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FAMILY OWNERSHIP, CORPORATE GOVERNANCE AND PERFORMANCE
THE CASE OF PORTUGUESE LISTED FIRMS

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Abstract

The research objective is to study the connections linking firm performance, family ownership and corporate governance. Board composition and board independence were used to represent corporate governance characteristics. The research used data for Portuguese listed companies in Euronext Lisbon Stock Exchange for the period of 2011 to 2021.

The analysis results from the development of multiple linear regressions and multivariate fractional polynomial regressions. The findings reveal that family ownership is linearly linked to performance measured in market terms, and non-linearly to performance measured in accounting terms. Additionally, corporate governance variables impact mostly performance, measured by Tobin's Q, and thus market expectations.

Keywords

    Corporate Governance

    Family Business

    Corporate Performance

    Board Structure

    Board Independence

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GROUP CONTRIBUTION

1. Introduction

A key aspect of investigations in the field of corporate governance is the way the firm and its owners relate. Issues studied started to submerge as corporations became more dispersedly owned, separating ownership and control. On the other hand, families are still key controllers of firms around the world, having great power and influence on the firms' business developments (Bennedsen, Pérez-González and Wolfenzon 2010). However, there is no clear consensus in corporate governance on whether a Family firm is more successful and performs in a higher manner due to the agency problem being theoretically resolved.

The contribution of family firms in the economy is particularly interesting when studying corporate governance as they have unique characteristics as a family is at the center of the decision-making process. Complex family relationships may impact not only corporate governance but also the financial performance of a company. These complexities bring more attention to the management mechanisms that ensure alignment between management and shareholders' goals. Board structure and the presence of independent directors can have an important role in the moderation of family firms' specific characteristics.

This paper has two major purposes. Firstly, is to study the case of listed Portuguese family firms and unveil the possible relationships between family ownership and control of their performance. The second is to understand if certain corporate governance measures can affect firm performance and if these measures differ significantly considering the different types of ownership of the firm. In this context, we analyse financial and corporate governance measures of listed companies in the Euronext Lisbon Stock Exchange for the period of 2011 to 2021.

2. Literature Review

Discussions regarding the impact of family ownership and control have long been happening, both from a theoretical standpoint also in empirical studies. However, no clear consensus seems to have been formed about the relationship between the two variables (Villalonga and Amit 2006) (Anderson and Reeb 2003). The results usually are highly dependent on the specifics of the market and the firms included in the study, nonetheless, both benefits and costs have been identified (Sacristán-Navarro, Gómez-Ansón and Cabeza-García 2011).

The global economy has evolved to a system where some of the world's largest corporations are family businesses, and a large percentage of many countries' GDPs depends on them. Still, the definition of what is classified as a family business is not agreed upon.

Additionally, often issues like the agency problem are solved with the aid of large shareholders, and the most common type of large shareholders are families, often called the entrepreneurial dynasty (Bennedsen, Pérez-González and Wolfenzon 2010). Making the study of these companies, their corporate governance practices, and how it relates to their performance a highly important topic.

The topics of family ownership and corporate governance have been jointly studied as the power in these companies is exercised by a group of people who are connected by personal ties. Thereby, the allocation and dynamics of power are complex, making the interactions within the family and other stakeholders a likely determinant of performance (Bennedsen, Pérez-González and Wolfenzon 2010).

One clear point of disconnect between authors is the definition of the family business itself, suggesting that further research is needed on the topic (Mazzi 2011). Anderson and Reeb (2003), classified a family firm as a firm where the founding family has an equity stake

and or family members have a position on the board of directors. This led to the conclusion that more than a third of companies in the S&P 500 at the time of the study were classified as family firms (Anderson and Reeb 2003). For Barontini and Caprio (2006), a firm can be classified as a family firm when the largest single shareholders own at least 10% of shares and that shareholder control more than 51% of voting rights. Leading to the conclusion, that 53% of the 675 sampled European firms from 11 countries are considered family firms. Donnelly (1964), defined a family firm as a firm that: "has been closely identified with at least two generations of a family, and when this link has had a mutual influence on the company policy and the interests and objectives of the family." The consensus seems to be in line with Donnelly, where firms are considered family firms when the family can employ an extent of influence over the company's business and daily activities either through ownership or management.

Another point of disconnect has to do with the methodology and data used, which highly influences the results of empirical studies. Some studies use a dummy variable to make a distinction between family businesses and non-family businesses and analyse the contrasts between the two groups (Anderson and Reeb 2003). On the hand, there are studies where the family firms are classified depending on the level of ownership of the family, allowing for results to take into account the degree of ownership concentration (Anderson and Reeb 2003). Other differences relate to the different variables included in the model. Some authors included CEO and found that companies where the CEO is of the family significantly underperform (Bennedsen, Pérez-González and Wolfenzon 2010). However, (Anderson and Reeb 2003), states that this relationship is dependent on whether the CEO is the founder or another family member.

These differences in methodology are part of the reason why there have been differences in results. In their studies (Anderson and Reeb 2003) and (Villalonga and Amit

2006) discovered that family firms are superior when it comes to Market-to-Book valuations and profitability. On the other hand, (Bennedsen, Nielsen, et al. 2007) found evidence of underperformance.

One thing that most methodologies have in common is the objective to detect a linear relationship between the different variables. However, (Mazzi 2011) states that the lack of consensus among the authors may be due to the complex family impact on performance, not suggesting a linear relationship.

Overall, the absence of consensus in the literature is one of the fundamental causes for the continuation of research on the topic. Particularly for a specific market, as the dispersion in results and methodologies does not allow for the application of results to other realities. Future research has the opportunity to find direct causal links between family ownership, corporate governance, and firm performance.

3. Corporate Governance and Theoretical Background

3.1. Corporate governance for family businesses

Corporate governance is the integrated system of internal controls and checks by which publicly traded companies are managed. It lays out a foundation defining the rights, roles, and responsibilities of different groups such as the management, board, and controlling/minority shareholders (Corporate Governance Slides 2021). Its purpose is to monitor and control whilst at the same time setting a vision, creating a mission, and undertaking a strategy. Moreover, it also has the purpose of promoting transparency and accountability. (Corporate Governance Slides 2021)

Corporate governance is especially important in family businesses, given the complexity of relationships that is inherent to them, and the challenges that arise from increasing growth and globalization. Owners, managers, and employee relationships need to

be managed in a way that the roles, reporting lines, and delegation of responsibility is clear (Sarbah and Xiao 2015). To address this challenge a good corporate governance system creates a solid organizational structure and puts into action the suitable policies to manage such complexity. As a positive result of the implementation of a solid corporate governance system, the family can devote effort to the key aspects of the business rather than focusing on resolving internal conflicts within the family setting (Sarbah and Xiao 2015). In certain instances, robust family leadership can create a standard that becomes the family operating model. In further instances, when many family members take on decision-making responsibilities, it may be helpful for the family to bring in external advisors to construct a model (Sinha e Govindaraj 2020).

Given that no two families or businesses are equal, their particular attributes and the context in which the business is run must be considered when defining the most appropriate operating model. In this process, three elements must be examined: ownership structure, the specificities of the business, and properties of the surrounding ecosystem such as the maturity of local capital markets, societal expectations, and the regulatory, legal, and tax constraints of the territory where operations take place (Sinha e Govindaraj 2020). When deciding on the governing structure, which can be more or less formal, three topics need to be established: the shareholders' agreement - including the definition of family, rules for owners, and rules for managers -, governing bodies, and a family code of conduct. (Sinha e Govindaraj 2020).

It is also very important for family firms to embed corporate governance practices into the company's culture, keeping the following principles in mind (Sarbah and Xiao 2015):

- **Shareholder recognition**: essential for preserving the company's stock price and ensures that the minority shareholders also are heard at general assemblies and have the opportunity to participate

- **Stakeholder interests:** addressing these interests helps the company to maintain a good public image

- **Board responsibilities:** ought to be aligned and outlined with clarity to all majority shareholders

- **Ethical behaviour:** a code of conduct must be defined to avoid legal and civil problems

- **Business transparency**: to promote shareholders' trust

Corporate governance practices also ensure that selection policies are clear, and therefore the right family member is chosen as the successor when the time due comes (Sarbah and Xiao 2015). Absence of accordance on succession planning is one of the largest origins of family disagreements and the one that is most likely to destroy value (Sinha e Govindaraj 2020). Therefore, corporate governance practices allow family firms to increase their reputation, as it monitors behaviours and guarantee that all the parts are working toward the common goal of maximizing the value of the company, therefore providing stakeholders with a feeling of safety.

Overall, a well-designed family governance structure intents to transmit the family values, mission, and long-term vision to all; keep family members up to date about important business achievements, challenges, and strategic options; communicate the rules and decisions that might affect employment, dividends, and other benefits; establish official communication channels that allow family members to share their ideas, aspirations, and issues; and allows the family to assemble and make any required decisions (Sarbah and Xiao 2015). This unifies the family relationship and the trust among members, maximizing the probability of future long-term prosperity.

3.2. <u>Stewardship Theory</u>

The stewardship theory presupposes that executive managers of a company will conduct their accountabilities as responsible stewards taking into account shareholders' interests and contributing to societal and economical value creation over time (Cossin, Hwee e Coughlan 2015). Thus, managers' and shareholders' values are aligned, developing a meaningful trust-based relationship where corporate goals go beyond profit levels. This theory presumes that the agent is engaged and committed to maximizing the company's performance, sharing the main objectives as the principal. Thus, stewards take the control of the firm with accountability and a long-run standpoint, making sure that the stockholder's wealth is being protected and maximized.

This way, managers feel that their work is appreciated by the board members and are motivated to keep a good performance (Glinkowska e Kaczmarek 2015). Consequently, shareholders show their contentment by empowering stewards with autonomy and confidence that they will work toward the company's success. This way, costs to monitor and control these executive managers are minimized as they are not self-interest since they "tend to view the corporation as an extension of themselves" (Sarbah e Xiao 2015).

As family-owned businesses are characterized by not having dispersed ownership structures, it sounds reasonable to go beyond financial goals. Thus, rather than just monitoring executive managers and making sure these are protecting stockholders' interests, a broader approach including the longevity and the overall success of the firm plays an important role in a family business's overall strategy. Hence, this theory defends that stewards will integrate the organization's goals as their own, finding gratification in the company's good performance and accomplishments.

