample.....17

2.2. Variables .....18

2.2.1. CEO Compensation .....18

2.2.2. Family Firms Characteristics.....19

2.2.3. Control Variables .....19

2.3. Empirical Model .....22

2.4. Descriptive Statistics .....22

3. Results .....24

3.1. One-Dimensional Analysis .....24

3.2. Multidimensional Analysis .....28

Conclusions .....33

Appendices .....35

References.....38

**Index of Tables**

Table 1 – Family clusters .....13  
Table 2 – Sample description .....17  
Table 3 – Family firm and type of CEO as determinants of CEO compensation .25  
Table 4 – Generational stage of the firm and family representation on the board of directors as determinants of CEO compensation .....27  
Table 5 – Family clusters and CEO compensation.....29  
Table 6 – Differences in CEO compensation among family firms.....31  
Table A1 – Definition of the variables .....35  
Table A2 – Descriptive statistics .....36  
Table A3 – Correlation matrix.....37

## **Abstract**

The objective of this study is to understand how CEO compensation in family firms is influenced by their heterogeneity dimensions. Using a sample of companies listed in the S&P 500 index, between 2007 and 2016, the results show that CEO compensation is higher when the family representation is multiple and when the CEO is professional. In addition, it is shown that the compensation of professional CEOs is less sensitive to the number of family representatives on the board and that family firms are more effective in keeping CEO compensation under control than non-family firms. The findings of this study contribute to the literature on the governance of family firms by identifying the features that make them more effective in terms of CEO compensation.

**Keywords:** family firms, heterogeneity dimensions, CEO compensation, Agency Theory, Stewardship Theory

## **Resumo**

O objetivo deste estudo é perceber como a remuneração dos CEOs nas empresas familiares é influenciada pelas suas dimensões de heterogeneidade. Utilizando uma amostra composta por empresas cotadas no índice S&P 500, entre 2007 e 2016, os resultados mostram que a remuneração é mais elevada quando a representação familiar é múltipla e quando o CEO é profissional. Adicionalmente, mostra-se que a remuneração dos CEOs profissionais é menos sensível ao nível de representação familiar no conselho de administração e que as empresas familiares são mais efetivas nesta matéria do que as não familiares. Os resultados deste estudo contribuem para a literatura sobre a governação das empresas familiares identificando as características que as tornam mais efetivas em matéria de remuneração dos CEOs.

**Palavras-chave:** empresas familiares, dimensões de heterogeneidade, remuneração, Teoria da Agência, Teoria *Stewardship*

## **Introduction**

There are several companies worldwide controlled by their founders, or by the families of their founders and their descendants. According to the latest Global Family Business Index, compiled by the University of St. Gallen, in 2017 the world's three largest family firms were the US retailer Walmart, the German car maker Volkswagen and the, also American, Berkshire Hathaway, owned, respectively, by the Walton, Porsche and Piech families, and Buffett, all with turnovers of over \$ 200 billion, and together with more than 3 million workers. These facts help to better understand the obvious and impressive economic power and relevance of family businesses in the world.

In the literature, existing empirical studies lean towards treating family firms as a subset of entities with similar characteristics, orientations, and objectives. However, they are heterogeneous (Chrisman & Patel, 2012; Barontini & Bozzi, 2018) and this heterogeneity motivates different behaviors that should be studied. One of those behaviors is related to the Chief Executive Officers (CEOs) compensation, one of the central issues in terms of Corporate Governance given the conflicting objectives of the multiple actors with interests in family firms, namely, managers, large shareholders and small shareholders.

Agency Theory (Jensen & Meckling, 1976) and Stewardship Theory (Davis, Schoorman, & Donaldson, 1997) are regarded as the two guiding theories when it comes to managers compensation, especially in terms of family firms' behaviors research. Therefore, this paper is built on the argument that the degree of stewardship of both owners and CEOs within each family cluster influences the compensation characteristics of these CEOs.

The empirical contribution of this study is to identify the characteristics of family firms that make them more effective in terms of CEO compensation. Specifically, this study finds support for its theory with respect to (i) the different effects of lone and multiple family representation on the board on CEO compensation and (ii) the different way family CEOs and professional CEOs are affected by family representation on the board of directors. The theory and results

of this study have important implications for understanding that family firms are in fact heterogeneous entities (Miller & Breton-Miller, 2006) and that this heterogeneity motivates very different behaviors, particularly in terms of CEO compensation (Jaskiewicz, Block, Combs, & Miller, 2017).

The objective of this paper is thus to investigate the relationship between the heterogeneity of family firms and how they pay their CEOs. Using a sample of family firms listed in the S&P 500 index and data from 2007 to 2016, the key features that make these companies more effective in CEO compensation are identified. This research is even more relevant because it uses a sample of US companies, which brings together 126 of the 500 largest family firms worldwide, according to the Global Family Business Index.

The empirical results can be summarized as follows. First, compensation is not contingent on the generational stage of family firms, and both founders and descendants are more stewardship-oriented and have greater incentives to closely monitor CEO actions when they are the sole family representatives in the company. Second, the number of family representatives on the company's board of directors affects much more family CEOs compensation than professional CEOs compensation. Third, professional CEOs are better paid than family CEOs. And fourth, non-family firms pay their CEOs more than family firms.

This study is organised in three sections, in addition to the introduction, conclusions and appendices. The first section includes a review of the relevant literature and the development of the hypotheses. The second section presents the methodology, and the third shows the results of the multivariate analysis.

## **1. Literature Review and Hypotheses Development**

The theoretical framework section presents some concepts related to the characteristics of family firms and CEO compensation, as well as the way in which they are combined to align interests, from the perspective of both Agency Theory and Stewardship Theory. In addition, the final part consists of the development of the hypotheses under research.

### **1.1. Guiding Theories**

Several theories have been used to explain the different behaviors of companies regarding CEO compensation. Among these theories, Agency Theory and Stewardship Theory have received the most attention from the literature, namely, the one that focuses on family firms, treating them as heterogeneous entities among themselves, and attempts to establish direct relationships between their characteristics and the level of incentives offered to their managers (e.g., Claessens, Djankov, Fan & Lang, 2002; Chen, Liu, Yang & Chen, 2016; Barontini & Bozzi, 2018; Catuogno, Arena, Cirillo & Pennachio, 2018).

#### **1.1.1. Agency Theory**

Agency Theory, formalized by Jensen and Meckling (1976), gained general acceptance with the separation of ownership and control, which resulted from the evolution of the organizational structure of companies after the industrial revolution. The authors defined agency relationship as a contract in which one party (the principal) instructs the other (the agent) to perform some type of service on his behalf, particularly in the decision-making domain. The most classic example of agency relationship in the literature, according to Jensen and Murphy (1990), is the one established between shareholders and the CEO.

According to Bloom and Milkovich (1998), Agency Theory is based on three behavioral assumptions: rationality and self-interest, relative to both parties, and effort and risk aversion, regarding the agent. While rationality allows each party to anticipate and evaluate possible future contingencies, the agent's effort and risk



aversion, coupled with information asymmetry, prevent an optimal solution from being reached from the point of view of the organization as a whole, using as a criterion the satisfaction of the two parties' own interests, as these are not in agreement with each other (Baiman, 1990). This conflict of interest underlies what Jensen and Meckling (1976) called the "agency problem".

The agency problem then arises because both the principal and the agent seek to maximize their own utility, and thus the agent does not always act in the best interests of the principal (Jensen & Meckling, 1976). The principal can limit these divergences by incurring the so-called "agency costs", which means establishing appropriate incentive and monitoring systems so that the agent acts to improve performance and increase company value (Jensen & Meckling, 1976; Baiman, 1990). The focus of Agency Theory is thus to design the most efficient contract, considering the different levels of uncertainty, risk aversion, information, among others, associated with each party (Eisenhardt, 1989).

It is therefore through the agency agreement that the principal seeks to control the agent's actions, by specifying the rights of both parties, the monitoring system and the compensation structure, including the degree of alignment of the interests of the first with the incentives of the second (Fama & Jensen, 1983). According to Milgrom and Roberts (1992), monitoring and incentive systems do not necessarily have to be substitutes, they can be complementary. The authors stated that they are substitutes when the agent's effort or results can be accurately measured and are complementary when there are difficulties to perform this measurement, since carrying out one of the activities makes the other more effective. However, according to Tosi, Katz and Gomez-Mejia (1997), the relationship between monitoring and incentives is much more complex than that and is not limited to complementarity or substitution relationships, as Agency Theory establishes.

Eisenhardt (1989) and Jensen and Murphy (1990) stated that if the principal had full information about the agent's actions, then the former could design a contract based on the latter's behavior because it is the most efficient. However, since the agent's actions are not perfectly observable by the principal (Jensen & Murphy, 1990), according to Eisenhardt (1989), the latter has two alternatives to

reduce this information asymmetry, the first one being to reinforce monitoring (through information systems, such as budgeting systems, additional layers of management, among others) and thus to maintain a contract based on the agent's behaviors, and the second to design a contract based on the outcomes of the company. Because the outcomes depend not only on the agent's behaviors but also on uncontrollable factors, when using this type of contract, the principal transfers the risk associated with that uncertainty to the agent (Eisenhardt, 1989). However, it must be borne in mind that, as uncertainty increases, the contract will no longer be effective, despite the motivational benefits it brings (Eisenhardt, 1989).

