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SME's cost of debt: A Meta-Analysis of borrower, creditor and financial statement verification attributes*

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Abstract: Private firm financing, given the far-reaching importance of non-publicly traded companies for global output and employment, is still a relatively underexplored area. Since the seminal work of Petersen and Rajan (1994), only a small branch of research into private firms' cost of debt has been established. We aggregate the full body of this research that has empirically investigated antecedents of private firms' cost of debt in a meta-analysis. The foremost antecedents can be categorized into either borrower, creditor or financial statement verification attributes. Our results reveal a set of 11 highly significant and robust determinants.

Keywords: Cost of debt; Meta-analysis; Private firms; SME

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1. Introduction

Companies of all sizes and industries are in the perpetual pursuit of raising funds to finance growth. However, if there are insufficient internal funds, companies must resort to obtaining equity or debt from capital markets. In contrast to publicly listed firms with relatively easy access to additional equity capital, small private businesses rely primarily on debt funding, mostly in the form of bank loans (e.g., Berger and Udell 1995). While new funding sources, such as crowdfunding, initial coin offerings and the like, have gained some notoriety in the business press in recent years and also sparked academic interest, their relative importance in practice is dwarfed by bank financing which remains the "classic" SME funding source (e.g. Deno et al. 2020). Hence, research on the determinants of private firms' cost of bank debt is of profound interest for managers and regulators alike. On one hand, managers have a substantial interest in reducing the amount of interest paid on their outstanding debt. Therefore, an awareness of the most significant determinants and how they can be influenced is crucial. On the other hand, policymakers can act on research findings to develop regulations that improve the flow of credit in the economy, for instance, by determining the optimal degree of disclosure requirements and mandatory financial statement verification.

Research on the various determinants of private firms' cost of debt began with the seminal work of Petersen and Rajan (1994). They were the first to investigate the effect of various firm, loan, and relationship characteristics on the magnitude of loan interest rates. However, despite the great importance of private firms for the world economy,[1] there is comparatively little research on the pricing of their most important source of funds. Nevertheless, even the scarce existing evidence shows mixed results on some of the supposed drivers of firms' cost of debt. This is not surprising given that access to private firm data is often problematic (e.g., Cassar 2011; Lisowsky and Minnis 2018). Thus, we encounter papers with widely varying sample sizes and a wide range of countries under investigation. As a result, this line of research has yet to achieve consensus on the required control variables. Hence, our meta-analytic approach closes an important gap in the literature. Meta-analyses entail several advantages. First, one can reasonably expect that potential errors made in individual studies cancel each other out (Fagard, Staessen and Thijs 1996). Specifically, while individual studies might suffer from multicollinearity and/or unobserved correlated variables, these issues should not bias meta-analytic results. Second, they are not prone to psychological biases. On one hand, if the number of underlying studies is great, narratively summarizing their results might be "too taxing for the human mind" (Hunter and Schmidt 1990: 468). On the other hand,

[1] Indicative of this, Lisowsky and Minnis (2018) estimate that in the U.S., private firms outnumber public firms by eighteen-to-one – or three-to-one if one requires a minimum of $100 million in revenues. Globally, small- and medium-sized (SME) private firms account for 95% of firms and about two-thirds of employment (OECD, 2000).

narrative literature reviews might also be skewed to only reflect the researcher's desired results (i.e., a practice that is commonly referred to as "cherry-picking").

For small private companies seeking debt capital can be a difficult endeavor, since they are subject to relatively few regulatory requirements with respect to the disclosure of financial information (Hernández-Cánovas and Martínez-Solano 2007; Van Caneghem and Van Campenout 2012). In general, for effective decision-making in lending, banks must rely extensively on the accurate and reliable financial information provided by loan applicants. They must do so to determine an appropriate risk premium as part of pricing the loan. Otherwise, lenders are forced to resort to more restrictive and relatively monitoring-intensive contract terms, such as collateral and covenants. Cumulatively, our meta-analytic results exhibit three important sets of drivers for private firms' cost of debt. Specifically, borrower, creditor, and financial statement verification attributes. Nevertheless, especially the latter part of the literature is still significantly underexplored. Cumulatively, we reveal a set of 11 determinants of private firms' cost of debt which fulfill all three quality criteria of meta-analytic research. First, they appear in at least five studies (Hay, Knechel and Wong 2006). Second, they are significantly associated with the dependent variable over the full body of research (Stouffer et al. 1949). Third, the association is robust as the number of unpublished papers with an insignificant association one would need to find to nullify the overall significant result is at least twice the number of published studies underlying the meta-analysis (i.e., the so-called "file-drawer test"; Rosenthal 1979).

We contribute to the current state of knowledge on the private firms' cost of debt by collecting, aggregating and evaluating the results brought forward in the available body of literature. Among other factors, there is strong evidence for significant negative correlations between a firm's size, interest coverage ratio, and potential collateral with various proxies for cost of debt. Additionally, the study of prior literature on the topic reveals that the effect of financial statement verification, with respect to the type of audit opinion or type of audit firm, recently found its way into academic research. The reason for this evolution can be attributed to the unique setting of private firms, in which the informational role of auditors can be investigated, largely unbiased by the effects of other information intermediaries (Kim, Simunic, Stein and Yi 2011) or the effects of auditor litigation concerns. While most individual studies might suffer from rather imprecise cost of debt estimations, attributable to the predominant form of computation that divides interest expense by (average) total debt and most often does not take into account the existence of (nominally) interest-free debt (e.g., accounts payable) or the maturity structure of loans, the meta-analytic results neutralize these biases.

The remainder of this paper is organized as follows: The subsequent section describes our systematic identification of the relevant literature as well as the underlying general empirical framework. Section 3 explains the methods used to conduct the meta-analyses. Section 4 presents the results clustered into borrower, creditor and financial

statement verification attributes as well as a range of robustness checks. The final section concludes the paper.

2. Data and methodology

2.1. Search strategy and data

The most common empirical approach employed in the identified publications takes the following form (1):

$$CostOfDebt_i = a_0 + a_1\, SIZE_i + \ a_2 LEV_i + \sum a_k g_{ik} + \sum a_e\, g_{ie} + e_i \qquad (1)$$

where $CostOfDebt_i$ is a proxy for the cost of debt incurred by private firms. The most prevalent measure is firms' aggregate interest expense at year-end scaled by average total liabilities. Other measures include bond spreads, external credit scores, or actual loan rates acquired from firm and bank questionnaires to which some authors had access. The independent variable $SIZE_i$ measures firm size. In most published research, it is the natural logarithm of total assets. Another control variable employed in virtually all published papers in this area is LEV_i, which proxies for the influence of a firm's indebtedness on its cost of debt. g_{ik} and g_{ie} each represent a vector of variables of interest and additional controls, respectively. These include firm, bank, auditor or other characteristics. We will discuss the identified variables more closely in the results section. Finally, e_i denotes the error term.

We initiated the process of identifying the relevant literature as inputs for our meta-analyses with a keyword search of the most prevalent scientific search engines (i.e., EBSCO Host, JSTOR and Google Scholar). Especially Google Scholar enables us to also identify working papers published in pre-print repositories. In the first step, our keywords consisted of "cost of debt", "debt pricing", "loan pricing", as well as "private firms" and "SME". We applied Boolean operators to narrow the search results down to papers at the intersection of cost of debt and private firm research. Second, we manually checked whether the papers actually followed a multivariate regression approach, such as the general model presented in equation (1). Additionally, we screened the detected literature for further cues to other relevant studies. Our final sample consists of 41 papers, which comprise a total of 44 analyses. The papers were published during the period from 1994 to 2018 and are based on samples from 15 individual countries as well as one paper which looks into a large cross-section of European countries (Fülbier and Gassen 2015). For each identified paper, we focus on the main results (i.e., the main

table). If a paper only reports results for subsamples, based on different data sets, each set of results is treated as a separate analysis.[2] Table 1 lists all identified papers.

- Insert Table 1 about here -

It became apparent that the topic of private firms' cost of debt resulted in interest from a range of scholarly fields, such as banking and finance, accounting, entrepreneurship and economics. Most papers were published in Small Business Economics (SBE, 5), the Journal of Accounting Research (JAR, 3), the Journal of Business Finance & Accounting (JBFA, 2), the Journal of Small Business Management (JSBM, 2), and The Accounting Review (TAR, 2) with 20 other journals following with single contributions. Additionally, seven studies are unpublished working papers (WP). A majority of papers investigates samples from the United States (U.S., 10), Germany (6), Spain (6) or Finland (5).