3.3. <u>Agency Theory</u>

The agency theory comprises a conflict-of-interest problem that arises throughout a relationship between a principal and an agent. Therefore, agency problems result from a segregation of ownership and control where the agent that is employed by the principal is responsible for takeover tasks that will affect the latter's payoff. Thus, whereas the principal, normally the company's shareholders, is the legal owner of the firm, agents, usually managers take over the routine activities of the company. Moreover, these managers are expected to take action in place of principal, with the main purpose of maximizing their long-term value and protecting their interests. Thus, complications emerge when these two parties' goals are not aligned and when there is an asymmetry of information.

There are two types of agency problems, type I, and type II.

3.3.1. Shareholders vs Managers

The first type results from relationships between the firm's shareholders and executives. Their objectives must be on the same page since managers deal with issues that will affect the firm's value and consequently, shareholders (Ing Malelak, Soehono e Eunike 2019). Hence, undesirable situations such as managers being tempted to pursue their interests and engaging in behaviours like using the company's assets at their ends will negatively affect the principal's wealth. Another important factor to take into account is the asymmetry of information. This stands for the fact that since managers control the company and run its activities, they typically have accessible more comprehensive information than shareholders and thus, sometimes ends up being complicated for the latter group to control every action taken by the agent as well as their information set.

3.3.2.   Controlling Shareholders vs Minority Shareholders

The second type refers to the affiliation between minority shareholders and controlling shareholders. With the supposition that this paper has the purpose of portraying family businesses, these controlling stockholders are indeed the family members that own a large portion and consequently control the company. In this situation, it is essential that these, when actively monitoring the firm, take into account the minority shareholders' interests. Since this latter group retains small stakes in the company, they rarely have much success when it comes to influencing the company's corporate governance. It can be difficult and costly for them to coordinate or win a proxy fight against the management or the other dominant shareholders. Hence, this type of relationship may lead controlling shareholders to expropriate minority stockholders and draw personal benefits (Leong Lim e Hwa Yen 2011). This is more prone to occur when institutional corporate governance is fragile so companies which follow a legal framework with the intuition of protecting the minority stockholders are more likely to have robust performance.

3.4. <u>Importance of Board Independence in Family-Owned Businesses</u>

The presence of independent board members, NEDs, may play a crucial role to strengthen a company's overall performance and fostering board performance to maintain the longstanding competitiveness of the business. (Ballini 2020). It ensures a higher level of corporate governance for the firm's shareholders as they have a tendency to be unbiased toward managers' and shareholders' interests (Cuadrado-Ballesteros, Rodríguez-Ariza and García-Sánchez 2015). As board members supervise managers, their main goal must rely on promoting long-term sustained growth and profitability and thus guiding management in this direction.

Ultimately, their presence is likely to mitigate arising conflicts of interest, and agency problems, and foster independent decision-making. This happens when the principal, usually

shareholders of the firm, hire managers to control the company's operations, taking over tasks that affect owners' pay-offs. Thus, some conflicts between these two parties can arise due to a misalignment of goals and expectations or even due to asymmetry of information since these executive managers typically have further comprehensive information than shareholders. Whilst shareholders benefit from receiving dividends, which are correlated with the company's profit, managers sometimes overlook profitability and are more focused on their reputation and compensation, outcoming in a very short-term perspective of profit. The independent NEDs, when practicing their role of controlling, guarantee that no one is acting on behalf of their interests and consequently coping with the negative effects that arise from agency problems. Likewise, they must carry out diligent work even if that means upsetting some other board members. In this way, conflicts of interest are avoided, and shareholders and potential investors are protected.

Moreover, board independence is a form of value added to the company as can improve board performance by boosting the company's access to external resources and connections. Hence, relevant expertise is acquainted as they usually have a wider range of valuable experience and contribute unbiased valuable insights.

Independent NEDs bring a level of independence to discussions and are assigned different roles in the BoD, and board of directors, such as controlling and helping to set strategy and policies (in cooperation with executives). Moreover, they may also take part in the hiring and remuneration of executives. All in all, non-executive directors conduce an important position in providing a creative contribution to the family businesses' board by contributing with independent oversight and constructive challenges to the executive directors (KPMG-ASSOCHAM 2011).

Therefore, having these independent board members brings a lot of benefits to the table, beyond just fulfilling regulatory requirements. It often improves the firm's credibility

as they guide and monitor managers toward safeguarding shareholders' interests, including minorities and other relevant stakeholders.

In conclusion, family businesses can take advantage of comprising independent directors on the board as they counsel family members and the management, ensuring the business runs smoothly and objectively and having a neutral and unbiased voice. Consequently, this most likely improves the board's effectiveness, improves financial and operating performance, cultivates best practices, and safeguards stakeholders' interests, creating long-term sustained growth.

3.5. **Family Business Definition**

Family businesses are key drivers of economic growth across the world, contributing 25% to 49% of GDP in countries with different characteristics, such as India and Germany. Consequently, the outcome of their business activities has impacts that extends well beyond the family. (Sinha e Govindaraj 2020)

When defining what a family firm is, there is a wide range of definitions that can be accepted, thus being difficult to agree on an exact definition. The literature on family business takes into consideration several factors such as the percentage of shares that must be owned by the family, the family presence on the board of directors or the board of commissioners, and the presence of descending generations of the founding family. Authors (Miller, Le Breton-Miller, et al. 2007) collected a list of 28 different definitions of family firms that have been widely acclaimed in literature through the years. Nevertheless, there seems to be an agreement that the business does not have to be solely owned and controlled by the family for it to be considered a family firm (Khan e Siddiqua 2015)

Given the scope of this study and the characteristics of the sample, we decided to take a more holistic approach, this way avoiding a myopic view and having to over-reduce our

already small sample. We considered a firm to be family owned when the founding family is the controlling shareholder or the biggest out of the minority shareholders, thus having a significant level of control over the company. Moreover, we also consider it a family firm when a considerable shareholder is a family firm itself, as the practices of a family-owned firm are being applied in the company. In this case, we had into consideration the amount of time the family firm has been in control, as it takes time to fully incorporate practices into a firm. Additionally, we consider that "the person who is generally recognized as a firm's founder is the one responsible for the firm's early growth and development into the business that it later became known for, yet this need not be the same individual who started and incorporated the company or a predecessor business, nor the one who took the company public" (Villalonga e Amit 2006).

Authors (Khan e Siddiqua 2015) related the fact that family firms, due to usually having longer CEO tenures and concern for the descending generations of the founding family, have a set of particular characteristics such as family firms are more probable to consider a long-term inclination when considering possible investments (Le, 2006); family firms have incremental challenges, namely concerning with family relationships (Schulze el al., 2001) which could consume time and resources; family firms are tendentially more risk averse (Barth et al., 2005), and thus, could pass on investment opportunities; and that family firms are generally more conservative and less innovative than non-family firms (Gomez-Mejia et al., 2001).

3.6. <u>Costs and Benefits of Family Involvement</u>

The specific features that differentiate family from non-family businesses may consequently derive into costs and benefits to the firms.

3.6.1. Potential Costs:

Family involvement can enable conflicts of interest between minority shareholders and large family shareholders (Villalonga e Amit 2006), since the actions of family members that hold crucial management positions may be influenced by the interest of the controlling family rather than the noncontrolling shareholders. (Sener 2014). This negative effect has the most impact when the safeguarding of minority shareholders is frail and when the family has a majority ownership stance (Khan e Siddiqua 2015). As mentioned, (Ronald e Reeb 2003), "diversified shareholders are presumed to evaluate investments using market value rules that maximize the value of the firms' residual cash flows. Large, concentrated shareholders, however, may derive greater benefits from pursuing objectives such as firm growth, technological innovation, or firm survival than from enhancing shareholder value".

The propensity to seek personal gain from control at the cost of minority shareholders may present different manifestations, such as offering special dividends, creating high-paying jobs for family members within the generations, prioritizing family members that hold management positions, and limiting the labour pool (Sener 2014). Restricted human resource pools may translate to human capital deteriorating the performance of the firm (Sener 2014) , as the family may lack the competencies to be the best-suited choice for the role in question. By continuing active in management, large shareholders can have a harmful effect on firm value, when they are not anymore fit or have the necessary qualifications (Anderson e Reeb 2003). These are examples of managerial entrenchment, namely situations where managers use their role to act in ways that only benefit themselves instead of the shareholders. Additionally, family owners' major stake may serve as a disincentive for other agents to bid on the company, therefore reducing the value of the firm. (Khan e Siddiqua 2015).

Additionally, the family dynamics themselves can also be detrimental to the company. Conflicts can arise due to the emotional clash of the roles board member play in the family

(e.g., parent) and the role that is to be carried out in the company (e.g., the employer) (Lana, et al. 2006).

The impact of these costs may be minimized by incorporating corporate governance practices as well as a well-functioning corporate governance structure within the family firm.

3.6.2. Potential Benefits:

On the other hand, many benefits are associated with family involvement in a firm, as there are governance advantages that derive from concentrated ownership and family practices.

First, agency problem type 1, namely owner-manager conflicts, is mitigated due to family members frequently occupying top management roles. This way the interests of the shareholders and the managers are met, given that they are the same, thus lessening the degree of agency costs and also mitigating managerial expropriation (Khan and Siddiqua 2015). Also, the possibility of free-rider problems – when individuals contribute little or nothing toward the group despite taking advantage of benefits as fully as any other member (Kim e Walker 1984) - that can occur in widely held firms is eliminated (Shleifer e Vishny 1986).

Family firms also have a strong long-term orientation that may not always be present in other firms, which is one of their stronger competitive advantages. They are highly focused on keeping a good reputation and transferring the family inheritance to the next generations. As a result, they are keen on investing more in long-term profits, thus leading to greater investment efficiency (Anderson e Reeb 2003). This avoids boosting uncertain short-term earnings that would not be sustainable over time (Sener 2014). Family firms are also keener on establishing long-term term contracts with shareholders, as they have a clear vision of the company's big picture. (Sener 2014).

Concentrated ownership by the family also puts them in an advantageous stance to govern and monitor the firm, as they have a large undiversified equity stance and dominance over management and directors. (Anderson e Reeb 2003).

These benefits are dependent on the level of involvement the family has, however, if they are properly leveraged, they can play a key part in the company's long-term prosperity.