According to Jensen and Murphy (1990), the optimal compensation contract should include sufficient incentive to align the interests of the agent with those of the principal. However, the contract must maintain its effectiveness by not transferring more risk to the (risk-averse) agent than the absolutely necessary as he will demand to be compensated with a risk premium for each additional unit of that uncertainty component he will have to incur (Gayle, Li, & Miller, 2018). Such an optimal contract should thus attract and retain competent (agent) executives, motivating them to maximize their effort with the lowest possible compensation (Kuang & Moser, 2009), providing the general incentives to act in the interests of shareholders (principal) and minimizing agency costs (Bebchuk, Fried & Walker, 2001).

### **1.1.2. Stewardship Theory**

Agency theory tends to assume that managers behave like homo-economicus (Davis, Schoorman & Donaldson, 1997). In fact, the model of man underlying this theory is that of a rational person who, having different options, will choose the one that maximizes his personal utility, as argued by Jensen and Meckling (1976). However, a few years later, the same authors (Jensen & Meckling, 1994) criticized this economic model of human behavior for being the result of economists' tendency to simplify, focusing only on one of the characteristics of behavior, the selfish desire for money or wealth, which by the way is one of the least attractive.

Given the need to explain other types of human behavior, an alternate theoretical current has emerged, called the Stewardship Theory. According to this theory, managers are authentic asset stewards and act pro-organizationally given the greater utility that these collectivist behaviors bring to them when compared to individual behaviors (Davis et al., 1997). Steward signals greater value in cooperation than in antagonism, that is, by refusing self-centeredness and opting for altruism (Schulze, Lubatkin & Dino, 2002).

However, Hernandez (2012) went even further, arguing that stewardship and altruism are theoretically and conceptually distinct. Whether altruism can be confused with stewardship when it is defined as a “moral value that motivates individuals to undertake actions that benefit others without any expectation of external reward” (Schulze et al., 2002, p.252), according to Hernandez (2012), the two concepts deviate with respect to the nature and scope of the actions undertaken by altruists and stewards. As stated by the same author, while altruism can be directed at a single individual, motivated only by relational considerations, and seeks short-term benefits, stewardship behaviors serve collective interests insofar as they include a larger stakeholder base, and create and maintain value over a longer period of time.

According to Hernandez (2012), the steward is governed by a psychological contract, which is based on his belief that his contributions to the principal (the organization) create an obligation of reciprocity (Rousseau, 1989). Under such a contract, the steward is paid with three different types of currency: economic, socio-emotional and ideological (Thompson & Bunderson, 2003). The psychological contract that gives rise to stewardship behaviors is therefore a multidimensional phenomenon that also provides for payment in the form of typical agency contract currencies, the economic and socio-emotional currencies, but now to a much lesser extent (Hernandez, 2012).

Thus, according to Rousseau and Parks (1993), an economic currency-based psychological contract gives rise to self-interested individual behaviors, consists of rigid rules, and entails permanent monitoring. In turn, a psychological contract based on socio-emotional currency is relational in nature, giving rise to group

behaviors and includes intrinsic rewards, such as job security, professional development, and affiliation (Rousseau & Parks, 1993). Nevertheless, this latter type of psychological contract, even being closer to that than Davis et al. (1997) defined as a generator of stewardship behaviors, is not yet, like the former, a guideline of collectivist behaviors because the achievement of self-welfare remains the main objective (Neckebrouck, Schulze, & Zellweger, 2018).

Finally, when the psychological contract is based on ideological currency the reward has also an intrinsic nature. However, in this type of contract, the steward moves for a different purpose, the pursuit of a cause that the organization is obliged to support, investing in it and showing commitment to it, that is, acting as a vehicle through which the steward can contribute, directly or indirectly, to that cause, even at the expense of personal sacrifice (Thompson & Bunderson, 2003). Stewardship behaviors can thus become a source of competitive advantage for the company (Breton-Miller, Miller, & Lester, 2011).

Organizations with good stewards and good stewardship planning are better able to maximize firm performance. According to Chrisman, Chua and Litz (2004), this is because, on the one hand, they do not have to bear the costs associated with agency problems and, on the other, there are no direct or indirect controls, thus eliminating one of the causes for the demotivation of these stewards. The same idea was advocated by Hernandez (2012), who stated that control mechanisms are not only necessary but also counterproductive as they affect the pro-organizational behavior of stewards.

A final note to the fact that Stewardship Theory is recurrently used to explain family culture, relationships and behaviors (e.g., Barontini & Bozzi, 2018; Neckebrouck, et al., 2018). This is because, due to the large emotional investment of the family in the company – the reputation and personal motivation of family members become inseparable from it – (Davis, Allen & Hayes, 2010), compared to other types of organizations, family firms have a higher proportion of non-economic goals, such as preserving the long-term business based on long-term relationships, which makes their members good stewards (Arregle, Hitt, Sirmon &

Very, 2007). Still, such generalization is dangerous given the heterogeneity among such firms.

## **1.2. Family Firms**

The existing literature on family firms (e.g., La Porta, Lopez-De-Silanes & Shleifer, 1999; Anderson & Reeb, 2003; Villalonga & Amit, 2006; Barontini & Bozzi, 2018) establishes, as a consensus, its key role within the world economy. In their influential study, La Porta et al. (1999) examined the ownership and control structure of the 20 largest publicly traded companies in each of the 27 richest world economies and found that approximately 30% were family-owned. Moreover, according to Anderson and Reeb (2003), this subset of companies represented about one third of the companies that made up the S&P 500 index between 1992 and 1999.

However, despite this consensus, the definition of family firm remains problematic (Kraiczy, 2013). In this sense, several alternative definitions have been used. For instance, Anderson and Reeb (2003) define family firms as those in which the founder or a member of his family, whether by blood or marriage, is a key executive, director or blockholder, individually or in group. On the other hand, Barontini and Bozzi (2018) state that, to be considered a family firm: (i) at least one family member must own more than 10% of the company; (ii) the family controls more than 51% of the direct voting rights or, alternatively, more than twice the direct voting rights of the second largest shareholder; and (iii) at least one family member must have a seat on the company's board of directors. This divergence makes comparability of the results of different studies difficult and this is still a challenge in this area of research (Kraiczy, 2013).

### **1.2.1. Family Firms Heterogeneity**

In the genesis of the difficulty in establishing a consensual definition of family firms is their heterogeneity (Arregle et al., 2007), whose assumption is the essential requirement for the development of a more effective theory about this subset of

firms, as argued by Chua, Chrisman, Steier and Rau (2012). According to the same authors, while this area of research previously focused on the differences between family and non-family firms, nowadays its scope also covers the explanation of variations between the former. This is even more important given the empirical evidence that behavior and performance variability can be at least as large among family firms as among non-family firms (Chrisman & Patel, 2012).

It is then important to understand what the potential causes of this heterogeneity are. Very broadly, they can be grouped into three categories, namely, objectives (Kotlar & Massis, 2013), governance structures (Carney, 2005) and resources (Sirmon & Hitt, 2003). Although sources of heterogeneity are not confined to these three, this paper will focus on them, given the particular attention they have received from the literature (e.g., Chua et al., 2012; Barontini & Bozzi, 2018).

As for the objectives, they can be divided into two groups, economic and non-economic, both of which are present in various types of family firms, although in different proportions, as stated by Jaskiewicz et al. (2017). These authors studied the effects of the generational stage of the family on CEO compensation systems and on the performance of family companies listed on the S&P 500 index and concluded that they exhibited distinct behaviors depending on whether the firm was owned by the founder or, alternatively, by his descendant(s). And this is because each of them is guided by different goals, given the degree of commitment, also different, that they have towards the company (Barontini & Bozzi, 2018).

On the other hand, regarding governance structures, heterogeneity originates from the degree of family involvement in company ownership and management, which Arregle et al. (2007) call it power. As a result, the greater the family's power, the better its position to negotiate with other shareholders and stakeholders. And that is why it is quite pertinent to distinguish here two types of companies, those where the family has the power to define its strategic position, the family-controlled companies (Miller & Breton-Miller, 2006), and those in which the family, having less representation in ownership or on the board, exerts its influence without

having unilateral control, the family-influenced companies (Sirmon, Arregle, Hitt & Webb, 2008).

The heterogeneity that arises from the different level of resources among family firms can be explained, as Arregle, Naldi, Nordqvist and Hitt (2012) did, from the point of view of the degree of family ownership. In the light of the Resource Dependency Theory, these authors studied how the presence of external parties (shareholders or representatives on the board) facilitated or motivated internationalization of family firms and concluded that, given the fact that families have limited resources, the company's greater opening to external ownership provide the source of resources required to compete at a multinational level. It can then be said that family-influenced firms exhibit an important advantage because they can add the positive attributes of family ownership to the extra resources brought in by external parties (financial, human and social capital), and this is directly related to their behaviors and performance (Sirmon & Hitt, 2003).

### **1.3. The Relation Between the Heterogeneity of Family Firms and CEO Compensation**

As mentioned earlier, the heterogeneity of family firms underlies the different types of performance and behaviors they present. However, CEO compensation is one of the areas in which the effects of such heterogeneity are particularly evident (Catuogno et al., 2018). Being heterogeneity a property that invites categorization, as defended by Chua et al. (2012), it is important to identify the dimensions that have been pointed out in the literature (Barontini & Bozzi, 2018) as the ones that most influence the way CEOs are paid, namely, the generational stage of the firm, the level of family representation on the board of directors and, lastly, the family status of the CEO.

