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Spheres of Influence

Exploring the impact of different ownership structures on the cost of debt

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Abstract

Title: Spheres of Influence: Exploring the impact of different ownership structures on the cost of debt

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Keywords: Sphere ownership, cost of debt, concentrated ownership, agency costs, stewardship

Purpose: The purpose of this study is to investigate whether sphere ownership influences the cost of debt for Swedish firms, and if the effect can be explained by different types of sphere ownership, such as family, institutional, or bank-affiliated spheres.

Methodology: To investigate the relationship between sphere ownership and the cost of debt, both pooled ordinary least squares and random effect models are employed. The models all include time dummies, industry dummies, and robust standard errors clustered by firm. To control the robustness and examine if the results suffer from self-selection bias, the paper further employs different ownership thresholds and a propensity score matching approach.

Theoretical perspective: Theoretical perspectives used in this study to formulate the hypotheses and explain our results are the agency theory and stewardship theory.

Empirical foundation: The sample employed in this study consists of 1,772 firm-year observations of 305 firms listed on the Stockholm Stock Exchange over the time period 2015-2023.

Conclusions: We find that firms owned by spheres and family spheres exhibit 120 and 130 basis points lower costs of debt, respectively. These results are attributable to the fact that spheres, and especially family spheres, help to mitigate agency problems by acting as stewards of the firms they control. However, we find no evidence that firms owned by institutional or bank-affiliated spheres see their cost of debt affected.

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1. Introduction

1.1 Background

The aftermath of the pandemic and the current global political climate have led Sweden to its highest interest rates since the financial crisis in 2008 (Sveriges Riksbank, 2024). The increasing interest rates have impacted many stakeholders in Sweden, such as consumers, corporations and the society at large (SEB, 2024). Moreover, Swedish banks that provide a significant share of debt financing for Swedish companies face direct consequences, since procuring funds from the Riksbank, the nation's central bank, becomes more expensive (OECD, 2022). These expenses are then transmitted to borrowers such as companies and consumers (SCB, 2023), which ultimately raises significant hurdles for all actors seeking to raise debt financing (Sveriges Riksbank, 2023).

Of these many actors, one of the most influential and prominent ones are the ownership spheres that dominate the Swedish market. While no unanimous definition exists, spheres are commonly described as groups of shareholders with aligned interests (Sundin & Sundqivst, 1998). The prominence of spheres stems from two important legislations brought forth during the 20th century. The first of which prohibited Swedish banks from owning shares in publicly listed companies. This led to the creation of Closed-End-Investment-Funds (CEIFs), such as the likes of Investor AB and Industrivärden, which meant the banks could transfer their assets to holding companies, allowing the owners of the banks to maintain control (Jakobsson & Wiberg, 2014). Because of this, the pyramidal structure of three layers, with a sphere on top controlling a CEIF, which in turn controls subsidiary companies, became prevalent. Moreover, since 1993, when strict regulations limiting foreign ownership were removed, the inflow of foreign capital and investments has increased drastically. As a response, many Swedish companies began issuing dual-class shares, allowing controlling owners, such as spheres to maintain control over their companies (Jakobsson & Wiberg, 2014). For example, the most prominent sphere in Sweden, the Wallenberg sphere, owns 23.75% of the votes in Ericsson but only 7.98% of the capital via their investment vehicle Investor (Holdings, 2024).

These spheres play a pivotal role in the economic landscape of Sweden through their large ownership shares in enterprises and banking institutions (Agnblad et al., 2002; Collin, 1993;

The Economist, 2016). Going back to 2013, spheres were the largest owners of 43.7% of Swedish-listed companies (Jakobsson & Wiberg, 2014). Moreover, many spheres have been active for long periods, and have managed to build up enormous wealth, which solidifies their influence over both the corporate and banking landscape. Yet, despite spheres exerting large control over many Swedish firms, a knowledge gap between the general public and the influence of spheres still exists.

1.2 Problem Discussion and Research Question

With the Swedish interest rates at a current peak, the topic of debt financing is more relevant than it has been for years. Considering that spheres exert significant influence, it becomes of interest to investigate whether ownership structures play a role in shaping the cost of debt. Decreasing the cost of debt is in many ways favourable for a firm as it reduces the costs of additional financing, which grants more access to capital, less financial constraint, and thus, lower financial risk. Moreover, the cost of debt is an integral part of the Weighted Average Cost of Capital (WACC). A lower cost of debt therefore generates a lower WACC, which in turn increases firm value.

Examining determinants of the cost of debt thus naturally becomes of great importance. Research surrounding the cost of debt largely revolves around the agency theory, which makes ownership structures relevant to examine. Arguments can be made both in favour of sphere ownership lowering and increasing the cost of debt. Agency theory suggests that large controlling ownership, such as spheres, could mitigate risk shifting, and better align incentives between shareholders and managers (Anderson et al., 2003; Purkayastha et al., 2022). However, the same theory also proposes that large controlling owners with distinct separation of ownership and control could lead to minority shareholder expropriation, which could increase the cost of debt (Jensen & Meckling, 1976). On the other hand, stewardship theory suggests that large controlling owners with a long-term vision and commitment to the firm's success may act as stewards, thereby reducing agency costs typically associated with the separation of ownership and control (Donaldson & Davis, 1991). Considering that many spheres are family-owned, social aspects such as reputation could also play an important part.

Even if spheres are similar in the way they gain wealth and control, they encompass many other characteristics. Commonly found traits of spheres are some that mirror characteristics of family ownership, with a long-term commitment and stewardship approach, whereas some spheres more resemble institutional ownership, where efficient monitoring and governance practices are prioritized (Agnblad et al., 2002). Although the literature on spheres is scarce, the subject of different ownership structures and their effect on the cost of debt is well studied.

Previous literature examining the cost of debt focuses on different types of ownership structures, such as family ownership (Anderson et al., 2003; Byun et al., 2013), institutional ownership (Chatterjee et al., 2023; Bhojraj & Sengupta, 2003; Kim et al., 2019), and bank ownership (Sanchez-Ballesta & García-Meca, 2011; Ang et al., 2000), and find contrasting results. As for family ownership, Anderson et al. (2003) find that it comes with a lower cost of debt, as these investors are often 'undiversified', and their incentives thus become more aligned with creditors. Contrastingly, however, Gao et al. (2020) investigate the Chinese market and demonstrate that family ownership leads to a higher cost of debt, due to increased tunnelling. Chatterjee et al. (2023) and Bhojraj and Sengupta (2003) study the Chinese and US markets respectively, and find that institutional ownership reduces the cost of debt as it comes with increased monitoring. In contrast, Kim et al. (2019) show that short-term institutional ownership instead increases the cost of debt. Moreover, research on bank ownership seems to suggest that it comes with increased monitoring, which reduces the cost of debt (Sanchez-Ballesta & García, 2011).

Due to the rather extraordinary case of ownership structures in Sweden, with large spheres that in certain ways incorporate aspects commonly found in both family and institutional ownership settings, examining how sphere ownership in Sweden influences borrowing costs become interesting. Moreover, to our knowledge, studies are yet to be performed on the specific subject. In light of this, our paper aims to examine whether sphere ownership in Sweden has a significant impact on a firm's cost of debt. In doing so, this paper hopes to fill one of the many research gaps regarding sphere ownership in Sweden by formulating the following research question:

How does sphere ownership affect the cost of debt?

1.3 Methodology

This paper investigates a sample of 1,772 firm-years and 305 firms listed on the Stockholm Stock Exchange between the years 2015-2023. Various estimation methods are employed to examine if sphere ownership in Sweden impacts the cost of debt, which is proxied by the effective interest rate. Sphere ownership in this paper is defined as a dummy variable that takes on the value 1 if the largest shareholder is a sphere and controls more than 20% of the votes. Similar dummy variables are created for the different sphere characteristics of family, institutional, and bank-affiliated spheres. Initially, univariate testing is performed to examine the relationship. This is followed by pooled ordinary least squares and random effects estimations with the inclusion of various control variables that are recurring in the literature regarding the cost of debt, along with industry and time controls. Moreover, to control the robustness of the results, different ownership thresholds are employed when re-estimating the regressions. Finally, previous literature suggests that ownership structure could be determined as a result of the cost of debt (Byun et al., 2013; Sanchez-Ballesta & García-Meca, 2011), meaning that spheres might actively decide to invest in such firms. To control for this possible self-selection bias, regressions on propensity score matched subsamples are employed.

1.4 Main Findings

This paper finds that sphere ownership and family sphere ownership significantly reduce the cost of debt of Swedish-listed firms by 120 and 130 basis points, respectively. The results are mainly attributed to family sphere owners acting as stewards of the firms they control, thus reducing agency costs. The findings suggest that there exists an optimal level of ownership concentration, where spheres with too little control have no impact and too much control becomes excessive. Furthermore, the results are robust when testing on a propensity score matched subsample. The paper does not, however, find any evidence that either institutional or bank-affiliated spheres lower the cost of debt.

1.5 Contribution

Ownership structure and its effects on various firm characteristics is a widely explored subject. However, the Swedish ownership spheres remain largely unexplored. This study aids in filling one of the many research gaps regarding ownership spheres in Sweden by linking the ownership structure to the cost of debt, something that, to our knowledge, has not been done before. The results should be of relevance for various stakeholders, investors, and creditors alike, since it reveals how sphere ownership manages to perform better in a critical aspect of corporate finance. Moreover, the findings are of value to the spheres themselves as guidance toward optimal ownership levels. The findings further contribute to the literature surrounding ownership structures, indicating that the Swedish ownership model could be valuable to replicate in other parts of the world.

1.6 Outline

This paper is further structured into eight additional chapters. In Chapter 2, the authors provide context for the Swedish ownership structure. Chapters 3 and 4 present the theoretical frameworks used to analyse the results, followed by previous literature on the subject. In Chapter 5, the hypotheses for the study are developed and presented. Chapter 6 describes the data along with the sample selection, followed by Chapter 7, which describes the methodology used to test the hypotheses. In Chapter 8 the results are presented and analysed. Finally, the conclusions of this study are described in Chapter 9.

2. The Swedish Framework

2.1 Ownership in Sweden

The phenomenon of a group controlling several businesses is not exclusive to Sweden. Nonetheless, the ownership structure in Sweden is by many measures differentiated from the standard Anglo-Saxon and American structures, as it is one of the few countries that allow the use of both dual-class shares and pyramidal holdings. Spheres in Sweden therefore operate in a unique setting, characterized by concentrated private ownership and a large separation of ownership and control (Agnblad et al., 2002; Holmén & Knopf, 2004). As suggested by La Porta et al. (1997), the large separation along with the rather weak formal regulatory protection for minority owners should lead to an inefficient financial market. Still, as Agnblad et al. (2002) propose, Sweden thrives in many regards and is able to produce large international companies.

With large separation of ownership and control, the risk of minority shareholder expropriation arises, however, as suggested by Agnblad et al. (2002), clear cases of minority shareholder expropriation seem to be rare in Sweden. The issues are supposedly mitigated by social aspects; the private owners want their actions reflected on their family name, and severe expropriation would reflect badly on their name as well as harm their acclaimed prestige (Agnblad et al., 2002; Holmén & Knopf, 2004). The risk of expropriation is, nonetheless, compensated by discounts of minority positions, highlighting that a conflict between controlling owners and the minority shareholders still exists (Agnblad et al., 2002). The authors further explain that firms with concentrated private ownership are more reliant on internally generated funds and debt for financing, as their lower valuation makes equity financing less favourable (Agnblad et al., 2002).

2.2 Spheres in Sweden

The definition of the term ‘sphere’ has been subject to different interpretations over time, and since the term has been used mainly in a Swedish context in previous research conducted, it has no direct comparison internationally (Agnblad et al., 2002). The original definition stems from Sundin and Sundqvist’s (1998) work, and their definition of a sphere is as follows: *A* *group of shareholders who share the same interests*. Although subject to different interpretations, spheres play an important role in the Swedish market and exhibit a significant degree of control. There are many prominent spheres in Sweden, with the two biggest ones being the Wallenberg and Lundberg spheres. Figure 1 in the Appendix showcases an illustrative representation of the Wallenberg sphere and demonstrates how their use of dual-class shares and pyramidal structures asserts their control. In a broader context, this is similar to how the richest 1% in Sweden controls 35.8% of the total wealth in Sweden and that 15 families controlled approximately 70% of the Stockholm Stock Exchange in 2017 (UBS, 2023; Allelin et al., 2018). Of these 70%, the Wallenbergs alone stood for almost half of the portion, by controlling firms worth more than SEK 2,000 billion. Furthermore, the Wallenberg and Lundberg spheres own two of Sweden's largest banks, SEB and Handelsbanken respectively, further adding to their degree of control, since they are also essential creditors which many firms depend on.

Spheres are constructed and controlled by many interconnected actors and entities, with the core family or institution on top. Moreover, the spheres often embody characteristics similarly found in both family and institutional ownership, such as concentrated ownership where the core owner exerts control over all subsidiaries and affiliated companies (Agnblad et al., 2002). Additionally, by emphasizing values such as strategic vision and organizational stability, sphere ownership can be linked to the stewardship theory, where owners manage with a long-term commitment (Davis et al., 1997; Donaldson & Davis, 1991). Many spheres also emphasize management practices commonly associated with institutional ownership, such as monitoring and access to resources. These structures further provide governance mechanisms that resemble those found in institutionally owned firms, which helps mitigate agency costs often affiliated with concentrated ownership (La Porta et al., 1997).

2.3 Debt Financing and the Role of Banks in Sweden

The Swedish market for non-financial companies has long been prevalent in its equity financing. However, the bond market has increased substantially and more than doubled during the years 2009-2021 compared to the period 2000-2008, and the annual bond issuance has surpassed the annual equity issuance (OECD, 2022). Regarding debt financing for companies, the bond share has also increased from about 10% in 2000-2012 to 15% in 2020 (OECD, 2022). Although the bond market has developed substantially over the last few years, it pales in comparison to bank financing. Swedish companies are heavily bank-dependent, with almost 85% of Swedish companies' debt being bank loans. Moreover, 47% of the total debt of companies consists of intercompany loans (OECD, 2022). An intercompany loan is a loan between two companies within a shared business group. As a large portion of Swedish listed firms are controlled by spheres with controlling interests in several companies, this high portion of intercompany loans is not surprising.

The banking market in Sweden can be described as concentrated, with the four largest banks—Handelsbanken, SEB, Nordea, and Swedbank—accounting for about two-thirds of the total credit market in the country (Copenhagen Economics, 2023). Smaller banks have, however, been gaining market shares from 2012 and onwards, but the larger banks still dominate the market. Although concentrated banking markets are often considered inefficient, the Swedish market manages to be relatively effective, since larger banks do not use their power to exploit those seeking funds (Copenhagen Economics, 2023).