- Insert Table 2 about here -

Table 2 presents the 201 independent variables employed in the 41 (44) identified papers (analyses), respectively. For the sake of clarity, we further cluster these variables into five main categories (i.e., borrower, creditor, financial statement verification, macroeconomic, or governmental attributes). In the next step, we follow Hay et al. (2006) and only consider independent variables that were employed in at least five studies. Hence, we disregard most variables, since, for instance, 146 were just employed once. This results in a final set of 17 variables, which we will investigate more closely. Otherwise, the results of the meta-analyses could lack validity and generalizability due to an insufficient number of observations in underlying studies.

2.2. Methodology

To conduct the meta-analyses, we follow the seminal work of Stouffer et al. (1949), who developed a method to aggregate the test-statistics of similar independent variables that occur among a wide set of empirical studies which share similar hypotheses. In this sense, Stouffer's method allows for making inferences about the overall significance and direction of the association of independent variables used in similar circumstances. Hence, the meta-analytic results are of a higher validity and generalizability compared to any single study's results.

[2] Specifically, this is the case for Elsas and Krahnen (1998) who run four separate annual analyses with sample sizes ranging from 83 to 92.

Initially, we build on Stouffer's unweighted test, which is implemented as follows:

$$Z_{Stouffer} = \frac{\sum_{i=1}^{k} Z_i}{\sqrt{k}}, \quad (2)$$

where $Z_{Stouffer}$ is the final Z-score value for the aggregated test-statistics of the individual variable under consideration. $\sum Z_i$ is the sum of Z-scores that are based on the transformed p-values of each test included in the final sample that employs the respective independent variable.[3] The sign for each Z_i is derived from the reported coefficient in the underlying individual analysis. k is the number of tests (i.e., analyses) included in the sum. To derive the aggregate level of significance, the respective value of $Z_{Stouffer}$ must be transformed into its corresponding p-value. We consider the variable to have a significant association if the p-value is less than 5 %. Finally, the overall direction of the effect is derived from the sign of $Z_{Stouffer}$.[4] The original version of Stouffer's test considers each result as having equal importance and validity, regardless of the individual studies' sample sizes. In our case, these vary widely, ranging from 83 in one of the partial analyses performed in Elsas and Krahnen (1998) to 442,026 in Fülbier and Gassen (2015). Hence, we present the main results using the weighted version of Stouffer's test:

$$Z_W = \frac{\sum_{i=1}^{k} w_i Z_i}{\sqrt{\sum_{i=1}^{k} w_i^2}} \quad (3)$$

where $\sum Z_i$ once more resembles the sum of Z-scores that are based on the transformed p-values of each test included in the final sample but is weighted by the proportion of observations in the respective study compared to the total number of observations in all included studies. Again, the respective value of Z_W is transformed into its corresponding p-value.

While meta-analyses have the advantage of being less prone to the errors made in individual studies (Fagard et al. 1996) and are not subject to psychological biases, such as "cherry-picking" (e.g., Hunter and Schmidt 1990), they suffer from their own potential shortcomings. By definition, they can only aggregate the results of published studies. However, there might be studies that are expected to exist but have never made their

[3] To determine the aggregate effect size of repeatedly used independent variables, their correspondingly reported t-statistics are transformed into p-values. Those, in turn, are transformed into z-scores.

[4] The final z-scores were capped to a maximum/minimum of +/- 4.892 for each analysis to reduce the effect of outliers, as some studies report t-statistics of much larger values.

way into a journal or other forms of publication. Studies that report insignificant results generally run the risk of not being published or released, a phenomenon that is commonly referred to as the "file-drawer problem" (Rosenthal 1979: 638). It is conjectured that studies that report type one errors find their way much easier into scientific journals, as they are more likely to be received as novel and relevant to the reader (Hay et al. 2006; Hunter and Schmidt 1990). This might create a perception of reality that is not in in line with the actual body of knowledge. To test for the possibility of a whole array of unpublished studies, the Fail-Safe-N test (Rosenthal 1979) was developed. This test estimates the number of studies with insignificant results that would be required to nullify the overall significance of a certain independent variable in a meta-analysis. In line with most other meta-analyses, we accept a Fail-Safe-N of twice the original number of published studies which use the variable in question. The Fail-Safe-N test takes the following mathematical form:

$$X = \left(\frac{\sum Z_i}{1.645}\right)^2 - k \tag{4}$$

where X is the number of unpublished studies with insignificant results that is required to make the aggregated (significant) results of a meta-analysis ultimately insignificant on a significance level of (greater) than 5 %. $\sum Z_i$ is the sum of Z-scores that are related to one specific independent variable from the studies included in the meta-analysis and k, once again, represents the number of analyses included.

3. Results

Table 3 presents meta-analytic results for the set of 17 independent variables that have occurred in at least five of the previously identified papers. Each result will be discussed in detail in terms of the underlying intuitions of what direction of causality can be reasonably expected, the actual result of the meta-analysis, and an attempt to explain unexpected or mixed results.

- Insert Table 3 about here -

For the sake of clarity, the control variables are categorized into borrower, creditor and financial statement verification attributes.

3.1. Borrower Attributes

Firm fundamentals There are three variables, which we consider to be firm fundamentals, that are widely represented in the private firm's cost of debt research,

namely, firm size, the potential for collateral, and firm age. The most prevalent independent variable in the literature is *firm size*. In most cases, it is proxied by a firm's total assets or total sales. Usually, the measure is then transformed into its natural logarithm to enhance the linear relationship with the explanatory variable. When investigating the effect of firm size on cost of debt, an overwhelming majority of authors expect a negative correlation as larger firms are usually more diversified and asset-backed (e.g., Vander Bauwhede, De Meyere and Van Cauwenberge 2015). In addition, larger firms are predominantly more mature and have already proven that they can run a sustainable business model and have established a better information environment (e.g., Badertscher, Givoly, Katz and Lee 2015). Nevertheless, they also commonly face greater agency conflicts, attributable to an increasing separation of management and ownership, which results in greater monitoring needs (e.g., Minnis 2011). Finally, larger firms are characterized by less concentrated lending (e.g., Petersen and Rajan 1994), whereas its effect is unclear a priori. Our results underpin these predictions and show a significantly negative correlation between firm size and the associated cost of debt ($p = 0.00001$). Of the 36 analyses included, 24 report significantly negative associations, whereas only two report significantly positive associations. Conclusive evidence for the overall negative effect comes from the file-drawer test, which estimates a total number of 2,848 unpublished studies with insignificant results to be required to nullify the overall meta-analytic findings. If we separately consider studies which measure firm size by total assets or total sales, we arrive at the same conclusion. Overall, firm size turns out to be a highly critical variable in the determination of the level of the cost of debt of private firms.

Similar results manifest for potentially *available collateral*. The meta-analytic results of the 18 included studies are in line with the common notion that firms with a larger proportion of tangible assets are considered less risky (e.g., Guedhami and Pittman 2008). The available collateral has a significantly negative association with the cost of debt ($p = 0.00031$). Of the 18 studies, 12 (3) report a significantly negative (positive) correlation with cost of debt, respectively. Our result is highly robust with a file-drawer test value of 327.

Similar to the rationale behind firm size, *firm age* proxies for maturity. As firms mature, they usually also grow. Moreover, their stakeholders generate increasingly profound private knowledge about the business model and associated risks. Moreover, mature firms are expected to have more long-standing and trust-based relationships with banks, which may further contribute to a decline in the cost of debt (Van Caneghem and Van Campenhout 2012; Karjalainen 2011; Niskanen and Niskanen 2010). However, this might also result in a hold-up situation, which could ultimately increase interest rates. Indicative of these contradictory lines of argument, only five of the 16 relevant studies report a significantly negative correlation, while three show significantly positive associations. While the largest proportion of studies reports insignificant results, the meta-analysis of all studies concludes a significantly negative association ($p = 0.00008$)

with a moderate Fail-Safe-N of 38. This result is partially attributable to the fact that the larger studies (i.e., the ones that carry more weight in our main results) report negative signs.