#### **1.3.1. The Generational Stage of the Firm**

The first of three dimensions concerns the generational stage of the firm, i.e., whether the founder still has an active role in it or, on the contrary, control has

already been taken over by his descendants. Studies such as the one of Villalonga and Amit (2006) or Mullins and Schoar (2016) have shown that founders and descendants can have very different impacts on family firms. While the former focus almost exclusively on the company's growth and financial performance (Fan & Leung, 2018), the latter move more toward socio-emotional goals (Jaskiewicz et al., 2017) and are more likely to extract private benefits from the company (Claessens et al., 2002; Miller & Breton-Miller, 2006).

According to Jaskiewicz et al. (2017), founders have greater incentives and are better prepared to monitor managers' decisions and influence their actions, which is explained by their greater emotional and financial connection to the company compared to their descendants (Wasserman, 2006). The same authors not only corroborated the stated by Miller, Breton-Miller, Lester and Cannella (2007) regarding the best performance of family firms in which the founder is still present, either as a board member or as a shareholder, but also added that, when the founder fails in monitoring, replacing it with greater CEO incentives, the company's performance slows down. The CEO compensation package is therefore designed according to the incentives that family members, founders or descendants, have to closely monitor CEO's actions, which may vary according to the magnitude of family presence on the board (Miller & Breton-Miller, 2006).

### **1.3.2. The Level of Family Representation on the Board of Directors**

Combs, Penney, Crook and Short (2010) found evidence of the relationship between the magnitude of family representation in the company and CEO compensation. Based on the methodological procedures of Anderson and Reeb (2003) and Gomez-Mejia, Larraza-Kintana and Makri (2003), the authors concluded that CEO compensation is approximately 44% lower when the family has multiple representatives in the firm than in the case of singular representation. According to them, these results originate from the strategic control function carried out by those multiple family representatives, which translates not only into intensified



monitoring actions but also, indirectly, in reducing the latitude of CEO interventions – managerial discretion.

However, besides the fact that this is a little researched theme, the results are contradictory (Barontini & Bozzi, 2018). This statement may be justified by the results of the study carried out by Cheng, Lin and Wei (2015), which dealt with the effects of conflicts between the founder and the other controlling-family members on CEO compensation. According to them, the multiple family presence is positively correlated with executive compensation, which they explained as being the result of these family members' intention to extract personal benefits from the company. In other words, the presence of more than one family member in the company increases the likelihood that they will enter into a favor exchange with the CEO, increasing his compensation, including the extra-performance component, so that he cooperates in tunneling activities. All at the expense of minority shareholders (Barontini & Bozzi, 2018).

### **1.3.3. The Family Status of the CEO**

The third dimension of the heterogeneity of family firms that influences CEO compensation is the family status of the CEO, a theme in which the study by Gomez-Mejia et al. (2003) became important. These authors studied the determinants of executive compensation in family firms and concluded that family CEOs are less paid than professional CEOs, and the gap widens as the concentration of family ownership grows. Therefore, family CEOs, because their wealth is tied to the family business and because they have little chance of getting a job in another type of company, accept lower pay in exchange for greater job tenure (Crocì, Gonenc & Ozkan, 2012).

Nevertheless, on the professional CEOs side there are also reasons that underpin their higher compensation in family firms. Since their ability and motivation to compete in the marketplace for managers is limited (Schulze et al., 2002; Sirmon & Hitt, 2003), which is because they pursue non-economic goals and family-centered strategies (Carney, 2005; Chrisman & Patel, 2012), family firms

need to offer higher-skilled CEOs more attractive incentives to compensate them for their lesser influence on business conduct (Page, 2018), lower expectations for career development and lower probability of achieving brilliant economic results in the future (Chrisman, Memili & Misra, 2013). Although there are some studies arguing otherwise, the bulk of the literature is consistent with the idea that professional CEOs have greater bargaining power in family firms (Barontini & Bozzi, 2018).

### 1.4. Research Hypotheses

After the literature review, this subsection proceeds with the formulation of research hypotheses by combining theoretical concepts related to the heterogeneity of family firms, CEO compensation and guiding theories. As stated by Barontini and Bozzi (2018), the three dimensions of heterogeneity must be considered together in the analysis in order to capture the complexity of this subset of companies. In this regard, note Table 1, where the possible combinations of this dimensional triad are shown.

Table 1 – *Family clusters*

Generational Stage	Representation on the Board	CEO type	Family Clusters
Founder	Lone	* Family	→ Founder–Lone–Family CEO
		Professional	→ Founder–Lone–Professional CEO
	Multiple	* Family	→ Founder–Multiple–Family CEO
		Professional	→ Founder–Multiple–Professional CEO
Descendants	Lone	* Family	→ Descendant–Lone–Family CEO
		Professional	→ Descendant–Lone–Professional CEO
	Multiple	* Family	→ Descendant–Multiple–Family CEO
		Professional	→ Descendant–Multiple–Professional CEO

Source: Based on Barontini and Bozzi (2018)

As Table 1 shows, there are eight family clusters, i.e., eight different types of family firms that emerge from the distinction between companies controlled by the

founder(s) or descendant(s), then combined with the other two dimensions, namely, the presence of a lone or multiple family representatives on the board of directors and the family or professional status of CEOs. In order to study the behavior of each of these clusters in terms of CEO compensation, three research hypotheses were developed, which are presented below.

#### **1.4.1. Founder–Lone vs. Founder–Multiple**

As already been mentioned, founders and their families are guided by different goals (Jaskiewicz et al., 2017). Their almost exclusive focus on the company's financial performance (Miller et al., 2007), coupled with their strong emotional connection to it and their central role in the organization's life (Wasserman, 2006), make the founders more effective in monitoring the CEO's actions. Therefore, their need to include greater financial incentives in the compensation package of these CEOs is lower (Jaskiewicz et al., 2017).

However, the presence of multiple family representatives on the board mitigates the founder's stewardship orientation (Barontini & Bozzi, 2018; Neckebrouck et al., 2018). As they have to share their influence with the other family members, founders begin to display lower degree of commitment to the company (Wasserman, 2006). In addition, the family firm becomes more exposed to tunneling and private benefit extraction activities at the expense of minority shareholders (Claessens et al., 2002; Cheng et al., 2015). As a result, the less effective monitoring, combined with the need to direct CEOs' actions towards the satisfaction of the family members' personal interests, makes these companies less efficient in terms of CEO compensation. Based on these arguments, the first research hypothesis will be as follows:

***Hypothesis 1:** In founder firms, CEO compensation is lower when the founder is the only family representative on the board than in the case of multiple representatives.*

### 1.4.2. Descendant–Lone vs. Descendant–Multiple

Concerning CEO compensation, the behavior of descendants is different from that of founders (Jaskiewicz et al., 2017). With a lower stewardship orientation (Breton-Miller et al., 2011), a greater focus on socio-emotional goals (Jaskiewicz et al., 2017) and a greater tendency for the expropriation of company resources (Claessens et al., 2002), descendants are considered to be less efficient than the founders in their role as family firms owners (Villalonga & Amit, 2006). Thus, when the descendant is the only representative of the family in the company, he behaves as an agent, acting for his own benefit and offering his CEO a more attractive incentive scheme to achieve his own purposes (Barontini & Bozzi, 2018).

In turn, the presence of multiple representatives on the board restricts the excessive power and influence of the descendant (Combs et al., 2010). This is because they act as monitors, providing greater efficiency for the company (Miller & Breton-Miller, 2006), thereby reducing the level of incentives paid to the CEO (Combs et al., 2010). Thus, the following research hypothesis arises:

***Hypothesis 2:** In descendant firms, CEO compensation is higher when the descendant is the only family representative on the board than in the case of multiple representatives.*

### 1.4.3. Family CEO vs. Professional CEO

The last research hypothesis will consider how family and professional CEOs are paid differently within each family cluster. When family firms, either to transmit signals of good governance to the other shareholders (Miller et al., 2007; Mullins & Schoar, 2016; Jaskiewicz et al., 2017) or because they need specific or more advanced management skills (Lin & Hu, 2007), decide to hire a CEO with no family connections, they have to offer him an attractive compensation package in order to persuade him to accept a professional challenge where he is less likely to succeed (Chrisman, et al., 2013), given the non-economic and family-centered goals that family firms tend to pursue (Chrisman & Patel, 2012). This gives professional CEOs great bargaining power (Brockman, Lee, & Salas, 2016). As a result, for professional

CEOs, compensation is expected to vary residually among family clusters (Barontini & Bozzi, 2018).

As for family CEOs, they accept lower compensation (Combs et al., 2010). This can be explained by their greater dependence on the family business, which, on the one hand, protects them from excessive personal risk taking (Gomez-Mejia et al., 2003) and, on the other, exposes them to the discretionary choices of the family. (Gomez-Mejia, Nuñez-Nickel, & Gutierrez, 2001). Therefore, family CEOs compensation is expected to show great variance across the different family clusters. Based on the previous arguments, the following hypothesis arises:

***Hypothesis 3:*** *In both founder and descendant firms, the effect of the level of family representation on the board of directors is greater for family CEOs than for professional CEOs.*

## 2. Methodology

According to Kaplan (1998), the methodology aims to help the reader to understand not only the results of the scientific method but also the research process itself. In this sense, this section is intended to provide information about the general procedures adopted, namely regarding the constitution of the sample, the definition of variables, data collection and processing, model construction and method of analysis.