3. Theoretical Framework

3.1 Agency Theory

Almost 50 years ago, Jensen and Meckling (1976) introduced the agency theory for the very first time. Agency theory revolves around the presence of an agent and a principal, and is of particular interest in corporate governance. The managers (agents) are supposed to act on behalf of the shareholders (principals), however, misalignment of incentives or information asymmetry might lead to inefficiencies and give rise to agency costs. When, for instance, the separation of ownership and control is large, this becomes prevalent (Jensen & Meckling, 1976). Ang et al. (2000) further strengthen this argument by showing that agency costs in firms increase when the manager or founder reduces their ownership stake. Higher agency costs in general, even if between managers and shareholders, should lead to creditors charging a premium, thus increasing the cost of debt (Sanchez-Ballesta & García-Meca, 2011).

Jensen and Meckling (1976), separate agency issues into Type I and II agency problems. Type I refers to the problems between the agent and the principal. Information asymmetry and adverse selection might necessitate contracting between the managers and shareholders, as the shareholders fear that the managers will shirk their duties. There are several ways to mitigate Type I agency problems. For instance, management can be granted stock options to align their incentives more with the shareholders (Purkayastha et al., 2022). Further, the existence of large controlling shareholders and blockholders could also help mitigate Type I agency problems. A key aspect of reducing Type I problems is to increase the monitoring of management. However, diversified minority owners frequently lack the incentives necessary to motivate monitoring. Controlling owners and blockholders on the other hand, can play a pivotal part in the monitoring aspect. As controlling owners usually have a significant stake in the company, liquidating their shares quickly can be a lengthy process, and the investment is thus, usually of a long-term nature. For these actors, the incentives for monitoring management increase (Purkayastha et al., 2022). These arguments apply to sphere owners, as they regularly hold significant stakes in companies and exert control over them (Jakobsson & Wiberg, 2014). Monitoring of management does, nonetheless, have consequences of its own. Müller and Inderst (1999) argue that increased levels of concentrated ownership, which exceed the ‘optimal level’, lead to over-monitoring, which can create additional agency costs.

Too much monitoring can lead to risk-averse behaviour that limits growth, as firms voluntarily forego profitable investment opportunities (Müller & Inderst, 1999).

Type II problems, on the other hand, refer to the problems that may arise between two principals, for instance, controlling sphere owners, and minority owners. Due to the extensive use of dual-class shares and pyramidal structures, the Swedish setting is signified by a large separation of ownership and control (Agnblad et al., 2002; Holmén & Knopf, 2004). Type II agency problems, thus, become extra relevant. Although concentrated ownership, which is commonly associated with spheres, may help reduce Type I agency problems, it might also exacerbate Type II problems. Instead of solely focusing on value maximization, undiversified controlling shareholders might use their influence on management to exert private benefits and in doing so expropriate minority shareholders (Jensen & Meckling, 1976). In the case of controlling managers, often seen in family-owned firms, the entrenchment issue can be prevalent. Entrenchment implies that controlling managers might use their power to maintain their position in the firm, even if that person lacks the necessary competence (Shleifer & Vishny, 1997). However, with the Swedish context in mind, the relationship between controlling shareholders and minority shareholders might differ. Large spheres that have controlling stakes in companies are not necessarily undiversified, as they usually have controlling ownership in several companies. This is in line with Agnblad et al. (2002), who argue that clear cases of minority shareholder expropriation in Sweden are rare, considering the ownership structure.

Another form of agency problem is the agency cost of debt, which regularly arises in the form of risk shifting. When a firm faces distress and is highly leveraged, bankruptcy might mean that shareholders receive nothing of the remains, as the debtholders have a claim on all existing cash and assets. This might incentivize shareholders to undertake risky investments, as their upside is limitless, and the downside has already been reached (Jensen & Meckling, 1976). By investing in risky projects, the risk is shifted to the debtholders. To mitigate these risks, creditors can include various covenants and increase monitoring, but eventually, as agency costs increase, so will the interest on the loan (Anderson et al., 2003). The likelihood of risk shifting is further increased when there is diverse ownership, due to diversified owners being more willing to risk a single investment, compared to a large undiversified owner (Anderson et al., 2003).

3.2 Stewardship Theory

An alternative to the agency theory, often used when studying governance in family-owned firms, is the stewardship theory. Contrary to the agency theory where individuals are assumed to be utility-maximizing and acting in self-interest, the stewardship theory assumes that individuals are collectivists and trustworthy. Managers (agents) and shareholders (principals) incentives are naturally aligned, and although a manager might have self-interests, they will prioritize and place a larger value on the cooperation (Donaldson & Davis, 1991). According to Davis et al. (1997), the steward's behaviour can be seen as rational, since their focus is on maximizing benefits for the organization. This is due to managers exhibiting a sense of ownership and commitment to the goals and values of their organization. The idea of trust between managers and principals can be seen as one of the key principles of the theory. Environments that are characterized by mutual trust should increase the likelihood of managers acting in the best interest of the organization and not themselves, even if moral monitoring mechanisms are absent (Davis et al., 1997). Reddy and Wellalage (2023) further explain that stewardship theory is relevant when studying family-owned firms. This is because family-owned firms might be more emotionally invested in the firm and its reputation, the economy of the family might depend on the firm's success, and thus, the owners act as stewards of the firm. As spheres are often family-controlled, and if not, often exhibit similar features, stewardship theory becomes applicable when studying sphere ownership.

On a contrasting note, Chrisman (2019) argues that while stewardship theory presents a model of human behaviour that is different from the agency theory, it still overlooks some specific fundamental characteristics. Some characteristics the author means are overlooked include self-interest and opportunistic behaviour, indicating that applying the theory in question without being critical of it may yield results that omit important elements. Instead of looking at stewardship theory as the opposite of agency theory, the author instead argues that it should be seen as a complement. Chrisman (2019) explains that these arguments become extra applicable in the context of family firms. The author argues that family firms show traits that are associated with the expectations of stewardship theory, however, they do not always live up to them. For instance, Chrisman (2019) states that family members in firms treat non-family members differently and that they pursue personal goals to increase their socioemotional wealth. Thus, making it reasonable to question the notion that managers' incentives are naturally aligned with those of the stakeholders.

4. Literature Review

Previous research delves into the relationship between different ownership structures and the cost of debt. There has, however, to the best extent of our understanding, been no earlier research conducted where the specific relationship between sphere ownership and cost of debt is examined. Instead of spheres, much of the existing literature focuses on ownership structures, such as family ownership or institutional ownership. Spheres do, nonetheless, share specific characteristics with both forms of ownership, allowing for the use of previous research done on both forms of ownership to be useful guiding tools in helping us form our hypotheses and contextualize our findings. Moreover, as many spheres highlight interconnectedness with banks, research on both bank ownership and relationship lending further helps us in investigating the relationship between spheres and the cost of debt.

4.1 Family Ownership and Cost of Debt

Several studies from past years have researched the prevalence of family firms in the corporate world. Roughly 50 years ago, Burch (1972) found that 42% of the Fortune 500 consisted of family firms, with an additional 17% reported as 'possibly family-owned'. Villalonga and Amit (2006) find that 37% of Fortune 500 firms have founders or members of their families as directors, owners, or key officers. Stretching beyond the Fortune 500, one of the most comprehensive studies conducted on corporate control and ownership by Aminadav and Papaioannou (2020), investigates over 40,000 public firms from 127 countries between the years 2004 and 2012. Their findings show that 15.2% of firms are controlled by families, along with 14.6% that are 'almost certainly' owned by a family, totalling an estimate of almost 30% family ownership. More studies have been able to show that in certain markets, over 50% of public firms are family-owned (La Porta et al., 1999; Claessens et al., 2000; Faccio & Lang, 2002; Villalonga and Amit, 2008).

The prevalence of family ownership is mainly explained by private benefits of control and competitive advantage. The private benefits of control hypothesis posit that since value is maximized for owning families, it expropriates non-family owners (Burkart et al., 2003). The expropriation is executed because families have objectives that differ from those of the minority shareholders. The competitive advantage hypothesis instead explains the prevalence of family ownership due to value being maximized for all shareholders, family or non-family alike (Bertrand & Schoar 2006). This is explained by family ownership providing better incentives and the ability to monitor its managers, which then reduces the agency problems that might exist (Villalonga & Amit, 2006). Bertrand and Schoar (2006) suggest that family ownership acts as a substitute for inadequate legal frameworks. In such cases, trust among family members can replace absent governance mechanisms and contractual enforcement.

As for the cost of debt in particular, Anderson et al. (2003) examine the impact of founding family ownership. In their sample of the S&P 500, founding families own on average 19% of their firms. The results suggest that family firms do have a lower cost of debt than non-family firms. The authors argue that family-owners are more undiversified and therefore have incentives more aligned with the bondholders of the firm, which reduces agency costs. Conversely, Gao et al. (2020) show that family control in China leads to a higher cost of debt instead, which results in these family-owned firms taking on less debt. The authors do, however, attribute this to firms in emerging markets being more incentivized to focus on tunnelling, rather than building reputations, due to low marketization and a poor legislative environment. Therefore, the authors suggest that family-owned firms may find certain markets more beneficial to their operations, particularly those with robust creditor protection and institutional environments (Gao et al., 2020).

Further studies, however, demonstrate that family ownership can lead to a reduced cost of debt. Swanpitak et al. (2020) explain that Thai family firms obtain a lower cost of debt due to playing a pivotal role in the economy. These firms, which are concerned with long-term survivorship and reputation, are granted strong and trustworthy relationships with lenders. Similarly, Lagaras and Tsoutsoura (2015) find that American family firms also benefit from relationships with lenders, which provides them with better loan terms. The authors also show that banks value the presence of family ownership since it might be seen as a signal of stability and commitment to the business. This is reflected by a significant portion of family firms having explicit restrictions in their credit agreements that require the founding family to maintain a minimum percentage of ownership or voting power (Lagaras & Tsoutsoura, 2015).

Byun et al. (2013) investigate the relationship between *Chaebols*, Korean for 'rich family', and the cost of debt. The authors measure the cost of debt as the bond spreads, measuring a sample of bonds issued in Korea during the period 2001-2007. The study finds significant results suggesting that companies owned by chaebols experience lower bond spreads, and thus, a lower cost of debt. The explanation put forth is that companies within these business groups benefit from risk-sharing or coinsurance. Large business groups can smooth earnings between companies and reallocate resources, which reduces the default risk and the cost of debt (Byun et al., 2013). This explanation is further strengthened by the authors, as they find that firms connected to chaebols with large resources benefit even more. The coinsurance effect also improves for firms with lower pledgeable income, and firms lower in the pyramid of the business group will benefit more than the ones on top (Byun et al., 2013). Chandera et al. (2018) strengthen this argument with their study on the coinsurance effect on the Indonesian market, where lower-level firms in a pyramidal structure experience significant benefits as a result of the coinsurance effect regarding their cost of debt.

On a separate note, family firms are often characterized by concentrated ownership (La Porta et al., 1999). The authors also find that family firms have a larger vote-to-capital ratio compared to non-family firms, meaning they can exert greater control over a firm while owning less capital. Lin et al. (2011) demonstrate that a larger ‘wedge’ between ownership and control, especially for family firms, increases the cost of debt. However, the sensitivity of the cost of debt to the wedge is lower in countries with greater shareholder and creditor protection along with stronger debt enforcement. As for ownership concentration, studies have not been able to show that it improves the cost of debt. Hirshleifer and Thakor (1992), Anderson et al. (2003), and Sanchez-Ballesta and García-Meca (2011) could not find that concentrated ownership has any significant impact on the cost of debt. In contrast, Müller and Inderst (1999) along with Jabbouri and Naili (2019) find that concentrated ownership increases the cost of debt. They credit the effect to actions by self-serving major shareholders, such as weak or non-existent monitoring and tunnelling, which increases corporate risk.

4.2 Institutional Ownership and Cost of Debt

Research on the impact of institutional ownership has varied findings. However, most studies on the subject do find that it decreases the cost of debt. For instance, Chatterjee et al. (2023) investigate 136 firms and 630 bond listings on the Chinese bond market during the period 2007-2015 and find that state, institutional, and foreign ownership all reduce the cost of debt, using bond yields as a proxy. Further, institutional ownership provides significant benefits in less marketized environments and for firms with lower credit ratings. Similarly, Bhojraj and Sengupta (2003) examine the effect of institutional ownership on bond yield spreads using a sample of 1,005 bond issues from 1991 to 1996. The authors find that institutional ownership is negatively related to bond yields, as it comes with increased monitoring and efficient governance practices. Nonetheless, the authors further discover that if the institutional ownership is too concentrated, it increases the bond yields. On a separate note, Elyasiani et al. (2010) find that, when examining the US market, the cost of debt is determined based on the stability of institutional owners rather than the ownership level. Furthermore, the authors find that the stability of institutional owners has a more pronounced effect on firms with greater information asymmetry.

Although most studies find that institutional ownership decreases the cost of debt, some studies find contrasting results. In a study on the private debt market in the US over the years 1990-2010, Kim et al. (2019) find a positive relationship between short-term institutional owners and the loan spread. The findings are explained by short-term institutional investors pressuring management to prioritise short-term gains, which increases agency costs and loan spreads (Kim et al., 2019). Moreover, when examining the relationship between institutional ownership and the cost of debt in the Indonesian market, Utami (2021) fails to find any effect. Utami (2021) argues that the findings can be explained due to the prevalence of family-owned firms in Indonesia, where the addition of institutional ownership has no impact on the creditor's perception of them.

4.3 Bank-affiliated Firms and Cost of Debt

When examining factors affecting the cost of debt, bank ownership naturally becomes relevant. Sanchez-Ballesta and García-Meca (2011) examine how different ownership structures influence the cost of debt. As a proxy for the cost of debt, the effective interest rate is employed. The authors investigate Spanish-listed firms during the years 1999-2002 and find that higher bank ownership reduces the cost of debt. Banks provide a large portion of a firm's financing in Spain, and by further owning shares in the firm the banks are incentivized to monitor them, which reduces the agency costs and, in turn, the cost of debt (Sanchez-Ballesta & García-Meca, 2011). Similarly, Ang et al. (2000), find that firms that delegate their monitoring to banks experience lower agency costs. This is, again, explained by the improved monitoring from the banks that reduces agency problems and increases firm performance.

Another aspect of banks that does not revolve around ownership regards relationship lending. Wang et al. (2020) find in their study that lower bank competition leads to increased bank market power, which in their study is proven to reduce the cost of debt for small and medium-sized enterprises (SMEs). The authors' sample consists of 528 banks matched with 77,911 SMEs in 17 EU countries from 2007-2015. The effect is seen to be stronger in economies where banking markets are more concentrated since it allows banks to invest and rely on relationship-lending techniques, where they could build long-term relationships. This would lead to more favourable loan terms being offered by banks to firms whom they know well. Bonini et al. (2016) exhibit similar results, with their study showing that relationship lending helps lower the costs of borrowing for firms. They do, however, find that a concentrated bank market leads to higher borrowing costs due to less competition, contradicting the findings of Wang et al.'s (2020) study.

