Board of Directors and Cost of Debt: The Moderating Effect of Ownership Structure – Evidence from European SMEs

Master Thesis

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Abstract

SMEs are known for paying a higher cost of debt than large firms. While SMEs are the backbone of the European economy, they experience difficulties in obtaining external debt financing. Based on the competitive environment in which they operate, their less diversified portfolio, and the existing information asymmetry, SMEs are considered to be risky. Consequently, to protect themselves against possible default risk, debtholders charge a high cost of debt. Empirical research has confirmed that corporate governance mechanisms of SMEs, such as board of directors and ownership structure, reduce the cost of debt. Therefore, the objective of this research is to examine the effect of board of directors on the cost of debt and the moderating effect of ownership structure on that relationship.

To test the hypotheses that board of directors reduce the cost of debt and ownership leads to an increase in the cost of debt, the Ordinary Least Squared (OLS) regression method is applied. With a sample of 2,576 European SMEs (8,742 observations) over the period 2013 to 2018, the results reveal that board size and board director ownership are negatively associated with the cost of debt but that board independence and board gender diversity are positively associated with the cost of debt. These results suggest that larger boards in SMEs and boards with higher director ownership contribute to lowering the cost of debt, while an increasing presence of independent directors and female directors on SMEs' boards leads to a higher cost of debt. Also, the moderating variable of concentrated ownership is positively associated to the cost of debt, while no significant relationship is found between the moderating variable of family ownership and cost of debt. The results imply that concentrated ownership in SMEs weakens the relationship between the board and cost of debt, while family ownership does not affect that relationship.

Keywords: *board of directors, ownership structure, cost of debt, SMEs*

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1. Introduction

1.1 Background information

Small- and medium-sized enterprises (SMEs) are the backbone of the European economy. They represent more than 90% of all firms and contribute to more than 60% to the total employment in Europe in 2018 (Statista, 2019). To ensure their survival and continue their potential business growth, they often depend on debt financing. Although SMEs are the engine of economic growth (Andrieu, Staglianò, & van der Zwan, 2018; Chen, Ding, & Wu, 2014), they experience difficulties in obtaining debt financing (Rahaman, 2011; Šeba, 2016). According to Serrasqueiro and Caetano (2015), the access to debt is relevant to SMEs because it stimulates business growth and development. This problem has also been recognized by the European Union where they provide financing programs to support SMEs with innovations and developments in member-countries of the European Union. Since debt financing plays an important role in the economies (Chen et al., 2014) and allows for optimal investment and firm growth (Rahaman, 2011), it is relevant to understand SMEs constrained access to debt financing as it reflects a higher cost of debt.

Previous researches have shown that large firms have lower cost of debt than SMEs. In comparison to SMEs, large firms differ in size and industry, affecting management incentives and decisions with regard to firm operations (Heyman, Deloof, & Ooghe, 2008; Scherr & Hulburt, 2001). Hence large firms have greater access to different external finances at a lower cost of debt. Van Caneghem and Van Campenhout (2012) argue that SMEs mostly operate in competitive markets, resulting in obtaining lower profit margins and causing a higher default risk (Fields, Fraser, & Subrahmanyam, 2012). Additionally, although SMEs have less diversified portfolio, their small size allows them to adapt to the changing environment, allowing them easily shift to riskier projects (Andrieu et al., 2018; Scherr & Hulburt, 2001). Accordingly, SMEs are considered risky firms by lenders. Moreover, a significant difference between large firms and SMEs and probably the most important is information asymmetry. Unlike large firms, European SMEs are not required to provide detailed firm and accounting information (Chen et al., 2014). Vander Bauwhede, De Meyere, and Van Cauwenberge (2015), therefore, claim that most SMEs have a low financial report quality, which makes it difficult for creditors to assess default risk. Due to these information asymmetries, creditors consider SMEs risky, which inhibit debt financing to SMEs (Pittman & Fortin, 2004). Therefore, in case SMEs are able to obtain debt financing, they have to pay higher cost of debt. In other words, because SMEs are considered risky, they are charged with higher cost of debt.

To assess the degree of default risk, debtholders mostly rely on financial reports to evaluate information about the firm (Ramly, 2013; Scherr & Hulburt, 2001). However, because debtholders do not have control over the use of provided funds (Amrah, Hashim, & Ariff, 2015; Hashim & Amrah, 2016), knowing that opportunistic managerial behavior could lead to pursuing personal interest and induce agency conflict, debtholders anticipate this behavior and enact towards its debt agreement with the firm. Consequently, demanding a higher cost of debt. Agency theory state that as agency conflict increases so does agency costs. In order to mitigate agency problems and agency costs, an effective corporate governance is needed. As Li, Dong, Liu, Huang, and Wang (2016) state, corporate governance has a direct effect on the cost of debt. Literature considers board of directors and ownership structure to be essential governance mechanisms as they are able to mitigate agency costs and information asymmetry. Especially since debtholders mainly rely on financial reports and assessment of default risk. Effective boards are able to reduce default risk by monitoring managerial behavior and provide credible financial reports, resulting in transparency and thereby reducing information asymmetry (Amrah et al., 2015; Lorca, Sánchez-Ballesta, & García-Meca, 2011; Ramly, 2013). Resulting into a lower cost of debt. Based on the argument that board of directors and

ownership structure are essential governance mechanism, this research investigates the effect of board of directors and moderating effect of ownership structure on the cost of debt.

Prior research has investigated governance mechanism on cost of debt. Many papers correspond with regard to the broad argument that the quality and effectiveness of corporate governance is associated with lower cost of debt (Fields et al., 2012; Lugo, 2019; Ramly, 2013). Debtholders highly value corporate governance practices and structures, such as board of directors and ownership structure, that protect their interest (Anderson, Mansi, & Reeb, 2003; Ramly, 2013). Besides the fact that boards monitor management in the interest of the shareholders, they also have other roles that contribute to firm value. Especially in SMEs, boards are more useful to provide access to external resources and efficiently use internal resources than merely monitor management. Thus, because boards control management, help making strategic decisions, and provide necessary resources, boards takeover debtholders' concern of default risk. Consequently, debtholders take into account their contribution when determining the cost of debt. Therefore, board characteristics and composition are important. Empirical evidence suggest that the size and independency of boards negatively affect the cost of debt (Anderson, Mansi, & Reeb, 2004; Fields et al., 2012; Li et al., 2016; Lorca et al., 2011). Furthermore, evidence also shows that ownership structure influence the cost of debt. Aslan and Kumar (2012) and Li et al. (2016) verify that concentrated shareholders have a significant negative effect on cost of debt, meaning that a higher level of concentration lowers the cost of debt. However, this also depends on the shareholders protection law of the country concerned. Moreover, there is an ongoing discussion on how ownership affects firm performance and cost of debt. While Aslan and Kumar (2012) and Ramly (2013) argue that family concentrated ownership has a positive effect on the cost of debt, Anderson et al. (2003) claim the opposite. Additionally, Amrah et al. (2015) and Hashim and Amrah (2016) both find that family controlled ownership has a positive moderating effect on the cost of debt.

1.2 Research objective and contribution

Although much research has been conducted on the effect of corporate governance and cost of debt, these researches either mainly focus on the mechanisms board of directors or ownership structure. To my knowledge, there is little research on how board of directors in combination with ownership structure affect the cost of debt (e.g., Amrah et al., 2015; Hashim & Amrah, 2016; Li et al., 2016, among others). However, these papers contain a sample of large listed firms. Besides, Amrah et al. (2015) and Hashim and Amrah (2016) merely focus on distinguishing family owned firms from non-family owned firms by using a dichotomous variable without considering the effect of the degree of concentration. Therefore, this research focusses on SMEs including various board characteristics and composition in combination with the degree of controlled ownership and the type of controlled ownership, such as family ownership. The purpose of this research is to explore the effect of board of directors on cost of debt and the moderating effect of ownership structure on the relationship between board of directors and cost of debt. This is the reason that the research question is: "What is the effect of board of directors on cost of debt in SMEs and the moderating effect of ownership structure on this relationship?".

This research contributes to the literature by extending previous studies on cost of debt in SMEs in various ways. First, this research considers European SMEs instead of large firms based in the U.S. or U.K. Since these types of firms contain less viable information due to the restricted accessibility, it is interesting to investigate these firms. Second, the results will enrich managers with additional information about how ownership structure and which board characteristics affect the cost of debt. Enabling board of directors to better mitigate agency costs. Third, the findings of this research will offer shareholders information on what their effect is on the firm's cost of debt. Which could result in better monitoring management decisions, with regard to the growth of the firm. Lastly, most

researches on ownership structure and cost of debt focus on a single aspect of ownership structure, while in this research the degree of controlled ownership and the type of owners are examined. Giving a broader explanation on the moderating effect of ownership structure on the relationship between board of directors and cost of debt.

1.3 Outline of the study

The remainder of the research is organized as followed. Section 2 contains the literature and hypotheses development. Section 3 discusses the methodology used in this research and the measurement of the variables. Section 4 mentions the selection criteria of the sample for this research. In section 5 the results are analyzed. And lastly, section 6 provides the conclusion, practical implications, and the limitations of the results.

2. Literature

2.1 Debt financing in SMEs

For SMEs to maintain potential growth and undertake investments there is a growing need for finance. As many researches have confirmed, debt financing is the most preferred financing instrument among SMEs. Both Krivogorsky, Grudnitski, and Dick (2011) and Šeba (2016) confirm that European SMEs mainly rely on debt financing rather than equity financing. This argument is based on the fact that equity is riskier than debt (Serrasqueiro & Caetano, 2015), therefore investors demand a higher risk premium for equity (Heyman et al., 2008). Meaning that the cost of finance through equity is higher than finance through debt. This corresponds the Pecking Order Theory. The Pecking Order Theory, brought by Myers (1984), argues that firms prefer internal finance. Whenever internal finance is exhausted and external finance is needed, firms first generate debt and as a last resort equity (Heyman et al., 2008; Ramalho & da Silva, 2009; Serrasqueiro & Caetano, 2015; Van Caneghem & Van Campenhout, 2012). Besides the fact that the cost of debt financing is lower than equity financing, SMEs realize several other advantages in gathering debt financing. The largest benefit is that debt financing can be used as a tax shield where, as opposed to dividend, the interest of debt financing is deductible (Heyman et al., 2008; Li et al., 2016; Šeba, 2016). This aligns with the Trade-Off Theory, in which it discusses that firms should enlarge debt finance to maximize their benefits of debt tax shields (Krivogorsky et al., 2011; Serrasqueiro & Caetano, 2015; Van Caneghem & Van Campenhout, 2012). Lastly, debt financing allows SMEs to maintain managerial and ownership control (Ang, 1992; Chen et al., 2014; Li et al., 2016). From the agency theory perspective, debt financing acts as corporate governance mechanism to mitigate agency problems between the principal and agency (Chen et al., 2014; Claessens & Yurtoglu, 2013), because free cash flow will be reduced and managers are no longer able to freely spend it at their own interests.

However, there are several reasons why SMEs have difficulties in obtaining debt financing. Compared to large firms, SMEs are often associated with higher default risk due to insufficient and volatile profits (Dasilas & Papasyriopoulos, 2015; Scherr & Hulburt, 2001), have fewer viable projects (Šeba, 2016), and are less diversified (Ramalho & da Silva, 2009; Van Caneghem & Van Campenhout, 2012). Furthermore, the older the firm becomes the more historical data is available on the firm's financial behavior, such as debt payment among others, allowing to better predict future behavior. On average, large firms are older than SMEs, so there is less likely to be historical data on SMEs financial behavior. In addition, because of age, SMEs are considered unexperienced and have no established reputation (Ang, 1992; Van Caneghem & Van Campenhout, 2012). Also, SMEs have more growth opportunities than large firms, however, debtholders consider growth opportunities to be risky because of potential financial loss. Because of growth opportunities and the associated costs, SMEs are less profitable than large firms, which increases bankruptcy costs and the probability of failing interest payment (Ramalho & da Silva, 2009). However, probably the most important difference between large firms and SMEs is information asymmetry. According to Andrieu et al. (2018), information asymmetry cannot be avoided, because lenders are less informed about the firm than the borrower itself. As SMEs are not obliged to publish detailed financial reports they are also not obliged to be audited (Chen et al., 2014; Van Caneghem & Van Campenhout, 2012). Therefore their financial statements are of low quality (Dasilas & Papasyriopoulos, 2015; Vander Bauwhede et al., 2015), and do not contain detailed financial analysis and information about their operations and prospects (Andrieu et al., 2018; Scherr & Hulburt, 2001). Consequently, available information is less liable and lenders are unable to verify this information. Lastly, large firms have more tangible assets than SMEs that can be used as collateral. With regard to information asymmetry, tangible assets' value are more easily to establish and they keep their value in case of bankruptcy (Ramalho & da Silva, 2009). It could

be concluded that all these differences imply that SMEs are considered risky firms by lenders, which results into a higher cost of debt (Lin, Ma, Malatesta, & Xuan, 2011).

2.2 Governance mechanism

In order to lower the cost of debt, SMEs need to mitigate information asymmetry. As proven by Chuluun, Prevost, and Puthenpurackal (2014), information asymmetry and cost of debt are significantly positively related. To mitigate information asymmetries, agency problems must be reduced. Many researchers have concluded that corporate governance mechanisms mitigate agency problems. According to Yeung and Lento (2018), an effective corporate governance system reduces agency conflicts, consequently reducing information asymmetry and thereby also lowering the cost of debt. The combination of governance mechanisms differs in each situation and thereby depend on the effectiveness of other mechanisms (Desender, Aguilera, Crespi, & García-Cestona, 2013; Hernández-Cánovas, Mínguez-Vera, & Sánchez-Vidal, 2016). However, effective corporate governance enables reducing default risk by enhancing monitoring of management behavior (Ramly, 2013), promoting managerial adequate decisions (Yeung & Lento, 2018), and, not to forget, protecting shareholders interest (Hashim & Amrah, 2016). This would positively influence credibility to the financial accounting reports, allowing transparency and alleviate information asymmetry, which also lowers the cost of debt (Bhojraj & Sengupta, 2003; Hashim & Amrah, 2016). Besides, effective governance mechanisms could also reduce the constrained access to debt finance.

Board of directors and ownership structures are the main governance mechanisms within an corporate that perform as control mechanism (Claessens & Yurtoglu, 2013; Feito-Ruiz & Renneboog, 2017). Both mechanisms have the instinctive and ability to monitor management. Depending on the supervision of the board of directors (Lipton & Lorsch, 1992), directors are able to limit management to pursue personal interests and misuse firm resources for personal benefit (Ramly, 2013). On the other hand, ownership structure has an important effect on reducing agency problems, especially in SMEs as they have more concentrated shareholders and managers that own shares in the company. Hashim and Amrah (2016) confirm that different levels of concentrated ownership and the different types of ownership affect the ability to monitor management and protect the interest of shareholders. Therefore, this research investigates the effect of board of director characteristics and composition, and the moderating effect of ownership structure, such as the degree of control and type of ownership, on the cost of debt.

2.3 Theories on board of directors

As there are significant differences between large firms and SMEs, this also applies to board of directors with regards to monitoring and resource provision. Therefore, it is interesting to know how board of directors are useful for SMEs according to different theories. Although, agency theory is by far the most investigated theory with regard to corporate governance and board of directors, especially in large public firms, resource dependence theory follows in research on board of directors. As these both theories dominate on the role of boards, there are also other existing theories that explain the role of boards. Therefore, besides agency theory and resource dependence theory, also the stewardship theory and resource-based view are applied to understand boards' role within SMEs.

2.3.1 Agency theory

In the literature of corporate governance agency problem is a common occurrence. Agency theory deals with agency problems that arise from conflicts of interest. These conflicts occurs when the managers' interests do not align with the interests of the owner(s) (Ang, Cole, & Lin, 2000; Claessens & Yurtoglu, 2013). This is also called principal-agent conflict, with the owner(s) being the principal and the managers the agent. Besides principal-agent conflict, there is also a principal-principal conflict that occurs between minority (small) and majority (large) shareholders (Douma, George, & Kabir, 2006).

According to Heyman et al. (2008), agency conflict also occur between debtholders and shareholders. The idea is that debtholders receive a part of the investment return for which they lend money, thereby extracting some wealth of shareholders, causing shareholders to invest in less profitable investments (underinvestment). However, this would be against the interests of shareholders because underinvestment affects firm performance and therefore also shareholders' wealth.

There are various occurrences that create principal-agent conflict of interest. However, it all depends on management behavior. Agency theory predicts that management that have much power tend to behave opportunistic (Ramly, 2013) and have incentives to extract personal benefits at the expense of debtholders, shareholders, and the firm (Lugo, 2019). This happens through shirking and overinvesting in risky and unprofitable projects (Ang et al., 2000; Bhojraj & Sengupta, 2003; Hashim & Amrah, 2016; Heyman et al., 2008; Lugo, 2019; Sánchez-Ballesta & García-Meca, 2011). Additionally, such managers increase information asymmetry constituting agency problem. This problem refers to the fact that management have superior information the is unavailable to outsiders, such as debtholders and investors, by withholding relevant information and manipulating financial reports (Bhojraj & Sengupta, 2003; Ramly, 2013). Such managerial behavior and decisions reflect inefficient management (Sánchez-Ballesta & García-Meca, 2011). Which increases the likelihood of default risk and have adverse effect on debtholders, thereby affecting the cost of debt financing. As a result, debtholders will impose a higher default premium to compensate the risk they bear (Hashim & Amrah, 2016; Li et al., 2016; Lugo, 2019; Pittman & Fortin, 2004; Ramly, 2013; Scherr & Hulburt, 2001; Zhai, 2019). Although principal-agent conflict is probably less common than principal-principal in SMEs, these aforementioned problems also exist in principal-principal conflicts between the owner and minority shareholders or debtholders.

Hence, board of directors are considered mechanisms. The main reason for that is the protection of shareholders' interest (Bhojraj & Sengupta, 2003; Guney, Karpuz, & Komba, 2020; Hillman & Dalziel, 2003; Yeung & Lento, 2018; Yusoff & Alhaji, 2012). According to Fields et al. (2012), boards practice in such a way that both shareholders and debtholders benefit. The most known activity of board of directors is monitoring management to reduce agency problems and costs. Also referred as the control role (Bendickson, Davis, Cowden, & Liguori, 2015). As part of monitoring and supervising, boards are responsible for the reliability and credibility of financial accountings by overseeing the accounting process (Anderson et al., 2004; Esa & Zahari, 2016), being involved in decision making and strategy execution (Li et al., 2016; Zhai, 2019), and ensuring that the firm complies with the law and regulations (Guney et al., 2020). These tasks improve decision making by management (Anderson et al., 2004), reduce information asymmetry as they have access to essential information (Lipton & Lorsch, 1992; Lorca et al., 2011), and improve firm efficiency and performance (Fields et al., 2012; Zheng, 2019). As Bin-Sariman, Ali, and Nor (2016) indicate, boards complement the monitoring role of debtholders. From a debtholders perspective, it is difficult to ensure the validity of financial statements, therefore they take into account boards attributes when assessing default risk, allowing to reduce risk premium (Anderson et al., 2004; Lorca et al., 2011). This has been empirically proven, saying that higher board of directors' quality result in lower cost of debt (Bin-Sariman et al., 2016; Fields et al., 2012; Guney et al., 2020; Hashim & Amrah, 2016).

Although most agency theory literature on the monitoring role of board of directors is based on samples of large firms, Bendickson et al. (2015) argue that boards also monitor in small firms. Although, boards incentives to monitor differs for SMEs. As firms size increases, management structures become more formal and the need for monitoring will also increase (Bennett & Robson, 2004). Large firms contain more employees, managers and executives, which increases the complexity of the management structure (Bendickson et al., 2015). On the other hand, SMEs have fewer employees, so the gap between employees, management, and even the owner is small, thereby having less agency problems. Therefore, board's monitoring role will be less relevant in SMEs. However,

opinions on agency problems within SMEs are dispersed. According to Arosa et al. (2013) and Machold, Huse, Minichilli, & Nordqvist (2011), agency problems also matters to SMEs. Although SMEs experience fewer principle-agency conflicts, they do experience principal-principal conflicts due to information asymmetry, as SMEs do not have formal reporting systems and external shareholders solely rely on information provided by management (Arosa et al., 2013; Bennett & Robson, 2004). Besides, large firms are mostly publicly held and observed under scrutiny, while SMEs are frequently privately held firms that are less observed (Eisenberg, Sundgren, & Wells, 1998; Maseda, Iturralde, & Arosa, 2015). Therefore, to reduce information asymmetry and principal-principle conflicts, boards in SMEs function as a controlling body in the company that monitors management and generates reliability.

2.3.2 Stewardship theory

Some researches view stewardship theory as an alternative to the agency theory (Huse, 2005), while others consider it as an opposite theory (Davis, Schoorman, & Donaldson, 1997; Donaldson, 1990). The stewardship theory defines managers as stewards based on the assumption that managers work in the interest of the owners (Yusoff & Alhaji, 2012), as their goals align with the goal of the owners (Arzubiaga, Kotlar, De Massis, Maseda, & Iturralde, 2018). Thereby having no principal-agent conflicts. Because most SMEs are family owned firms, where managers and executives are mostly executed by family members, the interest between owners and managers are better aligned (Chu, 2009). Therefore, this theory also focuses on the involvement of family members in the company, who have a high intensive of stewardship. As a result of managers highly valuing corporation goals and trying to achieve these goals (Davis et al., 1997), firm performance can be maximized and thereby also shareholder's wealth (Fox & Hamilton, 1994). According to Davis et al. (1997), this theory assumes that the success of the firm is related to the satisfaction of the principal. Besides the satisfaction of shareholders, also other stakeholders tied to the firm are satisfied, such as debtholders and banks. When it comes to rewards, the stewardship theory state that stewards are satisfied with rewards such as opportunities for growth, achievement, and affiliation, which is reinforced with intangible rewards (Davis et al., 1997). So, it can be concluded that managers are not driven by personal goals but rather are team players. And by enhancing firm growth and profitability, they continue the life of the firm.

However, about the composition of boards, stewardship theory support a majority of executive directors in boards because it allows to have available expertise and it provides a status reward (Donaldson, 1990; Yusoff & Alhaji, 2012). Executive directors are referred as directors working in the firm. In family held SMEs, director's roles are performed by family members. According to Arzubiaga et al. (2018), such boards are dominated by family members because they are emotionally attached to the firm and therefore have a higher motivation to effectively contribute to the board. Furthermore, when the CEO is also the chairman, power and commands are undivided, it could mitigate conflicts (Donaldson, 1990). So, the stewardship theory focuses on boards with power rather than monitor and control (Yusoff & Alhaji, 2012). This causes stewardship and agency theory to oppose each other. From the perspective of agency theory, managers have more individualistic behaviors to personally grow and reach higher achievements, creating a self-fulfilling prophecy (Davis et al., 1997), assuming managers to be opportunistic (Huse, 2005), and therefore need boards with a controlling and monitoring role. Adversely, from the perspective of stewardship theory, managers have collectivistic behaviors and work toward organizational goals that are expected to meet managers' personal needs, because managers are not considered opportunistic but rather good stewards (Donaldson, 1990), and therefore boards' controlling and monitoring role is less prominent.

2.3.3 Resource dependence theory

The resource dependence theory states that firms depend on external resources and therefore need linkages to the external environment. For firms' survival and success, firms depend on the interaction with its external environment by purchasing resources or selling products (Gabrielsson & Huse, 2005;

Hillman, Shropshire, & Cannella, 2007). However, SMEs are known for having constraint access to external resources and there are only a few alternatives to manage their resource dependence (Arosa et al., 2013). Therefore, board of directors play an important role in overcoming resource constraints as boards are mechanism for managing external resource dependencies (Arzubiaga et al., 2018; Hillman, Cannella, & Paetzold, 2000; Hillman et al., 2007). From the perspective of the resource dependence theory, boards main function is providing firms resources.

According to Hillman and Dalziel (2003), boards have 3 important roles: (1) service role, (2) strategic role, and (3) resource dependence role. Boards' service role is to enhance the firm's reputation and credibility by giving advice and counsel to executives (Hillman et al., 2007), enhancing legitimacy (Huse, 2005; Zahra & Pearce, 1989), and linking the firm with important stakeholders outside the firm by building external relations (such as customers, suppliers, political bodies, and other stakeholders) (Hillman et al., 2000; Hillman & Dalziel, 2003; Yusoff & Alhaji, 2012). Although enhancing legitimacy is more applicable to large firms, because they have great influence on society and economy (Pfeffer, 1972), SMEs gain more credibility when legitimacy is enhanced. Next, boards' strategy role is based on the fact that boards are actively involved in developing firms' strategy by introducing a strategy or suggesting alternatives (Maseda et al., 2015; Zahra & Pearce, 1989). As Arzubiaga et al. (2018) explain, boards want to effectively fulfill their strategic role. This is done by providing valuable information, for example about the agenda of other firms (Hillman & Dalziel, 2003), and opening doors to new strategic opportunities, allowing firms to better scan its external environment and thereby also mitigate uncertainty (Gales & Kesner, 1994). As a result, this role increases firm performance and allows to achieve efficiency goals. Lastly, boards' resource dependency role is to provide important resources for a firm to reduce the external dependency between the firm and external environment. Thereby protecting the firm for external threats (Huse, 2005). An example of an important resource provided by boards is the access to external financial capital (Chuluun et al., 2014; Maseda et al., 2015). This allows firms, especially SMEs, to secure capital for firm's survival, growth, and uncertainty on favorable conditions.