### 2.1. Sample

The sample consisted of industrial firms listed in the S&P 500 Index, from 2007 to 2016, which were not delisted during that period and with observations in all years. As can be seen from Table 2, the initial sample was composed by 500 firms. Thereafter, all firms with missing data were excluded, with a total of 354 remaining in the sample. Firms from the financial, insurance and real estate sectors were then excluded based on their Standard Industrial Classification code – SIC code with the first two digits between 60 and 67 – with the final sample comprising a total of 257 firms (2570 observations).

Table 2 – *Sample description*

Description	Sample Size
Number of firms listed on S&P 500 Index at beginning of year 2007	500
Number of firms excluded due to lack of data	146
Number of firms excluded because they belong to the financial, insurance and real estate sectors	97
<b>Final Sample</b>	<b>257</b>

Source: Own elaboration

The S&P 500 is an index composed of US firms listed on major exchanges, such as the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automatic Quotation System (NASDAQ). The stocks are components of the index and are quoted on the stock exchanges. The use of S&P

500 listed firms to study the effects of family presence on publicly traded companies has become popular in the literature (e.g., Anderson & Reeb, 2003; Combs et al., 2010; Jaskiewicz et al. (2017)). This happens given the prevalence of family ownership and influence on S&P 500 listed firms – according to Anderson and Reeb (2003), for example, family firms accounted for about one third of S&P 500 firms between 1993 and 1999. Therefore, it is pertinent, appropriate and interesting to use this sample for the study.

## **2.2. Variables**

The variables were divided into three groups: (i) CEO compensation; (ii) family firms characteristics; and (iii) control variables. In the following subsections, it is presented the composition of each group as well as information about the data used, i.e., their sources and how they were collected. Also note Table A1 (Appendices) where all the variables used are summarized.

### **2.2.1. CEO Compensation**

Data on CEO compensation were obtained from ExecuComp. It is a very complete database containing more than 100 compensation items collected annually, directly from each company's proxy statements, and has been used in several studies on this topic (e.g., Combs et al., 2010; Jaskiewicz et al., 2017; Page, 2018).

For each CEO, data on annual cash compensation (CASH\_COMP) was collected, which, following Gomez-Mejia et al. (2003), corresponds to the logarithm of the sum of salary, fixed component, with bonuses, contingent component of performance. In addition, the annual equity-based compensation (EQUITY\_COMP) consists of the logarithm of the value of option grants and stock awards at the grant date, as defined by Brockman et al. (2016). Since the sampling period does not include years prior to 2006, i.e., years prior to the implementation of FAS 123R, the value of stock options is based on their fair value at the grant date (Humphery-Jenner, Lisic, Nanda, & Silveri, 2016). Finally, as Brockman et al. (2016) did, total annual compensation (TOTAL\_COMP) is calculated as the

logarithm of the sum of cash-based compensation with equity-based compensation and with other compensation components, such as the value of pensions, which do not fit either of the other categories, and are included here.

### **2.2.2. Family Firms Characteristics**

Since the literature has not developed a consensual measure or criterion for identifying a family firm, this study followed the procedure adopted by Anderson and Reeb (2003), and also used by Chen, Chen and Cheng (2008), who considered as family firms those in which the founders or their families, whether by blood or marriage, are responsible, directors or blockholders, individually or in groups. To this extent, data were collected directly from proxy statements, which identify the founder, their closest family members and their holdings, as well as the composition of the board of directors. However, because the process was not always straightforward (often, as the result of family expansion, descendants have different last names from the founder), corporate histories had to be consulted on firm websites or press releases. Information regarding CEO's professional status was also collected in new releases or other alternative sources, when absent from the proxy statement. FAMILY\_FIRM is a dummy variable that identifies family firms, in which case it takes the value of 1, and 0 otherwise.

In addition, it was defined a set of dummy variables related to the different dimensions of family firm heterogeneity, as described above. Firstly, regarding the generational stage of the firm, it was verified whether its control belonged to the founder (FOUNDER) or to the descendants (DESCENDANTS). Secondly, concerning the level of family representation on the board, it was verified whether there was only one family representative (LONE) or, alternatively, more than one (MULTIPLE). Finally, it was checked the family (FAM\_CEO) or professional (PROF\_CEO) status of the CEO.

### **2.2.3. Control Variables**

The last set of variables included refers to the control variables. They were



introduced in the model in order to control for certain family firms' characteristics, namely size, performance, growth opportunities and complexity of operations, risk and ownership characteristics. Dummy variables were also included for industries and for years. Since these variables would have the effect of "contaminating" the results of the dependent variable by limiting the causal inference and reducing the explanatory power of the model, as argued by Stone-Romero (cited by Nielsen & Raswant, 2018), their control ensures that the different behaviors in terms of CEO compensation adopted by the various family clusters are explained only by the characteristics of the families.

Company size was proxied by the logarithm of total assets (FIRM\_SIZE) and was expected to be positively correlated with CEO compensation (Gabaix & Landier, 2008; Gayle & Miller, 2009; Cheng et al., 2015, Gayle et al., 2018). In turn, annual stock returns were adopted as a proxy for company's performance (RETURN) and a positive correlation with the dependant variables was also expected (Gabaix & Landier, 2008; Correa & Lel, 2016). In terms of growth opportunities and the complexity of operations, the chosen proxy was one of the most commonly used in the literature, the logarithm of Tobin's Q (TOBINS\_Q) (e.g., Kogan & Papanikolaou, 2010; Lahlou, 2018), which, once again, was expected to be positively related with CEO pay (Fernandes, Ferreira, Matos, & Murphy, 2013; Cheng et al., 2015).

According to prior studies such as those of Croci et al. (2012) and Fernandes et al. (2013), institutional investors (INST\_INVEST) have a positive and significant impact on CEO compensation in family firms. Thus, in order to reward them for accepting more risk, institutional investors increase the fraction of equity-based compensation. Being measured as the percentage share of ownership held by institutional investors, again, a positive correlation between this control variable and the dependent variable was expected.

Following the procedure of Linck, Netter and Yang (2008), the standard deviation of monthly stock returns (STD\_DEV), calculated over the previous three years, was used to control for the value of specific information held by the CEO. Firm-specific information asymmetry is greater in companies with high volatility of

stock returns, and, in addition, the cost of losing an informed CEO exceeds the cost of losing a CEO with no firm-specific information (Crocchi et al., 2012). Thus, CEO compensation, especially the equity-based component, was expected to be positively related to the standard deviation of stock returns.

In line with Jaskiewicz et al. (2017) and with Core, Holthausen and Larcker (1999), a set of other controls were included. Since the payment of dividends to shareholders reduces available cash flows that could otherwise be used to motivate the CEO, the variable `D_YIELD` was used to study this relationship, for which a negative sign was expected (Jaskiewicz et al., 2017). Furthermore, according to Core et al. (1999), the greater the number of directors in the board, the higher CEO compensation will be. Therefore, this control (`BOARD_SIZE`) had also been added.

Finally, according to Core et al (1999), when the CEO is also chairman of the board makes him more powerful, and therefore more influential in achieving a higher level of compensation. To that extent, the CEO's power was also controlled, being proxied, in line with Brockman et al. (2016), by the CEO / Chairman duality (`CEO_CHAIR`), CEO age (`CEO_AGE`), and the number of years since he took office (`YEARS_TENURE`). A positive relation between these three variables and the dependant variables was expected.

Financial and market data for the control variables were obtained from Worldscope (via Datastream). Correct data cross-checking between Worldscope and ExecuComp was ensured through the use of Ticker Symbols. These identifiers are composed of a set of characters (usually letters) and represent specific securities, being used by investors and traders to transact orders. Each Ticker Symbol is unique, facilitating the vast flow of trading orders that pass through financial markets every day.

Data of a different nature were collected from company websites or from proxy statements, available on the United States Securities and Exchange Commission website, where the search was also done through Ticker Symbols.

### 2.3. Empirical Model

As in previous analogous studies (e.g., Combs et al., 2010; Cheng et al., 2015; Correa & Lel, 2016), the multivariate linear regression method was used to test research hypotheses, which is, according to Gujarati (2003), by far one of the most powerful and popular methods of regression analysis. This happens, as argued by the same author, because it is highly intuitive and mathematically simple, very attractive statistical properties from the researcher's point of view. To that extent, the coefficients of the following equation (panel data regression model with random effects) were estimated:

$$CEOpay_{it} = a + \beta FamilyFirmsHet_{.it-1} + \gamma ControlVariables_{it-1} + \varphi TimeDummies_j + \delta IndustryDummies_k + U_i + \mathcal{E}_{it}$$

where  $CEOpay_{it}$  is the total, cash and equity-based compensation, respectively, for firm  $i$  in year  $t$ ;  $FamilyFirmsHet_{.it-1}$  is a set of dummy variables for firm  $i$  in year  $t-1$ , describing family firms characteristics; and  $ControlVariables_{it-1}$  are groups of variables for firm  $i$  in year  $t-1$ , as described above. The fixed effects for the year ( $TimeDummies_{it}$ ) and for industry ( $IndustryDummies_{it}$ ) were also included.  $\mathcal{E}_{it}$  is the term error.

Due to the presence of variables that do not vary over time, fixed effects for the firm could not be included in the regression model, otherwise these variables would not be considered in the estimation. This difficulty was overcome by including in the model the error term correlation with firm random effects ( $U_i$ ). This procedure was used by Barontini and Bozzi (2018), as it does not produce biased estimators, and is also supported by Gujarati (2003).