5. Hypothesis Development

Both theory and literature present conflicting views on how sphere ownership could impact the cost of debt. One area of conflict presented in the literature is that of concentrated ownership and its effect on the cost of debt, which is of interest since spheres are typically characterized by concentrated ownership. For instance, Müller and Inderst (1999) and Jabbouri and Naili (2019) find that concentrated ownership comes with increased expropriation, which in turn increases the cost of debt. Meanwhile, other studies have not been able to find any significant impact of concentrated ownership on the cost of debt (Hirshleifer & Thakor, 1992; Anderson et al., 2003; Sanchez-Ballesta & García-Meca, 2011).

From a theoretical perspective, large controlling shareholders such as spheres should have incentives to monitor management (Purkayastha et al., 2022), thus decreasing Type I agency issues and the agency cost of debt as they could be assumed to be less diversified (Anderson et al., 2003). On the other hand, Type II agency problems should increase with sphere owners as their ownership is often concentrated, which increases the possibility of minority shareholder expropriation (Jensen & Meckling, 1976). However, since minority shareholder expropriation in Sweden is rare (Agnblad et al., 2002; Holmén & Knopf, 2004), we argue that the effects of sphere ownership will be most pronounced in reducing Type I agency problems and mitigating risk shifting.

Moreover, spheres exhibit traits of both family and institutional ownership, which enables for analysis of the connection to the cost of debt from several perspectives. Although some studies suggest that both family and institutional ownership could increase the cost of debt (Gao et al., 2020; Kim et al., 2019), most of the literature suggests the opposite. Anderson et al. (2003), Swanpitak et al. (2020), and Lagaras and Tsoutsoura (2015) all find in their studies that family ownership improves the relationships with creditors through stronger alignment, which in turn reduces the cost of debt. This argument is further strengthened by the stewardship theory, since family owners are more inclined to act as stewards of the firm and prioritize organizational interests over personal gains, which further contributes to the alignment effect (Reddy & Wellalage, 2023). Another explanation in favour of spheres lowering the cost of debt is the coinsurance effect provided by business group affiliations (Byun et al., 2013; Chandera et al., 2018). As for institutional ownership, Chatterjee et al. (2023) and Bhojraj and Sengupta (2003) suggest that institutional ownership's active monitoring reduces conflicts between managers and creditors, which results in a lower cost of debt. With spheres often exerting significant control over a company with a long-term investment strategy, we argue that they come with increased monitoring, similar to the findings regarding institutional ownership.

Expanding the view beyond ownership structures, spheres can be seen as highly influential actors in the Swedish market due to their extensive control. It is further likely that this influence extends to relationships with banks. Some spheres, like the Wallenberg sphere, own banks directly, whereas others have long-standing relationships with them. This could help lower the cost of debt for different reasons. First, several studies find that bank ownership itself reduces the cost of debt as it comes with increased monitoring (Sanchez-Ballesta & García-Meca, 2011; Ang et al., 2000). Moreover, Wang et al. (2020) and Bonini et al. (2016) find that having relationships with banks increases trust between the parties, which results in lower interest rates. As the Swedish banking market can be described as concentrated, relationship-building with banks can prove an important aspect in reducing the cost of debt.

Evidence surrounding the subject finds that both family and institutional ownership can play essential parts in reducing the cost of debt for a company. As the Swedish ownership spheres exhibit traits and characteristics commonly found in both family and institutional ownership settings, we propose that these findings apply to spheres as well. Moreover, the close relationships many spheres maintain with banks also play an important part in reducing the cost of debt. Synthesizing theory and literature on the subject, we expect that firms owned by spheres will have a reduced cost of debt compared to non-sphere controlled firms. To examine this, the following hypothesis is formulated:

H_1: Sphere ownership lowers the cost of debt

To delve deeper into the relationship between spheres and the cost of debt, the identified spheres are divided into family spheres and institutional spheres. Although similarities between the two exist, such as concentrated ownership and a long-term investment horizon, some differences are also pronounced. Families tend to act as stewards of the firm, whereas institutional owners prioritize monitoring and governance practices aimed at reducing agency conflicts (Agnblad et al., 2002). In this paper, family spheres are defined as spheres where control is shared between family members, either at the same time or by passing down control through generations. For example, of the 15 largest owners of Malmbergs Elektriska, five of them are members of the Folke sphere, granting them over 70% control in voting rights in total (Holdings, 2024). Institutional spheres are defined as spheres where control is held by an institutional investor, whether that be an individual or company, such as Rutger Arnhult, who has voting rights of over 10% in 9 different firms (Holdings, 2024). For some spheres, such as the Wallenberg sphere, arguments can be made both in favour of a family classification and an institutional through Investor. In this paper, they are, however, classified as a family sphere, since control has been passed down through several generations within the family.

The cost of debt has been found to be reduced through both the alignment effect that comes with family ownership tied to stewardship aspects (Anderson et al., 2003; Swanpitak et al., 2020; Lagaras & Tsoutsoura, 2015), and the increased monitoring from institutional ownership as part of their governance practices (Chatterjee et al., 2023; Bhojraj & Sengupta, 2003). By separating the spheres into family and institutional, this study aims to examine whether any of these distinct aspects help explain how these types of spheres affect the cost of debt on the Swedish market. However, as both family and institutional ownership characteristics play important parts in reducing the cost of debt for companies, the following hypotheses are formulated:

H_2: Family sphere ownership lowers the cost of debt
H_3: Institutional sphere ownership lowers the cost of debt

Finally, given that the previous separation of spheres into institutional and family spheres does not consider whether a sphere is connected to a bank or not, they are further separated into bank-affiliated spheres. As described in Chapter 2, two of the largest spheres in Sweden, the Wallenberg and Lundberg spheres, exert significant control over two of Sweden's largest banks, SEB and Handelsbanken. Moreover, some spheres in the sample are actually banks themselves. This study therefore aims to examine the impact on the cost of debt for spheres with bank affiliations. Since both bank ownership and close ties to banks have been found to reduce the cost of debt (Sanchez-Ballesta & García-Meca, 2011; Ang et al., 2000; Wang et al., 2020; Bonini et al., 2016), we expect this argument to be even more relevant for spheres classified as bank-affiliated. The following hypothesis is thus formulated:

H_4: Bank-affiliated sphere ownership lowers the cost of debt

6. Data Description

6.1 Sample Selection

Data for this paper is gathered for firms listed on the Stockholm Stock Exchange over the nine years 2015-2023. By including the most recent years the relevance of the study increases. Additionally, we account for year-specific variations by incorporating yearly dummy variables. The paper uses an unbalanced panel data set, meaning that all firms do not have observations for each year. To mitigate survivorship bias, firms that have been delisted or in other ways disappeared during the period have been included in the sample. All ownership data is gathered from Modular Finance Holdings, the database with the most up-to-date and extensive data for ownership spheres in Sweden. All the remaining financial information is gathered from Refinitiv Eikon. After merging the financial data from Refinitiv Eikon with the ownership data from MFN Holdings, the initial sample contains 2,766 firm-year observations and 406 firms. Similar to Sanchez-Ballesta and García-Meca (2011), financial firms such as banks are removed from our sample, as they follow different regulations and their balance sheets can skew the statistics. However, firms operating within financial services are kept. This sector includes firms such as Investor and Industrivärden which, as previously described, are the investment vehicles of the Wallenberg and Lundberg spheres. The sector is therefore of relevance to this paper. Moreover, observations with missing variables are removed which contributes to a large drop in the sample size, this results in a final sample of 1,772 firm-years and 305 firms.

Based on the ICB supersector code gathered from Refinitiv Eikon, the final sample contains firms within 16 different industries, after merging the similar *Energy* and *Utility* sectors due to few observations. For a distribution of observations in each industry, see Table 1. Overall, the firms are rather evenly distributed, with a few exceptions. Numerous firms are in the industries of *Industrial Goods and Services* and *Health Care*, and for the *Media* and *Energy and Utilities* industries a rather small sample is observed.

Table 1. The distribution between industries and year

Industry / Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Automobiles and Parts	5	5	6	5	5	5	5	6	6	48
Basic Resources	13	12	15	14	16	16	17	17	17	137
Construction and Materials	14	12	14	18	19	21	24	24	24	170
Consumer Products and Services	8	6	8	13	15	18	17	19	13	117
Energy and Utilities	1	1	2	3	3	2	3	4	4	23
Financial Services	6	4	7	7	7	6	7	7	6	57
Food, Beverage and Tobacco	5	5	5	5	5	4	4	4	3	40
Health Care	12	10	14	23	40	45	47	42	28	261
Industrial Goods and Services	38	36	36	44	49	53	51	57	44	408
Media	1	0	2	3	3	4	3	4	3	23
Personal Care, Drug and Grocery Stores	4	3	3	5	5	5	5	4	3	37
Real Estate	5	4	3	7	9	11	10	16	13	78
Retail	4	6	6	7	9	9	8	10	9	68
Technology	11	11	12	17	28	28	26	32	17	182
Telecommunications	6	6	8	7	9	8	8	9	7	68
Travel and Leisure	3	4	6	7	8	8	7	7	5	55
Total	136	125	147	185	230	243	242	262	202	1,772

Table 1 shows the distribution of observations between year and industry.

6.2 Dependent Variable

A commonly used measure of the cost of debt is the bond spread (Anderson et al., 2003; Byun et al., 2013). However, although growing, the bond market still constitutes only a small portion of debt financing for Swedish firms, with a vast majority of debt financing stemming from bank loans (OECD, 2022). Similar to Sanchez-Ballesta and García-Meca (2011), who explain that most Spanish firms rely on bank debt, this paper argues that the bond spread is not an appropriate proxy for the cost of debt of Swedish firms. Instead, the effective interest rate is employed as a proxy for the cost of debt, similar to Sanchez-Ballesta and García-Meca (2011) and Pittman and Fortin (2004). The effective interest rate is calculated as the interest expense divided by the long and short-term interest-bearing debt.

$$\frac{Interest\ expense_{i,t}}{Long\text{-}term\ debt_{i,t} + Short\text{-}term\ debt_{i,t}}$$

(Eq. 1)

Further, by using the effective interest rate, this paper can generate a much larger sample size, as only a selected number of Swedish firms issue bonds consistently. However, as explained by both Sanchez-Ballesta and García-Meca (2011) and Pittman and Fortin (2004), the effective interest rate is a 'noisy' variable that highlights some extreme values. How this is dealt with is explained further in section 6.5.

6.3 Independent Variable

Similar to Anderson et al. (2003) and Byun et al. (2013) this paper employs a dummy variable for ownership, called *Sphere Control (20%).* The variable takes on the value of 1 if the largest controlling shareholder is a sphere and controls more than 20% of the votes. There is no consensus on what threshold to use when defining a controlling owner, however, as a certain level of control is needed to impact a firm's decisions, the threshold of 20% is employed in accordance with Villalonga and Amit (2006). This paper further relies on MFN Holdings for the identification of spheres. In the sample of firms listed on the Stockholm Stock Exchange between the years 2015-2023, a total of 60 spheres are identified. For a list of all spheres, see Table 10 in the Appendix.

This paper identifies three different categories of spheres; family spheres, institutional spheres, and bank-affiliated spheres. To test hypotheses 2 (H_2) and 3 (H_3), the variable for the spheres is divided into the first two categories. First, the family spheres are identified and separated, creating the new variable *Family Sphere Control (20%)*. Second, a new variable is created for the remaining spheres which are all classified as institutional, creating *Institutional Sphere Control (20%)*. When classifying the nature of the spheres, we first look at the names provided by Holdings. Those that are named as family spheres are kept as such, while the remaining spheres are analyzed to determine their characteristics. For spheres with several family members actively investing in the same companies or control of the sphere having been passed down at least one generation, the classification given is family. The remaining spheres, which include institutional investors, banks, companies, and the Swedish government are then classified as institutional. For the fourth hypothesis (H_4), a variable called *Bank-affiliated Sphere Control (20%)* is created which contains all spheres, family and institutional alike, that have affiliations with banks. This is proxied by spheres having controlling ownership in banks, or being banks themselves. All variables are dummy variables that use an ownership threshold of 20%.

6.4 Control Variables

To increase the validity of our results, several control variables that can be expected to impact the cost of debt are included in the different models. Below, a description of all variables and their expected signs is presented.

Vote-to-Capital measures the wedge between control rights and capital, measured as voting rights divided by capital. Lin et al. (2011) find that the cost of debt is significantly higher for firms where the wedge is larger, thus we expect it to yield a positive coefficient. Similar to previous literature, we control for firm characteristics such as firm size, profitability, leverage, growth, and collateral (Sanchez-Ballesta & García-Meca, 2011; Byun et al., 2013). *Size* is measured as the natural logarithm of the sum of market capitalisation and long-term debt, per Byun et al. (2013). The variable is expected to be negatively correlated with the cost of debt as larger firms are expected to be more mature, and face less risk, thus being able to obtain better loan terms (Ashbaugh-Skaife et al., 2006; Sengupta, 1998). Moreover, *ROA*, measured as the return on lagged assets, is also expected to yield a negative coefficient as profitable firms face less distress and risk (Santosuosso, 2014). *Leverage* is expected to yield a positive coefficient, and is measured as a firm's debt divided by total assets. The expectation of a positive coefficient stems from higher leverage indicating higher financial distress and risk, which should be reflected in the cost of debt (Sanchez-Ballesta & García-Meca, 2011; Solomon, 1963). As for *Growth*, which is measured as the growth rate of total assets, previous studies employing the variable have shown it to yield a negative coefficient in relation to the cost of debt (Byun et al., 2013; Sanchez-Ballesta & García-Meca, 2011). Based on that, we expect it to yield the same for our study. *Collateral* is measured as net PP&E divided by total assets and is an indicator of how much collateral capacity a firm may have. Since firms with high collateral experience lower costs of debt, as van Binsbergen et al. (2010) demonstrate, we expect it to yield a negative coefficient, similar to Byun et al. (2013) and Sanchez-Ballesta and García Meca (2011).

Further, the variable *Intangible* is measured by dividing intangible assets by total assets. According to van Binsbergen et al. (2010), firms with more intangible assets exhibit lower costs of debt, since they can aid debt claims in means similar to how collateral assets do. Byun et al. (2013) instead argue that a higher ratio of intangible assets is indicative of higher information asymmetry, which Derrien et al. (2016) suggest leads to an increased cost of debt. Due to these ambiguous expectations of the variable, we do not have any expectations of the direction of the coefficient. Continuing, *Interest Coverage* is included, calculated as the operating profit divided by the interest expense. The variable is expected to yield a negative coefficient, as a better interest coverage ratio should increase the debt repayment ability. The variable *Current Ratio*, measured as current assets divided by current liabilities, is further included in line with Sanchez-Ballesta and García-Meca, (2011). Its inclusion stems from the ratio being a proxy for liquidity, an important measure for analysing a firm's capacity to service debt. Finally, a dummy variable if the company reports a loss for the period is included per Byun et al. (2013), denoted as *Loss*. For a description of all variables, see Table 11 in the Appendix.