3.7. Institutional Background of the Portuguese Capital Market

Capital markets are a fundamental part of the economic ecosystem and are heavily affected by a range of policy areas, such as pension policy, tax policy, financial regulations, and corporate law. They also cover a wide range of players such as investors, issuers intermediaries, and markets, each with their incentives and roles (OECD 2020).

Historically, the Portuguese capital market has routes as far as the Middle Ages (Santos 2001). However, the first formal regulations are dated 1833. Despite being an old capital market, there was a low level of activity until the 1960's when extraordinary economic growth was verified, increasing the level of transactions both in terms of stocks and bonds (Santos 2001). After the revolution of 1974, there was a shock to the market due to the political and social instability, causing a period of no operations until 1976 for bonds and 1977 for stocks. The period of break coincided with the nationalization of the majority of public firms and upon reopening only a few small companies were left.

Influenced by the state, the reappearance of important companies in the capital market occurs in the 1980s, as important packages of financial benefits were offered with a peak of IPOs in 1986 and 1987 (Santos 2001) (OECD 2020). Once again in 1989, the state intervened promoting privatizations and ensuring that the market would reach the state of a mature market. The growth continued into the decade of the 1990s and was a natural growth that was seen throughout Europe, highly influenced by the safety and benefits brought by the European Union. However, there was a trend of privatizations, and the number of listed companies has

remained modest ever since (OECD 2020). In the new decade, and especially from the financial crisis of 2008 forward, the market has been characterized by stagnation and a large reduction of the listed companies. This era was also reflected in IPOs, with only 5 new IPOs from 2008 to 2020 (OECD 2020). Only in 2019, we saw the Portuguese GDP go back to the levels before the crisis.

One way of assessing the performance of the Portuguese capital market is by analysing the PSI-20 index. The PSI-20 is included in a pan-European platform, Euronext, and its history dates back to the 18th century (Ribeiro 2020). It consists of stocks issued by up to 20 companies ranked highest in free-float market capitalization. Eligible companies must meet the minimum free-floating rate threshold. Moreover, the free float market capitalization of included companies should be in principle at least EUR 100 million. (Euronext 2018)

The loss of prominence of the PSI-20 is notorious, especially in the last two decades. These last 20 years were marked by economic stagnation, financial and social struggles, and a drastic depletion in companies listed. (Ribeiro 2020). The main reasons why companies lack the interest to seek financing though the capital and invest in their projects are related to the high costs of supervision, compliance, governance, and IPO registration process; the intricacy of regulation and preconditions necessary; market liquidity and the absence of a favourable market environment; deficient attractiveness of the Portuguese capital market; the lack of willingness of investors and shareholders to split control and the inclination for bank related options. (Ribeiro 2020)

Some reasons that justify the lack of attractiveness of the Portuguese capital market are not related to the market itself, but rather to the country's business and social structure, which was critically affected by the 2008 crisis. The ecosystem is not favourable for the development of the capital market, given the consecutive progresses and setbacks of fiscal

and budget policy, administrative bureaucracy and inefficiency of justice, and an unfavourable social environment for the market (Ribeiro 2020)

Family firms have a solid presence within the listed firms on the Portuguese stock exchange, as most of the firms listed in PSI-20 are considered family firms and have thrived under the founding family continuously. This indicates that the practices associated with these firms have the potential to be successful if they are combined with good governance practices, as will be further elaborated on in this paper.

When focusing on corporate governance, 1999 the Portuguese Securities Market Commission (CMVM) approved recommendations on corporate governance, following the trend already happening in continental Europe (Cunha and Rodrigues 2018). The model used by the Portuguese authorities is what is known as "comply or explain" to the regulations implemented by CMVM but increasing involvement of investors is seen (Martins 2013). Revisions were made over the years and have been shown to promote the level of disclosures put out by companies. However, there is evidence that companies, where there is high shareholder concentration, disclose less information, which could be an indication toward family firms (which have high ownership concentration) have low disclosure rates when compared to other firms (Cunha and Rodrigues 2018).

4. Hypothesis Development

4.1. <u>Family Ownership</u>

Family firms are a pillar of the national economy as well as the global economy (PWC 2016). It is estimated that about 70% of Portuguese firms are family firms, being responsible for 65% of employment and 50% of the Gross Domestic Profit (Pimentel 2022). This would suggest that family firms are to some degree efficient and profitable, as the economic rationale

behind investment supports the profitable firms (Miralles-Marcelo, Miralles-Quirós and Lisboa 2014).

Additionally, they are often associated with the family presence in management, which brings different challenges to the agency problem regularly stated in corporate governance. With this participation, the agency problem between shareholders and management is at least diminished as ownership and control are partially unified again.

Another specificity of family firms that is usually highlighted in literature and that has an impact on performance is the long-term orientation. When there is the presence of family ownership there is a worry and desire to make the firm last and pass it on from generation to generation. It has even been reported to be the main concern of top executives in Canadian family firms (Chua, Chrisman and Sharma 2004). Furthermore, the participation of family in management allows companies to have a long-term-oriented strategy. This is because there is no short-term bias of management like we often find in cases of agency problems (Miller, Brenton - Miller, et al. 2007) .

Previous studies on family ownership and performance have yielded assorted results. In the USA studies discovered that the performance of family firms tends to be higher, especially in the first generation (Villalonga and Amit 2006). However, also in the US, (Miller, Brenton - Miller, et al. 2007) found that the out-performance of family firms is dependent on the definition of the family firm used for the study. Also found that large US family businesses did not transcend their market valuations (Miller, Brenton - Miller, et al. 2007). For the specific case of Portuguese firms, evidence shows that family firms' outperformance is better identified with accounting performance measures than market performance measures (Orozco, Vargas and Galindo-Dorado 2018).

Given this, the subsequent hypothesis can be proposed:

H1: The performance of family businesses is higher than non-family businesses in Portugal.

4.2. Family CEO

When family ownership overlaps with family management, there is an opportunity arising for families. The appointment of a family CEO can give even further control and advantages in a family business, through trust and even goal alignment (Anderson and Reeb 2003).

Family CEO typically have considerable personal wealth tied to the firm, often being more risk-averse to factors that may impact their durability in the position of control (Mishra and McConaughy 1999). This may lead to conflicts of interest between non-family shareholders as possible higher return opportunities are not taken to retain control (Mishra and McConaughy 1999).

Non-family CEOs bring new ideas and a new view into the family however, they may have a smaller influence on firm performance when conflicts rise within the family (Miller, Brenton-Miller, et al. 2013). Non-family CEO performance in family firms is dependent on ownership structure and the existence of a family Co-CEO, while family CEOs are not as susceptible to these factors (Miller, Brenton-Miller, et al. 2013).

Furthermore, some literature refers that the CEO being of the family or not can improve performance if there is a fit alignment between the company and the person hired and that suitable Corporate Governance mechanisms are in place (Lin and Hu 2007).

Given the ideas above we propose the hypothesis:

H2: Family CEO has an impact on company performance.

4.3. Board Size

According to previous Corporate Governance studies, board size is an important factor to assess the efficacy and effectiveness of corporate governance mechanisms in firms. The optimal board size is still being discussed and there does not seem to be an agreement on what it is. However, is said that a larger board size at first eases key board functions to be fulfilled, but if the board is too large there is a tendency for problems in coordination and communication diminishing effectiveness (Guest 2009).

In the particular instance of family firms, there is a tendency for Director positions to be filled with family members when the board is smaller, leading to an even larger alignment between ownership and control within these firms (Jaskiewicz and Rau 2007).

Following to the ideas presented, the subsequent hypothesis is suggested:

H3: Board size had an impact on company performance.

4.4. Independence of Board

Independent Board members have a crucial role in the company, supervising activities and ensuring transparency. This is especially important in cases where family ownership and control overlap, solving agency problem type 1 but creating Agency Problem type two, where there are clash of interest of minority shareholders and majority/family shareholders (Villalonga and Amit 2006).

Having these independent directors present on the board allows for the interests of all stakeholders to be taken into consideration. By not having associations with the company, these directors are more likely to see what is best for the company and the benefit of all shareholders, not only the controlling family (Siff 2016).

(Cuadrado-Ballesteros, Rodríguez-Ariza and García-Sánchez 2015) found that the number of independent directors in companies affects how transparent they are in terms of

Corporate Social Responsibility practices. However, their behaviour is often accordingly to the behaviours of family members.

(Vieira 2018) found that family firms usually opt for a different board structure different from non-family firms, mostly regarding independence and gender diversity. But the association of non-executive directors and independent directors and firm performance is not significant in the Portuguese scenario.

Based on the reasoning above we put forward the following hypothesis:

H4: The independence of the board has a positive impact on performance.

In the development of the hypothesis, there were some limitations with our expectations and beliefs, related to whether the relationship between the two variables was expected to be positive or negative. This is due to the discussion and opposing results and opinions found in the literature available on the topic. For this reason, the first three hypotheses were developed having only the perceived idea that there would be a relationship between the variables. With this study, and having in mind the Portuguese company data collected, we expect to be able to draw results on the positive/negative nature of the relationship.

5. Model and Measures Descriptions

5.1. Sample and Data

The sample includes most publicly traded Portuguese firms listed on the Euronext Lisbon Stock Exchange as of September 2022. Out of the 54 public companies, we excluded 5 companies before data was collected due to being vehicle companies with insufficient information or having their activity in Spain, making them not reflective of the Portuguese market.

We collected a panel of 429 company-years observations during the period of 2011-2021. This study data is quantitative, expressing the value of the magnitude or variables, and of secondary sources. Financial data for control and performance measures were extracted from Bloomberg. Due to a lack of information on Bloomberg, some additional sources like company annual reports and Euronext were consulted, and all these cases are properly identified in the supporting Excel. Other data related to corporate governance and management were collected manually from the articles of associations, corporate governance reports, and annual reports of companies. After the development of the database with both financial and corporate governance information, some additional companies had to be excluded due to their lack of information, which would jeopardize the quality of the results presented. The final sample was composed of 39 entities, of which we considered 17 to be family businesses.

The models and statistical tests performed in this report were done using Jamovi as well as Stata, as the first statistical software did not allow for all the model estimations necessary. Nonetheless, results were confirmed in both software to ensure consistency.