Most research on boards focus on board's composition and size. Studies on resource dependency theory examine board composition and size as an indicator for boards' ability to provide valuable resources to the firm (Hillman, Withers, & Collins, 2009; Pfeffer, 1972). According to Hillman et al. (2000), depending on the firm's dependencies a board's composition vary among firms. However, introduced by Hillman and Dalziel (2003), the ability of boards to provide resources to the firm is also referred to as board capital. Moreover, board capital further consists of human capital and social capital. Human capital is the provision of experience, expertise and reputation, while social capital is the provision of network ties between the firm and other external contingencies (Hillman & Dalziel, 2003). According to Chuluun et al. (2014), the impact of board capital is greater for firms with high information asymmetry. From a human capital point of view, each director has different knowledge and expertise, therefore they are able to reduce information asymmetry by improving the reliability of the firm's information flow (Chuluun et al., 2014), and thereby enhance the confidence of the investors and even banks. This suggests that board's prestige signals legitimacy (Zahra & Pearce, 1989). However, from the perspective of social capital, as directors have various connections with the external environment, they are able to improve the access to debt markets. Chuluun et al. (2014) find that connected boards have a negative relationship with yield spread on bonds. Which also reflects the effect of connected boards on the level of interest rates, especially when directors have ties with financial firms. Although agency theory and resource dependency theory explain different critical roles of boards, the constrain of critical resources in SMEs suggests that the monitoring function of boards is, again, less important than the provision of resources. Anyway, Hillman et al. (2009) and Hillman & Dalziel (2003) agree that board capital does affect the monitoring function and the provision of resource, since boards both monitor and provide resources.

2.3.4 Resource-based view

Resource-based view theory discusses that firm's internal environment, through resources and capabilities, allows to create sustainable competitive advantage (Arosa et al., 2013; Chen, Zou, & Wang, 2009; Gabrielsson & Huse, 2005). Sustained competitive advantage is defined as an value creating strategy that cannot be simultaneously be implemented by competitors (Barney, 1991). In this respect, resource-based view theory differs from resource dependency theory in the fact that the resource-based view mainly focuses on resources in the firm's internal environment, while resource dependency theory focuses on resources in the firm's external environment. The resource-based view theory assumes firms to possess resources that are complex, intangible and dynamic, and capabilities particular to its firm resource (Maseda et al., 2015). Moreover, resources and capabilities are also referred as organizational competencies or firm resources, such as internal processes, human resources, assets, information, and knowledge (Barney, 1991; Chu, 2009). According to Chen et al. (2009), these resources influence firm's strategic decisions. For example, the absence of internal financial capital could affect the firm's strategy with regards to growth or expansion. And SMEs are known for having constrained internal resources.

Because firm resources are not equal across firms, Barney (1991) states that to sustain competitive advantages firm resources should contain four characteristics: (1) valuable, (2) rare, (3) inimitable, and (4) non-substitutable. According to Calabrò, Mussolino, and Huse (2009), the resource-based view consider boards as firm resource that contribute to competitive advantage, by providing valuable resources that cannot be bought or employed (Huse, 2005). With their advisory and counseling role, boards provide strategic and service resources. Boards contribute to value creation and firm performance in SMEs by providing service and not only control (Calabrò et al., 2009). However, directors use their personal knowledge, experience, expertise, and network as valuable resources to improve firm's efficiency, effectiveness (Barney, 1991), and long-term performance (Maseda et al., 2015), and exploit opportunities and neutralize threats in the competitive environment (Barney, 1991; Calabrò et al., 2009). Also from the resource-based view, directors' contribution differs between large firms and SMEs. For example, for large firms it is important that directors have experience in complex operations management structures to be able to monitor their managers (Bendickson et al., 2015; Zahra & Pearce, 1989), while in SMEs it is important that directors have various experience, skills and are familiar with the industry, to be able to improve competitive strategies (Arosa et al., 2013).

2.4 Board characteristics

Literature has concluded that board of directors is an essential internal governance mechanism. Since boards have different roles, the effectiveness of their function strongly depends on the composition of the board. Therefore, this research includes the following board characteristics that have been primarily focused on in prior literature: (1) board size, (2) board independence, (3) board gender diversity, and (4) board director ownership.

2.4.1 Board size

Various research has shown the importance of boards on corporate governance and firm performance. Especially in SMEs, where boards have great influence over the firm (Bennett & Robson, 2004), since they execute activities commonly done by top management teams in large firms (Bendickson et al., 2015). However, the number of directors within a board indicate the ability to monitor and providing resources to the firm. Although boards in SMEs tend to be smaller than boards in large firms (Machold et al., 2011), it is expected that the board size increases as the size of the firm increases. However, some papers argue whether large boards are effective as small boards. The agency theory prefer smaller boards rather than large boards, because larger boards are less effective than small boards

due to the difficulties in organizing, communicating and coordinating large boards (Anderson et al., 2004; Arosa et al., 2013; Bettinelli & Chugh, 2009; Cornett, Marcus, Saunders, & Tehranian, 2007; Eisenberg et al., 1998; Zheng, 2019). Besides, the involvement of more directors could increase the decision-making time, leading to hesitated decisions and even procrastination (Guney et al., 2020; Lorca et al., 2011; Zhai, 2019). Eisenberg et al. (1998) algin with this argument by finding a negative relationship between board size and firm performance (ROA) in Finnish SMEs. This is also analyzed by Shehata, Salhin, and El-Helaly (2017) using a sample of U.K. SMEs. Consequently, these behaviors increase agency costs and thereby reflecting the effectiveness of the board of directors. As Zheng (2019) states, this way, boards are seen as a symbol rather than part of the management. Therefore, small boards are more preferred, since they are more manageable and allow all directors to contribute to discussing and come to a consensus to make decisions (Lipton & Lorsch, 1992; Lorca et al., 2011).

On the other hand, the resource dependence theory prefer larger boards because such boards could provide SMEs critical resources (Gales & Kesner, 1994). Large boards contain a variety of members with different skills, experience and background (Bettinelli & Chugh, 2009; Fields et al., 2012; Gaur, Bathula, & Singh, 2015; Lorca et al., 2011), which enables to divide the work load over a number of members (Anderson et al., 2004). Besides, larger boards have higher capacity in counseling, supervising and monitoring management (Gaur et al., 2015; Zhai, 2019), thereby broadening their services (Guney et al., 2020). This comes with the benefit of members committing more effort to oversee management (Anderson et al., 2004), offering access to external resources (Bettinelli & Chugh, 2009; Guney et al., 2020; Hillman et al., 2009; Lorca et al., 2011), and representing various ideas (Zheng, 2019). With regards to access to external resources, Pfeffer (1972) find a positive significant relationship between board size and debt-equity ratio. Meaning that when firms need access to external finance, larger boards are able to provide this. Thereby concluding that the number of directors is associated with the need for access to external financial capital markets. Moreover, as boards reduce default risks and increase financial reporting transparency, debtholders view larger boards as effective mechanisms. Previous studies have proven this point by finding a negative relation between board size and cost of debt (Anderson et al., 2004; Fields et al., 2012; Lorca et al., 2011). Indicating that firms with larger boards are able to borrow at a lower cost.

Lipton and Lorsch (1992) suggest that a board with 8 or 9 members, with a limit of 10, is most preferred, otherwise it will be difficult for all directors to contribute in meetings. Confirmed by Waheed and Malik (2019) and Zheng (2019), finding a positive relationship between board size and firm performance, with a sample of firms containing an average board size of 8 directors. Moreover, Guney et al. (2020) find board size to be negatively related with firm performance in firms with an average board size of 11 board members. However, these samples are based on large firms. As mentioned earlier, SMEs have smaller boards than large firms. Gaur et al. (2015) prove this point as their sample of listed firms in New Zealand has an average board size of 6 members. Their explanation for a small board size is because SMEs dominate in New Zealand. Oddly enough, Arosa et al. (2013) and Eisenberg et al. (1998) find a negative relationship between board size and firm performance. Moreover, Arzubiaga et al. (2018) find a negative relationship between board size and innovation within SMEs. Although Maseda et al. (2015) and Machold et al. (2011) find board size to be negatively related to firm performance and strategy involvement, their finding is not significant. Eisenberg et al. (1998) find that although board sizes ranging from 2 to 6 members decreases firm performance, firms are still profitable. This is confirmed by Bennedsen, Kongsted, and Nielsen (2008), finding that increased board size is correlated with lower returns on assets in SMEs, especially boards with six or more members are significantly negatively related to return on assets. A possible explanation for this finding is the board composition and the involvement of families in boards. Therefore, agreeing with Bettinelli and Chugh (2009), the optimal size depends on the characteristics and goals of the company and therefore impossible to identify.

2.4.2 Board independence

Besides board size, also board independency is a much researched board characteristic. Board independency refers to the proportion of independent directors within a board. Independent directors are also called outside or external directors. This means that these board members are not employed by the company nor are they connected to the company (Bennett & Robson, 2004; Calabrò et al., 2009; Maseda et al., 2015). Both internal and external directors contribute to the work of boards. According to Hillman and Dalziel (2003), both also have important human capital, allowing to provide advice and counsel to management. In contrast to external directors, internal directors have access to firm-specific information and information about the firms' competitive environment (Arosa et al., 2013; Hillman et al., 2000; Maseda et al., 2015). The presence of internal directors on the board can be a valuable asset because they possess information relevant for making strategic decisions (Hillman & Dalziel, 2003; Maseda et al., 2015). Stewardship theory is an opponent of internal directors, arguing that boards should contain of a majority of internal directors because internal directors have better understanding about the firm's operations than external directors, as they do not have sufficient knowledge about the firm's strength and weakness to provide counsel and advise (Gaur et al., 2015). Although this may be true from this point of view, research has shown that independent directors positively affect firm performance. However, the view on the contribution of independent directors varies across theories.

Agency theory states that an effective board should contain independent directors, as they have the incentive and ability to monitor management, thus reducing agency conflict between management and shareholders (Kim, Kitsabunnarat-Chatjuthamard, & Nofsinger, 2007). Independent directors play an active role in providing better control and monitoring of firm activities and management, by overseeing managerial performance (Bhojraj & Sengupta, 2003; Desender et al., 2013; Lorca et al., 2011), to maintain reputation and reduce monitoring costs. Moreover, to promote and protect the interest of shareholders they carry expertise and objectivity, allowing them to express their opinions to help the board make better decisions (Anderson et al., 2004; Zheng, 2019). Additionally, compared to non-independent directors, independent directors are more likely to remove poorly performing CEO's (Bhojraj & Sengupta, 2003). Lastly, to avoid legal liability, independent directors devote effort into identifying and correcting report inaccuracies made by management (Desender et al., 2013). Which also affects debtholders' view on the firm. It has been empirically proven that the effect of board independence negatively affect the cost of debt (Anderson et al., 2004; Bhojraj & Sengupta, 2003; Fields et al., 2012; Li et al., 2016; Usman, Farooq, Zhang, Makki, & Khan, 2019). Meaning that greater board independence is associated with lower cost of debt.

The resource dependence theory view external directors as a linking mechanisms between the firm and its external environment (Arosa et al., 2013; Gabrielsson & Huse, 2005). Thereby providing SMEs access to external resources needed to achieve organizational goals and gain competitive advantage. External directors use their personal networks and reputation to secure essential resources (Zahra & Pearce, 1989) and increase firm's legitimacy and reputation (Bennett & Robson, 2004). In addition, with their experience, skills, and knowledge, directors are able to better provide advice and counsel (Zahra & Pearce, 1989), enabling firms to adapt to the external environment (Gales & Kesner, 1994), and increase firm survival and reduce uncertainties (Bennett & Robson, 2004; Calabrò et al., 2009). This also corresponds to the resource based view, stating that the knowledge of external directors allow to better perform their advisory role (Arosa et al., 2013) and positively contribute to the decision-making process (Calabrò et al., 2009). Based on these assets and abilities, external directors are considered to complement or substitute management and internal directors (Calabrò et al., 2009; Maseda et al., 2015). According to Arosa et al. (2013) and Gabrielsson and Huse (2005), external directors are means to overcome internal lack of resources and human resource limitation that often occur in SMEs. Besides, concerning access to debt, Pfeffer (1972) find that the proportion

of internal directors inversely affect the need for external financial capital. Meaning that firms that need access to external financial capital are expected to have a higher percentage external directors on their boards. Because external directors may also sit on the board of a bank or has close networks with bank employees (Pfeffer, 1972).

However, it cannot be denied that the idealism of a fully independent board is purely theoretical. As in some cases, independent directors are appointed by managers (Bhojraj & Sengupta, 2003; Lorca et al., 2011), meaning that those directors are appointed because their interests align with the interests of the managers. Besides, independent directors lack of superior firm information and therefore rely on manager's report (Zheng, 2019), which reduces their ability to monitor management and their behavior. Therefore also internal directors are desired. Arosa et al. (2013) and Gaur et al. (2015) find that, with an average proportion of external directors of 62% and 80%, board independency negatively affect firm performance. Liu, Wei, and Xie (2014) and Maseda et al. (2015), on the other hand, find a positive relationship between board independency and firm performance, with an average proportion of external directors of 29% and 37%. These empirical evidences indicate that an excessive number of external directors relative to internal directors negatively affect firm performance, due to lack of internal firm knowledge. Although, Maseda et al. (2015) claim that the best proportion of external directors is 47%, again, Bettinelli and Chugh (2009) discuss that it is a complex issue to find the right proportion of independent directors.

2.4.3 Board gender diversity

The growing concerns about gender equality have also reached corporate governances. Board gender diversity refers to women present on boards. While Guney et al. (2020) discuss that gender diversity plays an important role in the functioning of the board, Liu et al. (2014) claim that the effect of gender diversity in boards depends on the quality of firms' governance. However, resource dependence theory and agency theory do not suggest a clear prediction of the relation between gender diversity and firm performance (Shehata et al., 2017). On the contrary, the token theory and critical mass theory predict that the higher the proportion of female directors representative in boards the more they are able to significantly influence board discussions.

With the focus to improve internal corporate governance and financial performance, female directors are active and attentive in monitoring management, thereby mitigating agency costs (Liu et al., 2014; Usman et al., 2019; Zhai, 2019). Consequently, reducing managerial opportunistic behavior and information asymmetry, thereby lowering the probability of default risk, which could lead to lower cost of debt. Also, gender diversity allows new perspective into the board (Guney et al., 2020), which improves decision making. Depending on the industry, women might have better insight into certain aspects than men. For example, Hillman et al. (2007) explain that in the retail industry women have better understanding of the consumers behavior, since women are primary consumers, and therefore are useful to make decision with regards the consumers. Additionally, female directors that have impact in the decision making are able to take care of the interest of shareholders and debtholders (Zhai, 2019). Moreover, because female directors are more responsible and less overconfident than their fellow male directors, they make less risky investment decisions (Usman et al., 2019). Other benefits from female directors is them serving as a role model by sending signals to employees that a firm offers opportunities for career growth (Hillman et al., 2007), thereby inspiring and attracting talented female employees (Liu et al., 2014). Not to forget to mention, another important reason for firms to appoint female directors to the board is to enhance legitimacy. Society's values regarding gender equality within organizations put pressure on firms to include female in boards (Hillman et al., 2007; Martín-Ugedo & Minguez-Vera, 2014). Besides society also regulators encourage to increase the representation of women on boards (Usman et al., 2019). For example, in 2012 the European Commission issued a proposal to increasing the proportion of women in boards to at least 40% in

publicly listed European corporations, to enhance the involvement of women in corporate decision-making. The goal is to reach 30% to 40% of women on boards by 2020. So far the European Commission reported that women represented approximately 28% of the board in large publicly listed firms in the European Union in 2019 (European Commission, 2020).

However, board gender diversity also has its consequences. The responsibility of female directors may lead to unnecessary over-monitoring by demanding more audit efforts (Liu et al., 2014), increasing monitoring fees. Furthermore, Usman et al. (2019) report that different perspectives and objectives could slow the decision-making process because of disagreements, leading to time-consuming decision making and affecting firm performance. These disagreements and perhaps conflicts deteriorate the communication and cooperation in boards, for which debtholders charge a risk premium and higher the cost of debt (Usman et al., 2019). Besides, as previously mentioned, women are more risk averse than men because they are more cautious, which can slow down the decision making (Martín-Ugedo & Minguez-Vera, 2014). Empirical evidence show mixed results about the contribution of female directors to firm performance. Liu et al. (2014) and Martín-Ugedo and Minguez-Vera (2014) show that the proportion of female directors on boards is positively associated with firm performance. Especially in smaller firms, where each director has greater power because of the smaller boards, female directors have more influence on the firm than female directors in large firms. Using the same gender diversity measurement as Martín-Ugedo and Minguez-Vera, Shehata et al. (2017) find a negative association between the proportion of female directors on boards and firm performance. However, following the resource dependence theory and agency theory, board diversity provides broader contribution to the firm. Through diversity of experience, knowledge, skills, and networks it is possible to supplement SMEs' needs. Also debtholders and banks believe that board diversity, in particular gender diversity, make a positive contribution to the firm. Usman et al. (2019) and Zhai (2019) report that board gender diversity negatively affect the cost of debt. Confirming that female directors contribute to the reduction of cost of debt by bringing in new resources and information, and enhance independence.

2.4.4 Board director ownership

Director ownership is the percentage of shares held by board members, also called insider directors. From the agency theory perspective, directors with ownership will have a personal incentive to better monitor management and ensure firm performance (Bhagat, Carey, & Elson, 1999; Farrer & Ramsay, 1998). Since the interest of insider directors and shareholders are aligned, it enables insider directors to mitigate agency conflicts. They put effort into providing supervision and participate in firm operation and management (Anderson et al., 2004; Zhai, 2019). Besides, shareholding is viewed as equity-based compensation to directors, which correlates directors' personal wealth with the company's prospects (Farrer & Ramsay, 1998). Meaning that if the company fails, so will the director's personal finances. So, to ensure a maintained income, directors will dedicate more time to the company to make better decisions. However, this can lead to a risk averse behavior, considering less high-risk projects that expropriate wealth from minor shareholders and debtholders (Lorca et al., 2011). Other reasons for directors to become risk averse is because they bear a reputation cost if firm fails (Eisenberg et al., 1998), and poor decisions could lead the firm to a takeover target (Farrer & Ramsay, 1998), thereby losing their jobs and income. Bennett and Robson (2004) argue that an excessive amount of shareholding could lead to a declining firm performance, because too much closeness between directors and owners could inhibit firm development and innovation.

However, evidence on director ownership and firm performance is inconclusive. Although Bhagat et al. (1999) claim there is a possible correlation between director's shareholdings and firm performance, they fail to find a significant relationship between director's shareholdings and growth opportunities. With a sample of Australian firms, Farrer and Ramsay (1998) find a negative correlation

between director share ownership and firm performance. However, their subsample of medium sized Australian firms show that firm performance positively increases at a director ownership between 0 and 5%. For their subsample of small Australian firm, Farrer and Ramsay (1998) find a negative correlation between director ownership between 0 and 5% and firm performance. Other findings turned out to be insignificant. However, despite the inconclusiveness of empirical evidence, debtholders and banks take board ownership into account. Both, Lorca et al. (2011) and Zhai (2019) find a negative relationship between director ownership and cost of debt. As insider directors, directors have superior insider information about the firm, they are able to disclose legitimate information (Zhai, 2019), by providing liable information in financial reports through monitoring management, thereby reducing information asymmetry and debtholder's risk (Lorca et al., 2011). Debtholders could benefit from a reliable and transparent financial report (Anderson et al., 2004). Debtholders entrust insider directors to work in their best interest, which leads to a lower cost of debt and less restrained covenants (Fields et al., 2012; Zhai, 2019). Supporting the argument that debtholders value insider ownership when estimating default risk.

2.5 Ownership structure

According to Desender et al. (2013), there might be a complementary effect between ownership structure and board of directors with regard to monitoring management. Meaning that the board's behavior is affected by the firm's ownership structure. Moreover, this complementary effect leads to different degree of monitoring (Desender et al., 2013). Besides board of directors, literature also suggests that ownership structure is an important mechanism in corporate governance. Although ownership structure consist of multiple aspects, the primary difference is whether the firm is owned or controlled (Claessens & Yurtoglu, 2013). In some firms, shareholder might not fully own the firm but have full control, having different incentives and interests. This points out how the differences affect the effectiveness of governance (Yeung & Lento, 2018). From the perspective of agency theory, different owners will have different goals and incentives that affect firm performance differently (Douma et al., 2006). Since board's monitoring also depend on ownership structure, in particular the level of concentration and the type of ownership, it is interesting to investigate the moderating effect of ownership structure on the impact of board of director on the cost of debt. Therefore, this research includes the following ownership structures: ownership concentration and family controlled ownership.

2.5.1 Ownership concentration

Ownership concentration is defined as a single or a small number of shareholders holding the majority of shares of a company. Thereby holding cash flow rights and control in a company (Esa & Zahari, 2016). The degree of shareholders control is reflected by the power that shareholders exercise over decisions and election of directors (Aslan & Kumar, 2012; Hernández-Cánovas et al., 2016). Ownership is usually more concentrated in SMEs, so overlap in ownership, board members, and management is very common (Martín-Ugedo & Minguez-Vera, 2014; Maseda et al., 2015; Shehata et al., 2017). Meaning that the same person is involved in all levels of the firm. Therefore, the impact of ownership on boards is great in SMEs (Machold et al., 2011). However, it is being discussed whether concentrated shareholders are efficient mechanisms (Hernández-Cánovas et al., 2016). Although Hernández-Cánovas et al. (2016) and Bin-Sariman et al. (2016) find that concentrated ownership is negatively correlated with debt, trying to avoid debtholders supervision (Li, Fu, Wen, & Chang, 2020), the need for debt cannot be avoided if SMEs want to stimulate firm growth. However, research has found that ownership concentration significantly affect agency conflicts between managers and small shareholders (Anderson et al., 2003; Bin-Sariman et al., 2016). Agency theory discusses that large shareholders, on the one hand, could mitigate agency conflicts between managers and shareholders (Kim et al., 2007), but on the other hand, they could also give rise to agency conflict between large and

small shareholders (Claessens & Yurtoglu, 2013). This could be due to the fact that concentrated shareholders suffer some costs. While large shareholders put in effort to monitor management, small shareholders might not have the knowledge to monitor (Douma et al., 2006). This could lead to small shareholders "free-ride" at the expense of large shareholders (Kim et al., 2007). However, empirical evidence find concentrated ownership to be positively associated with firm performance (Gaur et al., 2015; Guney et al., 2020; Waheed & Malik, 2019). Explained with the fact that firms with dispersed ownership increase management opportunism, because in such firms a single owner is not able to influence management directly through voting rights or through the board (Gaur et al., 2015).

Given their concentration, large shareholders could lose a lot, hence they have strong incentive and large ability to monitor management and restrain managerial behavior (Amrah et al., 2015; Douma et al., 2006; Kim et al., 2007; Krivogorsky et al., 2011). With the monitoring function of shareholders, they are able to hold management accountable for inconveniences (Yeung & Lento, 2018). According to Desender et al. (2013), they might even less rely on board monitoring and therefore directly monitor management. From the agency theory perspective, this incentive behavior could alleviate some agency conflicts and the need for monitoring. Consequently, it could lead to reducing agency risk against debtholders (Ramly, 2013; Sánchez-Ballesta & García-Meca, 2011), thereby enjoying a lower cost of debt. On the contrary, concentrated shareholders could also extract private benefits of control by pursuing self-interest at the expense of smaller shareholder and external investors, such as debtholders (Li et al., 2020; Lin et al., 2011; Sánchez-Ballesta & García-Meca, 2011). Concentrated shareholders could abuse their dominancy by tunneling (Aslan & Kumar, 2012; Douma et al., 2006), influencing management and shareholder decisions (Feito-Ruiz & Renneboog, 2017; Hernández-Cánovas et al., 2016), taking weak, risky and unprofitable investments (Byun, Choi, Hwang, & Kim, 2013; Li et al., 2020; Ramly, 2013), misappropriating resources by transferring assets and profits for own use (Lin et al., 2011; Sánchez-Ballesta & García-Meca, 2011), or increasing dividend payment (Anderson et al., 2003; Sánchez-Ballesta & García-Meca, 2011). Thereby reflecting the probability of the risk of wealth expropriation from minority shareholders. This increases agency conflicts among shareholders, but also monitoring costs and debt risk. As agency risk increases it would negatively affect debt covenants and the cost of debt. It has been proven that concentrated ownership positively affect the cost of debt (Aslan & Kumar, 2012; Li et al., 2016; Lin et al., 2011; Lugo, 2019). Concluding that the higher the proportion of concentrated ownership is the higher the cost of debt will be.