6.5 Descriptive Statistics

6.5.1 Summary Statistics

Table 2 shows the summary statistics of the variables employed in this study. As common in corporate financial research, accounting variables often include outliers. This is the case for our data as well, therefore all accounting variables—*Size, ROA, Leverage, Growth, Collateral, Intangible, Interest Coverage,* and *Current Ratio, Loss*—are winsorized at the 1st and 99th percentile. Moreover, the dependent variable *CoD* shows some extreme positive outliers and is therefore winsorized at the 1st and 95th percentile. Even after winsorizing, *CoD* showcases a spread, with a minimum value of 0.03% and a max value of 25%. The mean of 5.9% is slightly lower than the mean observed in other studies (Sanchez-Ballesta & García-Meca, 2011; Pittman & Fortin, 2004; Byun et al., 2013). The dummy variable *Sphere Control (20%)* has a mean of 0.288, indicating that 28.8% of the observations are controlled by spheres that control more than 20% of the voting rights. Additionally, dividing the spheres into family and institutional, the statistics show that 24% of the observations are controlled by family spheres whereas 4.8% are controlled by institutional spheres. This shows that family ownership is much more prevalent in the context of spheres when compared to institutional spheres. The variable *Bank-affiliated Sphere Control (20%)* shows that 8.7% of the observations are controlled by either spheres which are controlled by banks, or spheres with close bank affiliations.

As for the control variables, *Vote-to-Capital* highlights that the average largest owner of a firm's votes is 1.559 times larger than their capital stake. The median of 1, however, indicates that most of the largest owners have voting rights equal to their capital stake. The variable *Size*, which in Table 2 is expressed in absolute terms of billion SEK, demonstrates a strong positive skewness, with the mean being many times higher than the median. This is addressed later in the regressions by using the natural log of *Size* instead. The mean of *Size* is SEK 38.520 billion, and the difference between the max and min is considerable. The variable *ROA* has a mean of 6.4% and a median of 7.9% indicating that most firms are profitable. The mean firm in the sample is levered to 24.2% with the highest leverage observed being 74.6%. As for *Growth,* the mean firm showcases growth in their assets by 15% per year. Moreover, the first quartile highlighting a positive value indicates that a vast majority of the observations are actually growing. As for *Collateral* and *Intangible,* the mean observations have 16.1% of assets constituted by PP&E and 11.1% of assets constituted by intangible assets. Even after winsorizing, *Interest Coverage* displays a considerable range, with a min of -579.846 and a max of 501.683. The reason for the significant spread is that some firms report extremely low interest expenses, which leads to large values when the operating income is divided by them. The mean of 14.11 for *Interest Coverage* suggests that the average firm can repay their interest expenses with their operating profit 14.11 times. Furthermore, with a mean of 1.764x, the variable *Current Ratio* indicates that most firms are liquid, with their current assets being larger than their current liabilities. Finally, the mean of *Loss*, with a value of 14.4%, implies that 14.4% of the observations reported losses.

Table 2. Summary statistics

Panel A: Cost of debt	Mean	Median	Min	Max	p25	p75	SD	N
CoD	0.059	0.038	0.003	0.250	0.024	0.066	0.059	1,772
Panel B: Ownership variables								
Sphere Control (20%)	0.288	0	0.000	1	0	1	0.453	1,772
Family Sphere Control (20%)	0.240	0	0.000	1	0	0	0.427	1,772
Institutional Sphere Control (20%)	0.048	0	0.000	1	0	0	0.214	1,772
Bank-affiliated Sphere Control (20%)	0.087	0	0.000	1	0	0	0.282	1,772
Panel C: Control variables								
Vote-to-Capital	1.559	1.000	0.534	8.573	1.000	1.751	1.075	1,772
Size (billion SEK)	38.520	7.145	0.101	486.641	1.778	32.193	80.739	1,772
ROA	0.064	0.079	-0.987	0.454	0.042	0.127	0.159	1,772
Leverage	0.242	0.228	0.004	0.746	0.129	0.330	0.152	1,772
Growth	0.150	0.084	-0.512	2.025	0.007	0.198	0.322	1,772
Collateral	0.161	0.106	0.001	0.784	0.041	0.220	0.168	1,772
Intangible	0.111	0.058	0.000	0.723	0.019	0.150	0.138	1,772
Interest Coverage	14.11	10.797	-579.846	501.683	3.541	23.982	104.68	1,772
Current Ratio	1.764	1.398	0.072	10.074	1.041	1.955	1.456	1,772
Loss	0.144	0	0.000	1	0	0	0.352	1,772

Table 2 depicts the summary statistics regarding mean, median, min, max, first quartile, third quartile, standard deviation and count for all variables employed in the study. Panel A shows the dependent variable ***CoD*** which is calculated as the interest expenses divided by the long- and short-term debt. In Panel B, all ownership variables are defined. ***Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a sphere and controls more than 20% of the votes. ***Family Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a family sphere and controls more than 20% of the votes**.** ***Institutional Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is an institutional sphere and controls more than 20% of the votes. ***Bank-affiliated Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a bank-affiliated sphere and controls more than 20% of the votes. In Panel C all control variables are shown. ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. ***Size*** is calculated as the sum of a firm's market capitalization and long-term debt, illustrated in billions. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by the current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1st and 99th percentile, except for ***CoD*** that is winsorized at the 1st and 95th percentile.

6.5.2 Correlation Matrix

Table 3 presents a Pearson's correlation table of all variables used in this paper. The dependent variable *CoD* is negatively correlated with *Sphere Control (20%)*, significant at the 1% level. This is in line with the H_1 of this paper, suggesting that sphere-controlled firms would have a lower cost of debt. When separating spheres into distinct types, *Family Sphere Control (20%)*, *Institutional Sphere Control (20%)*, and *Bank-affiliated Sphere Control (20%)*, all types show a significant negative relationship with the cost of debt. Although, institutional ownership is the only one which does not exhibit significance at the 1% level. Moreover, the table shows that *CoD* is significantly correlated at the 1% level with all variables except for *Vote-to-Capital* and *Interest Coverage,* where the significance is at a 5% level. The results indicate that larger and more profitable firms are associated with a lower cost of debt. *Leverage* is negatively correlated with *CoD*, which would suggest that higher leverage implies lower *CoD* or the other way around. Furthermore, *Collateral* is negatively correlated with *CoD*, which aligns with the argument that more collateral should reduce the cost of debt. The variable *Intangible* is positively correlated with *CoD*, which is in favour of Derrien et al.'s (2016) argument, since more intangible assets have been shown to increase information asymmetry, which can increase the cost of debt. *Loss* is also positively correlated with *CoD*, which aligns with the notion that companies reporting losses may also face distress which makes them more uncertain in the opinion of creditors, leading to a higher cost of debt. Additionally, *Sphere Control (20%)* is strongly correlated with *Size,* proposing that sphere-controlled firms are larger than non-sphere-controlled firms. The strongest correlation, apart from that between *Sphere Control (20%)* and *Family Sphere Control (20%)*, which are never included in the same model, is seen between ROA and Interest Coverage, indicated by the coefficient of -0.682. This makes sense, due to both variables being measures related to profitability. A strong correlation between variables can induce problems in the regressions, as it can increase standard errors and make it unclear which variable explains the relationship. We argue, however, for the inclusion of both variables in the model since they measure different aspects. *ROA* is employed as a general performance measure, whereas *Interest Coverage* measures the repayment capabilities of firms. Finally, *Vote-to-Capital* is positively correlated with *Sphere Control (20%)*, indicating that the wedge between ownership and control is larger for spheres.

Table 3. Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) CoD	1.000														
(2) Sphere Control (20%)	-0.158***	1.000													
(3) Family Sphere Control (20%)	-0.146***	0.884***	1.000												
(4) Institutional Sphere Control (20%)	-0.043*	0.353***	-0.126***	1.000											
(5) Bank-affiliated Sphere Control (20%)	-0.120***	0.485***	0.366***	0.296***	1.000										
(6) Vote-to-Capital	-0.057**	0.142***	0.082***	0.137***	0.127***	1.000									
(7) Size	-0.350***	0.292***	0.256***	0.107***	0.359***	0.202***	1.000								
(8) ROA	-0.173***	0.108***	0.103***	0.023	0.052**	0.106***	0.246***	1.000							
(9) Leverage	-0.277***	-0.004	-0.005	0.001	-0.106***	-0.051**	0.151***	0.071***	1.000						
(10) Growth	-0.104***	-0.035	-0.024	-0.027	-0.052**	-0.027	0.024	0.071***	0.040*	1.000					
(11) Collateral	-0.171***	0.027	-0.012	0.081***	0.082***	-0.026	0.155***	0.083***	0.270***	-0.071***	1.000				
(12) Intangible	0.111***	-0.103***	-0.081***	-0.058**	-0.047*	-0.030	-0.140***	-0.151***	-0.086***	0.075***	-0.303***	1.000			
(13) Interest Coverage	-0.053**	0.103***	0.076***	0.065***	0.069***	0.113***	0.170***	0.682***	-0.042*	0.021	0.055**	-0.159***	1.000		
(14) Current Ratio	0.163***	-0.083***	-0.086***	-0.004	-0.062***	-0.080***	-0.119***	-0.235***	-0.385***	0.108***	-0.161***	0.051**	-0.188***	1.000	
(15) Loss	0.240***	-0.148***	-0.141***	-0.032	-0.075***	-0.130***	-0.307***	-0.671***	-0.091***	-0.093***	-0.103***	0.211***	-0.451***	0.272***	1.000

Table 3 shows a Pearson's correlation table for all variables employed in the study. ***CoD*** is the main dependent variable of this study and is calculated as the interest expenses divided by the long- and short-term debt. ***Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a sphere and controls more than 20% of the votes. ***Family Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a family sphere and controls more than 20% of the votes. ***Institutional Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is an institutional sphere and controls more than 20% of the votes. ***Bank-affiliated Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a bank-affiliated sphere and controls more than 20% of the votes. ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. ***Size*** is calculated as the natural logarithm of the sum of a firm's market capitalization and long-term debt. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by the current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1st and 99th percentile, except for ***CoD*** that is winsorized at the 1st and 95th percentile. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

6.6 Univariate Analysis

In Table 4, Panel A shows differences in means regarding the dependent variable *CoD*, which is tested for all sphere classifications; *Sphere Control (20%)*, *Family Sphere Control (20%)*, *Institutional Sphere Control (20%)*, and *Bank-affiliated Sphere Control (20%)*. The results showcase that the mean cost of debt is significantly lower for all different sphere classifications, in line with our hypotheses. For *Institutional Sphere Control (20%)*, however, the difference is only significant at the 10% level, whereas the others showcase significance levels of 1%. Worth noting is that *Institutional Sphere Control (20%)* only contains 85 observations, which might impact the results. The largest difference can be seen for the bank-affiliated spheres, which showcase a lower cost of debt of 250 basis points.

In Panel B (Table 4), the sample of this study's control variables is separated into two groups, one group with sphere-controlled firms, and one group where firms are not controlled by spheres where differences in means are again tested. The results indicate that firm characteristics of sphere-controlled firms are significantly different from those of firms not controlled by spheres, as all variables except *Leverage, Collateral*, and *Growth* showed statistically significant differences at the 1% level. The results show that the *Vote-to-Capital* wedge is significantly larger for sphere-controlled firms. This is in line with Agnblad et al. (2002), who explained that spheres make use of dual-class shares and pyramidal structures to control firms without providing as much capital. As for *Size* and *ROA,* the result indicates that sphere-controlled firms are larger and more profitable. Similar to *ROA,* sphere-controlled firms outperform regarding both *Interest Coverage* and *Loss*. The mean *Interest Coverage* for sphere-controlled firms is 30.964x compared to 7.28x for non-sphere-controlled firms, and significantly fewer sphere-controlled firms reported losses. The firms controlled by spheres further exhibit a lower ratio of intangible assets in relation to total assets. Finally, sphere-controlled firms have a lower *Current* ratio, based on the difference in size and profitability, this could be explained by sphere-controlled firms not needing to maintain excess liquidity reserves.

Table 4. Univariate testing of differences in means

Panel A: Test of difference in means for CoD regarding different sphere classifications

0	Mean	N	1	Mean	N	Diff (1 – 0)	P-value
Sphere Control (20%)	0.065	1,261	Sphere Control (20%)	0.044	511	-0.021	0.000***
Family Sphere Control (20%)	0.064	1,346	Family Sphere Control (20%)	0.044	426	-0.020	0.000***
Institutional Sphere Control (20%)	0.060	1,687	Institutional Sphere Control (20%)	0.048	85	-0.012	0.068*
Bank-affiliated Sphere Control (20%)	0.061	1,618	Bank-affiliated Sphere Control (20%)	0.036	154	-0.025	0.000***

Panel B: Test of difference in means for all control variables regarding sphere ownership

Non-Sphere Controlled			**Sphere Controlled**				
0	Mean	N	1	Mean	N	Diff (1 – 0)	P-value
Vote-to-Capital	1.462	1,261	Vote to Capital	1.798	511	0.336	0.000***
Size	22.393	1,261	Size	23.641	511	1.248	0.000***
ROA	0.053	1,261	ROA	0.091	511	0.038	0.000***
Leverage	0.242	1,261	Leverage	0.241	511	-0.001	0.873
Growth	1.157	1,261	Growth	1.132	511	-0.025	0.140
Collateral	0.158	1,261	Collateral	0.168	511	0.010	0.252
Intangible	0.120	1,261	Intangible	0.088	511	-0.032	0.000***
Interest Coverage	7.280	1,261	Interest Coverage	30.964	511	23.684	0.000***
Current Ratio	1.841	1,261	Current Ratio	1.573	511	-0.268	0.000***
Loss	0.178	1,261	Loss	0.063	511	-0.115	0.000***

Table 4 shows the result from univariate testing of differences in means. In Panel A differences in means regarding the dependent variable ***CoD*,** calculated as the interest expenses divided by the long- and short-term debt, is tested for all different sphere classifications. In Panel B, differences in means is tested for all control variables based on if the observations are sphere controlled or not (using the general ***Sphere Control (20%)*)*.* *Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a sphere and controls more than 20% of the votes. ***Family Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a family sphere and controls more than 20% of the votes. ***Institutional Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is an institutional sphere and controls more than 20% of the votes. ***Bank-affiliated Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a bank-affiliated sphere and controls more than 20% of the votes. ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. is calculated as the natural logarithm of the sum of a firm's market capitalization and long-term debt. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by the current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1^{st} and 99^{th} percentile, except for ***CoD*** that is winsorized at the 1^{st} and 95^{th} percentile. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

7. Methodology

This study aims to examine the relationship between sphere ownership and the cost of debt. To test this, the paper employs an unbalanced panel data set of 305 firms between the years 2015-2023. To build upon the initial univariate testing, several panel data estimation methods are employed to answer the paper's hypotheses. First, regressions using pooled ordinary least squares (POLS) with time and industry dummies are performed. Second, to control for unobserved heterogeneity, the hypotheses are tested using random effects (RE) models. Last, to control the robustness of the result and possible endogeneity concerns, different ownership thresholds are examined along with propensity score matching (PSM).