### 2.4. Descriptive Statistics

Table A2 (Appendices) summarizes the main characteristics of the sample. In terms of CEO pay, the mean total compensation for the entire sample was \$ 13.1 million, the mean cash-based component was \$ 1.56 million, and the equity-based

component was \$ 7.3 million. The family firms subsample presented higher values for the three compensation components, although only for cash-based compensation and equity-based compensation, this superiority was statistically significant.

Among family firms, CEO compensation was higher in those where the founder was still present, and this was true for any of the three compensation measures. Moreover, in firms with multiple family presence, cash-based and total compensation were statistically higher than those with a lone family representative. All other differences, although economically sizeable, were not statistically significant.

Regarding control variables, the firms from the various subsamples showed significantly different sizes. Thus, on average, non-family firms were larger than family firms. Among the latter, the largest were those with a family CEO and those with multiple family representatives on the board of directors.

Interesting were also the results for the variable YEARS\_TENURE. The data confirm that CEOs' tenure was longer in family firms than in non-family firms, and among the former, tenures were longer lasting when the founder was still present. Additionally, family CEOs presented significantly longer tenures than professional CEOs (15,16 years versus only 4,71).

The correlation matrix is reported in Table A3 of the Appendices.

### 3. Results

This section presents the results of the multivariate analysis and is divided into two subsections. The first subsection reports the differences in terms of CEO pay among family and non-family firms. In addition, focusing on family firms, the impact of each dimension of heterogeneity, considered individually, on CEO compensation will also be analysed in the final part of the first subsection. Finally, as the one-dimensional analysis does not include the intersections among these dimensions, in the second subsection they will be considered in combination to capture the real complexity of family firms.

#### 3.1. One-Dimensional Analysis

The results of the multivariate analysis of the determinants of CEO compensation are shown in tables 3 to 5. In all tables the dependent variables are cash compensation (CASH\_COMP), equity-based compensation (EQUITY\_COMP) and total compensation (TOTAL\_COMP).

Table 3 compares CEO compensation between family and non-family firms (columns (1) to (3)). As can be seen from column (1), in family firms CEO compensation is lower than in non-family firms, which is statistically significant in the case of cash compensation and total compensation.

On the other hand, in columns (4) to (6) the compensation of family and professional CEOs in family firms is compared with that of their non-family counterparts. The results show that family CEOs earn less cash compensation and total compensation than CEOs of non-family firms. Professional CEOs also have significantly lower total compensation. By being negative and statistically significant for both total compensation and cash compensation, the differences between family CEO and professional CEO coefficients provide additional evidence that family firms pay more the CEOs that hire externally, as stated by Gomez-Mejia et al. (2003).

As for control variables, the positive and statistically significant coefficient of the variable FIRM\_SIZE in column (3) indicates that the largest companies pay the

Table 3 – *Family firm and type of CEO as determinants of CEO compensation*

Dependant variable	CASH_COMP (1)	EQUITY_COMP (2)	TOTAL_COMP (3)	CASH_COMP (4)	EQUITY_COMP (5)	TOTAL_COMP (6)
C	2,3558*** (3,33)	4,3924*** (5,80)	3,0953*** (5,16)	2,3367*** (3,30)	4,3918*** (5,80)	3,0814*** (5,14)
FAMILY_FIRM	-0,2382*** (-3,33)	-0,0576 (-0,69)	-0,339*** (-5,94)			
FAM_CEO				-0,8881*** (-9,21)	-0,0184 (-0,16)	-0,9147*** (-11,97)
PROF_CEO				-0,0647 (-0,89)	-0,0687 (-0,79)	-0,1929*** (-3,36)
FIRM_SIZE	0,0533 (1,12)	-0,0673 (-1,31)	0,068* (1,69)	0,0602 (1,27)	-0,0676 (-1,32)	0,0732* (1,83)
RETURN	-0,0127 (-0,29)	0,1086** (2,11)	0,0648* (1,94)	-0,0135 (-0,32)	0,1086** (2,11)	0,0643** (1,98)
TOBINS_Q	0,1020 (0,76)	0,1776 (1,11)	0,1179 (1,11)	0,1245 (0,94)	0,1764 (1,10)	0,1383 (1,34)
INST_INVEST	0,1176 (1,46)	0,1753* (1,84)	0,0797 (1,25)	0,159** (2,01)	0,173* (1,81)	0,1188* (1,91)
STD_DEV	-0,6873 (-1,07)	-0,8750 (-1,13)	-0,6095 (-1,20)	-0,5372 (-0,85)	-0,8851 (-1,14)	-0,4883 (-0,99)
D_YIELD	-0,0115 (-0,96)	-0,0153 (-1,05)	-0,0070 (-0,74)	-0,0130 (-1,10)	-0,0152 (-1,05)	-0,0081 (-0,88)
BOARD_SIZE	0,0124* (1,65)	0,0178** (1,97)	0,0088 (1,49)	0,0096 (1,31)	0,018** (1,99)	0,0065 (1,13)
CEO_CHAIR	0,0903** (2,36)	0,0201 (0,43)	0,097*** (3,22)	0,0915** (2,44)	0,0202 (0,44)	0,0988*** (3,37)
CEO_AGE	0,0049 (1,48)	-0,0062 (-1,54)	0,0054** (2,04)	0,0019 (0,56)	-0,0060 (-1,48)	0,0027 (1,04)
YEARS_TENURE	-0,0152*** (-4,49)	-0,0085** (-2,09)	-0,0037 (-1,40)	-0,0021 (-0,59)	-0,0093** (-2,12)	0,0076*** (2,73)
N. obs.	2313	2313	2313	2313	2313	2313

Statistical significance: \*= $p < 0,10$ ; \*\*= $p < 0,05$ ; \*\*\*= $p < 0,01$ .

The table reports the results from estimating the determinants of CEO compensation, considering family firms and the type of CEO. Dependent variables are: CASH\_COMP is the logarithm of the sum of salary and bonuses; EQUITY\_COMP is the logarithm of the value of option grants and stock awards at the grant date; and TOTAL\_COMP is the logarithm of the sum of CASH\_COMP, EQUITY\_COMP, pension value variation, other deferred compensation, and others, as defined in ExecuComp. The independent variables are: FAMILY\_FIRM is a dummy that takes the value 1 if it is a family firm, and 0 otherwise; FAM\_CEO is a dummy that takes the value 1 when the CEO is a member of the family, and 0 otherwise; PROF\_CEO is dummy that takes the value 1 when the CEO is not a member of the family, and 0 otherwise; FIRM\_SIZE is the logarithm of total assets; RETURN is the annual stock return; TOBINS\_Q is the logarithm of Tobin's Q (calculated as the ratio between (book value of total assets – book value of shareholders' equity + market value of shareholders' equity) and (book value of total assets)); INST\_INVEST is the percentage share of ownership held by institutional investors; STD\_DEV is the standard deviation of monthly stock returns; D\_YIELD is the dividend yield, calculated as the ratio between total dividends and the market price of common shares; BOARD\_SIZE is the number of board members; CEO\_CHAIR is a dummy that takes the value 1 when the CEO is also the Chairman of the board, and 0 otherwise; CEO\_AGE is the CEO age in years; YEARS\_TENURE is the number of years since the CEO took office.

Source: Own elaboration.

highest salaries. This positive and significant relationship remains true for the variable RETURN, and here it extends to the equity-based compensation (column

2)), providing evidence that companies compensate their CEOs according to their performance, as proposed by Correa and Lel (2016). CEO compensation is also positively related to the size of the board (BOARD\_SIZE), especially when considering the equity-based component, to the duality CEO / Chairman (CEO\_CHAIR) and to institutional investors ownership (INST\_INVEST).

In turn, the analysis of the results for the variable YEARS\_TENURE must be two-fold. On the one hand, the length of CEO tenure shows a negative and significant relationship to cash compensation and equity-based compensation. On the other hand, this relationship becomes positive when the dependent variable is total compensation. This may be the result of the inclusion in total compensation, among other elements, of the value of pensions, not included in either cash compensation or equity-based compensation, as done by Brockman et al. (2016), and shows that the structure of CEO compensation differs according to how long he remains in the post.

The coefficients of the other control variables show no significant relationship with CEO compensation, and the results of the present analysis are consistent throughout Tables 3, 4, and 5.

Table 4 shows, in columns (1) to (3), the relationship between CEO compensation and the generational stage of the firm. Total compensation is significantly lower in both founder-controlled and descendant-controlled companies compared to non-family firms. However, the statistically significant difference between their coefficients shows that in descendant-controlled firms CEOs are better paid than in founder-controlled firms. These results are in line with previous studies, which showed that the presence of the founder reduces CEO compensation (Jaskiewicz et al., 2017; Barontini & Bozzi, 2018).