Although board of directors and ownership concentration are substitute governance mechanisms, concentrated shareholders also have power and incentive to influence board's behavior and composition (Desender et al., 2013; Kim et al., 2007). Amrah et al. (2015) argue that board's monitoring will have better effect when ownership is dispersed as opposed to concentrated ownership. Because concentrated shareholders are more influential, they are likely to get their wish no matter the strength of shareholder rights (Kim et al., 2007). For example, concentrated shareholders are able to appoint board members that align with their interests or they represent themselves on boards to be involved in the service and control role, to protect their interests (Zahra & Pearce, 1989). Which might lead to boards accepting risky projects that may benefit and enhance shareholder position relative to debtholders (Fields et al., 2012). Also, Hernández-Cánovas et al. (2016) confirm this as they find that concentrated ownership negatively affect debt. Thus, firms with a high degree of concentrated ownership are less likely to obtain debt. It is clear that concentrated ownership affects board's composition and effectiveness as it enlarge the authoritarian power of the shareholder. Kim et al. (2007) test the effect of ownership concentration on board independency and find a negative correlation between the two variables. Consistent with the stewardship theory, concentrated owners recognize the importance of internal directors. Also, both Gaur et al. (2015) and Waheed and Malik (2019) analyze that the interaction effect of ownership concentration and board independency negatively affect firm performance. This indicates that highly concentrated ownership negatively

affects firm performance. Moreover, according to Eisenberg et al. (1998), the degree of ownership concentration is an important factor explaining the board-size effect within a firm. Again, Gaur et al. (2015) and Waheed and Malik (2019) find a negative relation between the interaction effect of concentrated ownership and board size on firm performance. This implies that an increasing degree of concentration weakens the positive effect of boards on firm performance.

Nonetheless, ownership concentration also depends on the regulations of the representative country. The legal origin of countries is an important determinant of shareholders protection and creditor rights (Aslan & Kumar, 2012; Krivogorsky et al., 2011). Common-law countries are considered to have better corporate governance because of investor protection than civil-law countries (Aslan & Kumar, 2012; La Porta, Lopez-de-Silanes, & Shleifer, 1999). Although Aggarwal, Erel, Ferreira, and Matos (2011) argue that corporate governance is better in common-law countries, small firms tend to have better governance in civil-law countries. However, Claessens and Yurtoglu (2013) report that firms in countries with stronger shareholders protection and creditor rights have better access to financing. Because minority shareholders are better protected against expropriation and creditors are able to bargain repayment and take control in case of default (Lin et al., 2011). According to La Porta et al. (1999), countries with weak shareholders protection and creditor rights it is easier to lose control, which is very costly for shareholders, therefore controlling shareholders would do anything to retain control. As Ramly (2013) rather say, becoming controlling shareholder is self-protection. Confirmed by Hernández-Cánovas et al. (2016), it is observed that civil-law countries have firms with higher level of concentrated ownership. Prior research has shown that a country's legal origin and, with that, investor protection significantly negatively affect the cost of debt (Aslan & Kumar, 2012; Lugo, 2019). Based on the argument that shareholder protection mitigate expropriation by concentrated shareholders (Lin et al., 2011).

2.5.2 Family controlled ownership

Family controlled ownership refers to firms that are owned by members of a single family. Proponents of family controlled ownership claim that family members have positive incentives and ability to influence and monitor firm activities and management (Amrah et al., 2015; Anderson et al., 2003; Desender et al., 2013), supporting the stewardship theory. This is because family members have great access to insider information, making them better understand their firm's performance, allowing them to promote long-term survival, and create long-term relationship with the firm (Anderson et al., 2003; Chu, 2009; Ramly, 2013). Resulting in lower monitoring costs. Confirmed by Ang et al. (2000) and Chu (2009), family ownership is found to be positively associated to firm performance. Besides, from family perspective, it is expected that family members are tied together and develop loyalty. Because of their close interaction they are able to effectively and efficiently communicate and make decisions (Amrah et al., 2015), thereby reducing agency costs. Ang et al. (2000) find that family firms have 3% lower agency costs than non-family firms. Moreover, they also have the power to occupy important management position benefiting themselves by influencing management decision, maximizing firm value and private wealth (Anderson et al., 2003; Desender et al., 2013). Sánchez-Ballesta and García-Meca (2011) mention that it would help align the interest of management and shareholders, hence, mitigating agency problems. However, maximizing private wealth, especially at the expense of minority shareholders, could increase agency conflict between large and small shareholders.

As Douma et al. (2006) indicate, participation of family members in management could increase potential risk of expropriation and tunneling, such as extracting firm resources, increasing dividend payments, and excessive renumeration pay out (Amrah et al., 2015; Sánchez-Ballesta & García-Meca, 2011). Lin et al. (2011) confirm that tunneling risk is higher in family controlled firms. In contrast to stewardship theory, agency theory assumes that appointing family members to management positions can result in unskilled family member executing key positions (Hernández-

Cánovas et al., 2016), which can be harmful to the firm. Furthermore, private family problems could affect firm performance, for example because of envy among family members or sibling rivalry (Hernández-Cánovas et al., 2016). Not entirely unimportant to mention, as family firms hold undiversified portfolios they have the incentive to protect their wealth (Anderson et al., 2003; Bin-Sariman et al., 2016; Desender et al., 2013), thereby behaving risk averse by investing in less risky and profitable projects (Amrah et al., 2015). However, family owners could also have the incentive to invest in risky projects, in which they gain most of the benefits while minor shareholders or debtholders bear most of the costs (Ramly, 2013). In both cases, small shareholders and debtholders are at disadvantage, magnifying agency problems among shareholders.

In case of agency conflicts among shareholders, board of directors are needed to mitigate such problems. Although boards of directors in general contribute to family firms, their influence on the firm differs from non-family firms. The reason for that is that family owners often exercise power over boards through selection and renumeration of directors and application of information provided to them (Calabrò et al., 2009; Gabrielsson & Huse, 2005). Therefore, it is expected that boards in family firms have little influence on the firm. According to Arzubiaga et al. (2018) board of directors in family SMEs have merely a symbolic role. Gabrielsson and Huse (2005) state that even in case of an independent director on the board, the director is connected to the family or firm. Furthermore, as women in boards contribute to the firm, Martín-Ugedo and Minguez-Vera (2014) find that family firms are more likely to appoint a female as directors. However, they also find that they do not have significantly influence on firm performance. This suggests that family firms select women as directors only because of family relation and not based on the director's experience and knowledge. Maseda et al. (2015) examine generations in family firms with regards to independent directors and firm performance and find that second-generation family owned SMEs have significantly lower proportion of external directors than first-generation family owned SMEs. Explained by the increase in knowledge, experience, greater ability of networking. Thus, family firms do not make efficient use of the functions of board of directors. Even when family firms want to make efficient use of board of directors they struggle attracting qualified directors (Calabrò et al., 2009). This is explained by qualified directors avoiding family firms because of limited personal growth, lack of professionalism, and biased selection of family members as directors without considering their competencies.

Although boards in SMEs already are small and contain few directors, family members are frequently appointed as directors and commonly dominate the board (Arzubiaga et al., 2018). Although it is expected that board size positively affects firm performance, this does not have to apply to boards dominated by family members. In a sample of Danish SMEs, Bennedsen et al. (2008) analyze that CEO's and their relatives present almost 50% of the board. Although a positive relation is found between board size and firm performance, this positive relation weakens when moderating for family firms. Also Arzubiaga et al. (2018), in a sample of Spanish family SMEs, find that family members, on average accounting for 80% of the directors, negatively affect entrepreneurial innovation. Moreover, Desender et al. (2013) find the interaction between board independency and family ownership negatively affect audit fees. So, it could be concluded that family involvement in boards negatively affect firm value. This is also reflected to family firm affecting the cost of debt. Hashim and Amrah (2016) explain that cost of debt differs between family and non-family firms, with family firms having a higher cost of debt. This might be due to a high degree of ownership concentration in family firms (Aslan & Kumar, 2012). Empirical evidence show that family owned firms negatively affect the cost of debt (Aslan & Kumar, 2012; Hashim & Amrah, 2016; Lin et al., 2011; Ramly, 2013). In addition, Amrah et al. (2015) and Hashim and Amrah (2016) also find that the relation between board of directors and cost of debt weakens when the firm is family controlled. Beyond reduced agency costs, it suggests that debtholders do not trust family owners to protect their interests and therefore increase the cost of debt, to bear that risk.

Agency problems in highly controlled family firms mostly occur in countries with poor investor protection. In such countries agency problems shifts from problems between ownership and manager to problems between large and small shareholders (Amrah et al., 2015; Claessens & Yurtoglu, 2013; Hashim & Amrah, 2016). La Porta et al. (1999) noticed that countries with weak shareholder protection have more family controlled firms. Moreover, Ramly (2013) find that family firm located in countries with poor shareholders protection rights suffer from high cost of debt, while family firms located in countries with high shareholders protection rights benefit from lower cost of debt. Meaning that shareholders protection plays a significant role regarding the cost of debt, because debtholders are more comfortable when they are protected from expropriation.

2.6. Hypothesis development

2.6.1 Board size

A valid point of the agency theory is that an excess of board members on the board can affect board effectiveness and firm performance. However, from a theoretical point of view, SMEs already have few directors on their board, so board ineffectiveness and problems are not expected to occur. It is expected that there will be no difficulties in communicating and coordinating boards. Especially when board members are appointed by owners. As SMEs lack expertise and resources, such as financial capital, larger boards play an important role to complement these deficiencies. The resource-based view and resource dependence theory argue that larger boards contain directors with different expertise, knowledge, and networks. With directors' human capital, such as knowledge and skills, they are able to mitigate information asymmetry and enhance firm's credibility, while with their network they are able to provide access to external capital markets. In other words, by increasing the number of directors on boards it also increases their ability to contribute to SMEs by improving firm performance and its position in the market. Debtholders view larger boards as a mechanism as they are able to reduce default risk, providing debt at favorable conditions. Therefore, the following hypothesis is formulated:

H1: Board size in SMEs has a negative effect on the cost of debt.

2.6.2 Board independence

Stewardship theory, proponent of internal directors, states that the majority of directors on boards should be internal directors, due to their access to insider firm information and knowledge about the firm's strength and weakness that external directors do not have. In practice, due to the small boards it is expected that SMEs' boards contain low proportion of external directors. However, literature claims that independent directors complement internal directors with their competencies and unbiased view of the owners and management. Partly because of their independency, they are able to perform their roles in the interest of the firms. All three theories, agency theory, resource dependence theory, and resource-based view, recognize the contribution of external directors present on boards. Form the agency perspective, the contribution of independent directors results in reduced managerial opportunism and thereby reduces agency conflicts and monitoring fees. According to resource dependence theory and resource-based view, independent directors are able to connect the firm with its external environment, allowing to gain access to critical resources and provide an advice and service role. From these point of views, debtholders value board independence as important monitors that mitigate default risk and information asymmetry by providing transparency and validity in their financial reports. Also, independent directors are viewed as professional people with reputation, who would work in the interest of the firm and thereby increasing firm value. Therefore, the following hypothesis is formulated:

H2: Board independence in SMEs has a negative effect on the cost of debt.

2.6.3 Board gender diversity

Although the agency theory and the resource dependence theory do not clearly predict the impact of female directors on firm value, they do state that board diversity in general better contribute to firm's performance. However, female directors' contribution significantly differs from male directors. First of all, female directors are risk averse compared to male director. Although risk averse behavior could cause the firm to miss out on potential investment return, it prevents investing in risky investments that could cause losses, thereby protecting debtholders' position. This suggest that female directors take care of shareholders' and bondholders' interests. Secondly, women on boards allow for new perspectives, which could improve making decisions. Consequently, different perspective could slow down the decision making process and weaken the communication and cooperation between directors. However, this could also be caused by excessive numbers of directors on the board and not necessarily by the presence of women on boards. Lastly, women presented on board of directors enhance the legitimacy of the firm. However, as a result of small boards in SMEs, each director has the opportunity to contribute to the board. Therefore, it is expected that female directors have greater power and influence on the firm in SMEs. Thus, as female directors contribute to the firm by providing resources, debtholders believe that female directors positively affect firm value and performance. Therefore, the following hypothesis is formulated:

H3: Board gender diversity in SMEs has a negative effect on the cost of debt.

2.6.4 Board director ownership

Agency theory expects directors with ownership, through personal incentive or interests alignment with shareholders, to better monitor management and improve firm performance. From a theoretical perspective, ownership could be viewed as remuneration for directors, which is related to the director's personal wealth. Meaning that if the firm fails, it will negatively affect the director's personal wealth. Consequently, this could lead to adverse behavior. For example, directors could become risk averse by making better decisions and less risky investments that expropriate wealth from minority shareholders and debtholders. In addition, such directors also have to deal with reputation costs that comes from performance failure and in case of takeover, they are probably the first to lose their jobs. Furthermore, directors with ownership have access to insider information that can reduce information asymmetry and default risk by providing debtholders legitimate information. It is expected that debtholders take into account insider ownership when estimating default risk. Therefore, the following hypothesis is formulated:

H4: Board director ownership in SMEs has a negative effect on the cost of debt.

2.6.5 Ownership concentration

Literature on concentrated ownership has mixed opinions on whether concentrated ownership is an effective corporate mechanism. It is expected that ownership in SMEs is highly concentrated. Because of the overlap between management and ownership in SMEs, agency theory states that ownership concentration allows to mitigate agency conflicts between management and ownership. Although it is rational that concentrated shareholders would protect their interest by mitigating principal-agency conflict as it increases their wealth, it cannot be excluded that concentrated shareholders will not expropriate wealth from minority shareholders and external investors, such as debtholders, and increase principal-principal conflict. However, to pursue their interests, concentrated owners are more likely to influence their board's behavior. Concentrated owners have the incentive to directly monitor management as they benefit from improved firm performance. As a result, boards' monitoring role will be less important. Besides, concentrated owners are able to use their power to appoint board members that align with their interest. Moreover, it is also expected that concentrated owners in SMEs

are more likely to compose a smaller and less independent board, because smaller boards and internal directors are better manageable. From a debtholder's point, concentrated owners weaken the effectiveness of boards on firm performance and value, which will be taken into account when assessing the firm. Thus, it could be stated that even with an effective board of directors, the cost of debt will not be reduced when ownership is concentrated. Therefore, the following hypothesis is formulated:

H5: Ownership concentration in SMEs weakens the effect of board of directors on the cost of debt.

2.6.6 Family controlled ownership

Knowing that most SMEs are owned and controlled by members of a single family, arguments are divided about the effect of family controlled ownership on the cost of debt. Steward agency theory states that because of the concentrated ownership in family firms and insider information, family ownership allows to influence and improve firm performance, and create firm survival. In addition, in family owned SMEs, family members are expected to interact closely with each other, enabling them to better communicate and make decisions. On the contrary, agency theory states that as family firms are owned by a number of family members conflicts might arise, especially when more family members become active in the firm and interests do not align. Additionally, it is common that family members are appointed to key positions in the firm without considering their knowledge and experience, which can damage firm value. With this persistent behavior, directors' contribution to the firm can be expected to be neglected by the owners. Based on the argument that family owners have the incentive to directly monitor management, family owners would less rely on board monitoring and thereby reducing the effect of board monitoring. Also, family firms have board of directors to comply with legal requirements, while non-family firms have board of directors as governance mechanisms to reduce agency costs and problems related to the reduction of the cost of debt. This indicates that boards only play a symbolic role in family firms. Furthermore, family members have the power to appoint board members that are closely related to them, resulting into a lower proportion of independent directors on the board and lower monitoring costs. It could be stated that the effectiveness of boards' role could be adversely affected by the influence of concentrated family ownership in SMEs. As most family firms have smaller and less independent board of directors it is expected for family owners to negatively influence the effectiveness of board of directors and thereby negatively affecting the cost of debt. Therefore, the following hypothesis is formulated:

H6: Family controlled ownership in SMEs weakens the effect of board of directors on the cost of debt.

3. Research methodology

3.1 Method used in prior studies

In accordance with previous studies, this study uses panel data. Thereby containing detailed information on SMEs' board and ownership structure and financial statements. This allows to better find a causal relationship between board of directors, ownership structure, and cost of debt, as the variables show patterns over time. Also, it allows to control for individual heterogeneity, endogeneity, and collinearity among independent variables (Hernández-Cánovas et al., 2016; Heyman et al., 2008; Serrasqueiro & Caetano, 2015). Literature suggests various regression methods to investigate various types of data, also depending on the goal of the research.

3.1.1 Ordinary Least Square

The Ordinary Least Square (OLS) regression is one of the most frequently used research method and especially common in corporate governance studies, such as board of directors and ownership (Anderson et al., 2003; Arosa et al., 2013; Chu, 2009; Fields et al., 2012; Heyman et al., 2008; Lugo, 2019; Maseda et al., 2015; Pittman & Fortin, 2004; Usman et al., 2019). OLS regression model is a statistical method that estimates unknown parameters of independent variables in a linear regression model. Meaning that the dependent variable is predicted by a linear combination of independent variables (Osborne, 2000). The relationship between the independent variables and the dependent variables is estimated by minimizing the sum of squares in the difference between the observed and predicted dependent variables. This means that the squared error will be minimized, which results in a better explanatory power of the model.

A great advantage of the OLS regression model is that it allows to investigate the causal effect between multiple independent variables and a single dependent variable (De Veaux, Velleman, & Bock, 2015; Uyanık & Güler, 2013). This makes it a powerful model to answer complex research questions. OLS is also known for being a simple method that is easy to use for analyzing and interpreting findings. However, one disadvantage of this method is that it does not control for endogeneity. Potential endogeneity occurs when an independent variable might have a reversed causal relationship with the dependent variable (Chu, 2009). Prior studies show that there is potential existence of endogeneity in corporate governance studies (Bin-Sariman et al., 2016; Fields et al., 2012; Usman et al., 2019; Yeung & Lento, 2018). In this context, potential endogeneity might occur between the cost of debt and board variables. In other words, do board of directors lead to lower cost of debt, or does firms with low cost of debt attract directors? Hashim and Amrah (2016) claim that in such studies almost all independent variables are endogenous. Therefore it is impossible to fully eliminate endogeneity concerns (Lin et al., 2011). However, many studies conduct a robustness test to control for endogeneity.

Before conducting any analysis, certain assumptions must be met. The two basic assumptions for any linear regression are that, first, all variables have to be quantitative and metrically scaled. Second, the sample size must contain at least 50 observations to achieve sufficient statistical power. A greater sample size also increases the generalizability of the findings. Furthermore, before conducting the OLS regression model, a univariate analysis must be conducted to control for outliers or multicollinearity. Through generated descriptive statistics, variables could be checked on normality by skewness and kurtosis. A skewness and kurtosis value between the -1 and +1 indicates that the independent variable is normal distributed and not an outlier (Uyanık & Güler, 2013). Next, independent variables are not allowed to be strongly correlated with each other, which is known as multicollinearity. As a consequence of multicollinearity, the findings will not be precise and therefore will not allow to investigate the true effect of the independent variable on the dependent variable. In order to check for multicollinearity the Variance Inflation Factor (VIF) must be calculated for each

independent variable (Maseda et al., 2015). For the assumption to be met the VIF score must be below 10 (Arosa et al., 2013).

When the assumptions mentioned above are met, the assumptions for the OLS regression model also must be met to determine whether the data is sufficient to use the model. Thereby allowing to establish reliable and valid findings. First, there must be a linear relationship between the independent variables and the dependent variables. Linearity could be tested by plotting the independent and dependent variables into a partial regression plot. If the pattern shows a linear pattern, the linearity assumption is met (De Veaux et al., 2015). Second, the variance of error terms must be consistent, which is also called homoscedasticity. To assumption will be checked by creating a scatterplot with the residuals (De Veaux et al., 2015). When the spread of residuals around the lines are constant the assumption is met. Third, the residuals must be independent from each other. This assumption is called the independency assumption. Independency or errors can only be ensured by means of random sampling. Random sampling allows the data to be representative of the population (De Veaux et al., 2015). Fourth, the error terms must be normally distributed, also known as the normality assumption. Normality could be checked by the histogram of the residuals (Uyanık & Güler, 2013). In case the histogram looks nearly normal the assumption is met (De Veaux et al., 2015). When all the assumptions are met, the OLS regression model can be used.

In short, the OLS regression model is the most frequently used method in corporate governance studies. As it allows to investigate the effect of multiple independent variables on the independent variables, it is also a simple method to interpret the findings. Although this model does not control for endogeneity, which is a common concern for many studies, many studies do a robustness check to control for potential endogeneity. However, to conduct the OLS regression model several assumptions must be met, such as the linearity, normality, and the homoscedasticity assumptions among others. When all required assumptions are met the OLS regression model could be conducted.

3.1.2 Fixed and Random Effects Models

Other frequently used research methods for panel data are the fixed and random effects models (Bin-Sariman et al., 2016; Guney et al., 2020; Hashim & Amrah, 2016; Heyman et al., 2008; Pittman & Fortin, 2004; Shehata et al., 2017; Usman et al., 2019). As both time-variant and time-invariant variables occur in panel data, both effects models differ in how they include such variables in the model.

The fixed effects model estimates the within variance of the effects based on individual changes (Collischon & Eberl, 2020), by including only time-variant variables in the model (Bell & Jones, 2015). It assumes that the studies in the analysis share a common true effect size, and that any difference in effects is due to sampling error (Borenstein, Hedges, Higgins, & Rothstein, 2010). And an important advantage of the fixed effects model compared to the OLS regression model is that it controls for endogeneity by allowing unobserved variables to be correlated with the observed variables (Bin-Sariman et al., 2016; Guney et al., 2020; Usman et al., 2019). However, the model also has a number of disadvantages. As the fixed effects model examines changing individual characteristics it is unable to estimate the effect of independent variables that do not change over time as it filters them out of the model (Bell, Fairbrother, & Jones, 2019; Shehata et al., 2017). Consequently, as time-invariant independent variables may affect the dependent variables, this important information will be lost in the fixed effects models. Furthermore, excluding time-invariant variables could also cause heterogeneity bias. Although to avoid heterogeneity bias dummy variables could be included in the model (Bell & Jones, 2015). However, overuse of dummy variables can lead to noise in the model that could reduce useful information. Lastly, a valid point made by Collischon and Eberl (2020) is that the fixed effects model has a lower statistical power than the OLS regression model because the former

uses smaller number of observations to estimate the within-individual changes over time. Therefore, results might not be generalizable to the population.

The random effects model estimate the error variance of the effects across the individuals (Hashim & Amrah, 2016). In contrast to the fixed effects model, the random effects model also contains time-invariant variables in addition to the time-variant variables, because it assumes that the unobserved variables are not correlated with the observed variables (Guney et al., 2020). As both time-variant and -invariant variables are included, this model allows to investigate more complicated research questions (Bell et al., 2019). However, this model is used when it is expected that the difference between individuals affect the dependent variable. Another difference from the fixed effects model is that the random effects model assumes that all studies in the analysis might share a common effect size but it is also possible that the effect size differs from study to study (Borenstein et al., 2010). Therefore, it is expected that no sampling error will occur. Meaning that the results are generalizable to the population. Moreover, because this model includes time-variant and time-invariable variables heterogeneity bias will not exist (Bell & Jones, 2015). In this respect, the difference between the fixed and random effects models is that there is no need to use dummy variables to control for heterogeneity in the random effects model. However, an important disadvantage of this model is that it does not control for endogeneity. Unobserved variables are not allowed to be correlated with the observed variables (Hashim & Amrah, 2016). Therefore, in case variables are endogenous, fixed effects model is a more appropriate model than the random effects model. However, most studies conduct a robustness check to control for endogeneity.

To be sure which method is most appropriate to use with regards to the panel data, several tests can be performed. First, researchers could determine whether the fixed effects model or the OLS regression model is the most suitable research method by applying the F-test (Usman et al., 2019). The null hypothesis for the F-test states that the unobserved fixed effects is equal to zero (Liu et al., 2014), meaning that the fixed effects are equal across all individuals. Thereby suggesting that the OLS regression model is more appropriate than the fixed effect model. However, when the test is significant and the null hypothesis is rejected it could be concluded that the fixed effect model is more suitable than the OLS regression model. Second, the Breusch-Pagan (LM) test is conducted to determine whether the random effects model or OLS regression model is more appropriate to use (Hashim & Amrah, 2016), by testing for random effects in the model. Again, the null hypothesis states that the OLS regression model is the appropriate method. When the result of the LM test is significant and the null hypothesis is rejected it indicates that the random effects model is preferred (Usman et al., 2019). Lastly, the Hausman test is regularly used to compare which of the effects models is most appropriate. This is a test that investigates whether the between and within effects differ (Bell et al., 2019; Bell & Jones, 2015). The null hypothesis suggests that that the random effects model should be used. In case of significant results, the null hypothesis gets rejected and the fixed effects model is more suitable than the random effects model (Bin-Sariman et al., 2016).