7.1 Pooled OLS

To test our first hypothesis, we formulate our initial Pooled OLS model:

$$CoD_{i,t} = \beta_0 + \beta_1 Sphere_{i,t} + \beta_2 Vote\text{-}to\text{-}Capital_{i,t} + \lambda_1 Firm\ controls_{i,t} + \lambda_2 Year_t + \lambda_3 Industry_{i,t} + \varepsilon_{i,t}$$

(Eq. 2)

In a Pooled OLS, the data is treated as cross-sectional, i.e., the time aspect and units are ignored. This in many ways ignores some key aspects of using panel data, as the aim is to see changes over time and within units (Wooldridge, 2016). To control for the time aspect, however, we include year dummies, this allows the intercept to change between years. We also include industry dummies to control for differences between industries. Moreover, as heteroskedasticity is expected to be present in the model, a White's test is employed. The White's test produces a p-value of 0.000, confirming that heteroskedasticity is present, as seen in Table 12 in the appendix. To address this, all regressions use robust standard errors clustered by firm. Clustered standard errors correct for the correlation between the errors within a firm and is often preferred when using panel data. They further yield higher errors compared to 'normal' robust standard errors, leading to a more conservative approach (Wooldridge, 2016).

7.2 Random Effects Model

Since POLS ignores the unobserved individual effects, we expect the POLS model to suffer from unobserved heterogeneity. To combat this, two common methods often used are the fixed- and random effects models (Wooldridge, 2016). In a fixed effects (FE) model, the error term $\varepsilon_{i,t}$ can be divided into two components, the random error $\mu_{i,t}$ and the unobserved individual time-invariant error a_i. The FE model removes the unobserved a_i, and the model is thus 'time demeaned'. In this case, a_i is assumed to be correlated with the explanatory variables, causing endogeneity in the model. By removing it from the model, both the endogeneity and serial correlation in the error term are mitigated whilst allowing $x_{i,t}$ to be correlated with a_i. If a_i is assumed to be uncorrelated with $x_{i,t}$, an alternative estimation method is the RE. The RE model partially time-demeans the model but leaves a_i, the serial correlation issue is instead treated by employing a generalized least square estimation method (Wooldridge, 2016).

An issue with time demeaning the model and removing time-invariant variables with an FE approach is that the variables that are investigated demand a certain variation (Wooldridge, 2016). King and Santor (2008) investigate in their study how family ownership affects firm performance and capital structure. The authors argue that many of their variables, such as dummies for dual-class shares and owner type, exhibit little to no variation over time, making the RE model preferred over the fixed effect model. Similarly, many of this study's main explanatory variables such as the dummy for the largest owner or the vote-to-capital ratio are rather constant over time, as ownership structure tends to not change drastically over a couple of years. The FE model thus fails to estimate the effect of different ownership structures and the cost of debt. Due to the time invariance of some of the main variables in this study, we argue in favour of using RE models over FE models to test our hypotheses and formulate the following 4 models:

H_1: Sphere ownership lowers the cost of debt

$$CoD_{i,t} = \beta_0 + \beta_1 Sphere\ Control\ (20\%)_{i,t} + \beta_2 Vote\text{-}to\text{-}Capital_{i,t} + \lambda_1 Firm\ controls_{i,t} + \lambda_2 Year_t + \lambda_3 Industry_{i,t} + \varepsilon_{i,t}$$

(Eq. 3)

H₂: Family sphere ownership lowers the cost of debt

$$CoD_{i,t} = \beta_0 + \beta_1 Family\ Sphere\ Control\ (20\%)_{i,t} + \beta_2 Vote\text{-}to\text{-}Capital_{i,t} + \lambda_1 Firm\ controls_{i,t} + \lambda_2 Year_t + \lambda_3 Industry_{i,t} + \varepsilon_{i,t}$$

(Eq. 4)

H₃: Institutional sphere ownership lowers the cost of debt

$$CoD_{i,t} = \beta_0 + \beta_1 Institutional\ Sphere\ Control(20\%)_{i,t} + \beta_2 Vote\text{-}to\text{-}Capital_{i,t} + \lambda_1 Firm\ controls_{i,t} + \lambda_2 Year_t + \lambda_3 Industry_{i,t} + \varepsilon_{i,t}$$

(Eq. 5)

H₄: Bank-affiliated sphere ownership lowers the cost of debt

$$CoD_{i,t} = \beta_0 + \beta_1 Bank\text{-}affiliated\ Sphere\ Control(20\%)_{i,t} + \beta_2 Vote\text{-}to\text{-}Capital_{i,t} + \lambda_1 Firm\ controls_{i,t} + \lambda_2 Year_t + \lambda_3 Industry_{i,t} + \varepsilon_{i,t}$$

(Eq. 6)

7.3 Sphere Ownership Threshold

The main threshold used to determine if a firm is owned by a sphere or not is 20%, per Villalonga and Amit's (2006) study. However, as a certain amount of control is required to be able to impact a firm's decisions, whilst the presence of too much concentrated ownership is detrimental to firms and their cost of debt (Müller & Inderst, 1999; Jabbouri & Naili, 2019), additional thresholds will also be explored. For instance, La Porta et al. (1997) employ a 10% threshold when researching corporate ownership, since many countries mandate disclosure of 10% ownership stakes. Moreover, Swanpitak et al. (2020) employ a threshold of 25%, whereas Byun et al. (2013) define firms as chaebol-controlled if a chaebol owns more than 30% of the firm. In this paper, thresholds of 5%, 10%, 15%, 20%, 25%, and 30% respectively are employed to study the ownership structure's effect on the cost of debt.

7.4 Endogeneity

A common source of endogeneity is called omitted variable bias, which means that the model is missing variables that explain the dependent variable and that are correlated with the explanatory variables (Wooldridge, 2016). As the missing variable becomes included in the error term, the explanatory variables will be correlated with the error, causing endogeneity. To mitigate this, our study controls for several variables that in previous studies have been found to affect the cost of debt. Important to keep in mind, however, is that there are always some aspects that cannot be measured or that have simply been omitted due to lack of data availability.

Another form of endogeneity relevant to this paper is self-selection bias. In the case of sphere ownership and cost of debt, it could be the case that spheres self-select, i.e., that ownership structure is determined as a result of the cost of debt (Byun et al., 2013; Sanchez-Ballesta & García-Meca, 2011). This would imply that the sample of sphere-owned firms is not random as spheres actively invest in firms with a lower cost of debt, which would skew the result. To address this issue and control the robustness of our result, this paper employs a propensity score matching (PSM) methodology.

7.4.1 Propensity Score Matching

To see if the results are driven by self-selection bias, a PSM method is employed similar to Byun et al. (2013). When using PSM, treated (sphere-controlled) firms are matched with a control group of non-treated (non-sphere controlled) firms that share similar characteristics except for ownership structure. The matching produces a propensity score, which reflects the probability of a firm being treated (Kai & Prabhala, 2007). By matching firms with similar characteristics, PSM can compare the outcome, in this case regarding the cost of debt, of the treated firms compared to the firms that 'should' have been treated (Kai & Prabhala, 2007). A key aspect of PSM is thus identifying suitable variables to match firms on (Heinrich et al., 2010). The covariates used to match firms should both be a determinant of a firm being treated or not and impact the outcome variable (Caliendo & Kopeing, 2008). The matching in this study is done based on firm size, return on assets, and industry using replacement with logit. Caliendo and Kopeing (2008) explain that logit and probit models are preferred when the treatment is binary, and that they should yield similar results. Moreover, although matching with replacement increases variance, it is employed as it decreases bias and improves the quality of the matching (Caliendo & Kopeing, 2008).

8. Results and Analysis

Initially, all hypotheses are tested using pooled ordinary least square (POLS) models, which are reported in Table 13 in the appendix. The main models to test our hypotheses, however, use random effects (RE), which are presented below. Overall, the results between POLS and RE are similar. The main differences include that the magnitude for the main independent ownership variables is increased when using RE, the significance, nonetheless, remains the same. Moreover, some control variables exhibit a change in level of significance when comparing the POLS results with the RE results.

8.1 Sphere Ownership

Table 5 shows the results of the regression examining hypothesis 1 (H_1) using an RE model. The dependent variable is the cost of debt proxied by the effective interest rate, and the main independent variable is *Sphere Control (20%).* The results highlight a negative coefficient of -0.012, significant at the 5% level. This means that sphere-owned firms on average see their cost of debt reduced by 120 basis points compared to non-sphere controlled firms, which is in support of H_1. As the mean cost of debt is 5.9%, this effect seems material.

The results are in line with the H_1 of this study and can be analyzed through the perspective of agency theory. The main reasoning in much of the literature revolves around the cost of debt being correlated with agency costs, thus, these results would suggest that sphere ownership actively decreases agency costs (Anderson et al., 2003; Sanchez-Ballesta & García-Meca, 2011). This is in line with Purkayastha et al. (2022), who argue that large controlling shareholders have more aligned incentives with management, which lowers Type I agency costs. Moreover, as hypothesized, it could also be the case that sphere ownership to a certain extent prevents risk shifting. Anderson et al. (2003) corroborate this with the notion that large controlling shareholders are less diversified and thus not as willing to take on risks. Finally, as Agnblad et al. (2002) and Holmén and Knopf (2004) propose, the results show no indications of minority shareholder expropriation being of common occurrence in sphere-owned firms. This could further be supported by the notion that spheres to a stronger degree act as stewards of the firms they own (Reddy & Wellalage, 2023).

Further, drawing from Byun et al. (2013) and Chandera et al. (2018) the result can be explained by the coinsurance effect that arises with business affiliations. Seeing as some of the largest spheres encompass many firms in a pyramidal structure, it is in accordance with the coinsurance effect that firms positioned within a pyramid benefit from being a part of it. In this case, the benefit is in the form of a lowered cost of debt. An additional explanation for the results is the tight-knit banking market of Sweden. Concentrated bank markets have been shown to lead to a lower cost of debt, since it promotes relationship building (Wang et al., 2020). Many spheres have been active for long periods and have been able to build good reputations and long-standing relationships with banks and creditors. Considering that spheres are more reliant on debt, it is only natural for these relationships to have been developed over time (Agnblad et al., 2002). Thus, relationship lending in the concentrated Swedish banking market is an important factor to consider when trying to understand why sphere-owned firms in Sweden can obtain lower financing costs compared to non-sphere owned firms. Moreover, the results can be analyzed through literature both on family and institutional ownership. However, as seen in section 8.2, where the spheres are divided into family and institutional spheres, the result seems to be mainly driven by family spheres.

Regarding the control variables, the *Vote-to-Capital* ratio yields no significant results, contradicting the results of Lin et al. (2011). Furthermore, *Size* and *Leverage* show negative coefficients significant at the 1% level. The coefficient of *Size*, -0.009, implies that a 1% increase in assets leads to a 0.009 percentage unit decrease in the cost of debt, which makes sense as larger companies are expected to have a lower cost of debt. This result is further in line with the majority of literature on the subject, who find a negative relationship between firm size and the cost of debt (Anderson et al., 2003). More surprisingly, the negative coefficient of *Leverage* means that firms with higher leverage see their cost of debt reduced. Theoretically, this result seems questionable as higher-levered firms would be expected to have a higher cost of debt due to increased risk and financial constraints (Solomon, 1963). Mathematically, however, the result makes more sense, as more debt means a larger denominator in the *CoD* formula and thus, a lower effective interest rate. Comparing this result with previous studies, Byun et al. (2013), who use bond spreads as a proxy for the cost of debt, find a positive relationship. Nonetheless, Sanchez-Ballesta and García-Meca (2011) who use the effective interest rate find a negative relationship, although not significant.

Moreover, *Collateral* and *Growth* highlight significant coefficients at the 10% and 5% levels. The weakly significant coefficient of -0.03 for *Collateral* suggests that a 10 percentage unit increase in collateralizable assets decreases the cost of debt by 0.3 percentage units. This result makes sense as firms with more pledgeable assets should receive beneficial credit terms, which aligns with previous studies (Byun et al., 2013; Sanchez-Ballesta & García-Meca, 2011). As for *Growth*, the coefficient of -0.012, proposes that a 1 percentage unit increase in *Growth* decreases the cost of debt by 0.012 percentage units. Since firms with higher growth might have a better future outlook, which is reflected in the cost of debt, it adds up, and the result is further in line with both Byun et al. (2013) and Sanchez-Ballesta and García-Meca (2011).

Table 5. Regression results for H_1

	Model 1 RE
Dependent variable	CoD
Sphere Control (20%)	-0.012**
	(0.005)
Vote-to-Capital	0.000
	(0.001)
Size	-0.009***
	(0.002)
ROA	-0.003
	(0.020)
Leverage	-0.131***
	(0.016)
Collateral	-0.030*
	(0.018)
Growth	-0.012**
	(0.005)
Intangible	-0.018
	(0.018)
Interest Coverage	0.000
	(0.000)
Current Ratio	-0.003
	(0.002)
Loss	0.007
	(0.006)
Constant	0.373***
	(0.037)
Observations	1,772
R-squared (overall)	0.247
Standard errors	Clustered
Industry controls	Yes
Year controls	Yes
Number of firms	305

Table 5 shows the result from multivariate testing with the aim of establishing the relationship between sphere control and the cost of debt. Model 1 shows the results from an RE model with the inclusion of industry and year dummies and robust standard errors clustered by firm. ***CoD*** is the main dependent variable of this study and is calculated as the interest expenses divided by the long- and short-term debt. ***Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a sphere and controls more than 20% of the votes. ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. ***Size*** is calculated as the natural logarithm of the sum of a firm's market capitalization and long-term debt. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by the current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1st and 99th percentile, except for ***CoD*** that is winsorized at the 1st and 95th percentile.
Robust standard errors clustered by firms are reported in the parenthesis. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

8.2 Family and Institutional Spheres

Table 6 presents the results for hypotheses 2 (*H_2*) and 3 (*H_3*). Model 2 employs *Family Sphere Control (20%)* as the main independent variable, representing family sphere-owned firms with more than 20% of the voting rights. Model 3, on the other hand, uses *Institutional Sphere Control (20%)* as the main independent variable, which represents the institutional spheres that control more than 20% of votes. The variable *Family Sphere Control (20%)* in Model 2 has a negative coefficient of -0.013 significant at the 5% level, implying that family-sphere controlled firms on average have a reduced cost of debt of 130 basis points compared to firms not controlled by a family sphere, ceteris paribus. Thus, our findings support H_2. Furthermore, in Model 3, *Institutional Sphere Control (20%)* yields no significant results, meaning that we find no support for H_3. Moreover, the control variables highlight similar results to those explained in section 8.1.