5.2. Dependent Variables

During this study we will use two different dependent variables, these will be both market and accounting measures of profitability as proxies for company performance. Tobin's Q ratio is a market measure with the benefit of being forward-looking due to the underlying expectations of the market relative to the company (Al-Ghamdi and Rhodes 2015). This ratio was been widely used in studies of performance and ownership since (Morck, Shleifer and Vishny 1988), allowing us to have the perspective of investors and their expectations relative to the forecast of world events, giving a plenitude of possible outcomes to the present businesses depending on the optimism or pessimism of the market (Demzetz and Villalonga 2001).

On the other hand, we also used ROA (return on assets) as an accounting measure of firm performance, which will give us insight into the past management of the company (Al-Ghamdi and Rhodes 2015). Being an accounting measure, ROA is not affected by the expectations of investors, but also it only includes a partial estimate of future events through accounting valuations made for goodwill and depreciation (Demzetz and Villalonga 2001).

Tobin's Q ratio is the market value of a company divided by the asset replacement costs. Due to the complexity of calculations of Tobin's Q ratio, we used market-to-book value as a proxy (Villalonga and Amit 2006). To simplify calculations and according to some literature we used total assets as a stand-in for the asset's replacement costs (Villalonga and Amit 2006). The firm market value was computed using the market value of equity (or market capitalization) plus the book value of preferred stock plus the book value of debt. For this calculation book value of debt was used as a representative for the market value of debt (Khan and Siddiqua 2015). ROA was computed by net income divided by total assets.

5.3. Explanatory Variables

The explanatory variables of our model will highlight the specificities of family firms and some corporate governance metrics. They are the following:

- **Family Business (FB)–** A dummy variable constructed on our definition of family business. Dummy equals 1 if it is considered a family business and 0 if not.

- **Family CEO (CEO) -** Dummy variable that equals 1 if the CEO is a family member, and 0 otherwise.

- **Board Size (Board) –** Natural logarithm of the number of board members of the company.

- **Independent Directors (IndD) –** The percentage of the number of independent directors compared to the number of directors on the board**.**

In the development of our study, family ownership is the main independent variable, which will be equal to 1 in the case that the company is considered a family business and 0 otherwise. Given the definition of family business we developed above we observed at the specific case of each company to determine whether it is a family business or not. The analysis was performed based on the information on ownership structure collected in September and October of 2022. Due to our defined criterion and structure of our work, we assumed that if the company could be characterized as a family firm at the time of the analysis, this would have been maintained in the period of study. All considerations and notes from the authors can be found in the supporting Excel.

The variable family CEO helps us to investigate the level of control of the family and its effect on the management of the company. As in many family businesses, there is an inclination for family members to occupy top management positions. In other to determine if there is a family connection between the CEO and the controlling family, we used the last name criterion (Chu 2011). Some additional research was necessary in some cases due to family ramifications and expansions, making the last name not sufficient to understand all connections to the founding family. For years where information was not available as the CEO remained the same for the rest of the period in analysis, we assumed the continuation. All considerations from the authors can be found in the supporting Excel.

Board size is considered a variable that reflects the company's performance in terms of Corporate Governance. In theory, board sizes should be reflective of the size of the company and allow for enough space for non-executive and independent directors (Harris and Raviv 2008). There has been evidence in the literature that a bigger board is related to a higher corporate reputation (Orozco, Vargas and Galindo-Dorado 2018), but lower financial performance (Orozco, Vargas and Galindo-Dorado 2018) (Cao, Yang and Liang 2021). The segregation of ownership and control in companies can result in agency problems, and one of

the solutions involves the structure and composition of the board of directors, as its main function is to supervise the management and ensure shareholders' best interests.

To provide other variables that would be representative of the company's corporate governance, the percentage of independent directors was included. As explained above it is crucial to have the presence of independent directors as it ensures a higher level of corporate governance, which may be crucial to the long-term performance of the company. This is especially true for businesses where the ownership and control are within a family, which can bring an increased level of complications in personal relations.

5.4. Control Variables

Some control variables were also included in the model as explanatory variables. This decision is because there are other important determinants of firm performance other than the ones related to family ownership and corporate governance (Black, Jang and Kim 2006). Company age and size will account for factors such as market power, market opportunities, and even economies of scale and scope (Klein and Shapiro 2005). The leverage and liquidity account for the risk of each company (Klein and Shapiro 2005). The variables can be described as follows:

- **Age (LA)** – Natural logarithm of the years since the founding of the company.
- **Size (LTA) –** Measured as the Natural logarithm of book value of total assets.
- **Leverage (TDTA)** – Measured as total debt/total assets.
- **Liquidity (CR)** - Measured as the current ratio.

Age was included as a control variable to account for experience and expertise in the industry (Rossi 2016). The relationship between the age of a firm and its performance is still debated in the literature, however, we do know there is some impact. Following the definition presented by (Villalonga and Amit 2006) age of a company is the number of years since the

founding of the company or the older of its predecessor company. In our model, age is measured as the natural logarithm of age.

One reason for the inclusion of size has to do with market power, opportunities, and even economies of scale (Klein and Shapiro 2005). Some papers relate firm size to Tobin's Q ratio due to the "size effect" present on returns and the market value of common stock (Hu and Izumida 2008). Also, size may influence the ability of the family to exert their power, it is easier for families to control smaller companies (Hu and Izumida 2008). Following what was done in (Khan and Siddiqua 2015) (Anderson and Reeb 2003), in our model size is measured as the natural logarithm of total assets.

The relationship between leverage and performance in a company is a highly debated topic in corporate finance for example. High-leveraged companies are associated with higher risks due to the threat of bankruptcy. Leverage is also often something that investors look at and often negatively impacts firm valuations. On the other hand, leverage allows companies to take advantage of tax shields for example. We measured leverage as the ratio between total debt and total assets.

Liquidity will also have an effect on the company's performance, as the company needs the ability to meet its short-term obligations. Its relative importance however depends on the industry and the core business of each firm as certain industries have more working capital necessities. In some literature, we have found that there is a relation between the current ratio and ROA, as the performance measure is also calculated using accounting figures (Chuckwunweike 2014). For these reasons and keeping firm-specific risk in mind, we decided to include liquidity measured as the current ratio.

6. Multiple linear regression

INDIVUDAL CONTRIBUTION OF CAROLINA FREITAS

6.1. Total Sample

In this chapter, a multiple linear regression was conducted using the total sample, meaning that it comprised both family and non-family businesses. As such, this will be divided into four parts, namely descriptive statistics, correlation matrix, linear regression to study the effect on the first dependent variable, return on assets, and lastly a linear regression to investigate the impact on the latter dependent variable, Tobin's Q.

6.1.1. Descriptive Statistics

Descriptives

	ROA	Tobin's Q	CR	TDTA	LTA	LA	FB	CEO	Board	IndD
N	429	429	429	429	429	429	429	429	429	429
Missing	0	0	0	0	0	0	0	0	0	0
Mean	$-3.62e{-}4$	0.768	1.20	0.354	6.31	3.77	0.436	0.221	8.58	0.154
Median	0.0219	0.683	0.942	0.351	6.00	3.83	0	0	8	0.00
Standard deviation	0.196	0.395	1.11	0.224	2.00	0.752	0.496	0.416	4.35	0.201
Minimum	-2.88	0.00	0.00851	0.00	0.833	1.39	0	0	2	0.00
Maximum	0.539	2.13	8.00	1.60	10.8	5.43	1	1	24	1.00

Table 1- Descriptive Statistics of the Total Sample Linear Regression Model

Table 1 shown above displays the descriptive statistics for the 10 variables used in our estimations. Additionally, it exhibits the data description, namely the average, median, maximum, minimum, and standard deviation values for each variable. The sample is composed of a panel data of 39 firms, corresponding to the total number of 429 observations. From this total sample, 17 firms were considered to be family firms, corresponding to 43% of the firms included in the study. As a result, 22 firms are considered to be non-family firms in Portugal for the period studied of 2011-2021. This means that family ownership maintains its importance even in large and publicly traded companies in Portugal.

The average ROA and the average Tobin's Q for the sampled firms are respectively 0.00036 and 0.768, with the market performance measure (Tobin's Q) showing a higher variability than the accounting performance measure (ROA).

The average firm of the sample is 43 years old, showing the maturity of most companies present in the Portuguese capital market. While the average firm size, measured by total firm assets is 550.04 million EUR during the period studied.

The average firm included in the study has a current ratio of 1.2, meaning that the average firm has the financial resources to remain solvent in the short term. Thus, showing no signs of short-term liquidity issues for these companies. When it comes to leverage, the average total debt to total assets ratio is 0.354, showing that 35.4% of the average firm is owned by creditors, while 64.6% is owned by its shareholders.

Looking into corporate governance measures, we can conclude that the average company has a board of directors constituted of 9 members where 15.4% are expected to be independent directors, which yields an average of 1 independent director in a board of 9 directors. Lastly, from this sample, we can conclude that 22.1% of the companies in the sample present a family CEO. Considering that only the firms considered to be family firms can have a family CEO, there are around 9 companies where this measure is observed.

6.1.2. Correlation Matrix

Correlation Matrix

		ROA	Tobin's Q	CR	TDTA	LTA	LA	Board	IndD	FB	CEO
ROA	Pearson's r	—									
	p-value	—									
Tobin's Q	Pearson's r	0.042	—								
	p-value	0.391	—								
CR	Pearson's r	-0.170	-0.076	—							
	p-value	< .001	0.115	—							
TDTA	Pearson's r	-0.025	0.244	-0.458	—						
	p-value	0.609	< .001	< .001	—						
LTA	Pearson's r	0.059	0.269	-0.144	0.014	—					
	p-value	0.225	< .001	0.003	0.773	—					
LA	Pearson's r	0.142	0.105	0.071	-0.241	-0.055	—				
	p-value	0.003	0.029	0.141	< .001	0.252	—				
Board	Pearson's r	-0.019	0.237	-0.052	-0.089	0.617	-0.107	—			
	p-value	0.692	< .001	0.287	0.067	< .001	0.027	—			
IndD	Pearson's r	-0.080	0.050	-0.111	-0.095	0.435	-0.048	0.396	—		
	p-value	0.099	0.304	0.021	0.050	< .001	0.317	< .001	—		
FB	Pearson's r	0.133	-0.018	0.145	-0.258	0.162	0.430	0.081	-0.009	—	
	p-value	0.006	0.703	0.003	< .001	< .001	< .001	0.095	0.857	—	
CEO	Pearson's r	0.077	0.062	0.069	-0.172	0.093	0.380	-0.092	0.075	0.607	—
	p-value	0.110	0.201	0.152	< .001	0.055	< .001	0.057	0.119	< .001	—

Table 2- Correlation Matrix of Total Sample Model

Table 2 above presents the Pearson's Correlation Coefficient (R) matrix, measuring the linear correlation between the 10 variables included in the model. The p-values presented will help us to assess whether the correlations are statistically significant or not. For the analysis of the p-value, we will consider a conventional significance level of 5%.