Leverage and distress Firms that report high leverage (i.e., high *debt to assets* ratios) are expected to operate on comparatively more "shaky feet" with a higher risk of insolvency. Anecdotally, banks consider this in their loan pricing decisions and charge higher interest rates. Our meta-analytic results, however, cannot confirm this rationale. With a weighted Stouffer p-value of 0.00001, we follow the seminal work of Modigliani and Miller (1958). They conject that a firm can increase its value extensively when it mostly relies on debt capital funding, which is attributable to the tax-deductible nature of interest expenses. Only when the amount of debt financing becomes relatively too large will the increased risk of insolvency make an incremental increase in debt financing unfavorable. Of the 31 studies identified, ten support the initial assumption. Nine, however, report significantly negative associations. The majority of studies (12) report insignificant results. Another explanation for the mixed results in the literature might be that firms that are offered loans with small interest rates are prone to obtain excessive amounts of debt. Therefore, high leverage often coincides with relatively small interest expenses (Vander Bauwhede et al., 2015).

A considerable amount of empirical analyses also controls for the impact of clear over-indebtedness, as proxied by a *negative book value of equity*. Intuition suggests that negative equity capital will make any financial relationship a particularly risky undertaking for banks and thus will induce them to charge a considerable risk premium on their loans. Seven out of nine studies that control for this attribute report significantly positive results. The meta-analysis supports this overwhelming finding with a significantly positive association ($p = 0.00001$) and a Fail-Safe-N of 132.

Repayment ability The ability to generate sufficient *cash flows* is essential for a firm to service its debt. It is therefore expected that firms that show an increasing inflow of cash will be offered lower interest rates (e.g., Guedhami and Pittman 2008). Six studies control for this variable. Two (one) studies show significantly positive (negative) results. The remainder report insignificant results. Our meta-analysis also reveals mixed results with no overall significant association ($p = 0.27133$). An interpretation of this result may be that banks prefer information other than cash flow figures. Moreover, covenants and bank monitoring might favor tying into financial accounting data. As such, the results could also be attributable to a lack of sufficient observations, since in most jurisdictions'

Generally Accepted Accounting Principles (GAAP), cash flow is only a voluntary, pro forma figure.[5]

Another measure associated with repayment ability is *liquidity*. More favorable liquidity ratios are associated with improved credit scores and are thus expected to be rewarded by banks with lower interest rates (e.g., Dedman and Kausar 2012; Lennox and Pittman 2011). The aggregate result of 13 studies reports a negative and highly significant association ($p = 0.00001$). In addition, the majority of studies (eight) show a negative correlation, whereas three (two) report positive (insignificant) results. Moreover, 207 additional, previously unpublished studies would be required to invalidate the meta-analytic result. The single liquidity measures (i.e., current and quick ratios), corroborate the initial result with highly significant negative associations.

Another meaningful figure to determine a firm's debt servicing potential is the *interest coverage* ratio. The higher the ratio of earnings to overall interest expenses, the greater is a firm's ability to repay its creditors. Unsurprisingly, it is also one of the most widespread performance-based covenants (Chava and Roberts 2008). Our meta-analytic result confirms that rationale with a significantly negative association ($p = 0.00001$). Of the 19 included studies, 12 show a significantly negative correlation, while only four document significantly positive associations. The high Fail-Safe-N of 389 suggests that this result is very robust.

In their seminal study, Petersen and Rajan (1994) already control for the effect of *sales growth* on cost of debt, as this represents investment opportunities and gives an indication of a firm's future profitability. Hence, growth should be associated with lower risk as well as interest rates, except in the case of fast-growing start-ups that might be considered high risk, with the result of higher interest rates. Unsurprisingly, five of the 16 studies present significantly positive results, and another five studies document significantly negative results. Overall, the weighted Stouffer test results in a significantly negative association ($p = 0.02622$), whereas this result does not seem to be particularly robust to additional unpublished studies. As such, the overall contribution of sales growth to cost of debt remains an open question.

Profitability Regarding *profitability*, especially the influence of the return on assets (ROA) ratio, this has been thoroughly investigated in the literature. Our meta-analysis can significantly confirm the intuition that an increase in profits and, therefore, decrease in default risk will ultimately result in decreasing the cost of debt ($p = 0.00001$). Out of 15 identified analyses, five report a significantly negative correlation, while only two studies show a significantly positive correlation. The number of unpublished studies with no

[5] In contrast, US-GAAP and the International Financial Reporting Standards (IFRS) require (publicly listed) firms to disclose separate cash flow statements.

significant results would be 82. This result is also confirmed by a separate analysis based on the rather limited number of studies which employ a return on sales (ROS) figure.[6]

Form of ownership and liability A total of 13 studies also controls for the impact of the form of ownership or the liability status on a firm's cost of debt capital. Although 11 studies show no significant results, the overall analysis yields the conclusion of a significantly negative association (p-value = 0.03495). On the surface, this seems illogical. Limited liability limits the creditors' ability to access firm owners' personal wealth. However, wealthy owners of corporations are commonly still personally responsible through contractual agreements, thus, the "limited liability gain is fictional in actuality" (Cassar 2004: 268). Nevertheless, research has developed some explanations. First, limited liability corporations can (theoretically) have an unlimited number of shareholders, which increases the need for better financial reporting quality (Dixon, Gates, Kapur, Seabury and Talley 2006). Second, corporations exhibit higher levels of income smoothing and conservatism, which protects creditors from excessive dividend payouts by firm owners (Bigus, Georgiou and Schorn 2015). Third, the legal obligation to publicly disclose financial statements, which is the case for European limited liability corporations, regardless of stock market listing, results in improved access to bank capital (Deno, Loy and Homburg 2020).

3.2. Creditor attributes

Relationship attributes A long-standing *relationship between a firm and its bank*(s) is the leading indicator of relationship lending (Berger and Udell 1995; Petersen and Rajan 1994). Theoretically, the association between the duration of bank relationships and cost of debt can go both ways. This is also reflected in the mixed results we encounter in the literature. Two studies present a significant cost-increasing effect, whereas three studies attribute a cost-decreasing association. The majority of studies (nine) is likewise split but entails insignificant results. On one hand, trust between the parties is built over time, and the lender accumulates more private information, which decreases risk and monitoring cost. Moreover, clients with longer successful credit histories are more sought after by competing banks (Blackwell, Noland and Winters 1998). As such, longer bank relationships may reasonably result in a lower cost of debt. On the other hand, long-standing relationships can result in hold-up situations, in which banks can exploit their dominant market position to charge higher interest rates. Especially in the case of concentrated market environments, banks may acquire this position by providing insurance for firms to supply them with affordable capital in times of financial struggle

[6] Interestingly, the related issue of the influence of earnings management on the private firms' cost of debt has only been addressed in four studies.

(Berger and Udell 2006; Elsas and Krahnen 1998; Stein 2014). Furthermore, banks could benefit from the circumstance that firms are generally deterred from incurring switching costs to an alternative bank relationship (Howorth and Moro, 2012), or the new bank charges higher interest rates as it fears a "winner's curse" (Garriga 2006; Ziane 2003). However, the meta-analytic result follows the cost-increasing route with a p-value of 0.00895 and a Fail-Safe N of 11 additional unpublished studies.

Moreover, a total of seven analyses investigate the effect of the *number of a firm´s bank relationships* on its cost of debt. Anecdotal evidence suggests that as the number of bank relationships increases the more bargaining power the firm possesses over banks. In addition, banks that are free-riding the lead lenders' monitoring and private information can offer lower interest rates (e.g., Carletti, Cerasi and Daltung 2007; Diamond 1984). However, our meta-analytic result cannot support this line of argument. We encounter a significantly positive association ($p = 0.00001$), while only one study finds the predicted significantly negative result. A potential explanation for this observation may be that the mere threat of adding bank relationships is sufficient to incentivize the relationship lender to pass on its cost savings, which arise through economies of scale, back to the borrower (Ziane 2003). Nevertheless, the results must be treated with some caution, as only seven unpublished studies with insignificant results would be required to nullify the overall result.

Contractual attributes A total of six studies include controls for *contractually provided collateral*. Common wisdom suggests that collateral reduces the risk of default borne by banks. Therefore, it seems reasonable that banks split the gains from reduced risk with the borrower in the form of reduced interest (e.g., Bester 1985) or view collateral pledging and (higher) interest rates as substitutes in an effort to lower credit risk (e.g., Lehmann et al. 2004). Nevertheless, our meta-analytic result suggests that contractually provided collateral is significantly positively associated with the cost of debt ($p = 0.00532$). This result might be initially surprising, but there are potential explanations in the literature. On one hand, there is evidence that firms in longer banking relationships pay lower interest rates and pledge less collateral (Berger and Udell 1995).[7] On the other hand, collateral pledging seems negatively associated with older and larger firms (i.e., firms with longer successful track records; Harhoff and Körting 1998). Nonetheless, the underlying diverging results we encounter in the literature (i.e., two studies find the aforementioned significantly positive effect, while two provide evidence to the contrary) are also reflected in a low number of studies (i.e., six) required to turn the overall result insignificant. As data availability on collateral pledging is rather problematic, attributable

[7] On the contrary, there is survey evidence that "housebanks" are significantly more likely to ask for collateral (Lehmann et al., 2004).

to banking confidentiality rules and collateral being considered an off-balance liability in financial disclosures, the results are unlikely to become more robust in the near future.