In the same way as general sphere ownership, family sphere ownership demonstrates a significant relationship with the cost of debt. This aligns with much of the presented literature, suggesting that family ownership lowers the cost of debt, as families are concerned with their reputation and commitment to the firm (Anderson et al., 2003; Swanpitak et al., 2020; Lagaras & Tsoutsoura, 2015). Drawing from stewardship theory, these arguments become directly applicable to Swedish family-controlled spheres, since Agnblad et al. (2002) showed that Swedish family owners are mindful of their names and reputations. By showing a long-term commitment to the firm and acting as stewards, it is reasonable to assume that they build up trust with their creditors, which lends support to our findings. Moreover, the results support the competitive advantage hypothesis rather than the private benefits of control hypothesis, in explaining the prevalence of family-owned firms (Burkart et al., 2003; Villalonga & Amit, 2006; Bertrand & Schoar, 2006). On the other hand, the results are contrary to Gao et al. (2020) who find that family ownership increases the cost of debt. However, as the authors attribute their findings to emerging markets, the difference does make sense when comparing with results from the Swedish market.

Notably, the results in Table 6 show no significant relationship between institutional sphere ownership and the cost of debt. These findings contradict research by Chatterjee et al. (2023) and Bhojraj and Sengupta (2003), which suggests that institutional ownership lowers the cost of debt as it comes with increased monitoring and improved governance. Our results, however, support Utami (2021), who could not find a significant relationship between institutional ownership and the cost of debt in the Indonesian context. The explanation for Utami's (2021) result applies to this study, since there is a high prevalence of family firms in the Swedish context as well. Thus, the credit market might be so attuned to family ownership, that any additional monitoring offered by institutional investors has no impact on lending terms. Furthermore, our results contradict those of Kim et al. (2019), who find that short-term institutional ownership increases the cost of debt as the owners pressure management to focus on short-term gains. The different findings of this paper could be explained by the fact that most spheres, even institutional, usually have a long-term investment horizon.

Although much literature suggests that institutional sphere ownership in Sweden would lead to increased monitoring and thus a lower cost of debt, it could be the case that institutional spheres to a larger degree expropriate minority shareholders and undertake self-serving actions. Looking at the results from H_1, H_2 and H_3, it would seem that family spheres largely explain the initial relationship found in H_1. An explanation for this is that family spheres are more prevalent in the sample used for this paper, thus naturally driving the results given for the first hypothesis. Furthermore, we hypothesize that this is supported by the stewardship theory, which suggests that family owners act as stewards of their firm as they have a stronger emotional connection to the firm (Reddy & Wellalage, 2023). As both family and institutional spheres often exhibit concentrated ownership, institutional spheres might not share the emotional bond with the firms they own in the same manner as family spheres. The prevalence of self-serving interests and minority shareholder expropriation might thus be more pronounced in institutional spheres. Although Chrisman (2019) argues that it is unreasonable to assume that families act in a purely selfless manner where they are naturally aligned with all stakeholders, examining aspects of stewardship in family spheres could help us understand why they exhibit lower costs of debt whereas institutional spheres do not.

Table 6. Regression results for H_2 and H_3

	Model 2	Model 3
	RE	RE
Dependent variable	CoD	CoD
Family Sphere Control (20%)	-0.013**	
	(0.005)	
Institutional Sphere Control (20%)		-0.004
		(0.016)
Vote-to-Capital	0.000	-0.000
	(0.001)	(0.002)
Size	-0.009***	-0.010***
	(0.002)	(0.002)
ROA	-0.002	-0.003
	(0.020)	(0.020)
Leverage	-0.131***	-0.131***
	(0.016)	(0.016)
Collateral	-0.031*	-0.028
	(0.018)	(0.018)
Growth	-0.012**	-0.012**
	(0.005)	(0.005)
Intangible	-0.018	-0.017
	(0.018)	(0.018)
Interest Coverage	0.000	0.000
	(0.000)	(0.000)
Current Ratio	-0.003	-0.002
	(0.002)	(0.002)
Loss	0.008	0.008
	(0.006)	(0.006)
Constant	0.373***	0.382***
	(0.037)	(0.037)
Observations	1,772	1,772
R-squared (overall)	0.248	0.243
Standard errors	Clustered	Clustered
Industry controls	Yes	Yes
Year controls	Yes	Yes
Number of firms	305	305

Table 6 shows the result from multivariate testing with the aim of establishing the relationship between family sphere control and institutional sphere control and the cost of debt. Model 2 estimates the relationship between family sphere control and the cost of debt using from an RE model with the inclusion of industry and year dummies and robust standard errors clustered by firm. Model 3 estimates the relationship between institutional sphere control and the cost of debt using from an RE model with the inclusion of industry and year dummies and robust standard errors clustered by firm. ***CoD*** is the main dependent variable of this study and is calculated as the interest expenses divided by the long- and short-term debt. ***Family Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a family sphere and controls more than 20% of the votes. ***Institutional Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is an institutional sphere and controls more than 20% of the votes. ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. is calculated as the natural logarithm of the sum of a firm's market capitalization and long-term debt. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by the current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1st and 99th percentile, except for ***CoD*** that is winsorized at the 1st and 95th percentile.
Robust standard errors clustered by firms are reported in the parenthesis. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

8.3 Bank-affiliated Sphere Ownership

Table 7 presents the regression results for *H_4* regarding bank-affiliated spheres. Similar to Models 1– 3, the results for the control variables remain largely the same. For the cost of debt, however, *Bank-affiliated Sphere Control (20%)* exhibits no significant relationship with the variable, providing us with no support for our hypothesis (*H_4*).

The findings from Model 4 differ from the expectations formed based on previous empirical studies and the close relationship many spheres exhibit with banks. This paper suspected that bank-affiliated spheres would experience a distinct effect on the cost of debt for several reasons. Bank ownership usually comes with increased monitoring, which has been shown to reduce agency costs and thus also the cost of debt (Sanchez-Ballesta & García-Meca, 2011). Previous research also suggests that relationship lending tends to decrease the cost of debt (Swanpitak et al., 2020; Lagaras & Tsoutsoura, 2015; Bonini et al., 2016; Wang et al., 2020). Meanwhile, as intercompany loans constitute a large part of the financing for Swedish firms, we would suspect the effect to be even more pronounced for spheres with bank affiliations (OECD, 2022). An explanation for our contradicting results compared to the presented literature could be attributed to the way bank-affiliation is determined. Bank affiliation in this paper is determined by whether a sphere is a bank or has a noteworthy controlling stake in a bank. Although it provides clear evidence of a sphere being connected to a bank, it does not capture other ways in which relationships can or cannot be measured, which led to a rather small sample. Relationships created by long-term financing from banks are not necessarily reflected in stock ownership alone. Thus, these 'soft' values are not captured and measured in our study, which we believe is an important explanation as to why the results could not capture any significance. To obtain more observations regarding bank-affiliated spheres, a more thorough investigation on spheres and their relations with creditors could have been conducted, extending beyond solely stock ownership. Investigating if spheres have relied on the same creditors for long periods could have been evidence of relationship lending, adding observations and perhaps yielding different results.

Table 7. Regression results for *H₄*

	Model 4 RE
Dependent variable	CoD
Bank-affiliated Sphere Control (20%)	-0.007
	(0.011)
Vote-to-Capital	-0.000
	(0.001)
Size	-0.010***
	(0.002)
ROA	-0.003
	(0.020)
Leverage	-0.132***
	(0.016)
Collateral	-0.027
	(0.018)
Growth	-0.012**
	(0.005)
Intangible	-0.017
	(0.018)
Interest Coverage	0.000
	(0.000)
Current Ratio	-0.002
	(0.002)
Loss	0.008
	(0.006)
Constant	0.377***
	(0.040)
Observations	1,772
R-squared (overall)	0.245
Standard errors	Clustered
Industry controls	Yes
Year controls	Yes
Number of firms	305

Table 7 shows the result from multivariate testing with the aim of establishing the relationship between bank affiliated sphere control and the cost of debt. Model 4 shows the results from an RE model with the inclusion of industry and year dummies and robust standard errors clustered by firm. ***CoD*** is the main dependent variable of this study and is calculated as the interest expenses divided by the long- and short-term debt. ***Bank-affiliated Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a bank-affiliated sphere and controls more than 20% of the votes. ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. is calculated as the natural logarithm of the sum of a firm's market capitalization and long-term debt. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by the current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1st and 99th percentile, except for ***CoD*** that is winsorized at the 1st and 95th percentile.
Robust standard errors clustered by firms are reported in the parenthesis. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

8.4 Different Ownership Thresholds

As initial results support hypotheses H_1 and H_2, further testing is warranted. To check the robustness of the results, different ownership thresholds are employed, as seen in Table 8. For both sphere control and family sphere control, the thresholds 5%, 10%, 15%, 25% and 30% are employed. Interestingly, the strongest significance is found around the initial threshold of 20%. *Sphere Control* highlights a negative coefficient significant at the 5% level using a 15% threshold (Model 7). For all other thresholds, no significant results are yielded. As for family sphere control, the 15% and 25% thresholds yield negative coefficients significant at the 5% level (Models 12 & 13). Using thresholds of 5% and 10%, *Family Sphere Control* yields weakly significant negative coefficients at the 10% level (Models 10 & 11).

The results highlight two interesting findings. First, family sphere control yields more robust results, which could indicate that the significant results for H_1 are mainly driven by the family spheres. This could be linked to the prevalence of family-owned firms all across the world as found in multiple studies (Burch, 1972; Villalonga & Amit, 2006; Aminadav & Papaioannou, 2020; La Porta et al., 1999; Claessens et al., 2000; Faccio & Lang, 2002; Villalonga and Amit, 2008). As this study finds similar results, with 24% of all observations being controlled by a family sphere that owns more than 20% of the votes, it makes sense that it comes with certain benefits. If no benefits were found regarding family control, their prevalence would most likely not be as pronounced. Second, as the results are the most significant near the 20% threshold, this could imply the existence of an optimal ownership level. Spheres with too little control might not have enough power to exert their control and significantly impact a firm's operations, as indicated by the results showing no significance. On the other hand, when control gets too concentrated, such as 30%, the effect is again removed. This could be explained in line with Müller and Inderst (1999), who argued that control over the optimal level might lead to increased agency costs and underinvestment. This seems to be the case for spheres as well when examining the degrees of control and its impact on the cost of debt. Moreover, high levels of control can lead to increased entrenchment, and expropriation of minority shareholders (Shleifer & Vishny, 1997; Jensen & Meckling, 1976).

Table 8. Robustness check of different ownership thresholds for H_2 and H_3

	Model 5 RE	Model 6 RE	Model 7 RE	Model 8 RE	Model 9 RE	Model 10 RE	Model 11 RE	Model 12 RE	Model 13 RE	Model 14 RE
Dependent variable	CoD	CoD	CoD	CoD	CoD	CoD	CoD	CoD	CoD	CoD
Ownership thresholds (%)	5	10	15	25	30	5	10	15	25	30
Sphere Control	-0.007	-0.007	-0.010**	-0.008	0.002					
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)					
Family Sphere Control						-0.009*	-0.009*	-0.011**	-0.012**	-0.004
						(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Observations	1,772	1,772	1,772	1,772	1,772	1,772	1,772	1,772	1,772	1,772
R-squared (overall)	0.246	0.246	0.248	0.244	0.243	0.248	0.248	0.250	0.246	0.243
Standard errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	305	305	305	305	305	305	305	305	305	305

Table 8 reports the result of regressions testing the robustness of the initially found relationships between sphere ownership and family ownership on the cost of debt. Models 5-9 estimates regressions using different ownership thresholds of sphere ownership to establish its effect on the cost of debt. Models 10-14 estimates regressions using different ownership thresholds of family sphere ownership to establish its effect on the cost of debt. All regressions are done using RE, and includes control variables, industry dummies, yearly dummies, and robust standard errors clustered by firm.

Robust standard errors clustered by firms are reported in the parenthesis. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

8.5 Propensity Score Matching

As the relationship found could suffer from self-selection bias, a final robustness control regarding both sphere- and family-sphere is done using a propensity score matching (PSM) approach, reported in Models 15 and 16 (Table 9). For *Sphere Control (20%)*, a subsample of 852 observations is used, with 59.51% being treated (sphere-controlled) and 40.49% being untreated. For *Family Sphere Control (20%)*, a subsample of 746 observations is employed, with 57.24% treated and 42.76% untreated. The matching in both cases is done using *Size, ROA* and industry, and the results remain robust with similar coefficients and significance levels of 5%. For the PSM, results using POLS are reported in Table 13 (Models 21 and 22). The results from the PSM approach strengthen the notion that our initial findings are robust and not mainly driven by a self-selection bias.

Table 9. PSM for H_1 and H_2

	Model 15 RE	Model 16 RE
Dependent variable	CoD	CoD
Treatment Sphere Control (20%)	-0.015**	
	(0.006)	
Treatment Family Sphere Control (20%)		-0.014**
		(0.006)
Vote-to-Capital	-0.000	-0.000
	(0.002)	(0.002)
Size	-0.007***	-0.008***
	(0.002)	(0.002)
ROA	0.000	0.032
	(0.041)	(0.043)
Leverage	-0.119***	-0.123***
	(0.023)	(0.026)
Collateral	-0.031	0.004
	(0.020)	(0.021)
Growth	-0.012	-0.013
	(0.010)	(0.010)
Intangible	-0.041*	0.009
	(0.024)	(0.031)
Interest Coverage	-0.000	-0.000
	(0.000)	(0.000)
Current Ratio	-0.003	0.002
	(0.003)	(0.003)
Loss	0.016*	0.019**
	(0.009)	(0.009)
Constant	0.339***	0.322***
	(0.043)	(0.040)
Observations	852	746
R-squared (overall)	0.234	0.268
Standard errors	Clustered	Clustered
Industry controls	Yes	Yes
Year controls	Yes	Yes
Number of firms	220	207

Table 9 shows the result from further robustness tests on the initially found relationships between sphere ownership and family ownership on the cost of debt. Model 15 reports the results from a regression on a matched subsample for sphere controlled firms using PSM. Model 16 reports the results from a regression on a matched subsample for family sphere controlled firms using PSM. Both models Employ RE, robust standard errors clustered by firm, and both industry and time controls. ***CoD*** is the main dependent variable of this study and is calculated as the interest expenses divided by the long- and short-term debt. ***Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a sphere and controls more than 20% of the votes***.*** ***Family Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a family sphere and controls more than 20% of the votes. ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. is calculated as the natural logarithm of the sum of a firm's market capitalization and long-term debt. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by the current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1st and 99th percentile, except for ***CoD*** that is winsorized at the 1st and 95th percentile.
Robust standard errors clustered by firms are reported in the parenthesis. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

8.6 Limitations

When interpreting our results, it is important to recognize limitations. First, the usage of the effective interest rate as the dependent variable can be questioned. Apart from being an accounting variable that highlights some extreme values before winsorizing, it further fails to distinguish between public and private debt. Moreover, it also uses the book value of debt instead of market values. However, as explained in section 6.2, this paper argues that it is the most appropriate measure to use when examining the Swedish market due to the prevalence of debt financing in the form of bank loans in comparison to public bonds. Second, although many spheres are included in this study, providing a sufficient sample size, most of the spheres turned out to be family spheres which limits the amount of institutional sphere observations in the sample. While this does not necessarily skew the results, it might not be able to produce results that provide a fair representation of institutional spheres and their impact on the cost of debt. Due to the small sample size, the results are most likely driven by the specific firms controlled by institutional spheres, rather than the effect of the spheres themselves. Last, this paper addresses robustness and self-selection concerns of the results by employing different ownership thresholds when estimating the regressions along with PSM. However, endogeneity, for instance in the form of omitted variable bias, cannot be completely dismissed. This paper controls for several firm characteristics such as size, performance, and repayment capabilities, nonetheless, aspects such as relationships with banks that are hard to measure quantitatively could also be expected to influence the cost of debt.