Lastly, columns (4) to (6) show the relationship between CEO compensation and the level of family representation on the board. In general, equity-based compensation in companies with lone and multiple family representation is aligned with that of non-family firms. In turn, the negative and significant coefficients for cash-based compensation and total compensation show that family firms pay their

Table 4 – *Generational stage of the firm and family representation on the board of directors as determinants of CEO compensation*

Dependant Variable	CASH_COMP (1)	EQUITY_COMP (2)	TOTAL_COMP (3)	CASH_COMP (4)	EQUITY_COMP (5)	TOTAL_COMP (6)
C	2,4071*** (3,39)	4,3931*** (5,78)	3,1343*** (5,20)	2,344*** (3,30)	4,3871*** (5,79)	3,093*** (5,23)
FOUNDER	-0,3334*** (-4,11)	-0,0527 (-0,55)	-0,4064*** (-6,28)			
DESCENDANTS	-0,0583 (-0,57)	-0,0653 (-0,54)	-0,2132*** (-2,63)			
LONE				-0,212*** (-2,88)	-0,0380 (-0,44)	-0,3022*** (-5,18)
MULTIPLE				-0,3838*** (-3,17)	-0,1548 (-1,11)	-0,5476*** (-5,67)
FIRM_SIZE	0,0470 (0,98)	-0,0673 (-1,31)	0,0633 (1,57)	0,0543 (1,14)	-0,0668 (-1,30)	0,0669* (1,69)
RETURN	-0,0100 (-0,23)	0,1084** (2,10)	0,0668** (2,00)	-0,0141 (-0,33)	0,1077** (2,09)	0,063* (1,88)
TOBINS_Q	0,0946 (0,70)	0,1791 (1,12)	0,1120 (1,05)	0,1066 (0,79)	0,1801 (1,12)	0,1211 (1,14)
INST_INVEST	0,1220 (1,52)	0,1747* (1,83)	0,0827 (1,30)	0,1147 (1,42)	0,1725* (1,81)	0,0785 (1,23)
STD_DEV	-0,6536 (-1,01)	-0,8766 (-1,13)	-0,5871 (-1,16)	-0,6658 (-1,03)	-0,8625 (-1,11)	-0,5823 (-1,15)
D_YIELD	-0,0112 (-0,93)	-0,0152 (-1,05)	-0,0067 (-0,71)	-0,0113 (-0,94)	-0,0152 (-1,05)	-0,0068 (-0,72)
BOARD_SIZE	0,0118 (1,56)	0,0178** (1,97)	0,0084 (1,42)	0,0118 (1,56)	0,0174* (1,92)	0,0081 (1,37)
CEO_CHAIR	0,0829** (2,16)	0,0202 (0,44)	0,0918*** (3,04)	0,0861** (2,24)	0,0171 (0,37)	0,091*** (3,01)
CEO_AGE	0,0050 (1,49)	-0,0062 (-1,54)	0,0054** (2,04)	0,0052 (1,55)	-0,0060 (-1,49)	0,0058** (2,19)
YEARS_TENURE	-0,0148*** (-4,38)	-0,0085** (-2,08)	-0,0035 (-1,30)	-0,0152*** (-4,49)	-0,0084** (-2,08)	-0,0037 (-1,40)
N. obs.	2313	2313	2313	2313	2313	2313

Statistical significance: \*= $p < 0,10$ ; \*\*= $p < 0,05$ ; \*\*\*= $p < 0,01$ .

The table reports the results from estimating the determinants of CEO compensation, considering the generational stage of the firm and the level of family representation on the board of directors. Dependent variables are: CASH\_COMP is the logarithm of the sum of salary and bonuses; EQUITY\_COMP is the logarithm of the value of option grants and stock awards at the grant date; and TOTAL\_COMP is the logarithm of the sum of CASH\_COMP, EQUITY\_COMP, pension value variation, other deferred compensation, and others, as defined in ExecuComp. The independent variables are: FOUNDER is a dummy that takes the value 1 if the firm is controlled by the founder, and 0 otherwise; DESCENDANTS is a dummy that takes the value 1 if the firm is controlled by the descendants, and 0 otherwise; LONE is a dummy that takes the value 1 if there is only one family representative on the board, and 0 otherwise; MULTIPLE is a dummy that takes the value 1 if there are multiple family representatives on the board and, 0 otherwise; FIRM\_SIZE is the logarithm of total assets; RETURN is the annual stock return; TOBINS\_Q is the logarithm of Tobin's Q (calculated as the ratio between (book value of total assets – book value of shareholders' equity + market value of shareholders' equity) and (book value of total assets)); INST\_INVEST is the percentage share of ownership held by institutional investors; STD\_DEV is the standard deviation of monthly stock returns; D\_YIELD is the dividend yield, calculated as the ratio between total dividends and the market price of common shares; BOARD\_SIZE is the number of board members; CEO\_CHAIR is a dummy that takes the value 1 when the CEO is also the Chairman of the board, and 0 otherwise; CEO\_AGE is the CEO age in years; YEARS\_TENURE is the number of years since the CEO took office.

Source: Own elaboration



CEOs less than non-family firms, and no significant differences arise when the magnitude of family representation ranges from lone to multiple.

Overall, the results of the one-dimensional analysis do not suggest any relationship between the number of family representatives on the board and CEO compensation. However, by simultaneously including in the analysis the three dimensions of family firms heterogeneity, thus capturing the effects of their intersections, this and other relationships may become evident, as suggested by the theoretical arguments outlined above. In the next section this issue will be explored in more detail.

### **3.2. Multidimensional Analysis**

In the previous section, it was analysed how each of the dimensions of family firm heterogeneity relates individually to CEO compensation. In the following paragraphs, this analysis will be expanded to include the intersections between these dimensions of heterogeneity.

To perform this multidimensional analysis, it was necessary to build a dummy variable for each of the eight family clusters that arose from the possible combinations of the three dimensions of heterogeneity, as shown in Table 1. The estimation results are shown in Table 5.

Then, in Table 6, the differences between the coefficients associated with the various family clusters obtained in Table 5 were calculated, identifying those for which there is statistical significance. For example, for the first column of Panel A – Founder-controlled Family Firms (Table 6), the difference in cash-based compensation between *Lone-Family CEO* and *Multiple-Family CEO* equals -0,5482, and was obtained from the difference between the coefficients of the variables FOUND-LONE-FAM\_CEO (-1,3070) and FOUND-MULT-FAM\_CEO (-0,7588).

Hypotheses 1 and 2 say that the presence of multiple family members on the board of directors, rather than just one, is associated with higher CEO compensation in the founder-controlled firms (Hypothesis 1), whereas the opposite occurs for those controlled by descendants (Hypothesis 2).

Table 5 – *Family clusters and CEO compensation*

Dependant Variable	CASH_COMP (1)	EQUITY_COMP (2)	TOTAL_COMP (3)
C	2,387*** (3,37)	4,2945*** (5,80)	3,1194*** (5,58)
FOUND–LONE–FAM_CEO	-1,307*** (-11,31)	0,2148 (1,55)	-0,9271*** (-10,18)
FOUND–LONE–PROF_CEO	0,1478 (1,58)	-0,0681 (-0,60)	-0,1103 (-1,50)
FOUND–MULT–FAM_CEO	-0,7588*** (-5,06)	-0,4286** (-2,37)	-1,2132*** (-10,28)
FOUND–MULT–PROF_CEO	-0,3042** (-2,26)	-0,1504 (-0,95)	-0,2398** (-2,26)
DESC–LONE–FAM_CEO	-0,2603 (-1,45)	-0,3522* (-1,66)	-0,6486*** (-4,60)
DESC–LONE–PROF_CEO	-0,0550 (-0,52)	-0,1739 (-1,36)	-0,202** (-2,42)
DESC–MULT–FAM_CEO	-0,2461 (-0,65)	0,8959** (2,16)	-0,6073** (-2,05)
DESC–MULT–PROF_CEO	-0,3321 (-0,97)	0,7125* (1,87)	-0,5443** (-2,02)
FIRM_SIZE	0,0399 (0,84)	-0,0532 (-1,06)	0,0639* (1,70)
RETURN	-0,0306 (-0,74)	0,1096** (2,14)	0,0593* (1,83)
TOBINS_Q	0,285** (2,17)	0,1248 (0,77)	0,1576 (1,52)
INST_INVEST	0,1336* (1,70)	0,204** (2,14)	0,1085* (1,76)
STD_DEV	-0,3255 (-0,52)	-1,0729 (-1,40)	-0,5017 (-1,02)
D_YIELD	-0,0121 (-1,04)	-0,0173 (-1,20)	-0,0085 (-0,93)
BOARD_SIZE	0,0127* (1,74)	0,0159* (1,77)	0,0068 (1,18)
CEO_CHAIR	0,0809** (2,17)	0,0160 (0,34)	0,0819*** (2,79)
CEO_AGE	0,0017 (0,53)	-0,0051 (-1,28)	0,0036 (1,40)
YEARS_TENURE	-0,0010 (-0,28)	-0,0103** (-2,38)	0,0072*** (2,60)
N. obs.	2313	2313	2313

Statistical significance: \*= $p < 0,10$ ; \*\*= $p < 0,05$ ; \*\*\*= $p < 0,01$ .

The table reports the results from estimating the determinants of CEO compensation, considering family clusters that arise from the combination of heterogeneity dimensions of family firms. Dependent variables are: CASH\_COMP is the logarithm of the sum of salary and bonuses; EQUITY\_COMP is the logarithm of the value of option grants and stock awards at the grant date; and TOTAL\_COMP is the logarithm of the sum of CASH\_COMP, EQUITY\_COMP, pension value variation, other deferred compensation, and others, as defined in ExecuComp. The independent variables are: FOUND–LONE–FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is only one family representative and the CEO belongs to the family, and 0 otherwise; FOUND–LONE–PROF\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is only one family representative and the CEO does not belong to the family, and 0 otherwise; FOUND–MULT–FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is more than one family representative and the CEO belongs to the family, and 0 otherwise; FOUND–MULT–PRF\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is more than one family representative and the CEO does not belong to the family, and 0 otherwise; DESC–LONE–FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is only one family representative and the CEO belongs to the family, and 0 otherwise; DESC–LONE–PROF\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is only one family representative and the CEO does not belong to the family, and 0 otherwise; DESC–MULT–FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is more than one family representative and the CEO belongs to the family, and 0 otherwise; DESC–MULT–PRF\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is more than one family representative and the CEO does not belong to the family, and 0 otherwise. Control variables are defined in Table A1.