It could be concluded that the fixed and random effects models greatly differ from each other. The fixed effects model merely estimate the within effects based on time-variant variables, assuming the studies have a common effect size. On the other hand, the random fixed effects model estimates the between effects based on time-variant and -invariant variables, assuming that studies might also differ in effect size. However, each model has it disadvantages. For the fixed effects model it is that it does not estimate the effect of time-invariant variables, which is considered lost information and might cause heterogeneity problems. Although heterogeneity problems do not exist in the random effects model, this model does not control for endogeneity problems. Which is an important difference between the models. To ensure that the correct model is used there are several tests to conduct. The F-test is conducted to decide between the OLS regression model and the fixed effects model. The Breusch-Pagan (LM) test is conducted to decide between the OLS regression model and the random

effects model. And lastly, the Hausman test is conducted to decide which effects model is the most appropriate to use.

3.1.3 Hierarchical Multiple Regression

Although hierarchical multiple regression is not much used in panel data and corporate governance studies, several studies have conducted this statistical model (Amrah et al., 2015; Calabrò et al., 2009; Esa & Zahari, 2016). For example, Amrah et al. (2015) used this method to test the effect of family ownership control on the relationship between board effectiveness and cost of debt. Hierarchical multiple regression is a statistical method that estimate the effect of multiple variables on the dependent variable. It is considered an extension of the multiple regression method. With the hierarchical multiple regression it must be decided on the basis of theoretical hypotheses in which order the independent variables are added to the model, instead of adding all independent variables at once (Petrocelli, 2003). By entering independent variables at different steps the R^2 value changes (Petrocelli, 2003). R^2 value shows how much of the independent variable is explained by the model. This method focuses on the overall model and therefore models are compared as the R^2 value changes to control for the effect of the entered variables. Another advantage of the hierarchical multiple regression is that it is an appropriate method to examine moderating effects (Baron & Kenny, 1986; Frazier, Tix, & Barron, 2004). A moderating effects is the effect of an interaction variable on the relationship between an independent and dependent variable (Baron & Kenny, 1986). According to Frazier et al. (2004), moderating variables are usually included to increase the understating of this relationship and its outcome. However, a disadvantage of this method is that is has lower statistical power to estimate the interaction effect (Frazier et al., 2004).

Frazier et al. (2004) state that the hierarchical regression model should be conducted within three steps. First, the independent variables have to be regressed against the dependent variable. Second, the moderating variables should be entered. Third, the interaction variables should be added to the model. Since Calabrò et al. (2009) does not test moderating variables, their hierarchical analysis differs slightly. The first step is running the model by regressing only control variables against the dependent variable. In the second step the board members characteristics independent variables are added to the model. And in the third step the remaining board tasks independent variables are entered in the model. Amrah et al. (2015), on the other hand, conduct the method in four steps. First, the control variables are regressed against the dependent variable. For the second model, independent variables are added to the model. In the third model, the moderator variable is entered in the model. And lastly, the interaction variable included in the model with the control, independent and control variables. However, to conduct the hierarchical multiple several assumptions must be met. These are the same as the earlier mentioned assumptions of the OLS regression model: linearity, homoscedasticity, normality, independency, and multicollinearity.

To conclude, the hierarchical multiple regression is an statistical model that is appropriate to examine moderating effects. This model is executed within 3 steps. Based on theory it is decided in which order the independent variables are entered into the regression model. This differs from the OLS regression model, in which all independent variables are entered into the regression model at once. Another difference between the OLS regression and the hierarchical multiple regression is that the latter focuses on the changing R^2 value to see the effect of the added variables instead of the estimate effect of the individual variables. One similarity between the two methods is that the same assumptions must be met before conducting the hierarchical multiple regression model. However, the hierarchical multiple regression model does have a lower statistical power to estimate interaction effects, compared to the OLS model.

3.1.4 Two-Stage Least Square

The Two-Stage Least Square (2SLS) regression model is a statistical model that is used to address endogeneity problems (Anderson et al., 2003; Bennedsen et al., 2008; Fields et al., 2012; Guney et al., 2020; Hashim & Amrah, 2016; Heyman et al., 2008; Lin et al., 2011; Lorca et al., 2011; Sánchez-Ballesta & García-Meca, 2011; Usman et al., 2019; Yeung & Lento, 2018). The 2SLS regression is considered to be an extension of the OLS regression. Compared to the OLS regression method, the 2SLS is able to overcome endogeneity by estimating instrumental variables. Endogeneity bias means that an independent variable is correlated with the error term, which could occur through omitted variables, measurement error, or simultaneous bias (James & Singh, 1978). However, the principle behind the 2SLS regression is the use of instrumental variables to estimate the predicted values of endogenous variables that are not correlated with the error term (Lorca et al., 2011). Instrumental variables are substitutes for endogenous variables, this is usually the independent variable. An instrumental variable explains the causal effect of an independent variable on the dependent variable (Aggarwal et al., 2011; Martens, Pestman, de Boer, Belitser, & Klungel, 2006), without having a direct effect on the dependent variable and correlation with the error term (Bollen, 1996).

However, as the name implies, the 2SLS is carried out in two stages. In the first stage a regression is formulated in which the instrumental variables are regressed against the endogenous variable and an predicted value is calculated for this endogenous value (James & Singh, 1978; Walstad, 1987), which is not correlated with the error term. This regression is also referred as reduced-form. In the second stage the predicted values, calculated in stage one, are regressed against the dependent variable (James & Singh, 1978; Walstad, 1987). To use the 2SLS regression method, a number of assumptions must be met. James and Singh (1978) mention the following assumptions: (1) all variables must be measured on interval scales, (2) there must be a linear causality between the independent and dependent variable, (3) instrumental variables (measured causes) should not be correlated with unmeasured causes of the endogenous variable, (4) independent variables should not have random measurement error, and (5) the error term is assumed to be normally distributed.

Although the 2SLS regression method allows to address endogeneity issues it has some disadvantages. First of all, Guney et al. (2020) and Martens et al. (2006) state that in practice it is difficult to find exogenous instrumental variables, because of its strong assumptions. For an instrumental variable to be used it must meet several assumptions. First, the instrumental variable should be correlated to the independent variable (Martens et al., 2006), also referred as the relevance condition. The correlation should not be small, otherwise the instrumental variable will be considered weak. Weak instrumental variables could result in biased 2SLS estimations. Second, the instrumental variable must not be correlated with the error term (Bollen, 1996), also referred as the exogeneity condition. Otherwise, it could threat the validity of the instrumental variable. Third, the instrumental variable is not allowed to directly affect the dependent variable (James & Singh, 1978). Due its effect on other variables, it cannot be considered a substitute for the endogenous variable. Additionally, James and Singh (1978) argue that it is not possible to include all causes of an endogenous variables, assuming that the observed and unobserved causes are likely to be related. Thereby agreeing with Guney et al. (2020) and Martens et al. (2006) stating it is difficult to meet all the assumptions for instrumental variables.

The second disadvantage is that the 2SLS relies on strong instrumental variables (Bennedsen et al., 2008), because weak instruments result in biased estimations (Guney et al., 2020). Instrumental variables are weak when they are weakly correlated with to the independent variable. There are several methods to examine the strength of the instruments. To test the strength of the instruments in the first stage Bennedsen et al. (2008) and Aggarwal et al. (2011) use the F-test to see whether the outcome is significant. The F-test is considered significant when the value is at least 5 and preferably 10. Aggarwal et al. (2011) also conduct the Hansen's overidentification test to test the validity of the

instruments, because they have more instrumental variables than endogenous variables. And Bollen (1996) uses the R^2 value to check the quality of the instrumental variable. When the R^2 value is low, for example lower than 0.1, this indicates that the instruments are weak. Although, in case of weak instruments, researchers could use other and better instrumental variables or drop weak instruments, it is easier said than done because a lot of instruments are needed to do that. Therefore Martens et al. (2006) claim that is if often difficult to obtain strong instrumental variables.

Briefly summarized, the 2SLS regression method is a statistical model used to overcome endogeneity problems in studies. This method is carried out in two stages, wherein the first stage the instrumental variables are created and regressed against the endogenous variable to calculate the predicted value, which will be used in the second stage where these values will be regressed against the dependent variable. Although the 2SLS relies on strong instrumental variables several assumptions have to be met. Which makes it difficult to create strong instrumental variables.

3.2 Research design

Previous papers have shown the appropriateness of the OLS regression method in corporate governance studies, such as Anderson et al. (2003), Bhojraj and Sengupta (2003), Fields et al. (2012), Lin et al. (2011), Lugo (2019), Usman et al. (2019) to name a few. Considering it is the most applied research method, it has been decided apply the OLS regression method for the investigation of the effect between board of directors and cost of debt and the moderating effect of ownership structure. Although the OLS regression method allows to estimate moderating effects, it is remarkable that most studies mainly investigate direct effects, therefore it is interesting to investigate whether the result of this study will differ greatly from the results of previous studies. That aside, the OLS regression model is easy to use, making it easy to analyze and interpret the results. And as it is the most common used method it allows this research to compare with other studies, to confirm the results of this study.

Also compared with the aforementioned methods, the OLS regression method appears to be the most appropriate method. Although the fixed effects model allows to analyze the impact of independent variables over time, it would not be suitable for this research. This is because the fixed effects model excludes all time-invariant variables, which could be problematic when examining board and ownership variables. Because boards and ownership might not change over time, especially in SMEs. In this case, the random effects model would be a better method to use. So, in order to tests whether the random effects model is more appropriate than the OLS regression model the Breusch-Pagan test must be done. However, it is not possible to perform this test in SPSS. And since the random effects model does not control for endogeneity, the OLS regression model is easier to perform. Furthermore, although hierarchical multiple regression is an appropriate method to examine moderating effects, it merely focuses on the process and order of adding and removing each variable to examine its changing effect on the overall model. Because this is not the goal of this research, this method will not be conducted. Lasty, many researchers have conducted the 2SLS technique as a robustness test to deal with endogeneity. As it depends on strong instrumental variables, based on strong assumptions, it complicates the method. Therefore, it is easier to conduct the OLS regression model than the 2SLS regression. And in terms of endogeneity, endogenous variables will be lagged by one year to reduce endogeneity bias. This will be discussed in more detail in section 3.5.

To be able to apply the OLS regression model, a number of conditions must be met. This investigation uses binary, interval, and ratio scaled variables, thereby meeting the first assumption of using only metrically scaled variables. Also, as this research investigates European SMEs, it allows to have a sample size of at least 2.000 observations, which meets the minimum sample size of 50. Knowing that the OLS regression model is sensitive to outliers, there is a possibility that extreme values may occur. As outliers are not necessarily a problem, they could drastically change the outcome of the results and even lead to skewness. There are two methods to address this problem. A frequently used

method is winsorizing extreme values, whereby extreme values are transformed into the value of the desired percentiles. For example, Guney et al. (2020) and Vander Bauwhede et al. (2015) winsorized their data at the 5th and 95th percentile, whereas Van Caneghem and Van Campenhout (2012) and Zheng (2019) winsorized their data at the 1st and 99th percentile, and Lin et al. (2011) even at 0.5%. This way, winsorizing outliers allows data to maintain its population features (Guney et al., 2020). Another method used is trimming extreme values. Lorca et al. (2011) and Sánchez-Ballesta & García-Meca (2011) use this method to discard observations outside the 95th or 99th percentile. As Pittman and Fortin (2004) address, extreme values should be trimmed unless they could be replaced, because excessive trimming could increase their standard errors. Lastly, the natural logarithm is a frequently used method to normalize the distribution of a skewed variable (Lin et al., 2011; Ramly, 2013). However, which method to use during data analyzing depends on the nature of the outlier. However, if the outliers are reasonable then it is most likely to be retained as they are probably legitimate. Lastly, if multicollinearity occurs, the correlated variable will be removed.

3.3 Regression model

With the goal to examine the effect of board of directors on cost of debt and the moderating effect of ownership structure, 2 models will be used. Following the examination structure of Desender et al. (2013) and Li et al. (2020) by starting with the examination of the effect of the independent variables and in the following models also the effect of the moderating variables. In the first model the independent variables board size, board independence, board gender diversity, and board director ownership, and all control variables (total assets, ROA, sales growth, leverage, collateral, interest coverage, and industry) are regressed against the cost of debt. Thereby testing hypotheses 1 to 4 using the following model:

$$COD_{it} = \beta_0 + \beta_1(B\_SIZE)_{it} + \beta_2(B\_IND)_{it} + \beta_3(B\_GEN\_DIV)_{it} + \beta_4(B\_DOS)_{it} + \beta_5(CONTROL)_{it} + \alpha_j + \varepsilon_{it} \quad (1)$$

Where:

COD_{it} =	Cost of debt of firm i in year t
β_0 =	Intercept
B_SIZE_{it} =	Board size of firm i in year t
B_IND_{it} =	Board independence of firm i in year t
$B\_GEN\_DIV_{it}$ =	Board gender diversity of firm i in year t
B_DOS_{it} =	Board director ownership of firm i in year t
$CONTROL_{it}$ =	Control variables of firm i in year t
α_j =	Industry fixed effect
ε_{it} =	Error term

The second model includes independent variables, control variables, and the moderating variables, regressed against the cost of debt. Thereby testing hypothesis 5 and 6. To better allow examining the effect of ownership on the entire board and not only on the individual board characteristics, the independent variables board size, board independence, board gender diversity, and board director ownership will be composite into one variable: board effectiveness. For the examination of hypothesis 5 and 6 the following model will be used:

$$COD_{it} = \beta_0 + \beta_1(B\_EFFECT)_{it} + \beta_2(OS\_CON)_{it} + \beta_3(OS\_FAM)_{it} + \beta_4(B\_EFFECT * OS\_CON)_{it} + \beta_5(B\_EFFECT * OS\_FAM)_{it} + \beta_6(CONTROL)_{it} + \alpha_j + \varepsilon_{it} \quad (2)$$

Where:

COD_{it} =	Cost of debt of firm i in year t
β_0 =	Intercept
B_EFFECT_{it} =	Board effectiveness of firm i in year t
OS_CON_{it} =	Concentrated ownership of firm i in year t

OS_FAM_{it} =	Family controlled ownership of firm i in year t
$B\_EFFECT * OS\_CON_{it}$ =	Interaction term board effectiveness and concentrated ownership of firm i in year t
$B\_EFFECT * OS\_FAM_{it}$ =	Interaction term board effectiveness and family ownership of firm i in year t
$CONTROL_{it}$ =	Control variables of firm i in year t
α_j =	Industry fixed effect
ε_{it} =	Error term

Ultimately, the coefficients will be analyzed and compared to what extent they are affected by the addition of the moderating variables.

3.4 Variables measurement

3.4.1 Dependent variable

Cost of debt. In the literature of finance, the interest rate on borrowed financing is used as a proxy for the cost of debt. However, because there is not enough data on debt or firms having multiple debts (Chen et al., 2014; Ramly, 2013), most studies use the average interest rate as a proxy for the cost of debt. There are alternative measurements to calculate the cost of debt, such as the credit spread (Bhojraj & Sengupta, 2003; Byun et al., 2013), yield spread (Anderson et al., 2003, 2004; Bhojraj & Sengupta, 2003), and all-in-spread drawn (AISD) (Aslan & Kumar, 2012; Fields et al., 2012; Lin et al., 2011; Lugo, 2019). All these measurements use the difference in yield between 2 bonds. For credit and yield spread this is Treasury bond and bond security, for all-in-spread drawn it is based on the spread over LIBOR on a loan. Similar to Ramly (2013), due to unavailable data in Orbis about yield and credit spreads, it has been decided to use one measurement for the cost of debt. Following most studies (Amrah et al., 2015; Chen et al., 2014; Hashim & Amrah, 2016; Li et al., 2016; Li et al., 2020; Lorca et al., 2011; Pittman & Fortin, 2004; Ramly, 2013; Sánchez-Ballesta & García-Meca, 2011; Usman et al., 2019; Vander Bauwhede et al., 2015; Zhai, 2019), the cost of debt (*COD*) is computed as the firm's interest expense divided by its average long-term and short-term debt of the given year. As the average debt is calculated by the debt at the beginning and end of the year. However, in order to comply with the assumptions of the OLS method, it has been decided to use the natural log of the cost of debt to obtain reliable results. This deviates from the measurement in previous studies, in which the normal COD value is used.

3.4.2 Independent variables

For the measurement of the effectiveness of board of directors 4 variables are measured. To test hypotheses 1 to 4, each variable will be measured individually. However, in order to test hypotheses 5 and 6, the board's effectiveness is measured as a composite variable. Therefore, an alternative measurement is needed for each board variable. Table 1 summarizes the measurement of the variables.

Board size. Board size (*B_SIZE*) will be measured as the total number of directors on the board (Fields et al., 2012; Lorca et al., 2011). Larger boards contain a variety of members with different knowledges and experiences (Hashim & Amrah, 2016). This allows boards to better monitor management by dividing monitoring work to the appropriate members. Also, debtholders view large boards effective monitors as they are able to provide financial transparency. However, for the alternative measurement of board size, the variable equals 1 when the board size is higher than the mean and 0 otherwise.

Board independence. Independent directors (*B_IND*) are defined as directors that have no business relationship with the firm other than their directorship (Anderson et al., 2004). Due to their expertise and objectivity, independent directors contribute to the effectiveness of board of directors (Amrah et al., 2015). While there is no direct information on whether the directors are independent, comparable to the case of Rahaman (2011), Orbis does provide information on directors that practice executive functions within the company. Therefore, directors that do not perform any executive

functions within the firm are used as a proxy for independent directors. However, there are two ways to measure board independence. The first way is by using the number of independent directors on the board. The second way is by using the proportion of independent directors on the board. Following prior studies (Anderson et al., 2004; Desender et al., 2013; Lorca et al., 2011), the latter will be used to measure board independence. As for the binary variable, board independence will be measured by assigning a value of 1 to the variable when the proportion of independence is higher than the mean, otherwise it equals 0.

Board gender diversity. For the measurement of board gender diversity (*B_GEN_DIV*), the proportion of female directors on the board will be used (Usman et al., 2019; Yeung & Lento, 2018; Zhai, 2019). The presence of women in boards has a positive significant effect on the effectiveness of boards. As the proportion of female directors increase the more they have influence on board decisions and thereby also have better effect on monitoring. However, for the alternative measurement of board gender diversity, the value of the variable equals 1 when the proportion of female directors is higher than the mean and 0 otherwise.

Board director ownership. Directors with ownership is defined as directors having a stake in the firm. As directors are owners, they have greater incentives to monitor management and would be risk averse (Bhagat et al., 1999; Lorca et al., 2011), in favor of debtholders. Therefore, it is expected that an increase in the number of director owners also increase the effectiveness of boards. Most studies measure director ownership as the percentage of total amount of equity hold by the directors (Lorca et al., 2011; Ramly, 2013; Sánchez-Ballesta & García-Meca, 2011; Zhai, 2019). However, Orbis does not provide such information on directors. Therefore, consistent with Amrah et al. (2015), Bin-Sariman et al. (2016), and Fields et al. (2012), the proportion of directors that own equity in the firm will be used as a proxy for (board) director ownership (*B_DOS*). For the alternative measurement of board ownership, the value of the variable equals 1 when the proportion of director ownership is higher than the mean, otherwise 0.

Board effectiveness. Many have examined ownership structure on individual board characteristics, while relatively little has examined the effect of ownership structure on the entire board of directors. To have a better insight on how ownership affects the entire board, the composite variable of the board variables will be used as a proxy for board effectiveness (*B_EFFECT*). Therefore, following Bin-Sariman et al. (2016), Hashim and Amrah (2016), Ramly (2013), and Yeung and Lento (2018) the independent variables board size, board independence, board gender diversity, and board director ownership will be composite into one variable, representing the total boards' effectiveness, based on summed binary variables. Since all four independent variables are expected to have a negative relationship with the cost of debt, it is possible to compose them into one variable. Thereby assuming that board effectiveness also has a negative relationship with the cost of debt. Comparable to Yeung and Lento (2018), the boards variables will be transformed into binary variables, equaling 1 if the values are higher than the mean, otherwise it will equal 0. Then, the values of these variables are summed and create an overall score ranging between 0 and 4. Four (4) is the highest score, indicating the highest board effectiveness, while zero (0) is the lowest possible score, indicating the lowest board effectiveness.

3.4.3 Moderating variables

Concentrated ownership. In literature there is no clear definition of concentrated shareholder and how to measure this variable. For example, Li et al. (2020) define concentrated shareholder as an ultimate owner holding the largest control among all shareholders. According to La Porta et al. (1999), shareholders should hold at least 10% of the shares, to make a significant impact on the firm. While other papers agree at the minimum of 5% (Amrah et al., 2015; Hashim & Amrah, 2016; Kim et al., 2007; Ramly, 2013), or even 20% (Desender et al., 2013). Lin et al. (2011) agree with La Porta et al. (1999),

saying that in case a firm has no owners with 10% of the shares, the firm is classified as widely held. On the other hand, Feito-Ruiz and Renneboog (2017), Hernández-Cánovas et al. (2016) and Sánchez-Ballesta and García-Meca (2011) define concentrated shareholders as the proportion of shares hold by the largest shareholders, with no minimum proportion of shares owned. Following this criterion, ownership concentration (*OS_CON*) will be measured by the percentage of shares owned by the largest shareholder, without a minimum percentage of shares owned. Which aligns with the goal of this research to investigate the effect of the degree of concentrated shareholder.

Family controlled ownership. As the degree of concentration is already measured in the previous variable, it now would be interesting to examine what the effect of the type of the ownership is. As different types of owners have different goals and pursue different strategies (Desender et al., 2013; Douma et al., 2006), it is expected for controlling shareholders to exert diverse demands from the board and also having different incentives to monitor management. Therefore, for the identification of family controlled ownership binary variables will be used (Amrah et al., 2015; Hashim & Amrah, 2016; Hernández-Cánovas et al., 2016). For family controlled ownership (*OS_FAM*), the variable gest a value of 1 if the ownership is concentrated by an individual or family group and 0 otherwise.

3.4.4 Control variables

The regression models will also contain a number of control variable to investigate which other factors also affect the cost of debt. The literature on SMEs' cost of debt has shown the importance of control variables, as they have significant impact on the cost of debt (Amrah et al., 2015; Anderson et al., 2004; Li et al., 2020; Lorca et al., 2011; Sánchez-Ballesta & García-Meca, 2011). In accordance with prior research, this research includes various firm characteristics.

Firm size. Most studies use total assets as a measurement of firm size (Anderson et al., 2003; Bin-Sariman et al., 2016; Byun et al., 2013; Lorca et al., 2011; Sánchez-Ballesta & García-Meca, 2011). This also aligns with the definition criteria of SMEs. Therefore, total asset (*L_TOTAL_ASSETS*) will be used as a proxy for firm size, which is computed as the natural log of the sum of equity and debt of the firm. Larger firms generate more cash, which is viewed as bearing less financial risks (Vander Bauwhede et al., 2015). Knowing that larger firms have lower default risk, they maintain many resources and enjoy economies of scale with regard to the cost of debt (Amrah et al., 2015; Guney et al., 2020; Lorca et al., 2011).

Firm performance. The variables return on asset (ROA) and sales growth will be used as a proxy for firm performance (Anderson et al., 2004; Chen et al., 2014; Lugo, 2019; Ramly, 2013). As an indicator of firm profitability, return on asset (*ROA*) is calculated by dividing operating profit (EBIT) to total assets. Sales growth (*GROWTH*) measures firm's growth by the percentual change in sales revenue relative to last year's sales revenue. It is expected that an increase in ROA and sales growth, driving firm performance, will result in a lower cost of debt as it carries a lower risk of possible default.

Default risk. The variables leverage, interest coverage, and collateral will be used as a proxy for default risk. Leverage (*LEV*) is an indicator of financial structure and an important factor in the credit risk for debtholders. Because highly leveraged firms form a risk to debtholders, since it will become more difficult to reimburse debt. Thus, highly leveraged firms are expected to have higher cost of debt (Amrah et al., 2015; Sánchez-Ballesta & García-Meca, 2011; Vander Bauwhede et al., 2015). There are several approaches to calculate the leverage ratio. A frequently used measurement is the total liabilities divided by the total assets (Lorca et al., 2011; Martín-Ugedo & Minguez-Vera, 2014; Maseda et al., 2015). Another measurement is dividing the long-term debt to total assets (Anderson et al., 2003, 2004; Desender et al., 2013; Rahaman, 2011; Ramly, 2013). The latter will be used to calculate the leverage. Another important factor for debtholder for assessing default risk is collateral. Collateral (*COLLATERAL*), indicator of assets structure, is the ratio of tangible assets-to-total assets calculated by

dividing tangible fixed assets to total assets. Firms with more tangible assets are considered to be less risky, hence enjoy lower cost of debt (Lorca et al., 2011). Interest coverage (*INT_COV*) is measured by the ratio of operating profit over interest expense. Computed as operating profit (EBIT) divided by interest expense. Lower interest coverage rate reflects greater risk of default, indicating the firm's ability to reimburse it's debt (Hashim & Amrah, 2016).