9. Conclusion

As the Swedish market presents a rather interesting case of ownership structures, where a large portion of Swedish listed firms are controlled by so-called spheres, this paper aims to investigate if the spheres can impact and lower the cost of debt. As spheres in Sweden exhibit different characteristics, such as those family or institutional, this paper divides the spheres to see which characteristics are more pronounced in affecting the cost of debt. Moreover, as some of the largest spheres in Sweden have close ties to banks, a final classification of bank-affiliated spheres is done. To test whether spheres and different classifications of spheres impact the cost of debt, a sample of 305 firms and 1,772 firm-year observations for firms listed on the Stockholm Stock Exchange during the years 2015-2023 is employed. Initial univariate tests suggest that all four sphere classifications effectively decrease the cost of debt. However, in a multivariate setting using both pooled ordinary least squares and random effects with time and industry dummies and robust standard errors clustered by firms, only spheres and family spheres show significant negative relationships. These results are further robust when using a propensity score-matched subsample, and when employing different ownership thresholds, the results seem to propose the existence of an optimal ownership concentration for spheres.

When dividing spheres into family and institutional, only family spheres showcase significant results. This would indicate that the significant results we find for general spheres are mainly driven by the family spheres. This is further strengthened as the vast majority of spheres are family spheres, which exhibit more robustness using different ownership thresholds. We believe that the prominence of family spheres decreasing the cost of debt is in large part tied to stewardship theory arguments, which also helps explain why institutional spheres show no significant impact. By acting as stewards of the firms, this paper shows that family spheres, and spheres in general, can reduce agency costs, resulting in a lower cost of debt. Although efforts are taken to provide a study that is as comprehensive as possible, some limitations do exist. These include the choice of the dependent variable, the sample sizes for H_3 and H_4, and possible endogeneity concerns.

This paper highlights one of the many possible implications of sphere ownership in Sweden. Although the prevalence of spheres in Sweden is significant, they remain relatively unstudied. This paper aims to contribute to the scarce amount of research conducted on spheres, by showcasing that sphere ownership actively can decrease a firm's cost of debt. It further hopes to prompt more research which displays the advantages of sphere ownership. This could include a more thorough investigation of the WACC of firms under sphere ownership and how firm value is affected, something this study does not take into consideration. Moreover, we urge for research that compares other country-specific ownership phenomena, that in certain ways resemble spheres, and their cost of debt, to explore whether the effect is attributable to the ownership itself or the context of their respective countries.

Finally, our findings suggest an optimal ownership level of around 20% for spheres. These results could provide strategic guidance for spheres and family spheres in maintaining control levels that reduce the cost of debt. Moreover, although the effect of different ownership structures on the cost of debt is a well-studied subject, our paper contributes to the literature by showing that both spheres and family spheres with their active ownership can materially reduce the cost of debt. Additionally, the Swedish ownership model characterized by long-term concentrated ownership could act as an exemplar for ownership structures in different countries aiming to reduce borrowing costs. Although some characteristics, such as the Wallenberg sphere's level of control and resources, might be difficult to replicate, some aspects, such as acting as a steward of a firm are, however, more manageable.

Reference List

Agnblad, J., Berglöf, E., Högfeldt, P. & Svancar, H. (2002). Ownership and Control in Sweden: Strong Owners, Weak Minorities, and Social Control, *The Control of Corporate Europe*, pp.228–258, Available Online: https://academic.oup.com/book/41742/chapter-abstract/354141670?redirectedFrom=fulltext [Accessed 28 March 2024]

Allelin, M., Kallifatides, M., Sjöberg, S. & Skyrman, V. (2018). No. 55 Ägande- Och Förmögenhetsstrukturen Och Dess Förändring Sedan 1980 – Katalys, Available Online: https://www.katalys.org/publikation/no-55-agande-och-formogenhetsstrukturen-och-dess-forandring-sedan-1980/ [Accessed 8 April 2024]

Aminadav, G. & Papaioannou, E. (2020). Corporate Control around the World, *The Journal of Finance*, vol. 75, no. 3, Available Online: https://doi.org/10.1111/jofi.12889 [Accessed 11 April 2024]

Anderson, R. C., Mansi, S. A. & Reeb, D. M. (2003). Founding Family Ownership and the Agency Cost of Debt, *Journal of Financial Economics*, vol. 68, no. 2, pp.263–285, Available Online: https://doi.org/10.1016/S0304-405X(03)00067-9 [Accessed 8 April 2024]

Ang, J. S., Cole, R. A. & Lin, J. W. (2000). Agency Costs and Ownership Structure, *The Journal of Finance*, vol. 55, no. 1, pp.81–106, Available Online: https://onlinelibrary.wiley.com/doi/full/10.1111/0022-1082.00201 [Accessed 1 April 2024]

Ashbaugh-Skaife, H., Collins, D. W. & LaFond, R. (2006). The Effects of Corporate Governance on Firms' Credit Ratings, *Journal of Accounting and Economics*, vol. 42, no. 1-2, pp.203–243, Available Online: https://doi.org/10.1016/j.jacceco.2006.02.003 [Accessed 10 April 2024]

Bertrand, M. & Schoar, A. (2006). The Role of Family in Family Firms, *The Journal of Economic Perspectives*, vol. 20, no. 2, pp.73–96, Available Online: https://www.jstor.org/stable/30033651 [Accessed 11 April 2024]

Bhojraj, S. & Sengupta, P. (2003). Effect of Corporate Governance on Bond Ratings and Yields: The Role of Institutional Investors and Outside Directors, *The Journal of Business*, vol. 76, no. 3, pp.455–475, Available Online: https://doi.org/10.1086/344114 [Accessed 25 April 2024]

Bonini, S., Dell'Acqua, A., Fungo, M. & Kysucky, V. (2016). Credit Market Concentration, Relationship Lending and the Cost of Debt, *International Review of Financial Analysis*, vol. 45, pp.172–179, Available Online: https://doi.org/10.1016/j.irfa.2016.03.013 [Accessed 9 April 2024]

Burch, P. H. (1972). The Managerial Revolution Reassessed, Lexington Books

Burkart, M., Panunzi, F. & Shleifer, A. (2003). Family Firms, *The Journal of Finance*, vol. 58, no. 5, pp.2167–2201, Available Online: https://doi.org/10.1111/1540-6261.00601 [Accessed 11 April 2024]

Byun, H.-Y., Choi, S., Hwang, L.-S. & Kim, R. G. (2013). Business Group Affiliation, Ownership Structure, and the Cost of Debt, *Journal of Corporate Finance*, vol. 23, pp.311–331, Available Online: https://doi.org/10.1016/j.jcorpfin.2013.09.003 [Accessed 1 April 2024]

Caliendo, M. & Kopeinig, S. (2008). Some Practical Guidance for the Implementation of Propensity Score Matching, *Journal of Economic Surveys*, vol. 22, no. 1, pp.31–72, Available Online: https://doi.org/10.1111/j.1467-6419.2007.00527.x [Accessed 16 May 2024]

Chandera, Y., Utama, C. A., Husodo, Z. A. & Setia-Atmaja, L. (2018). The Co-Insurance Effect Hypothesis and the Cost of Bank Loans: Evidence from Indonesian Pyramidal Business Groups, *Global Finance Journal*, vol. 37, pp.100–122, Available Online: https://doi.org/10.1016/j.gfj.2018.03.003 [Accessed 8 April 2024]

Chatterjee, S., Gu, X., Hasan, I. & Lu, H. (2023). Ownership Structure and the Cost of Debt: Evidence from the Chinese Corporate Bond Market, *Journal of empirical finance*, vol. 73, pp.334–348, Available Online: https://doi.org/10.1016/j.jempfin.2023.08.003 [Accessed 8 April 2024]

Chrisman, J. J. (2019). Stewardship Theory: Realism, Relevance, and Family Firm Governance, *Entrepreneurship Theory and Practice*, vol. 43, no. 6, Available Online: https://journals.sagepub.com/doi/full/10.1177/1042258719838472 [Accessed 12 April 2024]

Claessens, S., Djankov, S. & Lang, L. H. P. (2000). The Separation of Ownership and Control in East Asian Corporations, *Journal of Financial Economics*, vol. 58, no. 1-2, pp.81–112, Available Online: https://www.sciencedirect.com/science/article/pii/S0304405X00000672 [Accessed 11 April 2024]

Collin, S.-O. (1993). The Brotherhood of the Swedish Sphere: A Third Institutional Form for Economic Exchange, *International Studies of Management & Organization*, vol. 23, no. 1, pp.69–86, Available Online: https://www.jstor.org/stable/40397235 [Accessed 9 April 2024]

Copenhagen Economics. (2023). Competition in the Swedish Banking Sector, Swedish Bankers' Association, Available Online: https://www.swedishbankers.se/media/5664/2310-competition-in-the-swedish-banking-sector-2023_.pdf [Accessed 26 April 2024]

Davis, J. H., Schoorman, F. D. & Donaldson, L. (1997). Toward a Stewardship Theory of Management, *The Academy of Management Review*, vol. 22, no. 1, pp.20–47, Available Online: https://www.jstor.org/stable/259223 [Accessed 8 April 2024]

Derrien, F., Kecskés, A. & Mansi, S. A. (2016). Information Asymmetry, the Cost of Debt, and Credit Events: Evidence from Quasi-Random Analyst Disappearances, *Journal of Corporate Finance*, vol. 39, pp.295–311, Available Online: https://doi.org/10.1016/j.jcorpfin.2016.05.002 [Accessed 10 April 2024]

Donaldson, L. & Davis, J. H. (1991). Stewardship Theory or Agency Theory: CEO Governance and Shareholder Returns, *Australian Journal of Management*, vol. 16, no. 1, pp.49–64, Available Online: https://doi.org/10.1177/031289629101600103 [Accessed 8 April 2024]

Elyasiani, E., Jia, J. (Jane) & Mao, C. X. (2010). Institutional Ownership Stability and the Cost of Debt, *Journal of Financial Markets*, vol. 13, no. 4, pp.475–500, Available Online: https://doi.org/10.1016/j.finmar.2010.05.001 [Accessed 8 April 2024]

Faccio, M. & Lang, L. H. P. (2002). The Ultimate Ownership of Western European Corporations, *Journal of Financial Economics*, vol. 65, no. 3, pp.365–395, Available Online: https://doi.org/10.1016/S0304-405X(02)00146-0 [Accessed 11 April 2024]

Fristedt, D. & Sundqvist, S.-I. (2009). Ägarna Och Makten I Sveriges Börsföretag 2009, SIS Ägarservice AB

Gao, H., He, J., Li, Y. & Qu, Y. (2020). Family Control and Cost of Debt: Evidence from China, *Pacific-Basin Finance Journal*, vol. 60, p.101286, Available Online: https://doi.org/10.1016/j.pacfin.2020.101286 [Accessed 8 April 2024]

Heinrich, C., Maffiolo, A. & Vázques, G. (2010). A Primer for Applying Propensity-Score Matching, Available Online: https://publications.iadb.org/en/primer-applying-propensity-score-matching [Accessed 18 April 2024]

Hirshleifer, D. & Thakor, A. V. (1992). Managerial Conservatism, Project Choice, and Debt, *Review of Financial Studies*, vol. 5, no. 3, pp.437–470, Available Online: https://doi.org/10.1093/rfs/5.3.437 [Accessed 9 April 2024]

Holdings. (2024). *Modular Finance AB*, Available Online: https://www.holdings.se/ [Accessed 12 April 2024]

Holmén, M. & Knopf, J. D. (2004). Minority Shareholder Protections and the Private Benefits of Control for Swedish Mergers, *The Journal of Financial and Quantitative Analysis*, vol. 39, no. 1, pp.167–191, Available Online: https://www.jstor.org/stable/30031899 [Accessed 15 May 2024]

Jabbouri, I. & Naili, M. (2019). Does Ownership Concentration Affect Cost of Debt? Evidence from an Emerging Market, *Review of Behavioral Finance*, vol. 12, no. 3, Available Online: https://doi.org/10.1108/RBF-10-2018-0106 [Accessed 9 April 2024]

Jakobsson, U. & Wiberg, D. (2014). Vem Ska Styra de Svenska Företagen?, Available Online: https://www.ifn.se/publikationer/rapporter/2011-2020/2014/2014-14/ [Accessed 8 April 2024]

Jensen, M. C. & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, *Journal of Financial Economics*, vol. 3, no. 4, pp.305–360, Available Online: https://doi.org/10.1016/0304-405X(76)90026-X [Accessed 1 April 2024]

Kai, L. & Prabhala, N. R. (2007). Self-Selection Models in Corporate Finance, *Handbook of Empirical Corporate Finance*, vol. 1, pp.37–86

Kim, H.-D., Kim, Y., Mantecon, T. & Song, K. Roy. (2019). Short-Term Institutional Investors and Agency Costs of Debt, *Journal of Business Research*, vol. 95, pp.195–210, Available Online: https://doi.org/10.1016/j.jbusres.2018.10.019 [Accessed 16 May 2024]

King, M. R. & Santor, E. (2008). Family Values: Ownership Structure, Performance and Capital Structure of Canadian Firms, *Journal of Banking & Finance*, vol. 32, no. 11, pp.2423–2432, Available Online: https://doi.org/10.1016/j.jbankfin.2008.02.002 [Accessed 16 April 2024]