Table 2 shows that family business and accounting performance (measured by ROA) are positively correlated and statistically insignificant and that board size and the market performance measure (Tobin's Q) are positively correlated and statistically significant.

When looking at the control variables, the current ratio is negatively correlated and significantly associated with ROA, and Ln (age) is positively correlated and significantly

associated with ROA. Considering Tobin's Q, we see a positive and significant correlation with total debt/total assets, Ln (total assets), and Ln (age).

It is important to conclude that these identified correlations between the independent variables of the model and the dependent variables are all below or equal to 0.269, which is generally considered a low correlation and is not expected to have an impact on our model and conclusions.

6.1.3. <u>Linear Regression with ROA</u>

Model Fit Measures

			Overall Model Test			
Model	R	R²	F	df1	df2	p
1	0.294	0.0866	4.98	8	420	< .001

Table 3.- Linear Regression Model fit measures for ROA Total Sample Model

As previously mentioned, in order to study the relationship between the dependent variable, return on assets (ROA), and the various explanatory variables of our model a regression analysis was conducted.

Table 3 depicts the fit of the regression as well as if this model explains and fits the dataset. In this case, the correlation coefficient, R, is 0.294, meaning that there is fairly a linear relationship between the dependent and the explanatory variables. Nevertheless, the coefficient of determination, R-squared, reveals that only 8.66% of the variation of the return on assets is explained by family business, family CEO, the board size, the percentage of independent directors, and the natural logarithm of company's age, the natural logarithm of size, leverage, and liquidity. The overall significance of the model can be examined by looking at the p-value. In this particular study, this value is below 0.001. Thus, considering a significance level of 0.05 the p-value turns out to be smaller meaning that there is sufficient statistical evidence to conclude that the explanatory variables, in fact, contribute to the overall fit of the model and consequently explain the variation in the dependent variable, ROA.

Model Coefficients - ROA

Predictor	Estimate	SE	t	p
Intercept [a]	-0.01907	0.08130	-0.235	0.815
CR	-0.04282	0.00952	-4.500	< .001
TDTA	-0.09705	0.04865	-1.995	0.047
LTA	0.01088	0.00623	1.745	0.082
LA	0.02407	0.01400	1.719	0.086
FB:				
0 – 1	-0.03976	0.02528	-1.573	0.116
Board	-0.00257	0.00283	-0.909	0.364
IndD	-0.13209	0.05283	-2.500	0.013
CEO:				
0 – 1	0.01263	0.02902	0.435	0.664

[a] Represents reference level

Table 4- Linear Regression Model Coefficients for ROA Total Sample Model

Furthermore, table 4 depicts the different estimated coefficients regarding each explanatory variable.

Assuming everything else constant, each coefficient presented in the table above is interpreted as the result, on average, provoked in the dependent variable, return on assets, due to a unitary increase that given explanatory variable. Thus, the return on assets is expected to increase when the company has a higher natural logarithm of assets (LTA), has a higher natural logarithm of age (LA), and when the CEO is a family member (CEO). For instance, if the company's CEO is a family member, the return on assets is expected to be approximately 0.013 units higher than if the CEO was not a family member. On contrary, the dependent variable is expected to decrease when the firm presents a higher total debt to total assets ratio (TDTA), the current ratio increases, if it is a family-run business, the company has a larger number of board members and a higher percentage of independent directors compared to the directors on the board. Therefore, according to the model, these five variables will negatively impact the return on assets of the firm.

Nevertheless, it is important to take into account whether all these explanatory variables are significant in the model and indeed impact the dependent variable. To do so,

analysing the p-value is once again crucial. Considering a significance level of 0.05, only the total debt to total assets ratio, current ratio and the percentage of independent directors compared to the directors are significant since all these values are below the common significance value of 0.05.

6.1.3.1. *Hypothesis 1 - Family Businesses vs Non-Family Businesses:*

As depicted in table 4, the coefficient regarding the family business dummy variable is negative, meaning that the return on assets is expected to be approximately 0.04 units lower if the company runs a family business. However, this explanatory variable is only statistically significant if a significance level of 0.12 is considered. Thus, this result is not consistent with the previous predictions as this explanatory variable was thought to influence the company's performance, hence a higher return on assets.

6.1.3.2. *Hypothesis 2 - Family CEO's impact on company performance:*

Despite the coefficient of this dummy variable, family CEO, being positive this is not statistically significant. Consequently, notwithstanding the seem that could eventually contribute positively to the company's performance, there is no sufficient statistical evidence to prove it.

6.1.3.3. *Hypothesis 3 – Board size impact on company performance:*

Table 4 portrays a negative value of approximately 0.003 with regards to the variable regarding board size. Nevertheless, following the previous train of thought this variable is not statistically significant. Thus, there is not sufficient statistical evidence to confirm this hypothesis.

6.1.3.4. *Hypothesis 4 – Board's independence impact on company performance:*

The last table shows a negative coefficient value regarding the percentage of independent directors compared to the directors on a firm's board explanatory variable. Thus, the return on assets is expected to decrease, on average, by approximately 0.003 units due to a unitary percentual increase of the explanatory variable. This latter variable is statistically significant since its p-value is lower than any significance level above 0.013.

This result goes against what was previously expected as it was predicted that having a higher percentage of independent board members would positively contributes to the firm's performance and its return on assets.

6.1.4. Linear Regression with Tobin's Q

Model Fit Measures

			Overall Model Test			
Model	R	R²	F	df1	df2	p
1	0.467	0.218	14.6	8	420	< .001

Table 5- Linear Regression Model Fit Measures for Tobin's Q Total Sample Model

In order to study the relationship between the companies' Tobin's Q and the independent variables of our model a regression analysis was conducted.

From the results from table 5, we can verify that the correlation coefficient, R, is 0.467, meaning that there is a considerable linear relationship between the dependent and the independent variables. The coefficient of determination, R-squared, is 0.218, meaning that the proposed model explains 21.8% of the company's Tobin's Q. Since the p-value is lower than any common level of significance, the model is considered to be significant. Therefore, we conclude that the independent variables contribute, in fact, to the overall fit of the model and it consequently explains the variation in the dependent variable, Tobin's Q.

Model Coefficients - Tobin's Q

Predictor	Estimate	SE	t	p
Intercept [a]	-0.3443	0.15162	-2.27	0.024
CR	0.0392	0.01775	2.21	0.028
TDTA	0.5925	0.09072	6.53	< .001
LTA	0.0399	0.01162	3.44	< .001
LA	0.1243	0.02611	4.76	< .001
FB:				
0 – 1	0.1530	0.04714	3.25	0.001
Board	0.0216	0.00527	4.10	< .001
IndD	-0.1763	0.09852	-1.79	0.074
CEO:				
0 – 1	-0.1412	0.05413	-2.61	0.009

[a] Represents reference level

Table 6- Linear Regression Model Coefficients from Tobin's Q Total Sample Model

Even though the model is significant, considering an alpha of 0.05, not all variables are, as can be assessed by looking at table 6. This table depicts the different estimated coefficients regarding each independent variable.

In this scenario, for a variable to be significant it must have a p-value lower than 0,05. The variables that have shown to be significant, thus having an impact on Tobin's Q results, are the current ratio, total debt to total assets, the natural logarithm of the company's total assets, the natural logarithm of the company's age, the family business dummy variable, Board size and the family CEO dummy variable, as it can be seen in table 6. The only variable that is shown to not be significant is the percentage of independent directors, however, if considered an alpha of 10%, this would be significant as well.

Assuming everything else constant, each coefficient presented in table 6 is interpreted as the result, on average, provoked in the dependent variable, Tobin's Q, due to a unitary increase that given explanatory variable.

6.1.4.1.   *Hypothesis 1 - Family Businesses vs Non-Family Businesses:*

Looking at the coefficient of the family business dummy variable, we can verify that Tobin's Q is expected to be approximately 0.15 units higher if the business is considered a family business rather than if not.

This result is consistent with our expectations, as we predicted that this variable would have a positive effect on the company's performance, and the statistical evidence has shown that our belief is verified. Therefore, we conclude that family businesses do, in fact, have a higher performance, when measured by Tobin's Q, than non-family businesses.

6.1.4.2.   *Hypothesis 2 - Family CEO's impact on company performance:*

Looking at the coefficient of the family CEO dummy variable, we can verify that Tobin's Q is expected to be approximately 0.14 units lower if the CEO is a family member rather than if the CEO is not a family member.

This result is consistent with our expectations, as we predicted that this variable would cause either a positive or negative impact on the company's performance. In accordance with these results, the disadvantages of having a family CEO in a Portuguese company offset the potential benefits that could arise.

Statistical evidence has shown that our belief is verified, therefore, we conclude that having a family CEO does, in fact, have an effect on the company's performance, when measured by Tobin's Q.

6.1.4.3.   *Hypothesis 3 – Board size impact on company performance:*

Looking at the coefficient of the board size, we can verify that Tobin's Q is expected to increase by approximately 0.02 units when adding a new member to the board. It is important to refer that this has some limitations, given that there will eventually be an optimal

point where adding new board members would not create incremental value. (Beiner, et al. 2004).

This result is consistent with our expectations, as we predicted that this variable would have an impact on the company's performance, and the statistical evidence has shown that our belief is verified. Therefore, we conclude that board size does, in fact, have an impact on the company's performance, measured by Tobin's Q.

6.1.4.4. *Hypothesis 4 – Board's independence impact on company performance:*

This variable, as mentioned above, is only considered to be significant when considering a significance level of 0.10, given that it has a p-value lower than 0.1. However, since we are considering a significance level of 0.05, this variable has shown not to be statistically significant for this model.

This result is not consistent with our expectations, as we predicted that this variable would have a positive influence on the company's performance and there is no statistical evidence that proves this. Therefore, we cannot conclude if board independence does or not, in fact, have a positive effect on the company's performance, measured by Tobin's Q.