An even smaller set of five studies also looks into the effects of *total amounts of specific loans* on the firms' cost of debt. As confidentiality laws also generally prohibit banks from disclosing client relationships and their terms (i.e., including loan amounts) and firms rarely disaggregate debt capital into specific loan components in their financial statements, only a handful of researchers can employ proprietary archival datasets or surveys. In theory, the association of loan amounts with firms' cost of debt can be complex. First, one can assume that as the loan amount increases, the relative overhead cost of monitoring decreases, since most tasks and regulatory filing obligations are independent of loan size. In a competitive environment, banks may pass parts of the savings to customers resulting in lower interest expenses. However, if the loan amount becomes excessive relative to the bank's overall amount of loans outstanding, cluster risk might drive up the required interest rates. Second, financially constrained firms will borrow larger amounts from more expensive sources as long as the rate of return on the investments financed through the debt is marginally higher (Petersen and Rajan 1994). Third, to some extent, a firm's size effect on total loan amounts is probable. Larger firms, which might simply have greater nominal financing needs, are typically more diversified and asset-backed (e.g., Vander Bauwhede et al. 2015). Therefore, both a negative as well as positive association of loan amounts with the firms' cost of debt is conceivable. Our meta-analytic result suggests a highly robust and significantly negative correlation ($p = 0.00001$; Fail-Safe-N = 88).

3.3. Financial statement verification attributes

While all accounting firms are legally obliged to reach a prescribed minimum audit quality, mounting evidence in audit research suggests a profound quality differential between the largest audit firms (i.e., the "Big 4", "Big 5" or "Big 6", depending on the period under investigation) and the mid-tier and especially the smallest competitors (for an empirical investigation in a Continental European private firm setting; cf. Loy 2013). Research attributes this result to better knowledge accumulation (Cano-Rodriguez and Alegria 2011), more pronounced independence (DeAngelo 1981), audit fee premiums (Simunic 1980), increased reputational risks in the event of an audit failure (Francis and Wilson 1988), or even pre-screening and nonacceptance of the riskiest clients (Kaplan and Wilson 2012) by the large audit firms. In line with these findings, we assume that private firms being audited by large audit firms incur a significantly lower cost of debt or, in other words, higher audit fees are presumably offset by lower cost of debt. Our meta-analytic results of nine available studies conclude that there is, indeed, a significantly negative association ($p = 0.00020$). The number of required studies with

insignificant results to nullify the overall result is 101. This is fairly robust as it amounts to about twenty times the number of studies that report significantly negative results.

Nonetheless, there is also a body of research that controls for the effect of obtaining an audit *per se*, as in most non-European countries, including the U.S., private firms obtain financial statement audits on an entirely voluntary basis. In the private firm setting, the informational role of audits can be investigated in a more isolated fashion compared to public firm samples (Deno et al. 2020; Kim et al. 2011; Minnis 2011). The effect of financial statement verification on the firms' cost of debt is unbiased from the influence of a large number of additional stakeholders and other information intermediaries, such as financial analysts or the business press. In line with the results on higher quality audits, we expect that firms that voluntarily choose to obtain financial statement verification will report lower cost of debt. The meta-analytic results confirm this notion with a significantly negative coefficient ($p = 0.00001$). Seven of the ten underlying analyses also report significantly negative results. Finally, the Fail-Safe-N amounts to a highly robust 155. An additional robustness check, with three studies that explicitly control for the presence of voluntary audits, yields similar results. Of these studies, two report significantly negative correlations, whereas one dissents. In the latter case, Koren, Kosi and Valentincic (2014) anecdotally suggest that creditors of Slovenian private firms punish firms with voluntary audits. They supposedly interpret the underlying audit decision as an attempt to dress up the firm's financial position. Nevertheless, we can confirm the overall positive effect of financial statement verification on a firm's cost of debt.

4. Robustness checks

Some researchers explicitly do not include working papers in their meta-analyses, as they have not yet been subject to rigorous peer-review and editorial processes (e.g., Hay et al. 2006). As the stream of literature that investigates the determinants of private firms' cost of debt is comparatively small – presumably for reasons that we will revisit in the next paragraph – we decided to keep working papers in our sample. Having said that, we repeat our analyses solely based on the 34 studies published in peer-reviewed academic journals and can generally confirm our results (Table 4, Column 1). One exception is the association of sales growth with cost of debt, which is rendered insignificant. However, already the main result does not seem to be particularly robust with a Fail-Safe-N of 16.

- Insert Table 4 about here -

Moreover, we also exclude papers based on U.S.-samples (Table 4, Column 2). On one hand, as private firms in the U.S. are not obliged to publicly disclose financial statements and/or obtain financial statement audits, there are issues of self-selection

(e.g., for a discussion, cf., Cassar 2011; Deno et al. 2020). This problem is exacerbated by the use of proprietary datasets from rating agencies (such as in Minnis 2011), banks (such as in Blackwell et al., 1998), or data from limited business surveys (e.g., Berger and Udell 1995; Cassar, Ittner and Cavalluzzo 2015; Petersen and Rajan 1994, 1995). Having said that, the results remain virtually unchanged.

- Insert Table 5 about here -

Along similar lines, papers based on small (proprietary) datasets are systematically underrepresented in our weighted approach. Hence, we repeat the meta-analysis with the original Stouffer method (Stouffer et al. 1949) as presented in Equation 1. Every paper now enters the overall meta-analytic result with equal weight. While most of our results presented in Table 5 are in line with our main results, three variables become insignificant. These are the debt to assets ratio, sales growth as well as the duration of the firm-bank relationship. As previously discussed, without weighting by sample size, the meta-analytic results are more susceptible to disagreement and mixed results in the literature. Each of the aforementioned variables has about an equal number of significantly positive and negative results in the considered papers, along with a large number of insignificant results.

While most papers in the main analysis (Table 3) use firms' aggregate interest expense at year-end scaled by average total liabilities (i.e., average cost of debt), there are some which rely on other measures which can be summed up under the umbrella of cost of additional debt (i.e., marginal cost of debt). At a conceptual level and in practice, these constructs are clearly distinct. For instance, a risky startup that is currently all equity financed by angel investors is likely to have a very high marginal cost of debt but an average cost of debt of virtually zero. On the other hand, established, well-capitalized firms likely have both a very low average as well as marginal cost of debt.

- Insert Table 6 about here -

Hence, we repeat our analyses focusing on the 21 papers which build on average cost of debt (Table 6). As the underlying analyses unanimously build on financial accounting data, they generally have no information on contractual attributes, such as information on collateral provided or disaggregated loan amounts. Moreover, the number of studies which include firms' incorporation status and cash flow information decreases severely, as these variables are not always included in commercially available databases. As such, for three variables (i.e., firm age, incorporation status, duration of firm-bank relationship) the Fail-Safe-N falls below our pre-defined critical level of at least twice the number of the original studies, attributable to a severely decreased number

of studies. Nevertheless, the results of this robustness check are again in line with the main results.

5. Conclusion

The purpose of this study was to conduct a series of meta-analyses on widely covered antecedents of (small) private firms' cost of debt. Although this line of research was established over 25 years ago with the seminal work of Petersen and Rajan (1994), it never reached "mainstream status". With greater future availability of private firms' financial statements, especially in the European Union, more research questions can and ought to be addressed. The private firm-setting is of particular interest for a number of reasons. First, it is less prone to principle–agent conflicts between (a large number of) owners and entrenched management. Second, private firms' financial statement disclosures more closely reflect managements' perspectives and are less likely to be optimized and rehearsed by large legal and investor relations departments or external consultants. Third, private firms' financial statements are most often the only quantitative information on the firms' financial position and profitability and, therefore, of utmost importance to arm's length lenders as well as other stakeholders (Deno et al. 2020).