Source: Own elaboration.

The results in Table 5 for family CEOs (Panel A, first column) show that in founder-controlled family firms, cash-based compensation is significantly lower in the case of the lone founder than when he is accompanied by other members of the family (the difference in the coefficient values is  $-0.5482$ ). The differences in total compensation and equity-based compensation are not significant. Hypothesis 1 is thus confirmed for cash-based compensation, but not for the other two measures of compensation. Moreover, these results are consistent with the idea that the presence of multiple family members mitigates the founder's stewardship orientation and leads to higher compensation to reward the CEO for helping the family in extracting private benefits from the company, at the expense of minority shareholders. Most likely, this reward will be paid mostly in the form of cash rather than equity, as argued by Cheng et al. (2015) and Barontini and Bozzi (2018).

In turn, the results show that the compensation of professional CEOs (Panel A, second column) is insensitive to the level of family representation on the board of directors. Although positive, the differences in the coefficients are not significant for any of the compensation measures, as opposed to family CEOs. Therefore, Hypothesis 3 is confirmed.

Regarding descendant-controlled family firms (Panel B, vertical orientation), the results obtained do not confirm Hypothesis 2. This is because equity-based compensation and total compensation are significantly higher when the descendant is accompanied by other family members on the board (the difference in the coefficients is equal to  $-1.248$  and  $-0.0414$ , respectively). However, the fact that the value for cash-based compensation is not statistically significant keeps open the possibility that, acting alone, the descendant may indeed behave as an agent.

In addition, the results from the second column of Panel B confirm Hypothesis 3 again, although this time only partially. In fact, total compensation and cash-based compensation of professional CEOs are indifferent to whether or not the descendant is the sole representative of the family on the board. However, CEO's equity-based compensation is significantly lower (the difference in the coefficients is  $-0,8864$ ) in case of lone representation.

In general, the results suggest that, in both founder-controlled and descendant-controlled firms, CEO compensation is lower when there is only one family representative on the board, which confirms the results that had been obtained by Cheng et al. (2015). In other words, the effectiveness of the governance structure in terms of CEO pay is not contingent on the generational stage of the firms.

Table 6 – Differences in CEO compensation among family clusters

			CASH_COMP	EQUITY_COMP	TOTAL_COMP
Panel A – Founder-Controlled Family Firms					
(1)	LONE-FAM_CEO vs LONE-PROF_CEO		-1,4548***	0,2829	-0,8168***
	vs	vs			
(2)	MULT-FAM_CEO vs MULT-PROF_CEO		-0,4546***	-0,2781	-0,9734***
<b>CASH_COMP</b>	-0,5482***		0,4520		
<b>EQUITY_COMP</b>	0,6434		0,0823		
<b>TOTAL_COMP</b>	0,2862		0,1296		
Panel B – Descendants-Controlled Family Firms					
(3)	LONE-FAM_CEO vs LONE-PROF_CEO		-0,2053	-0,1783	-0,4466**
	vs	vs			
(4)	MULT-FAM_CEO vs MULT-PROF_CEO		0,0859	0,1834	-0,0630
<b>CASH_COMP</b>	-0,0142		0,2771		
<b>EQUITY_COMP</b>	-1,248***		-0,8864***		
<b>TOTAL_COMP</b>	-0,0414**		0,3423		

Statistical significance: \*= $p < 0,10$ ; \*\*= $p < 0,05$ ; \*\*\*= $p < 0,01$ .

The table reports the differences between the coefficients associated with family clusters. Variables are defined as follows: CASH\_COMP is the logarithm of the sum of salary and bonuses; EQUITY\_COMP is the logarithm of the value of option grants and stock awards at the grant date; and TOTAL\_COMP is the logarithm of the sum of CASH\_COMP, EQUITY\_COMP, pension value variation, other deferred compensation, and others, as defined in ExecuComp; FOUND-LONE-FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is only one family representative and the CEO belongs to the family, and 0 otherwise; FOUND-LONE-PROF\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is more than one family representative and the CEO does not belong to the family, and 0 otherwise; FOUND-MULT-FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is more than one family representative and the CEO belongs to the family, and 0 otherwise; FOUND-MULT-PRF\_CEO is a dummy that takes the value 1 when the firm is controlled by the founder, there is more than one family representative and the CEO does not belong to the family, and 0 otherwise; DESC-LONE-FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is only one family representative and the CEO belongs to the family, and 0 otherwise; DESC-LONE-PROF\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is only one family representative and the CEO does not belong to the family, and 0 otherwise; DESC-MULT-FAM\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is more than one family representative and the CEO belongs to the family, and 0 otherwise; DESC-MULT-PRF\_CEO is a dummy that takes the value 1 when the firm is controlled by the descendants, there is more than one family representative and the CEO does not belong to the family, and 0 otherwise.

Source: Own elaboration.

Additionally, the analysis of Table 6 in its horizontal direction (lines (1) to (4)) shows evidence of the impact of the CEO's professional status on his compensation contract design. Apart from equity-based compensation, lines (1) and (2) show that cash-based compensation and total compensation are significantly higher for professional CEOs when the founder is still active in the firm, regardless of the level of family representation on the board. The evidence is not so strong for descendant-controlled family firms, for which only total compensation of professional CEOs is significantly higher than that of family CEOs in the case of lone family representation (the difference in the coefficients is -0, 4466). This confirms that professional CEOs have greater bargaining power, as proposed by Brockman et al. (2016), and, as a result, are better paid than family CEOs, thus confirming what Gomez-Mejia et al. (2003) stated.

## **Conclusions**

This study aimed to evaluate the impact of the different dimensions of the heterogeneity of family firms on CEO compensation, as well as to contribute to the global debate on this topic.

The results show that when the various dimensions of family firms heterogeneity are considered together in the analysis, it is possible to identify statistically evident trends in the way CEOs are paid. First, the presence of only one family representative on the board of directors is associated with a lower level of CEO compensation. Therefore, there is evidence that compensation is not contingent on the generational stage of the family firm and that both founders and descendants show high levels of stewardship orientation and have greater incentives to closely monitor CEO actions when there are no other family representatives in the company apart from them.

In addition, the level of family representation on the board of directors affects family CEOs compensation far more than professional CEOs compensation. This is because the former has less bargaining power, is better protected from excessive risk taking, and is more exposed to the discretionary choices of the family. In turn, professional CEOs, hired, either to transmit signals of good governance or to address the lack of specific management skills of family members, achieve a higher level of compensation than their family counterparts, especially in founder-controlled firms, apart from the fact of being less affected by the level of family representation.

Moreover, the analysis allows to compare the different behaviors of family and non-family firms in terms of CEO compensation. Overall, the results indicate that family control increases the effectiveness of the governance structure in preventing overpayment as both family CEOs and professional CEOs are not as well paid as their non-family counterparts.

These results contribute to the literature by showing that, in fact, family firms are heterogeneous entities and behave differently in terms of CEO compensation, according to the level of stewardship orientation of their members: when he is the

only family representative on the board, the family member acts less as an agent and more as a steward, has a stronger emotional connection to the company, greater incentives to closely monitor CEOs' actions and, as a result, becomes more efficient in terms of compensation. And that efficiency is even greater when these CEOs belong to the family.

This study has some limitations. The first concerns the definition of family firms, an issue that remains problematic in this field of research, making it difficult to compare the results of the different studies. The second limitation concerns the lack of information about the founders of some family firms, information often not disclosed in proxy statements or other reliable sources. Finally, the third limitation has to do with the fact that the analysis was made only for CEOs and did not consider other executives who play an important role in family firms' activity.

Given the limitations pointed out, some future studies are suggested. Firstly, by replicating the sample of companies listed in the S&P 500 index, it is suggested to use a different definition of family firm and compare the results obtained with those of the present investigation, thus overcoming the difficulty identified by Kraiczy (2013). In addition, it is proposed to extend the analysis to other executives than CEOs and to see if trends persist, as well as to use a sample of Portuguese companies for which, it is known, there is no available information on compensation, except for companies listed on the PSI-20 index. These would be very interesting and useful studies from the point of view of the debate on this topic.