Industry. In most studies industry variables are added to the regression model to control for possible industry effects (Anderson et al., 2003; Aslan & Kumar, 2012; Byun et al., 2013; D. Chen et al., 2014; Fields et al., 2012; Hashim & Amrah, 2016; Lorca et al., 2011; Lugo, 2019; Pittman & Fortin, 2004). As most studies create industry dummies based on SIC codes or Fama and French's industry classification there is a difference between the use of industry classification. For example, some create industry dummy variables based on 1-digit SIC code (Guney et al., 2020; Heyman et al., 2008; Maseda et al., 2015; Pittman & Fortin, 2004; Vander Bauwhede et al., 2015), while others use 2-digit SIC code (Bennedsen et al., 2008; Chu, 2009; Lugo, 2019). Although most studies create industry dummy variables based on SIC codes, Bin-Sariman et al. (2016), Hashim and Amrah (2016), and Shehata et al. (2017) use industry dummy variables equaling 1 if it is an industrial firms and 0 if service. However, this method is not appropriate to control for industry fixed effects as it merely explains whether industrial firms or service firms affect cost of debt. Therefore, following previous studies, as a proxy for industry fixed effect a dummy variable for each industry (*IND_DUM*) will be included in the regression model, based on 1-digit SIC code.

Table 1

Measurement of variables.

Variables	Measurement	Source
Dependent		
COD	Natural log of interest expense/average debt calculated the beginning and end of the year.	(Usman et al., 2019)
Independent		
B_SIZE	The number of directors on the board. Equal 1 if the board size is higher than the mean and 0 otherwise.	(Eisenberg et al., 1998; Lorca et al., 2011)
B_IND	The proportion of independent directors on the board. Equal 1 if the proportion of independent directors is higher than the mean and 0 otherwise.	(Anderson et al., 2004; Maseda et al., 2015)
B_GEN_DIV	The proportion of female directors on the board. Equal 1 if the proportion of female directors is higher than the mean and 0 otherwise.	(Fields et al., 2012; Usman et al., 2019)
B_DOS	The proportion of directors that own shares of the firm. Equal 1 if the proportion of director ownership is higher than the mean and 0 otherwise.	(Amrah et al., 2015; Fields et al., 2012)
B_EFFECT	Sum of the binary variables board size, board independence, board gender diversity, and board director ownership. Ranging from 0 to 4. (0 = low board effectiveness, 4 = high board effectiveness)	(Amrah et al., 2015; Hashim & Amrah, 2016)
Moderating		
OS_CON	Percentage owned by the largest shareholder.	(Sánchez-Ballesta & García-Meca, 2011)
OS_FAM	Equal 1 if controlling shareholder is individual/family and 0 otherwise.	(Anderson et al., 2003)
Control		
L_TOTAL_ASSETS	Natural log of total equity + total debt.	(Anderson et al., 2004)
ROA	Operating profit (EBIT)/total assets.	(Lorca et al., 2011)
GROWTH	(Sale year 1 – Sale year 0)/Sale year 0.	(Vander Bauwhede et al., 2015)
LEV	Long-term debt/total assets.	(Anderson et al., 2004)
COLLATERAL	Tangible fixed assets/total assets.	(Sánchez-Ballesta & García-Meca, 2011)
INT_COV	Operating profit (EBIT)/interest expense.	(Lorca et al., 2011)
IND_DUM	Equal 1 for the concerned industry and 0 if other industry.	(Anderson et al., 2003)

3.5 Robustness check

To confirm the validity of the results from the OLS regression method a number of robustness checks will be conducted. The principle behind robustness checks is to test whether the results are consistent under different circumstances. Thereby ensuring that the results are not based on chances.

The first robustness test is to control for endogeneity. A frequently used method to solve endogeneity problems is lagging variables by one year. For example, Sánchez-Ballesta and García-Meca (2011) use one year lagged ownership structure to test the endogeneity between ownership structure and cost of debt, because firms with lower cost of debt might attract investors. Also Lorca et al. (2011) did a robustness test with one year lagging board variables to examine the relationship between board of directors and cost of debt, because of the possibility that cost of debt might affect board of directors. Lagged variables are considered a cause of the associated current value (James & Singh, 1978). Which variables are considered endogenous differs across studies. For instance, while Lugo (2019) lagged all variables, Desender et al. (2013), Usman et al. (2019), and Liu et al. (2014), lagged only the independent variables. In accordance with previous studies all independent variable will be lagged by one year. However, since many control variables face endogeneity problems it has been decided to lag all control variables with one year. To test hypotheses 1 to 4, the following equation model with one year lagged variables will be used:

$$COD_{it} = \beta_0 + \beta_1(B\_SIZE)_{it-1} + \beta_2(B\_IND)_{it-1} + \beta_3(B\_GEN\_DIV)_{it-1} + \beta_4(B\_DOS)_{it-1} + \beta_5(CONTROL)_{it-1} + \alpha_j + \varepsilon_{it} \quad (3)$$

Where:

COD_{it} =	Cost of debt of firm i in year t
β_0 =	Intercept
B_SIZE_{it-1} =	Board size of firm i in year t-1
B_IND_{it-1} =	Board independence of firm i in year t-1
$B\_GEN\_DIV_{it-1}$ =	Board gender diversity of firm i in year t-1
B_DOS_{it-1} =	Board director ownership of firm i in year t-1
$CONTROL_{it-1}$ =	Control variables of firm i in year t-1
α_j =	Industry fixed effect
ε_{it} =	Error term

To test hypotheses 5 and 6, the following regression model with one year lagged variables will be used:

$$COD_{it} = \beta_0 + \beta_1(B\_EFFECT)_{it-1} + \beta_2(OS\_CON)_{it-1} + \beta_3(OS\_FAM)_{it-1} + \beta_4(B\_EFFECT * OS\_CON)_{it-1} + \beta_5(B\_EFFECT * OS\_FAM)_{it-1} + \beta_6(CONTROL)_{it-1} + \alpha_j + \varepsilon_{it} \quad (4)$$

Where:

COD_{it} =	Cost of debt of firm i in year t
β_0 =	Intercept
B_EFFECT_{it-1} =	Board effectiveness of firm i in year t-1
OS_CON_{it-1} =	Concentrated ownership of firm i in year t-1
OS_FAM_{it-1} =	Family controlled ownership of firm i in year t-1
$B\_EFFECT * OS\_CON_{it-1}$ =	Interaction term board effectiveness and concentrated ownership of firm i in year t-1
$B\_EFFECT * OS\_FAM_{it-1}$ =	Interaction term board effectiveness and family ownership of firm i in year t-1
$CONTROL_{it-1}$ =	Control variables of firm i in year t-1
α_j =	Industry fixed effect
ε_{it} =	Error term

As can be seen, main regression models 1 and 2 do not contain time fixed effect. While most articles merely include industry fixed effects in their regression models to test industry effect, a generous number of articles that also include time fixed effect to test for possible time effect (Anderson et al., 2003, 2004; Lugo, 2019; Sánchez-Ballesta & García-Meca, 2011). Therefore, the second robustness check is conducted to test for time effect. As with industry effect, a dummy variable

will be created for each year that will act as a proxy for time fix effect. The regression model will then look like this, where γ_t is time fixed effect:

$$COD_{it} = \beta_0 + \beta_1(B\_SIZE)_{it} + \beta_2(B\_IND)_{it} + \beta_3(B\_GEN\_DIV)_{it} + \beta_4(B\_DOS)_{it} + \beta_5(CONTROL)_{it} + \gamma_t + \alpha_j + \varepsilon_{it} \quad (5)$$

$$COD_{it} = \beta_0 + \beta_1(B\_EFFECT)_{it} + \beta_2(OS\_CON)_{it} + \beta_3(OS\_FAM)_{it} + \beta_4(B\_EFFECT * OS\_CON)_{it} + \beta_5(B\_EFFECT * OS\_FAM)_{it} + \beta_6(CONTROL)_{it} + \gamma_t + \alpha_j + \varepsilon_{it} \quad (6)$$

For the third robustness test, a test will be done in which the data is cleaned up even more. Although the descriptive statistics in Table 5 and in Appendix A approximately align with the statistics in similar articles, the sample may contain data that is redundant. For example, in Appendix A cost of debt has a minimum value of 0. Although the cost of debt is being investigated, it is questionable whether companies with 0% cost of debt are relevant to include in the study. The same goes for leverage. Again, it is questionable whether it is interesting to calculate the cost of debt of companies that have no debt. Moreover, in both Table 5 and Appendix A interest coverage has a negative minimum value. This means that companies with negative interest coverage cannot cover their interest costs. A valid question is asked whether it is relevant to include such companies in the research. That is why for this robustness test data is further cleaned up. This robustness check examines the extent to which the exclusion of companies that do not have interest costs and debts influences the result. To perform the test, first, all companies with a cost of debt and leverage value of 0% will be removed from the sample. Subsequently, all companies with negative interest coverage will be removed. Regression models 1 and 2 will be used for this robustness test.

Although theories have different assumptions regarding the effect of board of directors on cost of debt, unexpected results may emerge. To confirm the main results, it has been decided to perform a fourth robustness test in which the variables board independence and board gender diversity are measured in 3 different ways. Table 2 presents the measurements. The fifth robustness check that will be conducted is performing an OLS analysis for each year. There is a possibility that data on boards and ownership might not change over time, and therefore it is interesting to check whether the effect board of directors on cost of debt and the moderating effect on that relationship is explained by year. This means that if the results in a particular year differ remarkably from the other years, it may be due to an incidental event in that year. Lastly, a sixth robustness check will be conducted based on country. This test allows to investigate how board and ownership characteristics differ across countries and how this affect the cost of debt. For the third, fourth, and fifth robustness checks regression models 1 and 2 will be used.

Table 2

Alternative measurements of board independence, gender diversity, and director ownership.

Variable	Measurement	
Board independence		
b_indep	Measure 1	The number of independent directors.
b_non-indep	Measure 2	The number of non-independent directors.
b_%non-indep	Measure 3	The proportion of non-independent directors.
Board gender diversity		
b_female	Measure 1	The number of female directors.
b_male	Measure 2	The number of male directors.
b_%male	Measure 3	The proportion of male directors.

4. Data and sample

4.1 Data

To test the hypotheses, data from a sample of European SMEs will be used. The sample consists of European SMEs in the period between 2013 and 2018, a period of 6 years. During the period of 2013 to 2018, Europe has experienced an economic growth (Eurostat, 2020), which is expected for SMEs to apply for more debt financing. This economic growth also resulted in the increasing number of SMEs. Consequently, allowing this study to use a larger sample of European SMEs. Consistent with prior studies on European SMEs (Serrasqueiro & Caetano, 2015; Van Caneghem & Van Campenhout, 2012; Vander Bauwhede et al., 2015), SMEs are defined according to the definition of the European Commission of SMEs. The European Commission defines companies as SMEs as they meet the following criteria: (1) having less than 250 employees, and (2) a turnover less than €50 million or a balance sheet total of less than €43 million. However, these criteria also include micro-businesses and since this research will only investigate SMEs, micro-businesses will be excluded. These are companies that have less than 10 employees and less than €2 million turnover or total assets. Consistent with prior studies, this study excludes firms in the financial, utility and public sector. Such firms have different capital structures than firms in other industries. According to Fama and French (1992) and Pittman and Fortin (2004), these firms have higher leverage, which is normal in these industries, while in other industries high leverage would likely indicate financial distress. Thereby affecting the cost of debt. When it comes to public firms, Heyman et al. (2008) mention that managers in governmental are highly influenced by governmental decisions, therefore have less discretion when making decisions. Also, public firms are most likely non-profit organizations, which differs from regular firms. Besides, debtholders highly value profitable firms. Therefore, all firms with a SIC code 4, 6, and 9 will be removed.

With the goal to investigate European SMEs, country members of the European Union (EU) (27 countries) will be included as they represent Continental Europe. This differs with prior studies that investigate a single to a handful European countries (Andrieu et al., 2018; Krivogorsky et al., 2011; Lugo, 2019; Sánchez-Ballesta & García-Meca, 2011). Thereby, allowing to explain the effect of board of directors and ownership structure on cost of debt from a broader perspective. The choice of including countries of the European Union is based on the fact that most firms located in countries in Continental Europe are part of the EU. This causes countries to have similar political and business climate, and firms using the same accounting principles. As Krivogorsky et al. (2011) and Lugo (2019) state, the remaining difference between the state members are the country-specific characteristics, such as legal origin with the associated shareholders and creditors rights. However, data for this research will be derived from Orbis database, provided by Bureau van Dijk (BVD). Prior papers of Andrieu et al. (2018) and Krivogorsky et al. (2011) employ data from Orbis database. Orbis is known for providing reliable information about firm-specific characteristics. Therefore, information about cost of debt, board of directors, and ownership structure will be gathered from Orbis.

4.2 Sample size

After collecting data on European SMEs, the initial sample consisted of 53,066 European SMEs. At this point, the sample contains many missing values and incomplete data that has to be removed. An example of incomplete data on board of directors is that many companies have no information about the resignation data of a director. As a result, no reliable assumption could be made about in which years a director was active. Such companies have been removed from the sample. For ownership, the incomplete data came mainly from the percentage ownership. Many companies did not have available data on ownership. This made it necessary to eliminate these companies. Starting with removing missing financial data, the sample was reduced by 19,129 observations, resulting into a sample size of

33,937. Next, all missing values and incomplete data on board of directors and ownership has been removed. This led to a reduction of 31,361 observations, which resulted into a final sample size of 2,576 firm observations. Over a 6 year period this will create 15,456 firm year observations. See Table 3 for the sample procedure.

Table 3
Sample procedure.

Steps	Sample size
Initial sample	53,066
Missing financial data	(19,129)
Missing board and ownership data	(31,361)
Final sample	*2,576*
Number of observations	*15,456 (2,576*6)*

After checking the descriptive statistics of the variables, the data appears to contain companies with a total assets value of less than € 2 million and more than € 43 million. This resulted in a reduction of 1,012 observations. Subsequently, a check was made to see whether the data are normally distributed and whether there are linear relationships between the independent and dependent variables. Therefore, the focus was mainly on obvious outliers. To address extreme outliers, the boxplot for each variable is analyzed. Based on the boxplots, it was decided to follow Lorca et al. (2011), Pittman and Fortin (2004), and Sánchez-Ballesta and García-Meca (2011) to trim data at the 99th percentile. To avoid excessive data trimming, the descriptive statistics have been compared to other articles. It has been compared whether enough data has been trimmed and whether the outliers are reasonable. For example leverage, the trimmed observations represent leverage from 91% to 183% (22 observations). After cleaning data and filtering out missing values, 8,742 observations remained. Although a reduction from 15 thousand to 8 thousand observations is much, this is mainly due to the many missing values of board of directors and ownership, because this data is not available for every company for every year.

Table 4 classifies the sample distribution by year, industry and country. Panel A shows that the number of observations increases every year. Although 2018 contains the most observations, the observations are generally spread evenly over 6 years. Looking at Panel B, it shows that the majority of the firms (50.3%) is active in the manufacturing sector, followed by wholesale trade (23.9%). Meanwhile, the agriculture, forestry, and fishing and mining sectors are least represented by the sample, barely 2% of the sample. However, because this research does not focus on industries, the disproportionate representation of each industry is not a problem for the interpretation of the results. On the other hand, problems may arise when interpreting the results for European SMEs. Although this research includes 27 countries (member states of the European Union), only companies from 3 countries remained after the removal of firms with missing data and outliers, see Panel C. In addition, Italy dominates with 72.3% of the sample, followed by Belgium with 22.1% and Latvia with 5.6%. This may violate the external validity of the research, this will be discussed later.

Table 4

Sample distribution by year, industry, and country.

	Frequency	**Percentage**
Panel A: Year		
2018	1,798	20.6%
2017	1,576	18.0%
2016	1,465	16.8%
2015	1,302	14.9%
2014	1,320	15.1%
2013	1,281	14.7%
Total	*8,742*	*100%*
Panel B: Industry		
Agriculture, Forestry, and Fishing	107	1.2%
Mining	47	0.5%
Construction	459	5.3%
Manufacturing	4,395	50.3%
Wholesale Trade	2,090	23.9%
Retail Trade	411	4.7%
Services	1,233	14.1%
Total	*8,742*	*100%*
Panel C: Country		
Belgium	1,934	22.1%
Italy	6,321	72.3%
Latvia	487	*5.6%*
Total	*8,742*	*100%*

5. Results

5.1 Descriptive statistics

Table 5 provides summary statistics for the sample of 8,742 observations. Although some of the variables are logged, Table 5 presents the original values of the variable, because logged values do not provide descriptive information. Appendix A provides a table with descriptive statistics of unbalanced sample. Although the number of observations differ, the descriptive statistics in Table 5 and Appendix A differ slightly.

However, it is remarkable that the cost of debt has an average value of 1.35% while the interest rates vary between the minimum value of 0.02% and the maximum value of 7.92%. This indicates that there are obvious differences in the cost of debt among SMEs. This incident also occurs with Zhai (2019) and Usman et al. (2019), both investigating Chinese A-share listed companies. With roughly the same variation, the cost of debt in this sample differs from large firms. For example, Lorca et al. (2011) and Sánchez-Ballesta and García-Meca (2011) find that Spanish firms have an average debt cost of 7%. For Omani and Malaysian firms this turned out to be 6% and 9% (Amrah et al., 2015; Hashim & Amrah, 2016; Ramly, 2013). Moreover, the mean value also differs from the reported cost of debt mean of 9.6% by Vander Bauwhede et al. (2015) who examined Belgian SMEs. This could mean that SMEs in this sample either pay less interest or cannot borrow large amounts and therefore pay a lower interest rate.

Looking at board variables, board size has a mean of 2.7 directors, with a minimum value of 1 and a maximum value of 17 directors, respectively. This result is relatively lower than the results reported in board studies of SMEs (Arosa et al., 2013; Calabrò et al., 2009; Eisenberg et al., 1998). However, an average board size of 3 board members shows that SMEs generally have a small board size. Given the difference between the third percentile and the maximum value, it can be determined that most SMEs' board contain 1 to 4 board members. Although SMEs have small board sizes, the sample includes SMEs that have board sizes up to a maximum of 17 members. These results also appear to be found in other studies. Machold et al. (2011) and Maseda et al. (2015) study a sample of SMEs with a maximum board size of 10 and 18 members.

Board independence has a mean of 97.42%, indicating that boards mostly consist of directors that do not have ties with the firm. Although this roughly aligns with the board independency of Chuluun et al. (2014) (mean of 91.06%), most SMEs have boards with a lower percentage of independent directors, such as Arosa et al. (2013) with 61.83%, Bennedsen et al. (2008) with 37.5%, Calabrò et al. (2009) with 50%, and Maseda et al. (2015) with 37%. A possible explanation for a high percentage of board independence is the maintained board structure. Firms in Belgium and Italy have the option to choose between a one- or two-tier board structure. While in Latvia, listed companies are required to implement a two-tier board structure. A one-tier board model consists of executive and non-executive directors, while the two-tier board model is composed of two boards: management board and supervisory board. A management board consist of executive directors (management) and a supervisory board consist of non-executive directors. This means that supervisory boards are 100% independent. Although data on board of directors was collected from both board structures, it appears that data was mainly available from supervisory boards.

Board gender diversity shows an average of 12.74% female directors with a median value of 0%. This indicates that most boards hardly contain any women, suggesting that women rarely or do not serve in boards. Although the percentage is relatively low, it is higher than the value reported for Spanish SMEs with an average of 8.4% by Martín-Ugedo and Minguez-Vera (2014). However, a low proportion of women represented on boards is also observed in large firms (Desender et al., 2013; Liu et al., 2014; Usman et al., 2019). Furthermore, board director ownership shows a mean value of 6.88%. This means that on average 6.88% of the directors on a board own shares in the company. They are

therefore regarded as shareholders. It is remarkable that the median and percentile 1 and 3 have a value of 0. This indicates that most SMEs have boards that contain directors who do not own shares of the company. Furthermore, with regard to the composite variable, board effectiveness reports a mean value of 1.82 within the range between 0 and 4. This corresponds to the composite variables of Amrah et al. (2015) and Hashim and Amrah (2016) with a mean value of 1.7. The mean value of board effectiveness is quite on the low side, mainly reflected by the low representation of female directors and directors with ownership.

With a minimum value of 5.31% and a maximum value of 100%, the average value of concentrated ownership is 89.25%. From the table it is observable that between the minimum value of 5% and the first percentile of 96%, the concentration varies greatly and that after the first percentile it quickly moves towards the maximum concentration of 100%. This can also be seen from the median, which also shows a value of 100%. This implies that SMEs in this sample are highly concentrated. This sample has a greater concentrated ownership than reported by Desender et al. (2013) (70%), Ang et al. (2000) (65%), and Hernández-Cánovas et al. (2016) (62.7%). Moreover, family ownership has a mean value of 0.10, which equals 10% of the sample. Meaning that this sample of SMEs consist of 10% family owned SMEs. The proportion of family owners represented in this sample is smaller than that of Anderson et al. (2003), Lin et al. (2011), and Martín-Ugedo and Minguez-Vera (2014), of whom 30%, 45.2%, and 62.7% of the companies are family owned.

However, looking at the control variables there are no exceptional values. The minimum and maximum value of total assets meet the criteria for the definition of European SMEs. This is between € 2 million and € 43 million. With a minimum value of -71.42% and a maximum value of 50.38%, ROA has a reasonable mean value of 2.11%. The mean and median value are close to each other, indicating that the ROA is symmetrically distributed. This explains the low average ROA value compared to previous SME studies (Arosa et al., 2013; Martín-Ugedo & Minguez-Vera, 2014; Maseda et al., 2015). The systematic distribution also applies to sales growth and interest coverage. Sales growth has a mean value of 5.0% and a median value of 3.50% within the range of -97.66% and 99.49%. This time the average growth value appears to be higher than the value reported by Vander Bauwhede et al. (2015) (3.5%). Interest coverage has a mean value of 12.18 and a median value of 5.12 within the range of -65.01 and 88.92. While the mean value is higher than Sánchez-Ballesta and García-Meca (2011) 5.07 coverage, it is lower than Vander Bauwhede et al. (2015) 15.83 coverage. Not to forget to mention, the negative minimum values of ROA, sales growth and interest coverage imply that some SMEs have incurred losses.

However, regarding leverage, a mean value of 15.18% is observed within the range of 0 and 88.44%. Although a maximum leverage of 88.44% is high and mainly implies loss, the table shows that the third percentile has a value of 21.16%. This indicates that most SMEs have a leverage between 0 and 21.16%, confirming that it is difficult for SMEs to obtain external debt financing. With roughly the same range, Anderson et al. (2004) report a mean value of 22%, which is similar to the reported value in Table 5. Compared to other SMEs (Martín-Ugedo & Minguez-Vera, 2014; Maseda et al., 2015; Vander Bauwhede et al., 2015), the average leverage value is low. Collateral has a mean value of 20.27% with a minimum and maximum value of 0 and 92.9%. Similar to leverage, the table shows a third percentile value of 31.25%, which means that most SMEs have a low collateral ranging between 0 and 30%. Compared to other SMEs the average collateral is relatively low. For example, Vander Bauwhede et al. (2015) report a mean value of 28%. A possible explanation is that SMEs have difficulties in accessing external debt financing, reflected by the low leverage, which prevents them from investing in fixed assets. Compared to larger firms, Sánchez-Ballesta and García-Meca (2011) report a higher value of 39%, which is reasonable because large companies generally have more collateral than SMEs.

Table 5

Descriptive statistics.

	N	Mean	Median	Std. Deviation	Min.	Q1	Q3	Max.
COD	8,742	1.35	1.06	1.07	.02	.58	1.81	7.92
B_SIZE	8,742	2.73	2.00	1.79	1.00	1.00	4.00	17.00
B_IND	8,742	97.42	100.00	12.58	.00	100.00	100.00	100.00
B_GEN_DIV	8,742	12.74	.00	24.16	.00	.00	20.00	100.00
B_DOS	8,742	6.88	.00	20.24	.00	.00	.00	100.00
B_EFFECT	8,742	1.82	2.00	.90	.00	1.00	2.00	4.00
OS_CON	8,742	89.25	100.00	21.35	5.31	96.67	100.00	100.00
OS_FAM	8,742	.10	.00	.30	.00	.00	.00	1.00
TOTAL_ASSETS	8,742	17,103,648	15,051,926	10,026,210	2,002,790	8,906,090	23,803,404	42,959,390
ROA	8,742	2.11	2.02	7.52	-71.42	.07	5.31	50.38
GROWTH	8,742	5.00	3.50	19.39	-97.66	-4.15	12.39	99.49
LEV	8,742	15.18	11.04	14.29	.00	4.84	21.16	88.44
COLLATERAL	8,742	20.27	13.02	20.91	.00	3.29	31.25	92.90
INT_COV	8,742	12.18	5.12	20.64	-65.01	1.20	17.73	88.92

Note: This table presents the descriptive statistics of balanced data (filtered missing data), in which it presents normal values instead of logged values for descriptive purposes. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, B_DOS, and B_EFFECT are the independent variables. OS_CON, and OS_FAM are the variables used for the moderating variables. TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, INT_COV are the control variables. COD, B_IND, B_GEN_DIV, B_DOS, OS_CON, ROA, GROWTH, LEV, and COLLATERAL present a percentage value. B_SIZE, TOTAL_ASSETS, and INT_COV present a normal value. OS_FAM is a dummy variable that presents a value (between) 0 and 1.