6.1.5. **Summary**

After the conducted analysis, there is only sufficient statistical evidence that confirms that having independent directors on a company's board does have an impact on its performance (H4) when measured considering the dependent variable return on assets. However, this result is not in accordance with what was previously predicted as it was believed to positively influence a firm's performance. However, ROA ends up decreasing per each unitary percentual increase of that explanatory variable. Additionally, nothing can be concluded regarding the other three tested hypotheses as these independent variables were

proved to be statistically insignificant. Moreover, when measuring performance using Tobin's Q indicator, the opposite is verified. There is sufficient statistical evidence that proves that this latter dependent variable is impacted positively by whether it is a family business (H1) and the higher the board size is (H3) and negatively when the CEO is a family member (H2). However, the same cannot be argued when it comes to the presence of independent board members, as the independent variable was proved to not be statistically significant.

INDIVUDAL CONTRIBUTION OF FILIPA NUNES

6.2. Family Business Sample

In this chapter, we will conduct a multiple linear regression using the family firm sub-sample. The division of the total sample into family and non-family firms was done to better explore the specificities of each kind of firm. The main objective is to understand if the proposed hypotheses have different statistical results in the two sub-samples.

As such, this chapter will be split into four parts, namely descriptive statistics, correlation matrix, linear regression to study the effect on the first dependent variable, return on assets, and lastly a linear regression to investigate the impact on the latter dependent variable, Tobin's Q.

6.2.1. <u>Summary</u>

After the conducted analysis, there is no sufficient statistical evidence that confirms any of the proposed hypotheses of this paper measured considering the dependent variable return on assets in the sub-sample of family firms. This is due to the statistical insignificance of the explanatory variables, not allowing for any conclusions to be drawn from the data.

However, when measuring performance using Tobin's Q indicator, there is sufficient statistical evidence that proves that this latter dependent variable is impacted positively by the board size (H3). Nonetheless, the same cannot be argued when it comes to the presence of a family CEO and independent board members, as the variables are statistically insignificant.

6.3. Comparison Between Family Firms Results and Total Sample Results

Within this subtopic, we will analyse and compare the results derived from the family firm sub-sample, with the previously presented results of the total sample. It is relevant to remember that the family firm sample is a sub-sample from the total sample, meaning that data included in this sub-sample is also present in the total sample. Our main goal is to assess the differences between the results of the average Portuguese family firm and the average Portuguese firm.

6.3.1. Summary

When considering the Linear regressions with ROA, the model is a better fit for the average Portuguese Family Firm than for the average Portuguese Firm. Nevertheless, both models are significant in explaining the relationship between the ROA and the independent variables. When testing the proposed hypotheses, it can be verified that the percentage of independent members in the company's board has shown to be statistically significant for the total sample model, but not for family firms.

When considering the Linear regressions with Tobin's Q, once again the results show a stronger linear relation between the independent and the dependent variables in the case of Family firms, when compared to non-family firms. Nevertheless, both models are significant. When testing the proposed hypotheses, it can be verified that the presence of a Family CEO has shown to be statistically significant for the total sample model, but not for family firms. Additionally, it is important to highlight that the Board size has an impact on Tobin's Q in both samples considered.

INDIVUDAL CONTRIBUTION OF JOANA SILVA

6.4. Non-Family Business Sample

In this chapter, a multiple linear regression was conducted using the non-family business sub-sample. As such, this will be split into four parts, namely descriptive statistics and correlation matrix, linear regression to study the influence on the first dependent variable, return on assets, and lastly a linear regression to investigate the impact on the latter dependent variable, Tobin's Q.

6.4.1. <u>Summary</u>

After the conducted analysis, there is only sufficient statistical evidence that confirms that board size does have an impact on its performance (H3) when using Tobin's Q as the dependent variable, which is in accordance with what was predicted. Particularly, the results have shown that an increase in board size leads to an increase in performance, keeping in mind the limitations that are inherent to it. Nevertheless, nothing can be concluded regarding the other hypotheses, as their corresponding independent variables were proved to be statistically insignificant (H4), or they could not be tested in this sample (H1 and H2). Moreover, when measuring performance using the ROA indicator, nothing can be concluded, as there is no statistical evidence that allows us to conclude anything regarding the proposed hypothesis.

6.5. Comparison Between Non-Family Firm's Results and Family Firm's/Total Sample Results

In this subtopic, we will be comparing the data and the results that derive from the non-family firm sub-sample with the previously calculated results, namely the family firm results, and the total sample results. The objective is to assess the differences in how these models' measures impact performance.

6.5.1. <u>Summary</u>

<u>Non-family firm sample vs Family firm sample:</u>

When considering the Linear regressions with ROA, the model is a better fit for the average family firm than for the average non-family firms. Nevertheless, both models are still statistically significant. When testing the proposed hypotheses, it can be verified that there are no significant differences between these samples, as none of the explanatory variables are statistically significant in any of these models.

When considering the Linear regressions with Tobin's Q, the model is a better fit for the average non-family firm than for the average family firm. Nevertheless, both models are still statistically significant. When testing the proposed hypothesis, both samples display the same results, as there is a positive correlation between board size and the firm's performance for both samples, and no conclusions can be drawn regarding the board's independence effect on firm performance

<u>Non-family firm sample vs Total Sample:</u>

When considering the Linear regressions with ROA, the model is a better fit for the average non-family firm than for the average family firm. Nevertheless, both models are still statistically significant. When testing the proposed hypothesis non-family business sub-sample does not provide sufficient statistical evidence for any of the proposed hypothesis, whereas the total sample indicates that having a higher percentage of independent members on a board of directors has a slightly harmful effect on the company's performance.

When considering the Linear regressions with Tobin's Q, the model is still a better fit for the average non-family firm than for the average family firm. Nevertheless, both models are still statistically significant. When testing the proposed hypothesis, both samples display the same results, as there is a positive correlation between board size and the firm's performance for both samples, and no conclusions can be drawn regarding the board's independence effect

on firm performance.

<div style="text-align:center">**GROUP CONTRIBUTION**</div>

7. Multivariable Fractional Polynomial Model

After the development of the linear models, the level of significance of some of those models and some of the variables therein, it was decided to further the research and develop other models that could better describe the reality of our sample and variables. For this purpose, we developed a multivariate fractional polynomial model with the same dependent variables as before ROA and Tobin's Q. This type of statistical model allows us to investigate more flexible parameterization offering a variety of curve shapes where data may fit in (Royston and Sauerbrei 2008). Furthermore, the model was developed using the statistical software Stata using the regression command "regress".

7.1. Total Sample

7.1.1. ROA

Source	SS	df	MS			
				Number of obs	=	429
				F(10, 418)	=	22.56
Model	5.7501898	10	.57501898	Prob > F	=	0.0000
Residual	10.6559791	418	.025492773	R-squared	=	0.3505
				Adj R-squared	=	0.3350
Total	16.4061689	428	.03833217	Root MSE	=	.15966

Table 7- Multivariable Fractional Polynomial ROA Total Sample Model Fit

ROA	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
ICR__1	.3611326	.0717712	5.03	0.000	.2200553	.50221
ICR__2	-.139068	.0283237	-4.91	0.000	-.1947426	-.0833933
ITDTA__1	.0000103	8.68e-07	11.82	0.000	8.55e-06	.000012
ITDTA__2	-.0143323	.001231	-11.64	0.000	-.0167521	-.0119126
ILTA__1	.001455	.0055048	0.26	0.792	-.0093654	.0122755
ILA__1	.016014	.0117844	1.36	0.175	-.0071501	.039178
FB	.0636223	.0221282	2.88	0.004	.0201259	.1071186
CEO	-.061786	.025832	-2.39	0.017	-.1125629	-.0110091
IBoar__1	-.0037835	.002469	-1.53	0.126	-.0086367	.0010696
IIndD__1	.04177	.0459448	0.91	0.364	-.0485417	.1320817
_cons	.0330695	.0123721	2.67	0.008	.0087503	.0573888

Deviance = -367.850.

Table 8-Model Coefficients for the Multivariable Fractional Polynomial ROA Total Sample Model

The previous table 20 depicts the relationship between the different explanatory variables and the dependent variable, return on assets, through a multivariable fractional polynomial model. The R-squared, the coefficient of determination, reveals that 35.05% of the variation of the return on assets can be indeed dependent on family ownership, family CEO, the board size, the presence of independent directors, and the natural logarithm of the company's age, the natural logarithm of size, leverage, and liquidity. This value happens to be significantly higher than the 8.66% verified when a multiple linear regression was conducted. Thus, we may argue that the overall fit of the model is better. Moreover, the model's p-value is lower than any common significance level and thus, the overall significance of the model is verified. Therefore, there is sufficient statistical evidence that the independent variables contribute to explain the variation in the company's return on assets.

Furthermore, it is crucial to test the statistical significance of each of the estimated coefficients of the explanatory variables as some of them may not be statistically significant in order to impact the dependent variable. Hence, considering a significance level of 0.05 and assuming everything else constant, we can conclude that the current ratio, squared current ratio, total debt to total assets, squared total debt to total assets, if the company runs a family business and if the CEO is a family member are all statistically significant and contribute to the model's overall fit. Nevertheless, the Ln (total assets), the Ln (age), the number of board members, and the percentage of independent directors compared to the number of directors of the firm depict a p-value higher than 0.05 and thus are not statistically significant.

When testing the four hypotheses of this model, it turns out that hypotheses 1, 2, and 4 display different results.

Looking at table 21, the coefficient regarding the family business dummy variable is positive meaning that the return on assets is expected to increase by approximately 0.06 units if the company runs a family business. As previously discussed, this independent variable

turns out to be statistically significant as its p-value is lower than the established significance level of 0.05. This result is consistent with the previous predictions as there is sufficient statistical evidence that this explanatory variable positively influences the company's performance (H1). Moreover, the coefficient of the dummy variable respective to family CEO (H2) is negative and statistically significant as its p-value is lower than 0.05. Thus, it is also expected that the return on assets decreases by approximately 0.06 units when the CEO is a family member. Lastly, table 21 presents a positive value regarding the coefficient of the percentage of independent directors compared to the directors on a firm's board explanatory variable (H4). However, this variable is not statistically significant since its p-value is higher than any common significance level. Contrary to what was previously depicted when linear regression was conducted, this result goes against what was previously expected, as there is no sufficient statistical evidence that the percentage of independent board members would impact a company's performance.