## Appendices

Table A1 – *Definition of the variables*

Group of variables	Variable	Description	Type of variable / Form of calculation	Expected signal
CEO Compensation	CASH_COMP	CEO cash-based compensation	Logarithm of the sum of salary with bonuses	(Not applicable)
	EQUITY_COMP	CEO equity-based compensation	Logarithm of the value of stock options, stock grants, restricted stock and others at the grant date	(Not applicable)
	TOTAL_COMP	CEO total compensation	Logarithm of the sum of CASH_COMP, EQUITY_COMP, pension value variation, other deferred compensation, and others, as defined in ExecuComp	(Not applicable)
Family Firm Characteristics	FAMILY_FIRM	Family firm (according to Anderson e Reeb, 2003)	Dummy (1;0)	+
	FOUNDER	Founder is alive and active in the firm	Dummy (1;0)	-
	DESCENDANTS	Descendants are in control of the firm	Dummy (1;0)	+
	LONE	Only one family representative on the board	Dummy (1;0)	(Contradictory previous results)
	MULTIPLE	More than one family representative on the board	Dummy (1;0)	(Contradictory previous results)
	FAM_CEO PROF_CEO	The CEO belongs to the family The CEO does not belong to the family	Dummy (1;0) Dummy (1;0)	- +
Control Variables	FIRM_SIZE	Firm's size	Logarithm of total assets	+
	RETURN	Stock performance	Annual stock return	+
	TOBINS_Q	Growth opportunities and complexity	Logarithm of Tobin's Q (calculated as the ratio between (book value of total assets – book value of shareholders' equity + market value of shareholders' equity) and (book value of total assets))	+
	INST_INVEST	Institutional investors	Percentage share of ownership held by institutional investors	+
	STD_DEV	Firm's risk	Standard deviation of monthly stock returns (calculated over the previous three years)	+
	D_YIELD	Dividend Yield	Ratio between total dividends and the market price of common shares	-
	BOARD_SIZE	Size of the board	Number of board members	+
	CEO_CHAIR	The CEO is also the Chairman of the board	Dummy (1;0)	+
	CEO_AGE	CEO age	CEO age in years	- (Fernandes et al. (2013))
	YEARS_TENURE	CEO tenure	Number of years since the CEO took office	+ (Barontini e Bozzi, 2018))
YEAR	Year dummies	Set of dummies (1;0)	(Not applicable)	
INDUSTRY	Industry dummies	Set of dummies (1;0)	(Not applicable)	

Source: Own elaboration.



Table A2 – Descriptive statistics

Variables		Total Sample	Non-family Firms	Family Firms	Family CEO	Professional CEO	Family Founder	Family Descendant	Lone-family Member	Multiple-family members
CEO Compensation										
CASH_COMP (\$,000)	Mean	1554	1461	1795***	1810	1786	2175	1307***	1328	2648***
	Std. Dev..	2507	1060	4411	5237	3888	5836	606	3630	5468
EQUITY_COMP (\$,000)	Mean	7302	6984	8115***	8075	8137	9184	6744***	8253	7863
	Std. Dev..	6676	4568	10225	12153	9004	12258	6552	10918	8835
TOTAL_COMP (\$,000)	Mean	13096	12992	13364	13901	13068	14635	11734***	12670	14631*
	Std. Dev..	9560	7448	13550	15563	12311	16181	8897	13334	13874
Control Variables										
FIRM_SIZE (\$,000000)	Mean	33,88	37,05	25,75***	33,25	21,63***	25,47	26,11	20,13	36,03***
	Std. Dev..	60,70	66,81	39,94	48,62	33,58	32,87	47,54	26,28	55,61
RETURN	Mean	10,77%	10,34%	11,88%	0,15	0,10*	12,40%	11,21%	12,02%	11,63%
	Std. Dev..	33,58%	31,37%	38,70%	0,47	0,33	40,24%	36,68%	38,73%	38,71%
TOBINS_Q (Log)	Mean	2,08	1,97	2,36***	2,39	2,35	2,50	2,19***	2,39	2,32
	Std. Dev..	1,25	1,24	1,25	1,29	1,23	1,40	1,00	1,23	1,30
INST_INVEST	Mean	70,09%	70,40%	69,28%	0,63	0,73***	69,28%	69,29%	75,91%	57,17%***
	Std. Dev..	27,04%	25,62%	30,38%	0,37	0,25	30,88%	29,77%	24,97%	35,31%
STD_DEV	Mean	7,45%	7,11%	8,32%***	0,09	0,08***	8,62%	7,92%***	8,50%	7,99%
	Std. Dev..	3,27%	3,22%	3,26%	0,03	0,03	3,20%	3,29%	3,13%	3,46%***
D_YIELD	Mean	213,58%	2,41%	1,43%***	1,10%	1,62%***	1,15%	1,80%***	1,44%	1,42%
	Std. Dev..	170,20%	1,75%	1,33%	1,13%	1,40%	1,41%	1,13%	1,31%	1,37%
BOARD_SIZE	Mean	11,00	11,07	10,83**	10,23	11,15***	10,26	11,55***	10,68	11,10**
	Std. Dev..	2,32	2,17	2,65	2,60	2,62	2,73	2,34	2,48	2,91
CEO_CHAIR	Mean	0,63	0,73	0,40***	0,53	0,32***	0,37	0,44**	0,43	0,33***
	Std. Dev..	0,48	0,45	0,49	0,50	0,47	0,48	0,50	0,50	0,47
CEO_AGE	Mean	56,63	56,99	55,72***	58,20	54,35***	56,12	55,20	55,06	56,92***
	Std. Dev..	6,07	5,14	7,92	10,21	5,90	9,04	6,16	7,16	9,04
YEARS_TENURE	Mean	6,62	5,92	8,42***	15,16	4,71***	9,90	6,51***	8,03	9,13
	Std. Dev..	6,37	4,60	9,26	12,11	3,69	10,75	6,42	8,33	10,73
N. obs.		2570	1849	721	256	465	405	316	466	255

The statistical significance of the unpaired Z-test statistics on the differences between means are: \*= $p < 0,10$ ; \*\*= $p < 0,05$ ; \*\*\*= $p < 0,01$ . Each test refers to the two adjacent columns on the left side. The table reports statistics that describe the sample. Variables are defined as follows: CASH\_COMP is the logarithm of the sum of salary and bonuses; EQUITY\_COMP is the logarithm of the value of option grants and stock awards at the grant date; and TOTAL\_COMP is the logarithm of the sum of CASH\_COMP, EQUITY\_COMP, pension value variation, other deferred compensation, and others, as defined in ExecuComp; FIRM\_SIZE is the logarithm of total assets; RETURN is the annual stock return; TOBINS\_Q is the logarithm of Tobin's Q (calculated as the ratio between (book value of total assets – book value of shareholders' equity + market value of shareholders' equity) and (book value of total assets)); INST\_INVEST is the percentage share of ownership held by institutional investors; STD\_DEV is the standard deviation of monthly stock returns; D\_YIELD is the dividend yield, calculated as the ratio between total dividends and the market price of common shares; BOARD\_SIZE is the number of board members; CEO\_CHAIR is a dummy that takes the value 1 when the CEO is also the Chairman of the board, and 0 otherwise; CEO\_AGE is the CEO age in years; YEARS\_TENURE is the number of years since the CEO took office.

Source: Own elaboration.

Table A3 – Correlation matrix

	CASH_COMP	EQUITY_COMP	TOTAL_COMP	FAMILY_FIRM	FAM_CEO	PROF_CEO	FOUNDER	DESCENDANTS	LONE
CASH_COMP	1,000								
EQUITY_COMP	0,257	1,000							
TOTAL_COMP	0,486	0,850	1,000						
FAMILY_FIRM	0,060	0,076	0,017	1,000					
FAM_CEO	0,034	0,039	0,028	0,533	1,000				
PROF_CEO	0,043	0,059	0,001	0,753	0,156	1,000			
FOUNDER	0,107	0,122	0,070	0,693	0,445	0,463	1,000		
DESCENDANTS	0,037	0,031	0,053	0,600	0,236	0,517	0,162	1,000	
LONE	0,043	0,067	0,021	0,754	0,373	0,589	0,512	0,463	1,000
MULTIPLE	0,145	0,028	0,053	0,531	0,320	0,371	0,382	0,304	0,156
FIRM_SIZE	0,188	0,178	0,278	0,084	0,003	0,095	0,060	0,048	0,107
RETURN	0,015	0,007	0,012	0,021	0,045	0,011	0,021	0,005	0,017
TOBINS_Q	0,080	0,000	0,042	0,142	0,081	0,102	0,145	0,034	0,116
INST_INVEST	0,032	0,045	0,069	0,019	0,091	0,049	0,013	0,011	0,101
STD_DEV	0,045	0,026	0,050	0,166	0,175	0,057	0,155	0,054	0,151
D_YIELD	0,011	0,072	0,024	0,257	0,203	0,142	0,251	0,074	0,192
BOARD_SIZE	0,109	0,161	0,215	0,047	0,110	0,031	0,138	0,089	0,066
CEO_CHAIR	0,037	0,021	0,091	0,307	0,071	0,302	0,242	0,151	0,197
CEO_AGE	0,102	0,068	0,160	0,094	0,086	0,176	0,036	0,088	0,122
YEARS_TENURE	0,083	0,085	0,126	0,176	0,446	0,141	0,223	0,007	0,104

  

	MULTIPLE	FIRM_SIZE	RETURN	TOBINS_Q	INST_INVEST	STD_DEV	D_YIELD	BOARD_SIZE	CEO_CHAIR	CEO_AGE	YEARS_TENURE
MULTIPLE	1,000										
FIRM_SIZE	0,012	1,000									
RETURN	0,008	0,036	1,000								
TOBINS_Q	0,064	0,134	0,210	1,000							
INST_INVEST	0,159	0,186	0,043	0,050	1,000						
STD_DEV	0,055	0,116	0,148	0,109	0,045	1,000					
D_YIELD	0,139	0,192	0,280	0,222	0,154	0,271	1,000				
BOARD_SIZE	0,014	0,323	0,020	0,188	0,160	0,161	0,260	1,000			
CEO_CHAIR	0,208	0,123	0,010	0,036	0,074	0,087	0,153	0,032	1,000		
CEO_AGE	0,016	0,023	0,018	0,023	0,003	0,037	0,107	0,087	0,248	1,000	
YEARS_TENURE	0,131	0,015	0,031	0,091	0,052	0,104	0,093	0,128	0,185	0,442	1,000

Source: Own elaboration.

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