We identify 41 papers, with a total of 44 independent main analyses, in which a set of 17 independent variables are employed at least five times each. These determinants can be broadly categorized into three different areas, related to either borrower, creditor or financial statement verification attributes. Eleven out of the 17 variables are not only (highly) significantly associated with the private firms' cost of debt but are also highly robust with a Fail-Safe-N of at least twice the number of the original studies. This means that the body of literature has to grow quite substantially with studies that exhibit insignificant results for the overall meta-analytic result to become insignificant. Hence, researchers interested in the study of private firms should at least try their best to incorporate these variables as controls. Nevertheless, data availability, albeit increasing in the European Union, is still somewhat problematic, and proprietary datasets might not include this full set of important controls.

A limitation of our meta-analytic approach is that it cannot properly control for country-specific particularities, with the exception of a robustness test excluding the country with the highest number of studies (i.e., the U.S. with a total of 10 papers). Legal and judicial infrastructures likely determine the access to credit and loan contracting in a far-reaching manner (Berger and Udell 2006). While some studies narratively argue long-standing differences between the Continental European and Anglo-Saxon banking systems and modes of private firm financing (e.g., Hernández-Cánovas and Martínez-Solano 2010; Van Caneghem and Van Campenhout 2012), only one addresses the issue in a cross-country setting (Fülbier and Gassen 2015). They find that the countries' debt

contracting infrastructures has a moderating effect on the firm-level determinants of cost of debt. As such, investigating the topic more closely in an international setting provides ample room for future research.

References

Allee, K. D., & Yohn, T. L. (2009). The demand for financial statements in an unregulated environment: An examination of the production and use of financial statements by privately held small businesses. *The Accounting Review* 84(1): 1-25.

Badertscher, B., Givoly, D., Katz, S. P., & Lee, H. (2015). *Private ownership and the cost of debt: Evidence from the bond market*. Working Paper University of Notre Dame.

Ball, R., & Shivakumar, L. (2005). Earnings quality in UK private firms: Comparative loss recognition timeliness. *Journal of Accounting and Economics* 39(1): 83-128.

Berger, A. N., & Udell, G. F. (1995). Relationship lending and lines of credit in small firm finance. *Journal of Business* 68(3): 351-381.

Berger, A. N., & Udell, G. F. (2006). A more complete conceptual framework for SME finance. *Journal of Banking & Finance* 30(11): 2945-2966.

Bester, H. (1985). Screening vs. rationing in credit markets with imperfect information. *American Economic Review* 75(4): 850-855.

Bigus, J., Georgiou, N., & Schorn, P. (2015). Legal form and earnings properties. *European Accounting Review* 25(3): 515-548.

Bigus, J., Schachner, L., & Stein, I. (2009). *Relationship lending and conservative accounting? Empirical evidence from private firms*. Working Paper University of Berne.

Blackwell, D. W., Noland, T. R., & Winters, D. B. (1998). The value of auditor assurance: Evidence from loan pricing. *Journal of Accounting Research* 36(1): 57-70.

Cano Rodríguez, M., & Sánchez Alegría, S. (2012). The value of audit quality in public and private companies: Evidence from Spain. *Journal of Management and Governance* (2012) 16(4): 683–706.

Cano Rodríguez, M., Sánchez Alegría, S., & Arenas Torres, P. (2016). The influence of auditor's opinion and auditor's reputation on the cost of debt: Evidence from private Spanish firms. *Spanish Journal of Finance and Accounting* 45(1): 32-62.

Carletti, E., Cerasi, V., & Daltung, S. (2007). Multiple-bank lending: Diversification and free-riding in monitoring. *Journal of Financial Intermediation* 16(3): 425-451.

Carmo, C. R., Moreira, J. A. C., & Miranda, M. C. S. (2016). Earnings quality and cost of debt: Evidence from Portuguese private companies. *Journal of Financial Reporting and Accounting* 14(2): 178-197.

Cassar, G. (2011). Discussion of "The value of financial statement verification in debt financing: Evidence from private US firms". *Journal of Accounting Research* 49(2): 507-528.

Cassar, G., Ittner, C. D., & Cavalluzzo, K. S. (2015). Alternative information sources and information asymmetry reduction: Evidence from small business debt. *Journal of Accounting and Economics* 59(2-3): 242-263.

Chava, S., & Roberts, M. R. (2008). How does financing impact investment? The role of debt covenants. *Journal of Finance* 63(5): 2085-2121.

DeAngelo, L. E. (1981). Auditor size and audit quality. *Journal of Accounting and Economics* 3(3): 183-199.

Dedman, E., & Kausar, A. (2012). The impact of voluntary audit on credit ratings: Evidence from UK private firms. *Accounting and Business Research* 42(4): 397-418.

Deno, S., Loy, T. R., & Homburg, C. (2020). What happens if private accounting information becomes public? Small firms' access to bank debt. *Entrepreneurship Theory & Practice* 44(6): 1091-1111.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *The Review of Economic Studies* 51(3): 393-414.

Dixon, L., Gates, S. M., Kapur, K., Seabury, S. A., & Talley, E. (2006). *The impact of regulation and litigation on small business and entrepreneurship*. RAND Working Paper.

Elsas, R., & Krahnen, J. P. (1998). Is relationship lending special? Evidence from credit-file data in Germany. *Journal of Banking & Finance* 22(10-11): 1283-1316.

Fagard, R. H., Staessen, J. A., & Thijs, L. (1996). Advantages and disadvantages of the meta-analysis approach. *Journal of Hypertension* 14(2): Supplement 9-12.

Francis, J. R., & Wilson, E. R. (1988). Auditor changes: A joint test of theories relating to agency costs and auditor differentiation. *The Accounting Review* 63(4): 663-682.

Fülbier, R. U., & Gassen, J. (2015). Do creditors prefer smooth earnings? Evidence from European private firms. *Journal of International Accounting Research* 14(2): 151-180.

Garriga, J. M. (2006). *Relationship lending in Spain: An empirical examination of cost of capital and credit rationing*. Working Paper Universitat Autonoma de Barcelona.

Gill-de-Albornoz Noguer, B., & Muñoz, M. I. (2006). *The effect of auditor reputation on the pricing of accruals: Evidence from privately held companies*. Working Paper Universitat Jaume I.

Gray, P., Koh, P. S., & Tong, Y. H. (2009). Accruals quality, information risk and cost of capital: Evidence from Australia. *Journal of Business Finance & Accounting* 36(1-2): 51-72.

Guedhami, O., & Pittman, J. (2008). The importance of IRS monitoring to debt pricing in private firms. *Journal of Financial Economics* 90(1): 38-58.

Hay, D. C., Knechel, W. R., & Wong, N. (2006). Audit fees: A meta-analysis of the effect of supply and demand attributes. *Contemporary Accounting Research* 23(1): 141-191.

Harhoff, D., & Körting, T. (1998). Lending relationships in Germany: Empirical evidence from survey data. *Journal of Banking & Finance* 22(10-11): 1317-1353.

Hernández-Cánovas, G., & Martínez-Solano, P. (2010). Relationship lending and SME financing in the Continental European bank-based system. *Small Business Economics* 34(4): 465-482.

Howorth, C., & Moro, A. (2012). Trustworthiness and interest rates: An empirical study of Italian SMEs. *Small Business Economics* 39(1): 161-177.

Huguet, D., & Gandía, J. L. (2014). Cost of debt capital and audit in Spanish SMEs. *Spanish Journal of Finance and Accounting* 43(3): 266-289.

Hunter, J. E., & Schmidt, F. L. (1990). Dichotomization of continuous variables: The implications for meta-analysis. *Journal of Applied Psychology* 75(3): 334-349.

Huq, A., Hartwig, F., & Rudholm, N. (2018). *Do audited firms have lower cost of debt*? Working Paper Dalarna University.

Hyytinen, A., & Väänänen, L. (2004). *Mandatory auditor choice and small firm finance: Evidence from Finland*. Working Paper University of Jyväskylä.

Hyytinen, A., & Pajarinen, M. (2007). Is the cost of debt capital higher for younger firms? *Scottish Journal of Political Economy* 54(1): 55-71.

Kaplan, S. E., & Williams, D. D. (2012). The changing relationship between audit firm size and going concern reporting. *Accounting, Organizations and Society* 37(5): 322-341.

Karjalainen, J. (2011). Audit quality and cost of debt capital for private firms: Evidence from Finland. *International Journal of Auditing* 15(1): 88-108.

Kim, J. B., Simunic, D. A., Stein, M. T., & Yi, C. H. (2011). Voluntary audits and the cost of debt capital for privately held firms: Korean evidence. *Contemporary Accounting Research* 28(2): 585-615.

Koren, J., Kosi, U., & Valentincic, A. (2014). *Does financial statement audit reduce the cost of debt of private firms?* Working Paper University of Ljubljana.