5.2 Correlation analyses

Table 6 provides the correlation matrix that gives an overview of the correlation coefficients between the cost of debt, board variables, moderating variables, and the control variables. The correlation coefficient ranges in value from -1 to +1. When the coefficients are significant, a value below 0 indicates a negative relationship between the variables, while a value above 0 indicates a positive relationship between the variables. Coefficient values close to 0 indicate no linear relationship between the variables, values close to -1 or +1 indicate a perfect linear relationship between the variables. However, for the sake of brevity, only noteworthy correlations will be discussed.

The correlation coefficient between the cost of debt and board size (-.088), board independence (-.004), board effectiveness (-.037), and concentrated ownership (-.070) show the expected negative sign. However, the correlation between cost of debt and board independence is not significant. Thereby implying that board independence does not affect cost of debt. Lorca et al. (2011) and Li et al. (2016) also find no significant correlation between board independence and cost of debt, but their correlation coefficient shows a positive sign. However, this does not necessarily mean that the variables have no relationship at all. Li et al. (2016) proved that when running the regression model, the variable became significant. On the other hand, the table shows an unexpected positive correlation coefficient between the cost of debt and board gender diversity (.039), board director ownership (.008), and family ownership (.059). Suggesting that these variables increase the cost of debt as their value increases. This time, the correlation between cost of debt and board director ownership does not show a significant relationship. It is remarkable that both board independence and board director ownership have a low coefficient value close to 0. This might explain the insignificant result.

On the other hand, the correlation coefficients between the cost of debt and the control variables ROA (-.223), leverage (.268), collateral (.176), and interest coverage (-.465) are relatively high. ROA, leverage, and interest coverage show the expected direction of the relationship, which correspond to the correlation results of Lorca et al. (2011), Hashim and Amrah (2016), and Li et al. (2016). Growth also has an expected negative correlation with the cost of debt, but it is not significant. However, observing the correlation between the cost of debt and total assets, and collateral, a positive significant relationship is reported. This suggests that an increase in total asset and collateral increases the cost of debt. Although Sánchez-Ballesta and García-Meca (2011) also report a positive correlation

between the cost of debt and total assets, this correlation is not significant. Li et al. (2016), on the other hand, report a significant positive correlation between the cost of debt and collateral.

Looking at the correlations between the board variables, they are positive and significant, except the correlations between board independency and board gender diversity (-.026), and board size and board director ownership (-.047) are negative. This reflects that the more independent directors are present on the boards, the fewer female directors are present. And as board sizes increase, it will contain less directors with ownership. Furthermore, as expected, board effectiveness is highly positive correlated with the board variables. This is obvious because board effectiveness increases as the value of board variables increases. Since these variables will not be included together in one model, this high correlation is not a problem.

Other remarkable correlations are that family ownership is relatively highly correlated with board director ownership (.315). This means that board directors are more likely to own shares of the firm in family owned SMEs than non-family owned SMEs. Also, the high correlation between concentration and family business (-.329) is striking. This indicates that family SMEs are less concentrated than non-family SMEs. Possibly several family members may be involved in the company, which means that the concentration per shareholder is lower. Leverage and collateral (.348) are also highly correlated. This confirms that SMEs finance fixed assets investments with external debt. Finally, a high correlation has been found between ROA and interest coverage (.570). This is similar to the correlation coefficients reported by Hashim and Amrah (2016) (0.587) and Lorca et al. (2011) (0.52). Both variables use the EBIT to measure the variables, this might explain the high correlation. In this case, multicollinearity might be a possible concern. To assess this problem, the VIF value has to be calculated.

Besides the correlation coefficient, the table also provides the VIF value of the variables. This tests whether there is possible multicollinearity between two or more variables. Hashim and Amrah (2016) state that correlation coefficients above ±.70 indicate the possibility of multicollinearity. Although most coefficient values vary between ±.10 and ± 0, there are several variables with high correlation coefficients. For example, the correlation between board effectiveness and board size is .599, and the correlation between ROA and interest coverage is .570. Although these coefficients are below 0.70, the VIF test is done to make sure the variables are not multicollinear. The VIF value starts at 1 and has no limit value. Values close to 1 indicate no multicollinearity, values above 10 indicate high multicollinearity between the variables which might lead to unreliable results. In Table 6 the variables in this research have a minimum VIF value of 1.011 and a maximum VIF value of 1.641, indicating that there are no multicollinearity problems in this research. Naturally, this also applies to the variables with high correlation coefficients.

Table 6

Correlation matrix.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	VIF
1	COD	1														
2	B_SIZE	-.088***	1													1.019
3	B_IND	-.004	.047***	1												1.011
4	B_GEN_DIV	.039***	.070***	-.026***	1											1.040
5	B_DOS	.008	-.047***	.024***	.075***	1										1.021
6	B_EFFECT	-.037**	.599***	.239***	.483***	.344***	1									1.024
7	OS_CON	-.070***	-.003	.019*	-.028***	-.114***	-.013	1								1.121
8	OS_FAM	.059***	-.111***	.020**	.090***	.315***	.086***	-.329***	1							1.138
9	L_TOTAL_ASSETS	.046***	.034***	.027***	-.069***	-.036***	.012	.081***	-.102***	1						1.144
10	ROA	-.223***	.030***	-.006	.030***	.029***	.050***	-.002	.018**	-.048***	1					1.609
11	GROWTH	-.005	.010	.015	-.011	.010	.006	-.013	.015*	-.062***	.140***	1				1.026
12	LEV	.268***	-.017*	.008	.034***	.051***	.044***	-.044***	.099***	.100***	-.189***	-.038***	1			1.204
13	COLLATERAL	.176***	.019*	.014	.049***	-.002	.027***	-.043***	.047***	.209***	-.095***	-.032***	.348***	1		1.262
14	INT_COV	-.465***	.067***	.003	.014	.002	.045***	.023***	-.011	-.036***	.570***	.105***	-.187***	-.097***	1	1.641

Note: This table represents the correlation matrix and the VIF value. ***, **, * Correlation is significant at 1%, 5%, and 10% respectively. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, B_DOS, and B_EFFECT are the independent variables. OS_CON, and OS_FAM are the variables used for the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, INT_COV are the control variables.

5.3 Regression analysis

To answer the research question and test the hypothesis a regression analysis is done. Table 7 presents the estimates of equation model 1, testing hypotheses 1 to 4. Table 8 presents the estimates of equation model 2, testing hypotheses 5 and 6. Both regression models include industry dummy variables to control for industry effect on the cost of debt. The table also points out the adjusted R^2 and the F-statistics. The adjusted R^2 explains how much variance in the independent variables is explained by the model. In other words, it shows how well the independent variables in the model explain the dependent variable. The adjusted R^2 value increases when valuable independent variables that actually affect the dependent variable are added to the model. In this case, model 1 has an adjusted R^2 value of 0.329, implying that 32.9% of the cost of debt is accounted for by the independent variables present in the model. Model 2 shows a value of 0.326 (32.6%), indicating that the model did not improve as it remains constant. Compared to other studies, the adjusted R^2 value is relatively high. It is lower than the adjusted value of Anderson et al. (2003) and Anderson et al. (2004), but higher than Sánchez-Ballesta and García-Meca (2011) (29.52%), Lorca et al. (2011) (10.73%), Lin et al. (2011) (24.2%), and Vander Bauwhede et al. (2015) (20.1%), to name a few. Furthermore, the F-statistics explains whether the regression model better fit the data than a model that contains no independent variables. Both regression models have a significant F-value at 1% level, meaning that the independent variables in the model fit the data. Note that the cost of debt is measured with the natural logarithm, therefore the results should not be interpreted as an absolute value but as percentage value.

5.3.1 Board of directors

In column 1 to 4 of Table 7 the independent board variables are individually tested to see whether the results differ from equation model 1. It can be concluded that the results of the individual variables (column 1 to 4) have remained the same as the results of model 1, where all variables are included. This applies to both independent and control variables. It is striking that the adjusted R^2 from column 1 to 4 changes slightly compared to model 1. Additional tests have shown that board gender diversity and board director ownership make a minimal contribution to the model, while board independence hardly improves the model. Moreover, the direction and significance of the estimates do not change. For the sake of space, these results are not shown. Although board independence does not contribute to the model, it has been decided to still include it in model 1 for the complete picture.

However, the results in model 1 show a significant association between the cost of debt and all board variables: board size (at 1% level), board independence (at 1% level), board gender diversity (at 5% level), and board director ownership (at 1% level). The coefficient estimate on board size shows a negative value, indicating that SMEs with larger boards are able to borrow at a lower cost of debt. Thereby confirming hypothesis 1. Practically, it means that an increase of board size in SMEs by one director decreases the cost of debt by 2.86%. This is consistent with the resource dependence theory, larger boards provide SMEs access to critical resources. Besides offering access to external resources, as larger boards contain a variety of directors with different skills and knowledge, they have a greater ability to provide advice and monitor management. Lenders appreciate larger boards in SMEs as they reduce information asymmetry and agency costs. This result align to those reported by Anderson et al. (2004), Fields et al. (2012), Lorca et al. (2011), and Li et al. (2016), who find a negative relationship between board size and cost of debt.

Contrary to expectations, board independence shows a positive relationship with the cost of debt, which does not support hypothesis 2. This implies that a 1% increase of independent directors on SMEs' boards results in a 0.1% increase in the cost of debt. This justifies the stewardship theory, stating that boards should include a majority of internal directors. Though the result contradicts the results reported by Anderson et al. (2004), Fields et al. (2012), and Li et al. (2016), it does align with the result of Chuluun et al. (2014). It is noticeable that studies on firm performance also find a negative

relationship between board independence and firm performance (ROA). Such as Gaur et al. (2015) with a sample from New Zealand that contain a majority of SMEs and Arosa et al. (2013) who study a sample of Spanish SMEs. It shows that debtholders' concerns about the negative impact of independent directors on SMEs' firm performance is reflected in a higher cost of debt. There are several reasons that explain the positive relationship between board independence and cost of debt. Internal directors have firm-specific information that they use when offering advice on the firm's day-to-day operations (Arosa et al., 2013). Besides, independent directors do not have sufficient knowledge about the strength and weakness of the firm to provide adequate advise and counseling (Gaur et al., 2015), therefore, their presence in the board could lead to conflict of opinion and slow the decision-making process (Waheed & Malik, 2019). An alternative important explanation for this finding might be that SMEs appoint independent directors to comply with the regulations, without regarding the skills and knowledge of the director.

Another unexpected result is the positive relationship between board gender diversity and cost of debt, thus rejecting hypothesis 3. An increase of female directors by 1% is associated with an increase in cost of debt by 0.1%. This finding shows that the benefits of an increasing number of female directors on boards seem to be outweighed by the problems of unnecessary over-monitoring and slowing down the decision-making process that are associated with female directors on boards. Thereby confirming that female directors do not contribute to the reduction of the cost of debt. Although Fields et al. (2012) also find a positive relation between female on board and cost of debt, their finding is not significant. Nevertheless, this result contrast with the studies of Zhai (2019) and Usman et al. (2019) who find that the increasing the number of female directors reduces the cost of debt. The results on the contribution of female directors to the firm performance of SMEs also differ. For example Martín-Ugedo and Minguez-Vera (2014) find a positive relationship while Shehata et al. (2017) find a negative association. The presence of female directors is mainly found in larger companies with larger boards. Even though gender diversity on boards is predicted to reduce the cost of debt of SMEs from a resource dependency perspective, through the input of new perspectives, it may take some time for the positive impact on the firm to become visible. Besides, similar to board independent directors, SMEs might appoint female directors to comply with regulations or social expectations rather than critically select adequate female directors to fit the company.

The coefficient estimate on board director ownership is found to be negative, thus confirming hypothesis 4. This indicates that a 1% higher percentage of directors owning shares of the firm results in a 0.1% lower cost of debt. It supports the view that debtholders take board director ownership in SMEs into account when estimating its default risk. Due to insider information, insider directors provide better information to external parties and thereby also reduce information asymmetry. This negative relationship between director ownership and cost of debt is consistent with the results found by Lorca et al. (2011), Sánchez-Ballesta and García-Meca (2011), and Zhai (2019). A critical reason for this finding is that directors' ownership is linked to their personal wealth. Therefore, insider directors have the incentive to devote more time into monitoring management.

In terms of control variables, all variables are significantly (at 1% level) associated to SMEs' cost of debt. Among the control variables, the direction of the relationship for leverage and interest coverage are as expected. Unexpected is the positive relationship between total assets and cost of debt, because larger companies have better access to debt and enjoy lower cost of debt. Although this finding does not align with prior studies on cost of debt (Anderson et al., 2003, 2004; Li et al., 2016; Lin et al., 2011; Lugo, 2019), Martín-Ugedo and Minguez-Vera (2014) and Shehata et al. (2017) find a negative relation between total assets and firm performance in SMEs. Smaller SMEs are more profitable because they have fewer communication problems and can therefore make more efficient decisions. Furthermore, the cost of debt is also positively affected by collateral, which means that SMEs

with higher collateral pay a higher cost of debt. This finding contradicts prior studies (Hernández-Cánovas et al., 2016; Lorca et al., 2011; Vander Bauwhede et al., 2015), but aligns with Li et al. (2016).

Both performance variables ROA and sales growth have a positive relationship with the cost of debt. Though rising firm performance is expected to lower potential default risk. The evidence on sales growth give support to Lugo (2019), who find that sales growth increases the cost of debt. As discussed by Heyman et al. (2008) and Vander Bauwhede et al. (2015), fast growing SMEs increase agency problems and risks due to high level of information asymmetry as the quality of their financial statements are of low quality. An alternative explanation is that SMEs with high growth opportunity could lead to agency conflict between the shareholders and debtholders. Shareholders pursue self-interest by investing in risky projects at the expense of debtholders. With regard to ROA, most studies report a negative relationship between ROA and cost of debt (Chuluun et al., 2014; Fields et al., 2012; Usman et al., 2019; Zhai, 2019). Remarkably, studies that include ROA and interest coverage in their regression model report a negative insignificant relationship between ROA and cost of debt (Amrah et al., 2015; Hashim & Amrah, 2016; Lorca et al., 2011; Ramly, 2013). Although a VIF test has been conducted and no multicollinearity problems are found, the high correlation between ROA and interest coverage may be the cause of a deviate ROA result.

An additional test is performed in which the ROA and interest coverage are included separately in the regression model to investigate whether the ROA estimate changes and whether this change affects the estimate of the independent variables on the cost of debt. Appendix B presents the results. The results in model 1 of interest coverage are similar to the results reported in Table 7. Although most results in model 1 of ROA align with Table 7, merely the estimates of board independence and ROA differ. Though board independence indicates the same direction, it has now become insignificant. In addition, ROA has also turned negative, which previously had a positive impact on the cost of debt. Otherwise, the control variables have remained the same. The same also applies to model 2. The moderating variable of family ownership differs between ROA and interest coverage. Although the result differs in direction in both models, they are both insignificant. In addition, the total assets with ROA is not significant, but with interest coverage it is. Furthermore, all control variables match, except ROA now negatively impacts the cost of debt. Although most of the results do not differ, it can be concluded that ROA in fact has a negative effect on the cost of debt. However, when assessed together with interest coverage, debtholder prefer the interest coverage, because they consider ROA as firm performance rather than default risk. An alternative conclusion can be that ROA and interest coverage are substitutes for each other and that they differ in results when included together.

Table 7

Results of regression analysis of cost of debt on board of directors and control variables.

Variables	Hypothesis	Sign	(1)	(2)	(3)	(4)	Model 1
INTERCEPT			-.381***	-.491**	-.448**	-.384**	-.542***
			(-1.956)	(-2.438)	(-2.292)	(-1.970)	(-2.692)
B_SIZE	H1	-	-.027***				-.029***
			(-6.589)				(-7.124)
B_IND	H2	-		.001*			.001**
				(1.817)			(2.335)
B_GEN_DIV	H3	-			.001***		.001***
					(3.174)		(4.037)
B_DOS	H4	-				-.001***	-.001***
						(-3.147)	(-3.837)
L_TOTAL_ASSETS		-	.033***	.029**	.032***	.029**	.035***
			(2.784)	(2.458)	(2.723)	(2.478)	(2.944)
ROA		-	.032***	.032***	.032***	.032***	.032***
			(26.164)	(26.268)	(26.013)	(26.348)	(26.108)
GROWTH		-	.001***	.001***	.001***	.001***	.001***
			(3.612)	(3.557)	(3.658)	(3.605)	(3.660)
LEV		+	.007***	.007***	.007***	.007***	.007***
			(11.786)	(11.800)	(11.741)	(11.965)	(11.894)
COLLATERAL		-	.003***	.003***	.002***	.002***	.002***
			(6.532)	(6.415)	(6.222)	(6.354)	(6.258)
INT_COV		-	-.026***	-.026***	-.026***	-.026***	-.026***
			(-56.710)	(-57.083)	(-56.997)	(-57.133)	(56.768)
Industry			Yes	Yes	Yes	Yes	Yes
Adjusted R^2			0.326	0.323	0.325	0.324	0.329
F-statistic			326.583***	322.019***	322.789***	322.770***	268.330***
Observations			8,742	8,742	8,742	8,742	8,742

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors and various control variable using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables.

5.3.2 Board and ownership

Table 8 reports the coefficient estimates of the board and ownership variables on the cost of debt. In column 1 and 2 of Table 8 the moderating ownership variables are individually tested to see whether the results differ from equation model 2. While the estimates of all control variables have remained the same, several the ownership variables differ from the full model 2.

Both board effectiveness, a composite variable of the board variables, and concentrated ownership are significantly negatively associated with the cost of debt in all models. These evidences seem to support the view that debtholders take into account SMEs' board effectiveness and the concentration of the ownership when assessing the firm and determining the interest rate. The negative relationship between board effectiveness and cost of debt is in line with the findings of Amrah et al. (2015), Fields et al. (2012), Hashim and Amrah (2016), and Ramly (2013). Moreover, the negative relationship between concentrated ownership and cost of debt is consistent with the findings of Aslan and Kumar (2012) and Ramly (2013), implying that SMEs with concentrated ownership enjoy lower cost of debt. On the other hand, the results on family ownership in column 2 differ from the results in regression model 2. Although both models indicate a positive direction in the relationship between family ownership and cost of debt, the result of column 2 in which family ownership is individually tested is significant and in model 2 the result is insignificant. This proves that concentrated ownership is an important factor for debtholders to determine the cost of debt for an SME, and that family

ownership is only important when there is no concentration. However, the results in column 2 support prior studies (Aslan & Kumar, 2012; Hashim & Amrah, 2016; Lin et al., 2011; Ramly, 2013), and confirm that family owned SMEs pay a higher cost of debt than non-family owned SMEs. While results in model 2 indicate that family ownership does not affect the cost of debt.

These differences also occur in the moderating variables. While the moderator of concentrated ownership is found to be significantly positively associated with the cost of debt, the moderator of family ownership is found to be insignificantly negatively associated with cost of debt. This implies that in SMEs concentrated owners weakens the effect of board of directors on the cost of debt, while family ownership does not affect the relationship between board of directors and cost of debt. This means that an increase of concentrated ownership by 1% the effectiveness of the board weakens and increases the cost of debt by 2.3%. It can be concluded that hypothesis 5 is supported and hypothesis 6 rejected. The finding on concentrated ownership aligns with Kim et al. (2007) who find a negative relationship with board dependency, and Gaur et al. (2015) and Waheed and Malik (2019) who find a negative relationship with board size. As expected, concentrated owners have the incentive to directly influence management because they can do a lot through concentration. Eventually they would less rely on the board of directors. In addition, concentrated owners also influence board composition, such as appointing directors according to their own interest. It is interesting to know that concentrated ownership from 40% has a significant effect on the cost of debt and on the relationship with board of directors. For the sake of brevity these results are not presented. The results on family ownership, however, contrast with the evidence of Amrah et al. (2015) and Hashim and Amrah (2016) who find a significant positive relationship between family ownership and cost of debt.

These varying results are due to high multicollinearity between concentrated ownership and family ownership and their moderator variable. Therefore, family ownership and its moderator are found insignificant. An alternative explanation might be because family owned SMEs are merely represented by 10% of the sample. Sánchez-Ballesta and García-Meca (2011) report the same problem, their variable government ownership has lost its significance because of the small observation with government ownership. To confirm these assumptions an additional test is performed in which the sample is split into family owned SMEs and non-family owned SMEs. This should better explain the effect of family ownership on the cost of debt and how a small representation of family ownership might affect the results. The results are presented in Appendix C. With much lesser observations, some of the results of family-owned SMEs differ from the results of non-family-owned SMEs. The results of non-family owned SMEs are robust the results reported in Tables 7 and 8. On the contrary, concentrated ownership in family owned SMEs does not affect the cost of debt. Though the moderator variable of concentrated ownership has a positive significant effect on the cost of debt. Meaning that family concentrated ownership weakens the relationship between board of directors and cost of debt. This implies that family ownership in SMEs only affects the relation between its board and cost of debt when the firm is concentrated. In that regard, it confirms the family ownership results in Table 8. Furthermore, board results mainly correspond to Table 7, except board independence in family owned SMEs has become insignificant. Although some variables differ from the results of Tables 7 and 8, most are similar. Despite the disproportionate representation of family SMEs, the results in Table 8 regarding family ownership are confirmed.

Table 8

Results of regression analysis of cost of debt on ownership and control variables.

Variables	Hypothesis	Sign	(1)	(2)	Model 2
INTERCEPT			-.364* (-1.815)	-.340* (-1.689)	-.370* (-1.837)
B_EFFECT			-.032*** (-4.331)	-.034*** (-4.469)	-.032*** (-4.265)
OS_CON			-.034*** (-4.613)		-.032*** (-4.112)
OS_FAM				.020** (2.452)	.007 (.778)
*B_EFFECT*OS_CON*	H5	+	.025*** (3.607)		.023*** (3.081)
*B_EFFECT*OS_FAM*	H6	+		-.016** (-2.410)	-.007 (-.962)
L_TOTAL_ASSETS		-	.027** (2.231)	.026** (2.113)	.027** (2.251)
ROA		-	.032*** (25.419)	.032*** (25.523)	.032*** (25.386)
GROWTH		-	.001*** (3.589)	.001*** (3.630)	.001*** (3.598)
LEV		+	.007*** (11.873)	.007*** (11.722)	.007*** (11.827)
COLLATERAL		-	.003*** (6.327)	.003*** (6.360)	.003*** (6.301)
INT_COV		-	-.026*** (-55.576)	-.026*** (-55.665)	-.026*** (-55.492)
Industry			Yes	Yes	Yes
Adjusted R^2			0.326	0.324	0.326
F-statistic			271.859***	268.865***	239.367***
Observations			8,372	8,372	8,372

Note: This table presents the estimated coefficients from regressing cost of debt on ownership and various control variable using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. B_EFFECT, OS_CON, and OS_FAM are the independent variables. B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables.

5.4 Robustness check

Six robustness checks will be performed to verify that the main results have not been estimated by chance. In the first robustness check, the independent, moderating, and control variables will be lagged by one year. This is to control for endogeneity problems that may arise between cost of debt and board of directors, and ownership. The second robustness check includes the time fixed effect in the regression models, to control for time effect on the cost of debt. For the third robustness check data has been cleaned by removing companies that have 0% cost of debt and leverage, and companies with negative interest coverage. This allows to check whether the removal of redundant data affect the cost of debt. The fourth robustness test examines the relationship between board independence, board gender diversity, and cost of debt by using alternative measurements. Unexpected results have occurred in the main results, this test should confirm these results. For the fifth robustness check, relationships between cost of debt, board of directors and ownership are estimated per year. Board composition and ownership in SMEs may not change over time, which can cause a distorted representation between the relationship. For the sixth robustness check, the relationships between the cost of debt and board of directors and ownership will be investigated for each country. Board and ownership might affect the cost of debt of SMEs differently across countries.

5.4.1 Lagged variables

The results of the regression analysis including lagged variables are presented in Appendix D. The findings on board size, board gender diversity, and board director ownership are robust to Table 7. Board independence has maintained the direction of its relationship with the cost of debt but has become insignificant. This means that board independence does not affect the cost of debt. In this case, hypotheses 1, 3 and 4 are confirmed, but hypothesis 2 rejected. For model 2, all ownership variables and the moderating variable of concentrated ownership have remained the same as reported in Table 8. Although the moderator variable of family ownership has become positive, it has remained insignificant. Consequently, this signifies that hypothesis 5 is confirmed and hypothesis 6 rejected. Furthermore, all control variables have remained the same as reported in Table 7 and 8, except for sales growth. This has become insignificant. Although merely board independence differs from the results reported in Table 7, it can be concluded that the results of the lagged variables are robust to the main results. In other words, no endogeneity problems have occurred between the cost of debt and the board of directors, and ownership.