7.1.2. Tobin's Q

Source	SS	df	MS			
				Number of obs	=	429
				$F(13, 415)$	=	24.05
Model	28.6265006	13	2.20203851	Prob > F	=	0.0000
Residual	38.0047812	415	.091577786	R-squared	=	0.4296
				Adj R-squared	=	0.4118
Total	66.6312819	428	.155680565	Root MSE	=	.30262

Table 9- Multivariable Fractional Polynomial Tobin's Q Total Sample Model Fit

TobinsQ	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
ICR__1	.0838484	.015483	5.42	0.000	.0534135	.1142834
ICR__2	-.0418574	.008154	-5.13	0.000	-.0578857	-.0258291
ITDTA__1	1.34e-13	5.02e-14	2.67	0.008	3.52e-14	2.33e-13
ITDTA__2	.6742843	.0664546	10.15	0.000	.5436547	.804914
ILTA__1	-.0081189	.0018509	-4.39	0.000	-.0117573	-.0044805
ILTA__2	.1937604	.0689873	2.81	0.005	.0581524	.3293685
ILA__1	-.0446242	.0072358	-6.17	0.000	-.0588477	-.0304008
ILA__2	.0274575	.0040992	6.70	0.000	.0193998	.0355153
FB	-.0723172	.0421168	-1.72	0.087	-.1551061	.0104716
CEO	.0442366	.0474073	0.93	0.351	-.0489519	.1374251
IBoar__1	.0099581	.0050482	1.97	0.049	.0000347	.0198814
IIndD__1	.0048364	.0008878	5.45	0.000	.0030913	.0065815
IIndD__2	.0008045	.0001477	5.45	0.000	.0005142	.0010948
_cons	.7531113	.0362596	20.77	0.000	.681836	.8243867

Deviance = 177.663.

Table 10- Multivariable Fractional Polynomial Tobin's Q Total Sample Model Outputs

In order to analyse the relationship between the numerous independent variables and the dependent variable, Tobin's Q, a multivariable fractional polynomial model was used.

As Table 22, the coefficient of determination, R-squared, reveals that 42.96% of the variation of Tobin's Q indicator can be explained by family ownership, family CEO, the board size, the presence of independent directors, and the natural logarithm of the company's age, the natural logarithm of size, leverage, and liquidity. To assess the statistical significance of the overall model it is crucial to look at the p-value. Thus, taking into consideration a significance level of 0.05 it can be argued that the overall significance of the model is verified since the p-value is lower than that value.

Furthermore, it can be also contended that the overall fit of the model is better than a multiple linear regression since the latter's coefficient of determination was found to be 21.8%, so considerably lower.

Moreover, assuming everything else constant, the coefficients of each of the explanatory variables may or may not be statistically significant. To analyse that it is important to look at each one's p-value. Henceforward, considering a common significance level of 0.05, all the independent variables presented in table 23 are statistically significant except for the family business dummy and the dummy variable regarding the CEO being a family member as its p-value appears to be higher than the established threshold level of significance of 0.05.

Nevertheless, when studying the different hypotheses, hypotheses 1, 2, and 4 turn display different results to what was previously discussed in the case of a multiple linear regression.

Table 23 depicts that despite the coefficients regarding the dummy variables of family business and family CEO being negative and positive, respectively, these are not statistically significant. Consequently, notwithstanding the seem that could eventually impact the company's performance, there is no sufficient statistical evidence to prove it. Likewise, both

the linear and the squared coefficients with regards to the proportion of the presence of independent board members are positive and statistically significant. This result is according to what was previously expected. Accordingly, there is sufficient statistical evidence that shows beyond doubt that the presence of independent members influences positively the firm's Tobin's Q and as such its performance.

7.2. Family Business Sample

7.2.1. ROA

Source	SS	df	MS			
				Number of obs	=	187
				F(8, 178)	=	10.07
Model	.134020297	8	.016752537	Prob > F	=	0.0000
Residual	.296178718	178	.001663925	R-squared	=	0.3115
				Adj R-squared	=	0.2806
Total	.430199015	186	.002312898	Root MSE	=	.04079

Table 11- Multivariable Fractional Polynomial ROA Family Business Model Fit

ROA	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
ICR__1	-.0072344	.0056237	-1.29	0.200	-.0183322	.0038634
ICR__2	-.0078463	.0019944	-3.93	0.000	-.0117821	-.0039106
ITDTA__1	-.1177054	.0259596	-4.53	0.000	-.1689336	-.0664773
ILTA__1	-.0013489	.0026759	-0.50	0.615	-.0066295	.0039317
ILA__1	.0166728	.0067183	2.48	0.014	.003415	.0299307
CEO	-.0217963	.0074269	-2.93	0.004	-.0364525	-.0071402
IBoar__1	-.000883	.0010223	-0.86	0.389	-.0029003	.0011344
IIndD__1	.00097	.021282	0.05	0.964	-.0410276	.0429675
_cons	.0457329	.0054252	8.43	0.000	.035027	.0564389

Deviance = -675.074.

Table 12- Model Coefficients for the Multivariable Fractional Polynomial ROA Family Business Model

The output of the multivariable fractional polynomial model using ROA as a dependent variable and the sub-sample of family firms is shown in Table 24 and 25 above.

The coefficient of determination, or R-squared, shows that 31,1% of the variation of the dependent variable (ROA) is accounted for in the model, with both the explanatory variables and control variables that have been used in this study. These results acknowledge our suspicions that a non-linear model would be able to better predict the behaviour of the

dependent variable. The corresponding linear regression model, also focused on the sub-sample of family firms, presented an R-squared of 22%. Overall, we can argue for a better overall fit of the multivariate fractional polynomial model to the reality of our data.

When comparing to the linear regression model using the same sub-sample and dependent variable, we see maintenance in the explanatory variables that are significant at the significance level of 0.05. Expect for the CEO dummy variable, which is now statistically significant, pointing to a non-linear connection of this variable to the return on assets.

Another key point to consider is that the variable current ratio appears in the model in its squared form. This variable is extending our previous linear model and is considering extra predictors than the original. Considering that it is statistically significant at a significance level of 0.05, we can expect that the relationship between ROA and the current ratio is curvilinear.

When analysing the different proposed hypotheses of this paper, only hypothesis 2 leads to a different result when compared with the linear regression model. Due to the variable family CEO now being statistically significant, we can now say there is a negative relationship between having a family CEO and performance measured by ROA, namely a decrease of 0.02 units in the return on assets.

7.2.2. Tobin's Q:

Source	SS	df	MS			
				Number of obs	=	187
				F(9, 177)	=	26.25
Model	17.6576939	9	1.96196599	Prob > F	=	0.0000
Residual	13.2286456	177	.074738111	R-squared	=	0.5717
				Adj R-squared	=	0.5499
Total	30.8863394	186	.166055588	Root MSE	=	.27338

Table 13-Multivariable Fractional Polynomial Tobin's Q Family Business Model Fit

TobinsQ	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
ICR__1	.0364445	.0258882	1.41	0.161	-.0146449	.0875338
ITDTA__1	.0861897	.1845581	0.47	0.641	-.2780278	.4504072
ILTA__1	43.31076	5.77663	7.50	0.000	31.91083	54.71069
ILTA__2	-42.4357	6.296682	-6.74	0.000	-54.86193	-30.00946
ILA__1	-.0714155	.0151387	-4.72	0.000	-.101291	-.0415399
ILA__2	.0425468	.008318	5.12	0.000	.0261316	.058962
CEO	-.0851859	.0442416	-1.93	0.056	-.1724948	.002123
IBoar__1	-.1438104	.036419	-3.95	0.000	-.2156817	-.0719391
IIndD__1	-.2357123	.1391449	-1.69	0.092	-.5103088	.0388843
_cons	.6724154	.0360825	18.64	0.000	.6012082	.7436226

Deviance = 35.372.

Table 14- Model Coefficients for the Multivariable Fractional Polynomial Tobin's Q Family Business Model

The output of the multivariable fractional polynomial model using Tobin's Q as a dependent variable and the sub-sample of family firms is shown in table 26 and 27 above.

The coefficient of determination, or R-squared, shows that 57,2% of the variation of the dependent variable (Tobin's Q) is accounted for in the model, with both the explanatory variables and control variables that have been used in this study. These results acknowledge our suspicions that a non-linear model would be able to better predict the behaviour of the dependent variable. The corresponding linear regression model, also focused on the sub-sample of family firms, presented an R-squared of 32%. Overall, we can argue for a better overall fit of the multivariate fractional polynomial model to the reality of our data.

When comparing to the linear regression model using the same sub-sample and dependent variable, we see maintenance in most explanatory variables that are significant at the significance level of 0.05. The variable current ratio was significant in the linear regression model, but in the present model no longer is. On the other hand, Ln (total assets) which is used as a proxy for firm size was not significant in the linear regression and now appears to have a significant impact on Tobin's Q.

Another key point to consider is that both variables Ln (total assets) and Ln (age) appear in the model in their squared form. These variables are extending our previous linear model and consider extra predictors than the original. Considering that all of these are

statistically significant at a significance level of 0.05, we can expect that the relationship between Tobin's Q and Ln (total assets) or Ln (age) is curvilinear.

Our consideration towards the proposed hypotheses of the paper is maintained when comparing with the results of the equivalent linear regression model, where only hypothesis 3 regarding the influence of board size on performance was verified.

7.3. Non-Family Business Sample

7.3.1. ROA:

Source	SS	df	MS		
Model	9.04543778	9	1.00504864		
Residual	6.64172974	232	.028628145		
Total	15.6871675	241	.065091981		

Number of obs	=	242
F(9, 232)	=	35.11
Prob > F	=	0.0000
R-squared	=	0.5766
Adj R-squared	=	0.5602
Root MSE	=	.1692

Table 15- Multivariable Fractional Polynomial ROA Non-Family Business Model Fit

ROA	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
ICR__1	1.384408	.1383805	10.00	0.000	1.111765	1.657051
ICR__2	-.6646456	.0600701	-11.06	0.000	-.7829982	-.546293
ITDTA__1	-.0008159	.000088	-9.28	0.000	-.0009892	-.0006426
ITDTA__2	-.0000768	7.96e-06	-9.65	0.000	-.0000925	-.0000611
ILTA__1	.0256681	.0084893	3.02	0.003	.008942	.0423941
ILTA__2	.0126103	.0038259	3.30	0.001	.0050724	.0201483
ILA__1	.0075029	.0157019	0.48	0.633	-.0234336	.0384394
IBoar__1	.0010831	.0030466	0.36	0.723	-.0049194	.0070856
IIndD__1	.028339	.0612247	0.46	0.644	-.0922884	.1489664
_cons	.0568634	.013852	4.11	0.000	.0295716	.0841552

Deviance = -183.361.