Lehmann, E., Neuberger, D., & Räthke, S. (2004). Lending to small and medium-sized firms: Is there an East-West gap in Germany? *Small Business Economics* 23(1): 23-39.

Lennox, C. S., & Pittman, J. A. (2011). Voluntary audits versus mandatory audits. *The Accounting Review* 86(5): 1655-1678.

Lisowsky, P., & Minnis, M. (2018): *The silent majority: Private U.S. firms and financial reporting choices*. Working Paper University of Illinois at Urbana-Champaign and University of Chicago.

Loy, T. R. (2013). An audit is an audit? Evidence from the German private firm sector. *Die Betriebswirtschaft/Business Administration Review* 73(4): 325-353.

Menkhoff, L., & Suwanaporn, C. (2007). On the rationale of bank lending in pre-crisis Thailand. *Applied Economics* 39(9): 1077-1089.

Minnis, M. (2011). The value of financial statement verification in debt financing: Evidence from private US firms. *Journal of Accounting Research* 49(2): 457-506.

Modigliani, F, & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review* 48(3): 261-297.

Niskanen, M., & Niskanen, J. (2010). Small business borrowing and the owner-manager agency costs: Evidence on Finnish data. *Journal of Small Business Management* 48(1): 16-31.

OECD (2000). *Small and medium-sized enterprises: Local strength, global reach*. In: OECD (Ed.), OECD Policy Brief, June 1–8. Paris: OECD.

Peltoniemi, J., & Vieru, M. (2013). Personal guarantees, loan pricing, and lending structure in Finnish small business loans. *Journal of Small Business Management* 51(2): 235-255.

Petersen, M. A., & Rajan, R. G. (1994). The benefits of lending relationships: Evidence from small business data. *Journal of Finance* 49(1): 3-37.

Petersen, M. A., & Rajan, R. G. (1995). The effect of credit market competition on lending relationships. *The Quarterly Journal of Economics* 110(2): 407-443.

Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin* 86(3): 638-641.

Schindele, A., & Szczesny, A. (2016). The impact of Basel II on the debt costs of German SMEs. *Journal of Business Economics* 86(3), 197-227.

Shikimi, M. (2013). Do firms benefit from multiple banking relationships? Evidence from small and medium-sized firms in Japan. *International Economics and Economic Policy* 10(1): 127-157.

Simunic, D. A. (1980). The pricing of audit services: Theory and evidence. *Journal of Accounting Research* 18(1): 161-190.

Stein, I. (2015). The price impact of lending relationships. *German Economic Review* 16(3): 367-389.

Stouffer, S. A., Lumsdaine, A. A., Lumsdaine, M. H., Williams Jr., R. M., Smith, M. B., Janis, I. L., Star, S. A., & Cottrell Jr., L. S. (1949). *The American soldier: Combat and*

its aftermath. Studies in social psychology in World War II, Vol. 2. Princeton, NJ, U.S.: Princeton University Press.

Ughetto, E., Scellato, G., & Cowling, M. (2017). Cost of capital and public loan guarantees to small firms. *Small Business Economics* 49(2): 319-337.

Vander Bauwhede, H., De Meyere, M., & Van Cauwenberge, P. (2015). Financial reporting quality and the cost of debt of SMEs. *Small Business Economics* 45(1): 149-164.

Van Caneghem, T., & Van Campenhout, G. (2012). Quantity and quality of information and SME financial structure. *Small Business Economics* 39(2): 341-358.

Ziane, Y. (2003). Number of banks and credit relationships: Empirical results from French small business data. *European Review of Economics and Finance* 2(3): 32-48.

TABLE 1

Overview of identified studies that empirically investigate private firms' cost of debt

Author(s)	Date	Publication	Country	Period	N
Allee and Yohn	2009	TAR	U.S.	2003 - 2004	1,481
Badertscher, Givoly, Katz and Lee	2015	WP	U.S.	1987 - 2010	633
Berger and Udell	1995	JB	U.S.	1988 - 1989	863
Bigus, Schachner and Stein	2009	WP	Germany	1993 - 2004	1,653
Blackwell, Noland, and Winters	1998	JAR	U.S.	1998	212
Cano Rodríguez and Sánchez Alegria	2012	JMG	Spain	2000 -2005	60,524
Cano Rodríguez, Sánchez Alegria and Arenas Torres	2016	SJFA	Spain	1999 - 2009	91,431
Carmo, Moreira and Miranda	2016	JFRA	Portugal	2001 - 2007	10,283
Cassar	2011	JAR	U.S.	2001 - 2008	374
Cassar, Ittner and Cavalluzzo	2015	JAE	U.S.	2003	1,191
Dedman and Kausar	2012	ABR	U.K.	2004	4,873
Elsas and Krahnen	1998	JBFA	Germany	1994 - 1997	*353**
Fülbier and Gassen	2015	JIAR	Europe	1998 - 2007	442,026
Garriga	2006	WP	Spain	1993 - 2004	73,809
Gill-de-Albornoz and Illueca Munoz	2006	WP	Spain	1996 - 2002	39,968
Gray, Koh and Tong	2009	JBFA	Australia	1992 - 2005	2,057
Guedhami and Pittman	2006	JFE	U.S.	1996 - 2004	413
Harhoff and Körting	1998	JBF	Germany	1998	391
Hernández-Cánovas and Martínez-Solano	2010	SBE	Spain	1999 - 2000	182
Howorth and Moro	2012	SBE	Italy	2004	309
Huguet and Gandía	2014	SJFA	Spain	2001 -2010	15,423
Huq, Hartwig, and Rudholm	2018	WP	Sweden	2007 - 2014	11,302
Hyytinen and Väänänen	2004	WP	Finland	1999 - 2002	78,505
Hyytinen and Pajarinen	2007	SJPE	Finland	2000 - 2002	11,925
Karjalainen	2011	IJAu	Finland	1999 - 2006	10,799
Kim, Simunic, Stein, and Yi	2011	CAR	Korea	1987 - 1996	9,168
Koren, Kosi and Valentincic	2014	WP	Slovenia	2006 - 2010	5,885
Lehmann, Neuberger and Räthke	2004	SBE	Germany	1997	334
Lennox and Pittman	2011	TAR	U.K.	2003 - 2005	10,782
Menkhoff and Suwanaporn	2007	AE	Thailand	1992 - 1996	479
Minnis	2011	JAR	U.S.	2001 - 2008	14,952
Niskanen and Niskanen	2005	JSBM	Finland	1992 - 1997	1,451
Peltoniemi and Vieru	2013	JSBM	Finland	1995 - 2001	279

Petersen and Rajan	1994	JF	U.S.	1987	978
Petersen and Rajan	1995	QJE	U.S.	1987	1,277
Schindele and Szcesnzy	2015	JBE	Germany	2003 - 2010	37,042
Shikimi	2013	IEEP	Japan	2000 - 2002	74,367
Stein	2015	GER	Germany	1993 - 2004	15,035
Ughetto, Scellatio and Cowling	2017	SBE	U.K.	2000 - 2005	29,266
Vander Bauwhede, De Meyere and Van Cauwenberge	2015	SBE	Belgium	1997 - 2010	8,908
Ziane	2003	EREF	France	2001	189

*This study includes four separate annual analyses. *ABR*: Accounting and Business Research; *AE*: Applied Economics; *CAR*: Contemporary Accounting Research; *EREF*: European Review of Economics and Finance; *GER*: German Economic Review; *IEEP*: International Economics and Economic Policy; *IJAu*: International Journal of Auditing; *JAE*: Journal of Accounting and Economics; *JAR*: Journal of Accounting Research; *JB*: Journal of Business; *JBE*: Journal of Business Economics; *JBF*: Journal of Banking & Finance; *JBFA*: Journal of Business Finance & Accounting; *JF*: Journal of Finance; *JFE*: Journal of Financial Economics; *JFRA*: Journal of Financial Reporting and Accounting; *JIAR*: Journal of International Accounting Research; *JMG*: Journal of Management & Governance; *JSBM*: Journal of Small Business Management; *QJE*: Quarterly Journal of Economics; *SBE*: Small Business Economics; *SJFA*: Spanish Journal of Finance and Accounting; *SJPE*: Scottish Journal of Political Economy: *TAR*: The Accounting Review; *WP*: Working Papers.