5.4.2 Time fixed effect

The results of the regression analysis including time fixed effect are presented in Appendix E. In the first column neither time and industry fixed effects are included. In this model all variables in Panel A and B are robust to the main results. In the second column only time fixed effect is included. This time, all variables have remained constant except for board size. This have become insignificant. After performing a correlation test (result not presented), it appears that there is a high multicollinearity between board size and time fixed effect (positive correlation). In the last column both time and industry fixed effect are included. Again, the results have remained constant and board size is insignificant. It is striking that the adjusted R^2 increased after the inclusion of the time fixed effect, and that it remained after the inclusion of the industry fixed effect. The result suggests that time fixed effect has an improving effect on the model than industry fixed effect. Although it can be stated with certainty that time has an effect on the cost of debt, an appropriate decision has been made to not include it in the main regression model, with regard to multicollinearity. However, except for board size it can be concluded that the results of this test are robust to the main results.

5.4.3 Removing redundant data

Appendix F presents the results of the regression analysis in which companies with a cost of debt and leverage value of 0% and negative interest coverage are removed from the sample. This test is performed in two steps. In the first step, companies with a cost of debt and/or leverage of 0% have been removed. This has resulted in a reduction of more than 200 observations. However, the results in both models 1 and 2 have not changed. This means that the exclusion of these 200 companies do not have any effect on the cost of debt. In the second step, in addition to step 1, companies that have a negative interest coverage are removed from the sample. This resulted in an additional reduction of roughly 1,500 observations. Although the results in model 2 have remained the same, in model 1 board independence has become insignificant. This result also occurred in the robustness check of lagged variables. It is striking that after removing companies with negative interest coverage, the adjusted R^2 has risen sharply. This result indicates that excluding redundant data, the cost of debt is better explained by the independent variables. However, the discussion arises as to whether it is justified to remove 1,500 observations. It is not uncommon for companies to have negative interest coverage in certain years. In addition, removing 1,500 observations discard a lot of useful information. However, except for board independence, it can be concluded that the results are robust with the main results.

5.4.4 Alternative measurements

Appendix G presents the results of the regression analysis of board and ownership on cost of debt using alternative measurements for board independence and board gender diversity. Panel A presents model 1 in which the board variables are included. Panel B presents model 2 in which ownership variables and their moderator variables are included. For the sake of space, control variables are not presented in the table. The findings on control variables are robust to the results of Table 7 and 8.

The results of measurement 1 in Panel A show that board size and board independence are not significant. This is due to the high correlation between these two variables. The reason for this is that over 90% of the observations have a 100% independent board. As a result, the value of the number of independent directors is equal to the board size. However, when one of the variables is removed, they become significant again. The result of female directors, on the other hand, is significant. Like board director ownership, the estimates are robust to Table 7. As the only variable, board director ownership is constant in every model. Although board independence is measured in measurement 2 as the number of non-independent directors, the results indicate that this is not significant. The same goes for board size. However, the insignificant result of insider (non-independent) directors is caused by the low variation in the number of insider directors. The number of insider directors varies between 0 and 3 directors. The result of board size is this time due to the high correlation with the number of men on the board. Since most observations have boards consisting of 100% male directors, the values of men on the board are equal to board size. When removing the variable b_male, the estimate of board size becomes negative and significant. It is remarkable that when gender diversity is measured with the number of male directors on the board instead of female directors, it has a negative effect on the cost of debt. This implies that an increase in the number of men on boards results in a reduction in the cost of debt. This result confirms the result in Table 7. Finally, the board results in measurement 3 are all negative and significant. The proportion of the number of men represented on the board reflects a negative significant result. This is consistent with the previous measurement. However, this time the proportion of board non-independence is negative and significant. This means that boards containing executive directors contribute to the reduction of the cost of debt. This confirms the result in Table 7 and the stewardship theory.

The results in Panel B approximately align with the results of model 2 in Table 8. The different compositions of board effectiveness reflect the different moderating effect of ownership on the relationship between board and cost of debt. In all cases concentrated ownership has a direct negative

effect on the cost of debt while its moderating effect differs. For example, concentrated ownership has an effect on the relationship between board and cost of debt when the board contains male directors and executive directors. Although the direct effect of family ownership on the cost of debt is the same as the main results, its moderating effect is negative and significant in measurement 2. However, this result must be interpreted with caution because of the high correlation with concentrated ownership and its moderator. This also explains the insignificance of the moderator concentrated ownership. However, although unexpected results occurred in Table 7, with regard to board independence and board gender diversity, the results have been confirmed by using other measurements for those variables. With this it can be concluded that the main results are robust.

5.4.5 Years

Appendix H provides the result of the regression analysis of cost of debt on board and ownership for each year of the research period. Panel A presents model 1 in which the board variables are included. Panel B presents model 2 in which board and ownership variables are included. For the sake of space, control variables are not presented in the table. The findings on control variables are roughly similar to the results of Table 7 and 8.

In Panel A, board size is merely significant in 2018. Although a negative relationship is expected, the relationship turns positive in 2013, 2015, and 2016. However, these results are not significant. It is noticeable that board size is significant in 2018 while the other board variables are not, the other way around applies for the previous years. Furthermore, board independence is significant in 2013 and 2014. In 2018 a negative relationship is presented, but this is not significant. Board gender diversity is the only variable that has a consistent positive relationship with the cost of debt. This relationship is significant except in 2017 and 2018. This is largely consistent with the results in Table 7. Finally, board director ownership is only significant in 2016 and 2017. Although the direction of the relationship turned positive in 2013 and 2015, it is not significant. It is striking that when board size is negative board director ownership is too, when the estimate of board size changes to positive, the estimate of board director ownership is also positive. Except in 2016, where board size is positive while board director ownership is negative.

In Panel B, board effectiveness is significant in 2013, 2014, 2015, and 2018. However, the direction of the estimates in the years 2013 to 2015 is unexpectedly positive. This means that a more effective board leads to a higher cost of debt. This contradicts the results in Table 8, where a negative relationship is found. A possible reason for this finding might be that majority of the board variables in the relevant year have a positive effect on the cost of debt. As a result, the composite variable board effectiveness also displays a positive sign. On the other hand, the direction of the concentrated ownership estimates and the associated interaction variable have remained the same in all years. However, the results are not significant every year. It is noticeable that in the years when concentrated ownership is significant (2017 and 2018) the associated interaction variable is significant, except in 2013 where concentrated ownership is not significant, but the moderator is. These findings partly correspond with the results in Table 8. The same applies to family ownership. The estimates are positive and not significant, expect in 2018, the estimate is negative. It is striking, however, that in the years when the family ownership is positive, the associated moderator is negative, but in 2018 family ownership is negative while the moderator is positive. Furthermore, family ownership moderator appears to be negative and insignificant in all years, consistent with the results in Table 8. This confirms that family ownership does not affect the cost of debt and neither does it through the board of directors.

Appendix I provides a table that summarizes the results of the robustness check of each year. From this table it can be analyzed that the results of board and ownership variables differ over the years. A possible explanation for these varied results may come from incidental events in that year or

within the company that cannot be directly derived from the data. It is observable that in line with Table 8, hypothesis 6 is rejected in all years. This implies that the involvement of family members in the company does not affect the relationship between board of directors and cost of debt. Moreover, hypothesis 1 of board size is found to be the least confirmed, while hypotheses 2, 3, and 5 are the most confirmed across the years. These findings are robust to the main findings in Table 7 and 8. However, while the significant results are robust to the results in Table 7 and 8, the results differ greatly from year to year. Therefore, it cannot be concluded with certainty whether the hypotheses are generally confirmed or rejected.

5.4.6 Country

Appendix K provides the results of the regression analysis of board and ownership on cost of debt for each country represented by the data. In addition, Appendix J presents the descriptive statistics for each country. The results of model 1 for Belgium are consistent with the results in Table 7. However, the results of ownership differ from the results in Table 8. Family ownership and its associated interaction effect are not included in model 2 because no family owned SMEs are present in the data for Belgium (see Appendix J, Panel A). As a result, the effect of family ownership cannot be estimated. The finding of board effectiveness also differs from previous results. This has now turned positive, suggesting that board effectiveness within SMEs increases the cost of debt. Concentrated ownership, on the other hand, aligns with the results in Table 8. This is negative and significant. However, the concentrated ownership moderator is not significant. This implies that concentrated ownership does not affect the relationship between board of directors and cost of debt. Furthermore, the results of models 1 and 2 for Italy are roughly robust with the results in Table 7 and 8. Although board gender diversity is positive, it is not significant. In this respect it differs from the results of board gender diversity in Table 7. However, it retains the rejection of hypothesis 3. In contrast to Belgium, board effectiveness in Italy has a negative relationship with the cost of debt. Moreover, the ownership variables correspond to the results in Table 8. Concentrated ownership reduces the cost of debt but increases in combination with board effectiveness. Further, family ownership is now significant, compared to Table 8. This implies that when an SME in Italy is owned by family members, it has a negative impact on the cost of debt. However, family ownership has no effect on the cost of debt through board of director. This aligns with previous results.

Finally, the results for Latvia differ from both Belgium and Italy, and also partly from the results in Tables 7 and 8. First of all, board independence is excluded from the model because of invariance within the variable. In other words, all boards of Latvian SMEs appear to be 100% independent (see Appendix J, Panel C), so the actual effect of board independence on the cost of debt cannot be investigated. The high percentage of independence is explained by the fact that Latvia maintains a two-tier board structure. In which the supervisory board contains non-executive board members. Secondly, board gender diversity is positive but not significant. This implies that the presence of female board members has no effect on the cost of debt. This differs from the results in Table 7. Also unexpected results have emerged with regard to ownership in model 2. First, although the estimate of board effectiveness is negative, it is not significant. This indicates that board effectiveness has no influence on the cost of debt. Second, concentrated ownership is positive, which differs from Belgium and Italy, but is not significant. Third, the interaction effect of concentrated ownership has now become negative but not significant. This suggests that concentrated ownership has no effect on the cost of debt through the board. It is striking that the moderating variable of family ownership has become positive but is not significant. This differs from Italy and Table 8. However, this is consistent with the expectation that family ownership weakens the relationship between the board and cost of debt, confirming hypothesis 6.

In short, the results with regard to board of directors and ownership vary between countries. It is noticeable that ownership differs most among the countries. A possible explanation for this variation is the unbalanced number of observations for each country. For example, with most observations, the results of Italy are robust with the main results, while for Latvia, with approximately 500 observations, unexpected results are found that do not correspond to previous results. An alternative explanation is the represented number of family SMEs in the data. For example, the data for Belgium does not contain family owned SMEs. Therefore, no estimate can be made about the effect of family ownership on the cost of debt. Thus, different results with regard to ownership are strongly influenced by the sample size. In any case, it can be concluded that in general the results of the countries correspond fairly well with the results in Tables 7 and 8.

In addition to sample differences, results also differ due to country-specific characteristics. With regard to board variables, it can be noted that the results for board size, board gender diversity and board director ownership have remained the same in all countries. Although board gender diversity is positive in every country, it is only significant in Belgium. This does not apply to board independence. However, these results are explained by the board structure established by each country. Because Belgium and Italy have the choice between a one-tier or a two-tier board structure the data for these two countries contain different board structures. Allowing to estimate the relationship between board independence and cost of debt. In addition, a country's regulations also affect the cost of debt. Countries with strong shareholder protection and creditor rights protect majority shareholders from expropriation (Claessens & Yurtoglu, 2013), allowing debtholders to have control in the event of default, while weak regulation requires concentrated shareholders to protect themselves by retaining control (La Porta et al., 1999). Since regulations regarding shareholder protection and creditor rights differ between these three countries, these might explain the different results regarding ownership.

Finally, the tax regulations of a country must also be taken into account. From a trade-off theory perspective, debt financing is favored in connection with tax benefits. Especially in European countries where the accounting systems are tax based (Krivogorsky et al., 2011). However, the tax benefits depend on the tax regime of the country in which a company is located. Tax, especially corporate tax, plays an important role in the choice between debt and equity financing (Graham, 1996). This has to do with interest that is tax-deductible, also known as tax shield. The higher the corporate tax, the higher the deductible tax. As a result, the after-tax cost of debt is lower than the before-tax cost of debt. This also affects the level of leverage. Van Binsbergen, Graham, and Yang (2010) address that leverage is less attractive when tax rates decrease. It can be expected that board of directors and shareholders will consider the effect of tax when deciding on external financing. After all, tax costs should not outweigh tax benefits. Although this cannot be deduced from the test, it is worth mentioning.

6. Conclusion and Discussion

6.1 Main results

SMEs are known for having difficulties in obtaining external debt financing. And if they do, they pay a higher cost of debt than large firms. An important explanation for this is that information asymmetry often occurs in SMEs. Empirical research has proven that corporate governance mechanisms in SMEs can reduce this problem. Therefore, the objective of this research is to provide evidence on the relationship between board of directors and cost of debt and the moderating effect of ownership in SMEs. This research contributes to the literature on corporate governance by extending previous studies on cost of debt. Although previous studies mainly focus on large listed companies, this research focuses on European SMEs. Providing a broader perspective on how corporate governance mechanisms (e.g., board of directors and ownership) affect the cost of debt in SMEs. Besides, while most studies have conceptualized a theoretical framework based on traditional agency theory, this research also includes several other theories related to SMEs, such as stewardship theory, resource dependence theory, and resource-based view. These theories explain the behavior of both the board of directors and ownership within SMEs. For example, agency theory states that agency conflicts in SMEs occur between majority shareholders and minority shareholders (e.g., debtholders). On the other hand, stewardship theory assumes that board directors work in the best interest of the owners. While resource dependence theory asserts that SMEs depend on external resources and that board directors provide linkage with the external environment, the resource-based view focuses on how existing (internal) resources can be used effectively to maintain sustainable competitive advantage. However, in order to complete this research, the following research question has been formulated: "What is the effect of board of directors on cost of debt in SMEs and the moderating effect of ownership structure on this relationship?". To answer the research question, six hypotheses have been formulated and tested by using the Ordinary Least Square (OLS) regression method.

The results of this study, based on a sample of 8,742 firm-year observations of European SMEs over the period from 2013 to 2018, reveal that the mechanisms of board of directors and ownership have a significant effect on the level of cost of debt. As expected, board size and board director ownership are negatively significantly associated with the cost of debt. Hypotheses 1 and 4 have thus been confirmed. This suggests that SMEs with larger boards and boards that contain directors with ownership enjoy a lower cost of debt. Debtholders benefit from boards containing directors with different skills and knowledge, and ownership, which work in the interests of debtholders. Although hypotheses 2 and 3 expect board independence and board gender diversity to have a negative relationship with cost of debt, the results show the opposite. Board independence and board gender diversity are significantly positively associated with the cost of debt. As a result, hypotheses 2 and 3 are rejected. Although independent directors can provide external resources with their personal network and reputation, it appears that SMEs derive more benefits from insider directors. This is due to the fact that insider directors have better knowledge of the internal and external environment of the firm that is important for making decisions. SMEs that have boards with a higher representation of female directors pay a higher cost of debt. The result suggests that appointing female directors to SMEs boards is not based on their expertise or knowledge but on the creation of legitimacy. With regards to ownership, the moderating effect of concentrated ownership is found to be significantly positively associated with the cost of debt, thereby confirming hypothesis 5. Suggesting that concentrated ownership in SMEs weakens the impact of board of directors on the cost of debt. The moderating effect of family ownership is found to be insignificantly negatively associated with the cost of debt. Thereby rejecting hypothesis 6. This indicates that family ownership does not affect the relationship between the board and cost of debt. The explanation for this evidence is the small representation of family firms in this sample.

To ensure the robustness of the main results six robustness checks were conducted. The first check controls for endogeneity between board variables and cost of debt, and ownership and cost of debt. Therefore, all independent and control variables are lagged by one year. Board independence appears to be the only variable to have an insignificant effect on the cost of debt. The rest is significant and consistent with the findings of the main results. The second check controls for time effect. After adding the time fixed effect in the regression model, only the result for board size became insignificant, due to high multicollinearity. The rest of the results are robust to the main results. For the third check, companies with 0% cost of debt, 0% leverage, and negative interest coverage were removed from the sample. Again, merely board independence has become insignificant. The fourth check is conducted to confirm the unexpected results of board independence and board gender diversity. Measuring these variables as the proportion of dependent directors and proportion of male directors on the board confirmed the main results. Both variables have become negative and significant. The fifth check is conducted to investigate the effect of board and ownership on cost of debt each year. Based on the possibility that boards and ownership do not change over time in SMEs. The results of this test reveal varying results. A resemblance with the main results is that the moderating effect of family ownership is not significant in all years. Other board variables and concentrated ownership differ each year. The last check is conducted to test how the effect of board and ownership on the cost of debt differ across countries. Again, results on board and ownership vary across countries. For Belgium the results are robust to the main results, except for family ownership and its moderator which are not estimated due to the absence of family ownership. For Italy, the results are also robust to the main results, except that board gender diversity has become insignificant while family ownership has become significant. For Latvia, the results correspond least to the main results. Board independence is excluded from the regression model by invariance, board gender diversity is insignificant, and ownership is insignificant except the moderator variable of family ownership. While this confirms hypothesis 6, it contradicts the main result.

In short, the results reveal a significant negative relationship between board size and board director ownership on the cost of debt, and a significant positive relationship between board independence and board gender diversity on cost of debt. There results confirm hypotheses 1 and 4, and reject hypotheses 2 and 3. For the moderating effect of ownership, concentrated ownership is positively significantly moderating the relationship between the board and cost of debt, while family ownership does not show a significantly moderating effect. Thus, hypothesis 5 is confirmed but hypothesis 6 is rejected. After controlling for endogeneity, the results have remained consistent with the main results, except for board independence. The same result has been shown when removing redundant data. After controlling for time effect, the results have remained consistent with the main results, expect for board size that has become insignificant. Finally, the fifth and sixth robustness checks are conducted for each year and country. The results vary each year and across countries, in which these results are not entirely robust to the main results.

6.2 Implications

This research provides a clearer picture of how corporate governance mechanisms in different contexts affect the cost of debt within SMEs. Therefore, the results of this research have several potential valuable practical implications for board of directors, owners, regulators, and debtholders that will protect their interests.

First, board of directors can use the results to compose an effective board. Although previous studies have proven that independent directors and female directors negatively affect the cost of debt, this research shows a positive relationship. These findings suggest that boards in SMEs should select their board members more strategically, based on personal experiences and skills appropriate to the firm and its needs. Fields et al. (2012) have shown the importance of board members with expertise

and diversity on the improvement of lowering the cost of debt. Moreover, as the practice of board of directors is gaining more importance to SMEs (Machold et al., 2011), the selection of board members becomes more critical. It is therefore important that the director selection criteria become a mechanism so that boards in SMEs can ensure the presence of adequate directors who will actually create value for the firm and thereby reducing the cost of debt.

Second, the findings are useful for shareholders to better understand how their ownership structure in SMEs affect the relationship between the board of directors and the cost of debt. This allows them to adopt effective corporate governance mechanisms to reduce wealth expropriation from minor shareholders (e.g., debtholders), for example, by including more internal directors into the board to protect minority shareholders' interests.

Third, from a regulatory perspective, these results can assist the analytical work on the impact of corporate governance mechanisms on SMEs and on their cost of debt. With regard to board gender diversity, despite the fact that the findings indicate that female directors increase the cost of debt within SMEs, many studies have proven the importance of female directors in boards. With the increasing social pressure on gender equality within companies, this also applies to board of directors (Hillman et al., 2007; Martín-Ugedo & Minguez-Vera, 2014). It is therefore important for the European Commission to assess the actual impact of female directors within the boards in SMEs, to promote and introduce legislative quotas for female representation on boards in SMEs, just as with large listed firms in the European Union. Consequently, this could encourage SMEs to select female directors more carefully.

Lastly, the evidence in this study may also be of interest to debtholders, because weak corporate governance mechanisms could damage SMEs' financial position and leave them vulnerable to losses. Taking into account the composition and quality of the board of directors in SMEs, these results show that the board of directors in SMEs may be carelessly appoint directors, which can reduce the effectiveness of the board. Therefore, these results can contribute to the assessment of the default risk of SMEs.

6.3 Limitations and future research

Although this research contributes to the literature by investigating the effect of board of directors on the cost of debt and the moderating effect of ownership, this research acknowledges several limitations that provide avenues for future research. First, for this research a sample of European SMEs was used from 27 member states of the European Union. Due to the many missing data on board of directors and ownership, many companies have been removed from the sample. As a result, the number of representative countries has decreased to 3 European countries. This can limit the generalizability of the findings to other countries and even to European countries. Therefore, future research could replicate this research by including more European countries, preferably all 27 member states of the European Union, to determine whether these findings are generalizable.

Second, coming back to the generalizability of the research, this research only focuses on one ownership type: family ownership. This can again limit the generalizability of the research for companies in other ownership contexts. Other types of ownership are ignored because of the brevity of the research and the literary expectation that SMEs are mainly family owned. However, unexpectedly, the sample of this research shows that the majority of the SMEs present are non-family owned (90%). In this case, it would have been interesting if other ownership types were explored, such as corporations (Desender et al., 2013; Hernández-Cánovas et al., 2016; Martín-Ugedo & Minguez-Vera, 2014; Sánchez-Ballesta & García-Meca, 2011), institutions (Bhojraj & Sengupta, 2003; Guney et al., 2020; Martín-Ugedo & Minguez-Vera, 2014; Usman et al., 2019), banks (Desender et al., 2013; Sánchez-Ballesta & García-Meca, 2011), and government (Lin et al., 2011; Liu et al., 2014; Sánchez-Ballesta & García-Meca, 2011; Usman et al., 2019; Yeung & Lento, 2018). Future researches could

expand this research by including several other types of ownership to find a broader explanation of the moderating effect of ownership.

Third, continuing on family ownership, based on the nature of the data, 10% of the sample consists of family owned SMEs. This unbalanced data lead to an insignificant moderating effect of family ownership on the relationship between board of directors and cost of debt. After an additional test, it turned out that family ownership has a significant effect. As a result, the validity of the main findings could be questioned. Therefore, the results must be interpreted with necessary caution. A possible future study is to investigate a balanced data, at least in which family ownership is sufficiently represented in relation to non-family ownership. This allows to better explain the moderating effect of ownership (mainly family ownership) on the cost of debt.

Fourth, as a result of poor data, descriptive statistics show that the sample has an average board independence of 97% and concentrated ownership of 89%. Although data on both supervisory board and executive boards have been retrieved, data is mainly available from supervisory boards. This has resulted in unexpected results regarding board independence. This is also noticeable in many robustness tests where board independence is often insignificant. This problem also occurs with concentrated ownership. Although the concentration in the sample is very high, most companies appear to be concentrated by one corporation only. Although this is not necessarily a problem, it can lead to misinterpretations especially in the type of ownership. Because most of these companies are subsidiaries, and it may be that the parent company is owned by family members. This partly explains the low number of family businesses as mentioned above. Therefore, once again the results should be interpreted with caution. Although it would have been interesting to investigate which owner type controls the parent company, it was not possible due to the large sample size. Future studies should gather better data from databases that provide more information about board independence and concentrated ownership. This will result in more reliable results that provide better explanation of the effect of board and ownership on the cost of debt.

Lastly, due to a lack of data, a limited number of board characteristics were investigated that present the effectiveness of board of directors. Although theoretically no rules have been established for composing a qualitative or effective board of directors, it would have been more realistic if additional board characteristics could be added to the composite variable. To get a more complete picture of the effect of boards on the cost of debt. A number of commonly used board characteristics: age as a proxy for director experience (Anderson et al., 2004; Liu et al., 2014; Shehata et al., 2017; Yeung & Lento, 2018), meeting frequency as a proxy for board activity (Amrah et al., 2015; Arosa et al., 2013; Hashim & Amrah, 2016; Lorca et al., 2011; Usman et al., 2019), director's academic degree as a proxy for director qualification (Gaur et al., 2015; Guney et al., 2020; Liu et al., 2014), and CEO duality as a proxy for leadership in boards (Arosa et al., 2013; Desender et al., 2013; Gaur et al., 2015; Liu et al., 2014; Lorca et al., 2011; Usman et al., 2019; Waheed & Malik, 2019; Yeung & Lento, 2018). Thus, future research could investigate the quality or effectiveness of board of directors in SMEs on the cost of debt by including more board characteristics.

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Appendices

Appendix A: Descriptive statistics unbalanced data

Table 9

Descriptive statistics unbalanced data.