La Porta, R., Lopez de Silanes, F., Shleifer, A. & Vishny, R. W. (1997). Legal Determinants of External Finance, *The Journal of Finance*, vol. 52, no. 3, pp.1131–1150, Available Online: https://doi.org/10.1111/j.1540-6261.1997.tb02727.x [Accessed 8 April 2024]

La Porta, R., Lopez-De-Silanes, F. & Shleifer, A. (1999). Corporate Ownership around the World, *The Journal of Finance*, vol. 54, no. 2, pp.471–517, Available Online: https://onlinelibrary.wiley.com/doi/full/10.1111/0022-1082.00115 [Accessed 11 April 2024]

Lagaras, S. & Tsoutsoura, M. (2015). Family Control and the Cost of Debt: Evidence from the Great Recession, *SSRN Electronic Journal*, Available Online: https://dx.doi.org/10.2139/ssrn.2618560 [Accessed 16 April 2024]

Lin, C., Ma, Y., Malatesta, P. & Xuan, Y. (2011). Ownership Structure and the Cost of Corporate Borrowing, *Journal of Financial Economics*, vol. 100, no. 1, pp.1–23, Available Online: https://doi.org/10.1016/j.jfineco.2010.10.012 [Accessed 10 April 2024]

Müller, H. M. & Inderst, R. (1999). Ownership Concentration, Monitoring, and the Agency Cost of Debt, *SSRN Electronic Journal*, Available Online: https://dx.doi.org/10.2139/ssrn.190497 [Accessed 9 April 2024]

OECD. (2022). The Swedish Corporate Bond Market and Bondholder Rights, Available Online: https://doi.org/10.1787/c443352d-en [Accessed 8 April 2024]

Pittman, J. A. & Fortin, S. (2004). Auditor Choice and the Cost of Debt Capital for Newly Public Firms, *Journal of Accounting and Economics*, vol. 37, no. 1, pp.113–136, Available Online: https://www.google.com/url?q=https://doi.org/10.1016/j.jacceco.2003.06.005&sa=D&source=docs&ust=1714118283902950&usg=AOvVaw2jUsQ-hcGz888vc2K5NuS1 [Accessed 26 April 2024]

Purkayastha, S., Veliyath, R. & George, R. (2022). Type I and Type II Agency Conflicts in Family Firms: An Empirical Investigation, *Journal of Business Research*, vol. 153, pp.285–299, Available Online: https://doi.org/10.1016/j.jbusres.2022.07.054 [Accessed 8 April 2024]

Reddy, K. & Wellalage, N. H. (2023). Effects of Family Ownership and Family Management on the Performance of Entrepreneurial Firms, *Research in International Business and Finance*, vol. 65, p.101977, Available Online: https://doi.org/10.1016/j.ribaf.2023.101977 [Accessed 8 April 2024]

Sánchez-Ballesta, J. P. & García-Meca, E. (2011). Ownership Structure and the Cost of Debt, *European Accounting Review*, vol. 20, no. 2, pp.389–416, Available Online: https://doi.org/10.1080/09638180903487834 [Accessed 9 April 2024]

Santosuosso, P. (2014). Cost of Debt and Corporate Profitability, *International Business Research*, vol. 7, no. 2, Available Online: https://doi.org/10.5539/ibr.v7n2p13 [Accessed 10 April 2024]

SCB. (2023). The Interest Rate for Mortgages to Households Continues to Increase, Available Online: https://www.scb.se/en/finding-statistics/statistics-by-subject-area/financial-markets/financial-market-statistics/financial-market-statistics/pong/statistical-news/financial-market-statistics-june-2023/ [Accessed 9 April 2024]

SEB. (2024). Nordic Outlook: Eagerly Awaited Interest Rate Cuts in a Turbulent World, Available Online: https://sebgroup.com/press/press-releases/2024/nordic-outlook-eagerly-awaited-interest-rate-cuts-in-a-turbulent-world [Accessed 9 April 2024]

Sengupta, P. (1998). Corporate Disclosure Quality and the Cost of Debt, *The Accounting Review*, vol. 73, no. 4, pp.459–474, Available Online: https://www.jstor.org/stable/248186 [Accessed 10 April 2024]

Shleifer, A. & Vishny, R. W. (1997). A Survey of Corporate Governance, *The Journal of Finance*, vol. 52, no. 2, pp.737–783, Available Online: https://doi.org/10.1111/j.1540-6261.1997.tb04820.x [Accessed 9 April 2024]

Solomon, E. (1963). Leverage and the Cost of Capital, *The Journal of Finance*, vol. 18, no. 2, pp.273–279, Available Online: https://www.jstor.org/stable/2977908 [Accessed 10 April 2024]

Sundin, A. & Sven-Ivan Sundqvist. (1998). Ägarna Och Makten I Sveriges Börsföretag 1998, SIS Ägarservice

Sveriges Riksbank. (2023). Högre Räntor Utmanar Högt Skuldsatta Företag Och Hushåll, Available Online: https://www.riksbank.se/sv/press-och-publicerat/nyheter-och-pressmeddelanden/pressmeddelanden/2023/hogre-rantor-utmanar-hogt-skuldsatta-foretag-och-hushall/ [Accessed 8 April 2024]

Sveriges Riksbank. (2024). Search Interest Rates and Exchange Rates, *Www.riksbank.se*, Available Online: https://www.riksbank.se/en-gb/statistics/interest-rates-and-exchange-rates/search-interest-rates-and-exchange-rates/?s=g2-SECBLENDEFF&a=M&from=2006-03-01&to=2024-04-04&fs=3#result-section [Accessed 8 April 2024]

Swanpitak, T., Pan, X. & Suardi, S. (2020). Family Control and Cost of Debt: Evidence from Thailand, *Pacific-Basin Finance Journal*, vol. 62, p.101376, Available Online: https://doi.org/10.1016/j.pacfin.2020.101376 [Accessed 16 April 2024]

The Economist. (2016). A Nordic Pyramid, Available Online: https://www.economist.com/business/2016/03/10/a-nordic-pyramid [Accessed 9 April 2024]

UBS. (2023). Global Wealth Report 2023, Available Online: https://www.ubs.com/global/en/family-office-uhnw/reports/global-wealth-report-2023.html [Accessed 9 April 2024]

Utami, S. (2021). The Effect of Institutional Ownership, Managerial Ownership, Family Ownership, and Independent Commissioners on Cost of Debt, *International Journal of Management Studies and Social Science Research*, vol. 209, no. 3, Available Online: https://ijmsssr.org/paper/IJMSSSR00415.pdf [Accessed 8 April 2024]

van Binsbegen, J. H., Graham, J. R. & Yang, J. (2010). The Cost of Debt, *The Journal of Finance*, vol. 65, no. 6, pp.2089–2136, Available Online: https://doi.org/10.1111/j.1540-6261.2010.01611.x [Accessed 10 April 2024]

Villalonga, B. & Amit, R. (2006). How Do Family Ownership, Control and Management Affect Firm Value?, *Journal of Financial Economics*, vol. 80, no. 2, pp.385–417, Available Online: https://doi.org/10.1016/j.jfineco.2004.12.005 [Accessed 11 April 2024]

Villalonga, B. & Amit, R. (2008). How Are U.S. Family Firms Controlled?, *Review of Financial Studies*, vol. 22, no. 8, pp.3047–3091, Available Online: https://doi.org/10.1093/rfs/hhn080 [Accessed 11 April 2024]

Wang, X., Han, L. & Huang, X. (2020). Bank Competition, Concentration and EU SME Cost of Debt, *International Review of Financial Analysis*, vol. 71, p.101534, Available Online: https://doi.org/10.1016/j.irfa.2020.101534 [Accessed 9 April 2024]

Wooldridge, J. M. (2016). Introductory Econometrics: A Modern Approach, 6th edn, Boston: Cengage Learning, Cop

Appendix

Tables

Table 10. List of spheres provided by Holdings Modular Finance

Names of spheres	
Ahlström-släkten	Lundström-familjen
Al Amoudi-sfären	Länsförsäkringar
Axel Johnson-sfären	Persson-sfären
Bennet-sfären	Qviberg-intressen
Blomqvist-släkten	Raysearch grundare
Claesson	Rejler-familjen
Dinkelspiel-släkten	Rosenblad-intressen
Douglas-sfären	Rutger Arnhult
East Capital-sfären	Salén-familjen
Egis Technology Inc	Samhällsbyggnadsbolaget i Norden AB
Ehrnrooth-släkten	Schörling-Sfären
Erik Paulsson-familjen	Sectras grundare
Familjen Af Jochnick	Selin-intressen
Familjen Batljan	SHB-sfären
Familjen Hamrin	Stenbeck-sfären
Folke-släkten	Stillström-sfären
Fåhraeus-intressen	Svedberg-släkten
Giertz-familjen	Svedulf-familjen
Göran Lundin-familjen	Svenfelt-intressen
Hagströmer-intressen	Svenska Staten
Hamberg-familjen	Swedbank-sfären
Hans Wallenstam med bolag och familj	Tidstrand-familjen
Herlin-familjerna	Tigerschiöld-familjen
Hielte & Hobohm-familjerna	Tjernberg-Backman-familjerna
Huaso-Holdings	VBG-sfären
Jacobson-intressen	Wallenberg-sfären
Johansson-intressen	Wall-sfären
Jonason-familjen	Ättlingar Heba
Lissinger-familjen	Öräs-familjen
Lundberg-sfären	Öster-släkten

Table 11. Variable descriptions

Variable name	Description	Source
Panel A: Cost of debt		
CoD	Interest expense / (long-term debt + short-term debt)	Refinitiv Eikon
Panel B: Ownership variables		
Sphere Control (20%)	Dummy variable if the largest owner is a sphere and controls more than 20% of the votes	MFN Holdings
Family Sphere Control (20%)	Dummy variable if the largest owner is a family sphere and controls more than 20% of the votes	MFN Holdings
Institutional Sphere Control (20%)	Dummy variable if the largest owner is an institutional sphere and controls more than 20% of the votes	MFN Holdings
Bank-affiliated Sphere Control (20%)	Dummy variable if the largest owner is a bank affiliated sphere and controls more than 20% of the votes	MFN Holdings
Panel C: Control variables		
Vote-to-Capital	Voting rights of the largest shareholder / capital of the largest shareholder	MFN Holdings
Size	Natural log of market capitalization + long-term debt	Refinitiv Eikon
ROA	Operating profit / lagged total assets	Refinitiv Eikon
Leverage	Total debt / total assets	Refinitiv Eikon
Growth	(Total assets / lagged total assets) - 1	Refinitiv Eikon
Collateral	PP&E / total assets	Refinitiv Eikon
Intangible	Intangible assets / total assets	Refinitiv Eikon
Interest Coverage	Operating profit / interest expense	Refinitiv Eikon
Current Ratio	Current assets / current liabilities	Refinitiv Eikon
Loss	Dummy variable if operating profit < 0	Refinitiv Eikon

Table 12. White's test

Test	H0	P-value
White	Homoskedasticity	0.000***

Table 12 shows the result from the White's test which indicates that heteroskedasticity is present in the model.

Table 13. POLS regressions

	Model 17 POLS	Model 18 POLS	Model 19 POLS	Model 20 POLS	Model 21 POLS	Model 22 POLS
Dependent variable	CoD	CoD	CoD	CoD	CoD	CoD
Sphere Control (20%)	-0.009**					
	(0.004)					
Family Sphere Control (20%)		-0.010**				
		(0.004)				
Institutional Sphere Control (20%)			0.001			
			(0.009)			
Bank-affiliated Sphere Control (20%)				-0.011		
				(0.007)		
Treatment Sphere Control (20%)					-0.009**	
					(0.004)	
Treatment Family Sphere Control (20%)						-0.010**
						(0.004)
Vote-to-Capital	0.000	0.000	0.000	0.000	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size	-0.008***	-0.008***	-0.009***	-0.008***	-0.007***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROA	-0.022	-0.021	-0.021	-0.021	0.001	0.029
	(0.025)	(0.025)	(0.025)	(0.025)	(0.041)	(0.040)
Leverage	-0.090***	-0.090***	-0.089***	-0.093***	-0.072***	-0.076***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.019)	(0.021)
Collateral	-0.027**	-0.029**	-0.025*	-0.023*	-0.021	-0.006
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.015)
Growth	-0.011*	-0.011*	-0.011*	-0.011*	-0.008	-0.015*
	(0.006)	(0.006)	(0.006)	(0.006)	(0.010)	(0.009)
Intangible	-0.000	-0.000	0.001	0.002	0.003	0.037
	(0.019)	(0.019)	(0.019)	(0.019)	(0.023)	(0.026)
Interest Coverage	0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Ratio	-0.001	-0.001	-0.000	-0.001	0.000	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Loss	0.017**	0.017**	0.017**	0.018**	0.017	0.024**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)	(0.010)
Constant	0.332***	0.334***	0.339***	0.328***	0.267***	0.239***
	(0.031)	(0.030)	(0.031)	(0.032)	(0.038)	(0.048)
Observations	1,772	1,772	1,772	1,772	852	746
R-squared	0.259	0.259	0.255	0.257	0.254	0.287
Standard errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	305	305	305	305	220	207

Table 13 shows the result from multivariate testing using POLS. All models use robust standard errors clustered by firm and control for both industry and year effects. Models 17-20 highlight the results for each respective hypothesis, Models 21 and 22 show the results using a PSM sub-sample on hypotheses 1 and 2. ***CoD*** is the main dependent variable of all regressions and is calculated as the interest expenses divided by the long- and short-term debt. ***Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a sphere and controls more than 20% of the votes. ***Family Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a family sphere and controls more than 20% of the votes**.** ***Institutional Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is an institutional sphere and controls more than 20% of the votes. ***Bank-affiliated Sphere Control (20%)*** is a dummy variable that takes on the value one if the largest owner of the firm is a Bank affiliated sphere and controls more than 20% of the votes**.** ***Vote-to-Capital*** is the 'wedge' of votes and capital calculated as the voting rights of the largest owner divided by their capital. ***Size*** is calculated as the natural logarithm of the sum of a firm's market capitalization and long-term debt. ***ROA*** is the return on assets calculated as earnings before interest and taxes divided by lagged assets. ***Leverage*** is calculated as the total debt divided by total assets and growth is measured as the growth in assets. ***Collateral*** is the net plant property and equipment divided by total assets. Similarly, ***Intangible*** is the intangible assets divided by total assets. ***Interest Coverage*** is the earnings before interest and taxes divided by the interest expense. The ***Current Ratio*** is a firm's current assets divided by current liabilities. ***Loss*** is a dummy variable that takes on the value 1 if a firm reports negative earnings before interest and taxes. All accounting variables are winsorized at the 1st and 99th percentile, except for ***CoD*** that is winsorized at the 1st and 95th percentile.
Robust standard errors clustered by firm are reported in the parentheses. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively.

Figures

Figure 1: The Wallenberg sphere from the 26th of January 2009 (Fristedt & Sundqvist, 2009).