TABLE 2

List of independent variables used in cost of debt of private firms research (N=44)

Category	Independent Variable*	Total number of analyses
Borrower Attributes		
Firm Fundamentals	Accounts payable turnover (in days)	1
	Accounts receivable turnover (in days)	1
	Activity (inventory/assets)	1
	Collateral available (PPE/TA)	**18**
	Cost of debt of prior year	3
	Cumulative non-operating accruals	1
	Decile rank of firm's assets turnover ratio	1
	Employment growth	1
	Firm age	**16**
	Firm age categories (1,2)	1
	Firm assets categories	2
	Firm employees categories (1,2,3)	1
	Firm is above average of sample mean in terms of size	1
	Firm sales categories (1,2,3)	1
	Firm size (employees)	2
	Firm size (market valuation)	1
	Firm size (total assets)	**30**
	Firm size (total sales)	**6**
	Firm's credit score	4
	Firm's industry average Q ratio	1
	Firm's rating score applied by bank	1
	Intangible assets	2
	Inventory turnover (in days)	1
	Knowledge intensive business model	1
	Low knowledge intensive business mode	1
	Marginal tax rate	1
	New born firm	1
	Small or medium-sized firm	1
	Wage expense per employee	1
	Working capital	1
	Years since firms incorporation	1

(The table is continued on the next page.)

TABLE 2 (Continued)

List of independent variables used in cost of debt of private firms research (N=44)

	Young firm	1
Business Risk	Absolute value of discretionary accruals	1
	Altman's z-score	2
	Earnings smoothness	1
	Earnings volatility	1
	Financial stress within the last 5 years	1
	Firm's probability of default	1
	High risk company	1
	Low risk company	1
	O-score bankruptcy probability	1
	Sales volatility	1
	Volatility of operating cash flows	1
Leverage	Bank debt to total assets	1
	Debt to assets	**31**
	Debt with initial maturity of more than one year	1
	Leverage with bank debt	1
	Negative book value of equity	**9**
	Negative book value of equity with bank loans on balance sheet	1
	Short-term debt to total debt	2
Repayment Ability	Accrual quality	3
	Cash flow from operations	**6**
	Liquidity (current and quick ratio)	**13**
	Earnings quality	1
	Firm growth to prior year	1
	Interest coverage ratio	**19**
	Sales growth	**16**
Profitability	Firm loss year	1
	Mean 1987 gross profits/assets ratio in two-digit SIC industry	1
	Conservatism score	1

(The table is continued on the next page.)

TABLE 2 (Continued)

List of independent variables used in cost of debt of private firms research (N=44)

	Mean gross profits/assets between 1983-87 in two-digit SIC industry	1
	Operating income to net assets	1
	Pretax profit margin (% of sales)	1
	Profitability (return on assets, return on sales)	**15**
Form of Ownership and Liability	At least 50 % ownership is held by one family	1
	Average ownership stake held by owner-managers	1
	Family owned enterprise	1
	Firm has limited liability	**13**
	Firm is government or municipality owned	1
	Firm is owner-managed	3
	Firm is part of a group	2
	Firm is a partnership	3
	Firm is an S corporation	1
	Firm is a subsidiary of a foreign company	1
	Foreign owner	1
	Joint stock company	1
	Majority of firm owners is non-white	1
	Manager is main shareholder	1
	Number of firm's owners	1
	Number of legal person owners	1
	Number of natural person owners	1
	Number of years the current owners own the firm	1
	Ownership stake of largest shareholder	1
	Private equity firm owns firm	1
	Recent change of legal form	1
	Recent change of ownership	1
	Second biggest ownership stake	1
Internal Control	Firm has financial statements	1
	Firm produces accrual-based financial statements	2
	Legal obligation to select a certified auditor	1

(The table is continued on the next page.)

TABLE 2 (Continued)

List of independent variables used in cost of debt of private firms research (N=44)

Management	Management skill	1
	Technological skill	1
Governance	Number of top managers	1
Industry	Construction	4
	High-tech manufacturer	1
	Hotels and restaurants	1
	Manufacturing	3
	Primary sector	1
	Retail	4
	Services	4
	Transport	2
Location	East German firm	1
	Firm in city county	1
	Firm in fringe county	1
	Firm is in a unit banking state	1
	Firm is in MSA	1
	Firm is in urban location	1
	Firm is operating within area of hq	1
	Region of South Tyrol or Friuli Venezia Giulia	1
	West German firm	1
	Number of firm's owners	1
	Number of legal person owners	1
	Number of natural person owners	1
	Number of years current owners own firm	1
Creditor Attributes		
Relationship Attributes	Actual overdraft at time of the survey	1
	Cooperative bank	1
	Duration of relationship with bank	**14**
	Financial services used by firm	1
	Firm has a savings account	1

(The table is continued on the next page.)

TABLE 2 (Continued)

List of independent variables used in cost of debt of private firms research (N=44)

	Firm is subject to credit rationing	1
	Government affiliated financial institution	1
	Housebank	3
	Housebank status unclear	1
	Information symmetry	1
	Length in years firm has worked with bank with longest relationship	1
	Line of credit used	1
	Loan's fraction of a specific bank	1
	Number of meetings per year	1
	Multiple bank relationships (binary)	2
	Mutual trust between bank and firm	3
	Number of bank accounts	2
	Number of bank relationships	**7**
	Number of performing loans from subject bank	1
	Number of unsettled debt payments	1
	Single bank relationship	1
	Relation with specific banks	1
	Number of reviews per year	1
	Savings bank	1
	Small credit commitment	1
	Structure of lending	1
	Two bank relationships	1
	Use of overdraft facilty	1
Contractual Attributes	Amount of secured debt	3
	Collateral provided	**6**
	Debt from primary financial institution	2
	Default on loan	1
	Default premium	2
	Discount for early payments	1
	Fees and points paid for loan	1
	Guarantee by nonbank financial institution	1
	High risk loan	1

(The table is continued on the next page.)

TABLE 2 (Continued)

List of independent variables used in cost of debt of private firms research (N=44)

	Length of relationship with current lender (in years)	1
	Remaining time until loan maturity	2
	Loan from a non-financial firm	2
	Loan has a fixed rate	4
	Loan has a floating rate	2
	Loan is guaranteed	2
	Loan is secured with AR/INV	1
	Loan requires compensating balances	1
	Loan secured other than through AR/INV	1
	Number of bank managers involved with firm	1
	Some debt is secured	1
	Total amount of the loan	**5**
	Uncollateralized loan amounts	1
	Unsecured debt	1
	Use of long-term debt (1-5 Likert scale)	1
	Use of short-term debt (1-5 Likert scale)	1
	Use of trade credit (1-5 Likert scale)	1
Bond Properties	Duration of bonds outstanding	1
	Proportion of senior bonds	1
	Bond credit rating	1
	Outstanding years to maturity	1
	Rate on bond issued	1
	Senior debt	1
	Refinance loans with bond issues	1
Supplier Properties	Firm was denied trade credit	1
	Percent of purchases based on trade credit	1
Miscellaneous	Loan used to replace investments	1
	Loan has no specific use	1
	Loan from associated company	1
	Loan from owner	1

(The table is continued on the next page.)

TABLE 2 (Continued)

List of independent variables used in cost of debt of private firms research (N=44)

Financial Statement Verification Attributes		
Auditor Quality	At least one BIG4 auditor	1
	Audited by Big4/5/6	**9**
	Audited by certified auditor (Finland)	3
Audit Engagement	Audit report signed by more than one auditor	1
	Financial statements have been audited	**10**
	Switch between voluntary and mandatory audit	1
	Switch to mandatory audit	1
	Voluntary audit of financial statements	3
Audit Problems	Modified opinion	1
	Qualified opinion	1
Macroeconomic Attributes		
National	Economic development (price adjusted GDP)	1
Bank Attributes	Bank affiliation	1
	Bank fragility	1
	Bank size	2
	Herfindahl-Hirshman-Index	3
	Number of banks in firm's area	3
	Number of branches of non-government banks	1
Capital Markets	Duration spread	2
	Interest development	1
	Lagged inter-bank refinancing interest rate	1
	Prime rate at the start of loan	3
	Term premium	3
	Bank of Italy expects tightening of credit	1
Governmental Attributes		
Internal Revenue Service	Monitoring probability	1

*Independent variables in bold font are subject to meta-analysis in this study.