Table 16- Model Coefficients for the Multivariable Fractional Polynomial ROA Non-Family Business Model.

On table 28 and table 29, the outputs of the multivariable fractional polynomial model using ROA as a dependent variable and the sub-sample of non-family firms may be verified

The coefficient of determination, or R-squared, shows that 57.6% of the variation of the dependent variable (ROA) is accounted for in the model, with both the explanatory variables and control variables that have been used in this study. These results also reinforce our suspicion that a non-linear model is able to better predict the behaviour of the dependent variable, as this R-squared is bigger than the correspondent linear regression's R-squared.

Thus, it can be argued that this multivariate fractional polynomial model is a better fit for the data of this study.

When comparing to the linear regression model using the same sub-sample and dependent variable, we see a slight difference in the independent variables that are significant at the significance level of 0.05. The firm's total asset value variable is now statistically significant, pointing to a non-linear connection of this variable to the return on assets. On the other hand, the firm's age is no longer statistically significant.

Another important point to consider is that the variable current ratio, the total debt to total assets, and the total asset's value appear in the model in its squared form. These variables are extending our previous linear model and are considering extra predictors than the original. Considering that they are statistically significant at a significance level of 0.05, we can expect that their relationship with the ROA is curvilinear.

When analysing the different proposed hypotheses of this paper, the conclusions that derive from the correspondent linear regression model are also verified in this case.

7.3.2. Tobin's Q:

Source	SS	df	MS			
				Number of obs	=	242
				F(9, 232)	=	28.47
Model	18.7485595	9	2.08317328	Prob > F	=	0.0000
Residual	16.9737893	232	.073162885	R-squared	=	0.5248
				Adj R-squared	=	0.5064
Total	35.7223488	241	.148225514	Root MSE	=	.27049

Table 17-Multivariable Fractional Polynomial Tobin's Q Non-Family Business Model Fit

TobinsQ	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
ICR__1	.0913722	.0282407	3.24	0.001	.0357311	.1470132
ITDTA__1	-1.53e-10	4.85e-11	-3.15	0.002	-2.49e-10	-5.73e-11
ITDTA__2	.8876786	.0814797	10.89	0.000	.7271438	1.048213
ILTA__1	.0323583	.0111302	2.91	0.004	.0104291	.0542876
ILA__1	-.0328148	.0085287	-3.85	0.000	-.0496184	-.0160111
ILA__2	.0199754	.0049666	4.02	0.000	.0101901	.0297607
IBoar__1	-.0025576	.0060664	-0.42	0.674	-.01451	.0093947
IIndD__1	.0055687	.0008651	6.44	0.000	.0038643	.0072732
IIndD__2	.0009264	.0001439	6.44	0.000	.0006429	.0012099
_cons	.8641757	.0338011	25.57	0.000	.7975793	.9307722

Deviance = 43.708.

Table 18- Model Coefficients for the Multivariable Fractional Polynomial Tobin's Q Non-Family Business Model

The output of the multivariable fractional polynomial model using Tobin's Q as a dependent variable and the sub-sample of family firms is shown in table 30 and table 31.

The coefficient of determination, or R-squared, depicts that 52.5% % of the variation of the dependent variable (Tobin's Q) is accounted for in the model, with both the explanatory variables and control variables that have been used in this study. These results continue to reinforce the suspicion that a non-linear model is able to better predict the behaviour of the dependent variable, as this R-squared is bigger than the correspondent linear regression's R-squared. Thus, it can be argued that this multivariate fractional polynomial model is a better fit for the data of this study.

When comparing to the linear regression model using the same sub-sample and dependent variable, we see a difference in the independent variables that are significant at the significance level of 0.05. The current ratio, the Ln (age), and the percentage of independent directors are now statistically significant, pointing to a non-linear connection of these variables to Tobin's Q. Nevertheless, the number of board members is no longer statistically significant.

Another key point to consider is that the total debt to total assets ratio, the Ln (age), and the percentage of independent directors appear in the model in their squared form. These variables are extending our previous linear model and take into consideration extra predictors

than the original model. Considering that these are statistically significant at a significance level of 0.05, we can expect that the relationship between these variables and Tobin's Q is curvilinear.

When analysing the different proposed hypotheses of this paper, the conclusions that derive from the correspondent linear regression model differ from the ones that verify in this case. Hypothesis 3 is no longer confirmed when using the multivariable fractional polynomial model, as the board size variable is no longer statistically significant and therefore no conclusion can be drawn. However, hypothesis 4 is now verified, as it can be concluded that the percentage of independent directors has a positive impact on the non-family firm's performance.

8. Results and Discussion

8.1. Multiple linear regression vs Multivariable Fractional Model

Our analyses were derived from two different statistical models - multiple linear regression and a multivariable fractional model – to study the fourth previously mentioned hypotheses.

The latter model proved to be a better fit for the data as it presented higher values for the coefficients of correlations when testing for both dependent variables – return on assets and Tobin's Q. Likewise, it can be stated that a higher percentage of the variation of these two dependent variables is due to the independent variables in this second model. Accordingly, following this train of thought, this model is found to be more suitable given the data from the three samples – total, family business, and non-family business – since by adding some polynomial terms to the regression, it can also investigate the non-linear relationship between the two dependent variables and the numerous independent ones. Likewise, a wider range of

the function is fitted, having a better approximation of the relation between those two categories of variables.

Moreover, despite the dataset depicting a somewhat linear relationship, as it was stated when analyzing the correlation coefficients in the multiple linear regression model, using a multivariable fractional model enlarges the range set of data that can be covered and studied, minimizing some of the errors and residuals which are risen on the first model.

8.2. Performance: Return on Assets vs Tobin's Q

The return on assets and Tobin's Q were chosen to be tested separately, as two different endogenous variables, given their specific nature and what they can assess. Like it was previously mentioned in this paper, the return on assets reflects the book value of the company, whilst Tobin's Q reflects the market value and the perception the investors have of the company, as it is a measure to assess if the business is over- or undervalued.

Looking at the model fit measures for the linear regression model, we can verify that the coefficient of determination, the R-squared, is always bigger in Tobin's Q model than in the correspondent ROA model. This means that the proposed model better explains the variation of the firm's Tobin's Q rather than their return on assets.

The same happens for the case of the multivariable fractional polynomial models, except for the non-family business sub-sample, which means that in this case, the independent variables have a stronger non-linear relationship with return on assets rather than on Tobin's Q. However, this difference mainly derives from the control variables, rather than the explanatory ones, given that this model considers more predictors for the control variables than the Tobin's Q model.

As a consequence, we can also verify that more conclusions can be drawn regarding the 4 proposed hypotheses of this paper when we are considering Tobin's Q models, rather than the ROA models.

Thus, it can be stated that the corporate governance practices that reflect from the proposed model of this study – if a company is a family business, having a family CEO, board size, and board independence - have the most impact on the investor's perspective of the company, rather than on its book value. This is in accordance with the results of the study performed by (Durnev e Kim 2005), who state that firms with better governance practices display a higher valuation.

However, if we only take into consideration the multivariable fractional polynomial model, which has shown to be a better fit when compared to the linear regression model, we can verify that some of the proposed explanatory variables also have a significant effect on the return on assets. This means that even though there is not a significant linear relationship between the ROA and the explanatory variables of this model, there appears to be a non-linear one, namely regarding the family business dummy variable and the family CEO dummy variable. Therefore, it can be said that, according to this model, being a family-run business and having a family CEO has an impact on the accounting performance of the average company. On the other hand, independence and board size have an impact on the market performance of the average company.

Nevertheless, the total sample results for both models show us that family firms are linked with better performance. This finding is in accordance with the views of (Lee 2004), that state that the potential disadvantages associated with family control are offset by the benefits that are inherent to it.

9. Limitations and Future Research Recommendations

The principal limitation of this paper is the lack of comparability to previous results presented in the literature. This limitation arises from the difference in definitions of a Family Firm, which can lead to contrasting decisions in terms of ownership characterization. Another point that increases the difficulty in the comparison of results has to do with the variables used in the modelling, as different authors consider different variables relevant. However, it is important to remember that these limitations are present in the generality of papers in this stream of literature, as we pointed out in the literature review.

Another point worth mentioning is that analyses similar to the ones done in this paper should always have in mind the institutional and historical characteristics of the market. These considerations would improve the results of the analysis but endure the comparison of results across markets.

To improve the future of this line of research we would recommend, further focus on the establishment of a more universal definition of family business. Even if the definition has small specificities to account for the reality of each market, a generally agreed-upon definition would highly benefit this body of research.

10. Conclusion

Family firms still have a considerable presence in the Portuguese market. This study focuses on examining research models that link family ownership to company performance and corporate governance measures.

Results of the study vary depending on the type of regression, multiple linear regression, or multivariate fractional polynomial regression, and on the sub-sample of data used. Despite this, there are four main conclusions that can be drawn from the results and data.

Firstly, family ownership appears to have a positive linear relationship with Tobin's Q. This means that on average in the Portuguese market family firms have higher performance levels when measured from a market perspective. On the other hand, family ownership appears to have a positive non-linear relationship with ROA. This means that on average in the Portuguese market family firms have higher performance levels when measured from an accounting perspective.

Secondly, the models constructed in this analysis are generally more significant for Tobin's Q, our proxy for market performance measures. Thus, often the independent variables chosen to have a larger influence on the market performance measures can accounting measures. This could hint that investors and the market use variables such as those included to develop their expectations about a firm's performance.

Thirdly, there is evidence that corporate governance impacts performance in Portugal. Given all models and sub-samples, there is at least one corporate governance measure, board size or board independence, that is significant. Typically, these measures are more relevant in models regarding Tobin's Q, connecting corporate governance once again to the market expectations towards firms.

Lastly, the average Portuguese family firm is different from the average Portuguese non-family firm when it comes to the determinants of performance. After the separation of the sample into sub-samples, we were able to better predict the variations in performance, both in linear and non-linear models. Meaning that there is some noteworthy difference between the two groups of companies, and that data is coarser when analysed in these groups.

11. Bibliography

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