	N	Mean	Median	Std. Deviation	Min.	Q1	Q3	Max.
COD	15,148	1.26	.97	1.08	.00	.45	1.75	7.97
B_SIZE	11,251	2.75	2.00	1.80	1.00	1.00	4.00	17.00
B_IND	11,251	97.62	100.00	12.15	.00	100.00	100.00	100.00
B_GEN_DIV	11,251	12.61	.00	24.05	.00	.00	20.00	100.00
B_DOS	11,251	6.76	.00	20.15	.00	.00	.00	100.00
B_EFFECT	11,251	1.83	2.00	.89	.00	1.00	2.00	4.00
OS_CON	14,974	89.54	100.00	20.91	5.31	96.01	100.00	100.00
OS_FAM	14,965	.11	.00	.31	.00	.00	.00	1.00
TOTAL_ASSETS	14,444	17,258,058	15,147,268	10,051,523	2,002,790	9,065,011	24,023,501	42,965,542
ROA	15,454	2.89	2.29	8.19	-86.32	.16	6.26	89.10
GROWTH	15,179	5.46	4.00	19.46	-99.80	-3.57	12.86	99.79
LEV	14,443	14.40	10.42	13.62	.00	4.73	19.80	90.87
COLLATERAL	15,368	19.16	11.97	20.02	.00	3.08	29.52	92.90
INT_COV	13,830	10.91	4.55	20.92	-89.31	1.13	16.33	88.98

Note: This table presents the descriptive statistics of unbalanced data (without filtering missing data), in which it presents normal values instead of logged values for descriptive purposes. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, B_DOS, and B_EFFECT are the independent variables. OS_CON, and OS_FAM are the variables used for the moderating variables. TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, INT_COV are the control variables. COD, B_IND, B_GEN_DIV, B_DOS, OS_CON, ROA, GROWTH, LEV, and COLLATERAL present a percentage value. B_SIZE, TOTAL_ASSETS, and INT_COV present a normal value. OS_FAM is a dummy variable that presents a value (between) 0 and 1.

Appendix B: ROA and interest coverage

Table 10

Results of regression analysis of ROA and interest coverage.

			ROA		Interest coverage	
Variables	**Hypothesis**	**Sign**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
INTERCEPT			-.654*** (-2.755)	-.731*** (3.091)	-.439** (-2.141)	-.293 (1.432)
B_SIZE	H1	-	-.050*** (-10.256)		-.032*** (-7.538)	
B_IND	H2	-	.000 (-.456)		.001* (1.889)	
B_GEN_DIV	H3	-	.002*** (5.520)		.002*** (4.838)	
B_DOS	H4	-	-.001* (-1.751)		-.001*** (-2.749)	
B_EFFECT				-.004*** (-4.921)		-.029*** (-3.762)
OS_CON				-.043*** (-4.752)		-.034*** (-4.343)
OS_FAM				.021** (2.111)		.015* (1.798)
*B_EFFECT*OS_CON*	H5	+		.030*** (3.393)		.026*** (3.461)
*B_EFFECT*OS_FAM*	H6	+		.001 (.153)		-.008 (-1.124)
L_TOTAL_ASSETS		-	.024* (1.761)	.020 (1.386)	.029** (2.380)	.021* (1.733)
ROA		-	-.024*** (-21.789)	-.024*** (-21.504)		
GROWTH		-	.002*** (3.887)	.002*** (3.916)	.002*** (6.430)	.002*** (6.276)
LEV		+	.015*** (21.678)	.015*** (21.339)	.006*** (11.231)	.007*** (11.191)
COLLATERAL		-	.004*** (9.467)	.004*** (9.112)	.003*** (6.382)	.033*** (6.372)
INT_COV		-			-.019*** (-50.108)	-.019*** (-49.168)
Industry			Yes	Yes	Yes	Yes
Adjusted R^2			0.155	0.151	0.285	0.284
F-statistic			118.028***	102.958***	231.413***	206.945***
Observations			9,558	9,153	8,693	8,322

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and control variable by including ROA and interest coverage separately, using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables. B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables.

Appendix C: Family and non-family owned SMEs

Table 11

Results of regression analysis of family owned and non-family owned SMEs.

			Family owned SMEs		Non-family owned SMEs	
Variables	**Hypothesis**	**Sign**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
INTERCEPT			1.088* (1.681)	1.274** (2.039)	-.643*** (-2.921)	-.567*** (-2.654)
B_SIZE	H1	-	-.071*** (-4.454)		-.027*** (-5.980)	
B_IND	H2	-	.001 (.835)		.001** (2.615)	
B_GEN_DIV	H3	-	.002** (2.212)		.001*** (3.892)	
B_DOS	H4	-	-.001** (-2.138)		-.001*** (-3.160)	
B_EFFECT				-.050** (-2.217)		-.031*** (-3.760)
OS_CON				-.002 (-.104)		-.045*** (-5.125)
*B_EFFECT*OS_CON*	H5	+		.026* (1.946)		.017** (1.981)
L_TOTAL_ASSETS		-	-.053 (-1.385)	-.066* (-1.733)	.039*** (3.005)	.039*** (3.002)
ROA		-	.036*** (8.174)	.035*** (8.031)	.031*** (23.868)	.031*** (23.971)
GROWTH		-	.001 (1.285)	.002 (1.422)	.001*** (3.506)	.001*** (3.330)
LEV		+	.007*** (3.459)	.007*** (3.745)	.007*** (11.410)	.007*** (11.605)
COLLATERAL		-	.003** (2.222)	.003** (2.196)	.002*** (5.743)	.002*** (5.735)
INT_COV		-	-.031*** (-20.548)	-.031*** (-20.280)	-.025*** (-51.903)	-.025*** (-51.861)
Industry			Yes	Yes	Yes	Yes
Adjusted R^2			0.422	0.415	0.321	0.320
F-statistic			39.398***	40.795***	223.425***	236.837***
Observations			843	843	7,529	7,529

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and control variable of family owned and non-family owned SMEs, using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables. B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables.

Appendix D: Robustness check lagged variables

Table 12

Results of robustness check using lagged variables.

Variables	Hypothesis	Sign	Model 1	Model 2
INTERCEPT			-.806*** (-3.873)	-.836*** (-4.015)
B_SIZE	H1	-	-.002*** (-4.774)	
B_IND	H2	-	.001 (1.431)	
B_GEN_DIV	H3	-	.001*** (2.914)	
B_DOS	H4	-	-.001*** (-2.600)	
B_EFFECT				-.020** (-2.552)
OS_CON				-.030*** (-3.662)
OS_FAM				.001 (.138)
*B_EFFECT*OS_CON*	H5	+		.013* (1.681)
*B_EFFECT*OS_FAM*	H6	+		-.003 (-.393)
L_TOTAL_ASSETS		-	.042*** (3.481)	.046*** (3.612)
ROA		-	.024*** (17.071)	.023*** (16.484)
GROWTH		-	.000 (.522)	.000 (.843)
LEV		+	.011*** (17.778)	.012*** (17.738)
COLLATERAL		-	.004*** (8.985)	.004*** (8.793)
INT_COV		-	-.002*** (-34.285)	-.022*** (-33.010)
Industry			Yes	Yes
Adjusted R^2			0.253	0.250
F-statistic			129.812***	114.337***
Observations			6,166	5,796

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and various control variable using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables. B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables. In this analysis all independent, moderating and control variables are lagged one year.

Appendix E: Robustness check time fixed effect

Table 13

Result of robustness check including time fixed effect.

Variables	(1)	(2)	Model 5
	Panel A: Board of directors		
INTERCEPT	-.618***	-1.190***	-1.128***
	(-3.205)	(-6.109)	(-5.549)
B_SIZE	-.030***	-.005	-.005
	(-7.237)	(-1.210)	(-1.088)
B_IND	.001**	.001**	.001**
	(2.298)	(1.975)	(2.013)
B_GEN_DIV	.001***	.001***	.002***
	(3.829)	(4.795)	(4.991)
B_DOS	-.001***	-.001***	-.001**
	(-4.000)	(-2.689)	(-2.517)
Control variables	Yes	Yes	Yes
Time	No	Yes	Yes
Industry	No	No	Yes
Adjusted R^2	.328	.345	.346
F-statistics	428.170***	308.472***	220.940***
Observations	8,742	8,742	8,742
Variables	**(1)**	**(2)**	**Model 6**
	Panel B: Ownership		
INTERCEPT	-.431**	-.925***	-.879***
	(-2.244)	(-4.793)	(-4.351)
B_EFFECT	-.034***	.014*	.017**
	(-4.555)	(1.754)	(2.040)
OS_CON	-.030***	-.020***	-.022***
	(-3.890)	(-2.601)	(-2.859)
OS_FAM	.007	.001	.001
	(.786)	(.071)	(.067)
B_EFFECT*OS_CON	.024***	.024***	.022***
	(3.320)	(3.263)	(3.012)
B_EFFECT*OS_FAM	-.007	-.007	-.006
	(-1.041)	(-.967)	(-.890)
Control variables	Yes	Yes	Yes
Time	No	Yes	Yes
Industry	No	No	Yes
Adjusted R^2	.326	.343	.343
F-statistics	368.962***	273.705***	199.690***
Observations	8,372	8,372	8,372

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and various control variable by including time fixed effect, using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. Panel A represents model 5, where B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables. Panel B represents model 6, where B_EFFECT, OS_CON, and OS_FAM are the independent variables, and B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables.

Appendix F: Robustness check removing redundant data

Table 14

Result of robustness check excluding redundant data.

			Step 1		Step 2	
Variables	**Hypothesis**	**Sign**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
INTERCEPT			-.620***	-.529***	-.913***	-.904***
			(-3.018)	(-2.577)	(-4.347)	(-4.308)
B_SIZE	H1	-	-.029***		-.027***	
			(-7.103)		(-6.522)	
B_IND	H2	-	.001**		.000	
			(2.265)		(.352)	
B_GEN_DIV	H3	-	.001***		.001***	
			(3.714)		(3.272)	
B_DOS	H4	-	-.001***		-.001***	
			(-3.697)		(-3.700)	
B_EFFECT				-.035***		-.039***
				(-4.644)		(-5.018)
OS_CON				-.034***		-.030***
				(-4.389)		(-3.775)
OS_FAM				.007		.004
				(.824)		(.535)
*B_EFFECT*OS_CON*	H5	+		.022***		.023***
				(2.936)		(2.993)
*B_EFFECT*OS_FAM*	H6	+		-.006		-.007
				(-.904)		(-1.015)
L_TOTAL_ASSETS		-	.040***	.037***	.062***	.058***
			(3.286)	(2.965)	(5.038)	(4.558)
ROA		-	.033***	.033***	.072***	.073***
			(25.969)	(25.396)	(38.954)	(38.540)
GROWTH		-	.001***	.001***	.001***	.001***
			(3.789)	(3.670)	(3.352)	(3.307)
LEV		+	.007***	.007***	.006***	.006***
			(12.481)	(12.380)	(10.076)	(9.991)
COLLATERAL		-	.002***	.002***	.002***	.003***
			(5.629)	(5.853)	(5.694)	(6.124)
INT_COV		-	-.026***	-.026***	-.003***	-.033***
			(-56.358)	(-55.164)	(-71.843)	(-70.728)
Industry			Yes	Yes	Yes	Yes
Adjusted R^2			.332	.331	.475	.476
F-statistic			265.559***	238.119***	393.705***	356.613***
Observations			8,502	8,166	6,947	6,664

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and various control variables after excluding redundant data in two steps, using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. Panel A represents model 5, where B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables. Panel B represents model 6, where B_EFFECT, OS_CON, and OS_FAM are the independent variables, and B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables. Step 1 is the removal of companies with a cost of debt and leverage value of 0%. Step 2 is the additional removal of companies with a negative interest coverage.

Appendix G: Robustness check measurement

Table 15

Result of robustness check board and ownership on cost of debt using alternative measurements.

Variables	Measurement 1	Measurement 2	Measurement 3
	Panel A: Board of directors		
INTERCEPT	-.402**	-.402**	-.279
	(-2.065)	(-2.065)	(-1.523)
B_SIZE	-.035	.007	-.030***
	(-1.193)	(.625)	(-7.185)
b_indep	.001		
	(.018)		
b_non-indep		-.001	
		(.985)	
b_%non-indep			-.001**
			(-2.324)
b_female	.041***		
	(3.513)		
b_male		-.041***	
		(-3.513)	
b_%male			-.001***
			(-4.079)
B_DOS	-.001***	-.001***	-.001***
	(-3.655)	(-3.655)	(-3.823)
Control variables	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Adjusted R^2	0.329	.329	.329
F-statistics	268.149***	268.149***	268.993***
Observations	8,742	8,742	8,742
	Panel B: Ownership		
INTERCEPT	-.361*	-.381*	-.325
	(-1.795)	(-1.898)	(-1.617)
B_EFFECT	-.027***	-.048***	-.079***
	(-4.360)	(-6.380)	(-6.683)
OS_CON	-.002***	-.002***	-.002***
	(-4.394)	(-4.153)	(-2.606)
OS_FAM	.039	.040	.068
	(1.060)	(1.110)	(1.206)
B_EFFECT*OS_CON	.001**	.001	.000
	(2.183)	(1.553)	(.603)
B_EFFECT*OS_FAM	-.024	-.040*	-.040
	(-1.320)	(-1.667)	(-.138)
Control variables	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Adjusted R^2	.327	.329	.329
F-statistics	240.051***	242.329***	242.029***
Observations	8,372	8,372	8,372

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and various control variable using alternative board measurements, by conducting the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. Panel A represents model 1, where board size, board independence, board gender diversity, and board director ownership are the independent variables. Panel B represents model 2, where B_EFFECT, OS_CON, and OS_FAM are the independent variables, and B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables. Measurement 1 measures board independence and board gender diversity as the number of independent and female directors on the board. Measurement 2 measures non-independence and non-gender diversity as the number of executive and male directors on the board. Measurement 3 measures non-independence and non-gender diversity as the proportion of executive and male directors on the board.

Appendix H: Robustness check years

Table 16

Result of robustness check board of directors and ownership on cost of debt each year (2013-2018).

Variables	2018	2017	2016	2015	2014	2013
			Panel A: Board of directors			
INTERCEPT	-.584 (-1.294)	-.499 (-1.025)	-6.74 (-1.383)	-.980** (-1.981)	-1.570*** (-3.125)	-1.934*** (-3.889)
B_SIZE	-.014* (-1.667)	-.007 (-.711)	.001 (.055)	.009 (.741)	-.007 (-.548)	.003 (.224)
B_IND	-.002 (-1.420)	.001 (.396)	.001 (1.048)	.000 (-.142)	.003** (2.063)	.003** (2.066)
B_GEN_DIV	.000 (-.263)	.000 (.273)	.001** (2.043)	.002*** (3.065)	.002*** (2.639)	.003*** (4.103)
B_DOS	-.001 (-1.513)	-.002* (-1.775)	-.002*** (-1.791)	.000 (.883)	-.001 (-1.067)	.000 (-.469)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.367	0.359	0.352	0.335	0.323	0.258
F- statistic	64.511***	56.078***	50.672***	41.985***	40.256***	28.521***
Observations	1.798	1,576	1,465	1,302	1,320	1,281
			Panel B: Ownership			
INTERCEPT	-.665 (-1.498)	-.250 (-.521)	-.425 (-.878)	-.792 (-1.618)	-1.378*** (-2.742)	-1.632*** (-3.241)
B_EFFECT	-.046*** (-2.893)	-.002 (-.102)	.011 (.599)	.064*** (2.736)	.043* (1.662)	.100*** (3.668)
OS_CON	-.044* (-1.934)	-.037* (-1.770)	-.026 (-1.424)	-.008 (-.416)	-.014 (-.715)	-.014 (-.680)
OS_FAM	-.025 (-.916)	.001 (.049)	.008 (.393)	.002 (.088)	.005 (.220)	.002 (.096)
*B_EFFECT*OS_CON*	.041** (2.313)	.031* (1.812)	.010 (.576)	.024 (1.067)	.020 (.891)	.039* (1.716)
*B_EFFECT*OS_FAM*	.013 (.781)	-.001 (-.062)	-.006 (-.348)	-.007 (-.319)	-.011 (-.479)	-.004 (-.167)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.365	0.362	0.348	0.337	0.317	0.254
F-statistic	58.788***	51.587***	45.404***	38.197***	35.030***	24.453***
Observations	1.755	1,514	1,415	1,246	1,251	1,190

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and various control variable from each year (2013-2018), using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. Panel A represents model 1, where B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables. Panel B represents model 2, where B_EFFECT, OS_CON, and OS_FAM are the independent variables, and B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables.

Appendix I: Summary robustness check years

Table 17

Summary of the results of the robustness check each year.

Hypotheses + expected direction	2018		2017		2016		2015		2014		2013	
	+/-	Result	+/-	Result	+/-	Result	+/-	Result	+/-	Result	+/-	Result
H1 -	-	Confirm	-	Reject	+	Reject	+	Reject	-	Reject	+	Reject
H2 -	-	Reject	+	Reject	+	Confirm	+	Reject	+	Confirm	+	Confirm
H3 -	+	Reject	+	Reject	+	Confirm	+	Confirm	+	Confirm	+	Confirm
H4 -	-	Reject	-	Confirm	-	Confirm	+	Reject	-	Reject	+	Reject
H5 +	+	Confirm	+	Confirm	+	Reject	+	Reject	+	Reject	+	Confirm
H6 +	+	Reject	-	Reject	-	Reject	-	Reject	-	Reject	-	Reject

Note: This table summarizes the results of the robustness check each year. H1 test the negative effect of board size on cost of debt. H2 test the negative effect of board independence on cost of debt. H3 test the negative effect of board gender diversity on cost of debt. H4 test the negative effect of board director ship on cost of debt. H5 test the impact of concentrated ownership on the effect of board effectiveness on cost of debt. H6 test the impact of family ownership on the effect of board effectiveness on cost of debt.

Appendix J: Descriptive statistics country

Table 18

Descriptive statistics for each country.

	N	Mean	Median	Std. Deviation	Min.	Q1	Q3	Max.
				Panel A: Belgium				
COD	2,397	1.25	0.93	1.14	.00	.42	1.71	7,66
B_SIZE	2,405	3.33	3.00	1.96	1.00	2.00	4.00	17.00
B_IND	2,405	91.49	100.00	20.98	.00	100.00	100.00	100.00
B_GEN_DIV	2,405	15.18	.00	25.51	.00	.00	25.00	100.00
B_DOS	2,405	1.62	.00	9.38	.00	.00	.00	100.00
B_EFFECT	2,405	1.76	2.00	.79	.00	1.00	2.00	4.00
OS_CON	2,101	88.10	99.90	23.88	5.31	96.67	99.99	100.00
OS_FAM	2,101	.00	.00	.00	.00	.00	.00	0.00
TOTAL_ASSETS	2,378	12,798,005	10,279,654	8,451,302	2,002,790	6,389,703	16,868,641	42,396,312
ROA	2,460	3.62	3.01	8.55	-81.71	.50	6.83	48.40
GROWTH	2,436	3.92	2.73	16.77	-81.92	-4.36	10.79	98.05
LEV	2,393	9.57	3.87	13.46	.00	.53	12.79	81.01
COLLATERAL	2,455	18.01	11.81	18.32	.00	3.49	26.62	91.89
INT_COV	2,147	12.15	5.51	22.41	-84.73	1.19	18.93	88.92
				Panel B: Italy				
COD	11,856	1.25	.99	1.04	.00	.48	1.76	7.97
B_SIZE	8,199	2.55	2.00	1.67	1.00	1.00	3.00	15.00
B_IND	8,199	99.23	100.00	7.70	.00	100.00	100.00	100.00
B_GEN_DIV	8,199	11.39	.00	23.14	.00	.00	16.67	100.00
B_DOS	8,199	8.01	.00	21.74	.00	.00	.00	100.00
B_EFFECT	8,199	1.82	2.00	.92	.00	1.00	2.00	4.00
OS_CON	12,230	89.51	100.00	20.57	8.00	95.00	100.00	100.00
OS_FAM	12,230	.12	.00	.33	.00	.00	.00	1.00
TOTAL_ASSETS	11,466	18,537,020	16,633,711	10,060,042	2,046,814	10,357,739	25,632,230	42,965,542
ROA	12,340	2.62	2.05	7.94	-86.32	.12	5.92	89.10
GROWTH	12,122	5.62	4.17	19.58	-99.80	-3.34	13.09	99.79
LEV	11,454	15.24	11.60	13.01	.00	5.93	20.50	90,87
COLLATERAL	12,267	18.83	11.62	19.83	.00	2.94	29.18	92.90
INT_COV	11,090	10.66	4.28	20.71	-89.31	1.10	15.73	88.98
				Panel C: Latvia				
COD	642	1.63	1.38	1.15	.01	.87	2.22	7.64
B_SIZE	647	3.18	3.00	2.03	1.00	2.00	4.00	14.00
B_IND	647	100.00	100.00	.00	100.00	100.00	100.00	100.00
B_GEN_DIV	647	18.45	.00	27.98	.00	.00	33.33	100.00
B_DOS	647	10.15	.00	24.87	.00	.00	.00	100.00
B_EFFECT	647	2.13	2.00	.89	1.00	1.00	3.00	4.00
OS_CON	632	94.94	100.00	15.31	12.51	100.00	100.00	100.00
OS_FAM	632	.21	.00	.41	.00	.00	.00	1.00
TOTAL_ASSETS	600	10,493,787	7,899,043	7,711,866	2,032,011	4,584,058	14,341,145	38,742,936
ROA	654	5.29	4.65	10.55	-55.95	1.30	9.57	77.69
GROWTH	621	8.45	7.02	25.66	-82.42	-4.15	17.96	99.49
LEV	596	17.68	9.98	19.99	.00	1.41	26.93	83.73
COLLATERAL	646	29.84	23.19	25.98	.01	4.81	49.61	92.47
INT_COV	593	11.12	6.00	19.08	-70.93	1.58	16.90	85.67

Note: This table presents normal values instead of logged values for descriptive purposes. Panel A represents the descriptive statistics of Belgium, Panel B represents the statistics of Italy, and Panel C represents the statistics of Latvia. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, B_DOS, and B_EFFECT are the independent variables. OS_CON, and OS_FAM are the variables used for the moderating variables. TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, INT_COV are the control variables. COD, B_IND, B_GEN_DIV, B_DOS, OS_CON, ROA, GROWTH, LEV, and COLLATERAL present a percentage value. B_SIZE, TOTAL_ASSETS, and INT_COV present a normal value. OS_FAM is a dummy variable that presents a value (between) 0 and 1.

Appendix K: Robustness check country

Table 19

Result of robustness check board of directors and ownership on cost of debt in every country.

	Belgium		Italy		Latvia	
Variables	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
INTERCEPT	-1.815***	-.778*	-1.338***	-1.323***	.945**	.487
	(-4.764)	(-1.902)	(-5.269)	(-5.612)	(2.051)	(1.044)
B_SIZE	-.036***		-.049***		-.018*	
	(-4.572)		(-10.251)		(-1.865)	
B_IND	.003***		.002*		-	
	(4.399)		(1.895)			
B_GEN_DIV	.003***		.000		.000	
	(5.972)		(.319)		(-.353)	
B_DOS	-.004***		-.001*		-.002***	
	(-2.827)		(-1.742)		(-2.728)	
B_EFFECT		.062***		-.069***		-.010
		(3.938)		(-8.581)		(-.470)
OS_CON		-.031*		-.026***		.032
		(-1.930)		(-3.054)		(.852)
OS_FAM		-		.015*		.005
				(1.703)		(.231)
*B_EFFECT*OS_CON*		.005		.021***		-.032
		(.354)		(2.659)		(-.810)
*B_EFFECT*OS_FAM*		-		-.002		.056***
				(-.296)		(2.869)
L_TOTAL_ASSETS	.102***	.051**	.088***	.090***	-.026	-.004
	(4.404)	(2.008)	(6.252)	(6.328)	(-.897)	(-.126)
ROA	.039***	.040***	.025***	.025***	.072***	.070***
	(15.749)	(14.597)	(18.298)	(18.305)	(17.048)	(16.166)
GROWTH	.002*	.002**	.002***	.002***	-.001	-.001
	(1.851)	(2.408)	(4.524)	(4.195)	(-1.438)	(-1.612)
LEV	.014***	.015***	.005***	.006***	.002*	.002*
	(12.289)	(11.306)	(8.764)	(8.887)	(1.740)	(1.658)
COLLATERAL	.001	.001	.001***	.001***	.003***	.003***
	(.592)	(1.215)	(2.974)	(3.172)	(2.834)	(2.873)
INT_COV	-.024***	-.025***	-.026***	-.026***	-.065***	-.065***
	(-27.637)	(-25.700)	(-52.143)	(-51.790)	(-19.647)	(-18.805)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.418	0.394	0.381	0.381	0.602	0.612
F-statistic	86.986***	71.838***	233.635***	217.704***	34.332***	30.169***
Observations	1,941	1,650	6,314	6,251	487	470

Note: This table presents the estimated coefficients from regressing cost of debt on board of directors, ownership and various control variable from each country, using the OLS regression method. ***, **, * Correlation is significant at 1%, 5%, and 10%, respectively. COD is the dependent variable. B_SIZE, B_IND, B_GEN_DIV, and B_DOS are the independent variables for model 1. B_EFFECT, OS_CON, and OS_FAM are the independent variables, and B_EFFECT*OS_CON and B_EFFECT*OS_FAM are the moderating variables for model 2. L_TOTAL_ASSETS, ROA, GROWTH, LEV, COLLATERAL, and INT_COV are control variables.