TABLE 3

Summary of the results from the meta-analysis for selected independent variables

Attributes	Independent Variables	N	# of significant results			Stouffer weighted test		Fail-Safe-N at p = 0.05
			Pos.	Neg.	Insign.	Sign	Sig.	
Borrower Attributes								
Firm Fundamentals	**Combined Size Measure**	**36**	**2**	**24**	**10**	**(-)**	**0.00001**	**2.848**
	Single Size Measure: Assets	30	1	21	8	(-)	0.00001	2.411
	Single Size Measure: Sales	6	1	3	2	(-)	0.00393	12
	Potential for Collateral	18	3	12	3	(-)	0.00031	327
	Age	16	3	5	8	(-)	0.00008	38
Leverage and Distress	Debt to Assets	31	10	9	12	(-)	0.00001	31
	Negative Book Value of Equity	9	7	1	1	(+)	0.00001	132
Repayment Ability	Cashflow from Operations	6	2	1	3	(-)	0.27133	-
	Combined Liquidity Measure	**13**	**3**	**8**	**2**	**(-)**	**0.00001**	**207**
	Single Liquidity Measure: Current Ratio	10	3	6	1	(-)	0.00001	68
	Single Liquidity Measure: Quick Ratio	3	0	2	1	(-)	0.00001	33
	Interest Coverage Ratio	19	4	12	3	(-)	0.00001	389
	Sales Growth	16	5	5	6	(-)	0.02622	16
Profitability	**Combined Profitability Measure**	**15**	**2**	**5**	**8**	**(-)**	**0.00001**	**82**
	Single Profitability Measure: Return on Assets	13	2	4	7	(-)	0.00001	41
	Single Profitability Measure: Return on Sales	2	0	1	1	(-)	0.00403	4

(The table is continued on the next page.)

TABLE 3 (Continued)

Summary of the results from the meta-analysis for selected independent variables

Form of Ownership and Liability	Firm is incorporated (has limited liability)	13	0	2	11	(-)	0.03495	48
Creditor Attributes								
Relationship Attributes	Duration of Firm-Bank Relationship	14	2	3	9	(+)	0.00895	11
	Number of Firm-Bank Relationships	7	3	1	3	(+)	0.00001	7
Contractual Attributes	Collateral Provided	6	2	2	2	(+)	0.00532	6
	Total Loan Amount	5	0	5	0	(-)	0.00001	88
Financial Statement Verification								
Audit Quality	Audited by Big 4/5/6 Company	9	1	5	3	(-)	0.00020	101
Audit Engagement	**Combined Measure: Audited Financial Statements**	**10**	**1**	**7**	**2**	**(-)**	**0.00001**	**155**
	Single Measure: Voluntary Financial Statement Audit	3	1	2	0	(-)	0.00687	5

TABLE 4

Robustness Checks without working papers or U.S.-based studies

			(1) w/o working papers		**(2) w/o U.S.-based papers**	
		N (w/o WP / w/o U.S.)	Stouffer weighted test		Stouffer weighted test	
Attributes	Independent Variables		Sign	Sig.	Sign	Sig.
Borrower Attributes						
Firm Fundamentals	Combined Size Measure	31/30	(-)	0.00001	(-)	0.00001
	Potential for Collateral	13/16	(-)	0.00001	(-)	0.00056
	Age	13/15	(-)	0.00001	(-)	0.00009
Leverage and Distress	Debt to Assets	26/22	(-)	0.00001	(-)	0.00001
	Negative Book Value of Equity	7/7	(+)	0.00001	(+)	0.00001
Repayment Ability	Cashflow from Operations	5/5	(-)	0.29051	(-)	0.27133
	Combined Liquidity Measure	10/11	(-)	0.00001	(-)	0.00006
	Interest Coverage Ratio	15/16	(-)	0.00067	(-)	0.00001
	Sales Growth	12/11	(-)	0.25848	(-)	0.02622
Profitability	Combined Profitability Measure	10/12	(-)	0.00001	(-)	0.00001
Form of Ownership and Liability	Firm is incorporated (limited liability)	13/7	(-)	0.03491	(-)	0.03495
Creditor Attributes						
Relationship Attributes	Duration of Firm-Bank Relationship	14/9	(+)	0.00895	(+)	0.00895
	Number of Firm-Bank Relationships	6/6	(+)	0.00001	(+)	0.00001
Contractual Attributes	Collateral Provided	6/3	(+)	0.00532	(+)	0.00532
	Total Loan Amount	5/2	(-)	0.00001	(-)	0.00001
Financial Statement Verification						
Audit Quality	Audited by Big 4/5/6 Company	6/9	(-)	0.00001	(-)	0.00020
Audit Engagement	Combined Measure: Audited Financial Statements	7/6	(-)	0.00001	(-)	0.00001

TABLE 5

Robustness Check: Summary of the results from the unweighted meta-analysis for selected independent variables

		N	**# of significant results**			**Stouffer weighted test**		**Fail-Safe-N at $p = 0.05$**
Attributes	Independent Variables		Pos.	Neg.	Insign.	Sign	Sig.	
Borrower Attributes								
Firm Fundamentals	Combined Size Measure	36	2	24	10	(-)	0.00001	2.848
	Single Size Measure: Assets	30	1	21	8	(-)	0.00001	2.411
	Single Size Measure: Sales	6	1	3	2	(-)	0.00393	12
	Potential for Collateral	18	3	12	3	(-)	0.00001	327
	Age	16	3	5	8	(-)	0.00025	38
Leverage and Distress	Debt to Assets	31	10	9	12	(-)	0.86029	-
	Negative Book Value of Equity	9	7	1	1	(+)	0.00001	132
Repayment Ability	Cashflow from Operations	6	2	1	3	(-)	0.68327	-
	Combined Liquidity Measure	13	3	8	2	(-)	0.00001	207
	Single Liquidity Measure: Current Ratio	10	3	6	1	(-)	0.00001	68
	Single Liquidity Measure: Quick Ratio	3	0	2	1	(-)	0.00001	33
	Interest Coverage Ratio	19	4	12	3	(-)	0.00001	389
	Sales Growth	16	5	5	6	(-)	0.95455	-
Profitability	Combined Profitability Measure	15	2	5	8	(-)	0.00001	82
	Single Profitability Measure: Return on Assets	13	2	4	7	(-)	0.00080	41
	Single Profitability Measure: Return on Sales	2	0	1	1	(-)	0.00403	4
Form of Ownership and Liability	Firm is incorporated (has limited liability)	13	0	2	11	(-)	0.00035	48

(The table is continued on the next page.)

TABLE 5 (Continued)

Robustness Check: Summary of the results from the unweighted meta-analysis for selected independent variables

Creditor Attributes								
Relationship Attributes	Duration of Firm-Bank Relationship	14	2	3	9	(+)	0.42661	-
	Number of Firm-Bank Relationships	7	3	1	3	(+)	0.01991	7
Contractual Attributes	Collateral Provided	6	2	2	2	(+)	0.01954	6
	Total Loan Amount	5	0	5	0	(-)	0.00001	88
Financial Statement Verification								
Audit Quality	Audited by Big 4/5/6 Company	9	1	5	3	(-)	0.00001	101
Audit Engagement	**Combined Measure: Audited Financial Statements**	10	1	7	2	(-)	0.00001	155

TABLE 6
Robustness Check with a focus on papers building on average cost of debt

Attributes	Independent Variables	N	# of significant results			Stouffer weighted test		Fail-Safe-N at $p = 0.05$
			Pos.	Neg.	Insign.	Sign	Sig.	
Borrower Attributes								
Firm Fundamentals	Combined Size Measure	21	1	14	6	(-)	0.00001	920
	Potential for Collateral	15	3	10	2	(-)	0.00016	213
	Age	9	3	3	3	(-)	0.00020	2
Leverage and Distress	Debt to Assets	15	6	9	0	(-)	0.00001	59
	Negative Book Value of Equity	6	5	1	0	(+)	0.00001	80
Repayment Ability	Cashflow from Operations	3	2	1	0	(-)	0.16820	-
	Combined Liquidity Measure	9	3	6	0	(-)	0.00005	62
	Interest Coverage Ratio	13	3	9	1	(-)	0.00001	251
	Sales Growth	11	5	3	3	(-)	0.01485	25
Profitability	Combined Profitability Measure	9	2	3	4	(-)	0.00001	20
Form of Ownership and Liability	Firm is incorporated (has limited liability)	3	0	1	2	(-)	0.02149	3
Creditor Attributes								
Relationship Attributes	Duration of Firm-Bank Relationship	2	1	0	1	(+)	0.00153	3
	Number of Firm-Bank Relationships	2	2	0	0	(+)	0.00001	18
Financial Statement Verification								
Audit Quality	Audited by Big 4/5/6 Company	6	1	5	0	(-)	0.00002	120
Form of Ownership and Liability	Firm is incorporated (has limited liability)	13	0	2	11	(-)	0.00035	48