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Earnings quality and the cost of debt of German non-listed firms and the impact of leverage

Master Thesis

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Abstract

In this study, the relationship between earnings quality of German non-listed firms and the cost of debt is examined. A sample of 6,821 non-listed firms between the period 2013 and 2015 is used. The relationship between earnings quality and the cost of debt is examined by using OLS regressions. The examination shows that the earnings quality of non-listed firms is negatively related to those firms' effective interest cost. The results in this study are consistent with the idea that earnings are important for lenders to better predict default risk and the repaying capacity of a loan. Next, this study finds that leverage has a negative association with earnings quality and the cost of debt. Finally, through moderation- and mediation analyses, this study finds that leverage does not have a moderating effect on the relationship between earnings quality and the cost of debt, but has a mediating (indirectly) effect.

Key words: Cost of debt, Financial reporting quality, Earnings quality, Leverage, Information asymmetry, Non-listed firm, Moderation, Mediation.

Contents

1. Introduction

In general, both listed firms and non-listed firms search for access to external capital with an acceptable cost (Ding, Liu, & Wu, 2016). Many firms- and lenders decisions are made based on accounting information. The quality of accounting information has an effect on the true extent of the cost of debt (Saffari & Ghasemi, 2016). The extensive literature on debt contracting argue that properties of firms' accounting information, such as accruals quality, disclosure, audit and other earnings properties can exacerbate or reduce the agency cost of debt, thereby impact debt pricing (Armstrong, Guay, & Weber, 2010; Shivakumar, 2013).

Non-listed firms (firms that are not traded on public stock exchanges) play an important role in stimulating employment opportunities and contributing to economic growth worldwide, in both emerging economies and developed markets (Ding et al., 2016). Berzins, Bøhren, and Rydland (2008) agree that non-listed firms have a relative contribution. They show that non-listed firms have about four times more employees, three times higher revenues and twice the amount of assets than listed firms. Furthermore, in most countries, more than 99% are non-listed firms, who borrow over a half of their capital from banks (Berzins et al., 2008; Nagar, Petroni, & Wolfenzon, 2011; Pacter, 2009).

Given the lack of access to the public capital market, the capital structure of non-listed firms comprises a combination of private non listed equity and/or debt market. The availability of private non-listed equity is often limited to non-listed firms that mainly depend on certain industries, geographies, or firm lifecycle stages (Hope & Vyas, 2017). In addition, non-listed firms, in general, have larger managerial ownership. This suggests that debt financing is likely to be more important in non-listed firms than listed firms (Berger & Udell, 1998; Ding et al., 2016).

Firms have to publish a set of annual financial statements to inform their stakeholders. The accounting information plays an important role in firms decisions, but also in credit decisions by lenders. Lenders predict the repaying capacity of a firm by information from financial reports. The repaying capacity refers to the borrowers' ability to repay term debt on time. High-quality financial information can reduce wrong firms- and lenders decisions and could be able to alleviate the agency conflict between lenders and borrowers, arising from information asymmetry (Jensen & Meckling, 1976). Firm owners have unlimited upward potential with regard to returns, while debt holders have fixed claims based on contractual agreements. As a result, lenders tend to focus on the future cash flows of borrowers to ensure fixed payments of interest (Ding et al., 2016). In comparison to listed firms, non-listed firms disclose less non-accounting information. Ball, Robin, and Sadka (2008) show that financial reporting information is more important for debt holders than for equity holders. The reason is that debt holders of non-listed firms have fewer information channels about borrowers' financial information than lenders of listed firms. (e.g., analysts,

institutional investors, credit rating agencies, and media). This suggests that the quality of financial report information is important for debt holders, especially for non-listed firms. As a result of high-quality financial report information, lenders can better predict the repaying capacity of a firm, which reduces the default risk and firms' cost of debt. It is important for both non-listed firms and lenders that they can trust on the quality of financial reports.

Based on the accounting literature the financial report quality is measured in accruals quality (Bharath, Sunder, & Sunder, 2008; Dechow & Dichev, 2002; Francis, LaFond, Olsson, & Schipper, 2005; Francis, Olsson, & Schipper, 2008; McNichols, 2002). The accruals quality is an earnings quality metric. Earnings quality is the precision of the earnings signal from the firm's financial reporting system. Accruals provide information about future cash flows. The accruals will be more representative of future cash flows when the accruals process is free of estimation errors. Francis, Nanda, and Olsson (2008) show this measurement is a good proxy for overall reporting quality.

Bank loans are primary sources of external capital for non-listed firms (Berger & Udell, 1998). The empirical evidence on the association between financial reporting quality and non-listed firms' cost of debt and access to debt financing is scarce (Elemes, 2015). Prior studies have primarily focused on the financial reporting quality differences between listed- and non-listed firms, the relation between financial reporting quality and the cost of debt for listed firms, or the effect of auditing on firm's cost of debt and access to external financing (Ball et al., 2008; Ball & Shivakumar, 2005; Bharath et al., 2008; Givoly, Hayn, & Katz, 2010; Gray, Koh, & Tong, 2009; Hope, Thomas, & Vyas, 2013; Hope & Vyas, 2017; Minnis, 2011). However, only three current studies (Carmo, Moreira, & Miranda, 2016; Ding et al., 2016; Vander Bauwhede, De Meyere, & Van Cauwenberge, 2015) studied the impact of earnings quality on non-listed firms' cost of debt. They found that earnings quality is negatively related to firms' cost of debt. The findings in these current papers are consistent with the idea that earnings are important for lenders in predicting the repaying capacity of a firm. Less estimation error in accruals reduce information risk and enhances earnings' ability to predict future cash flows and reduce the cost of debt. However, these researchers researched only the Belgian, Chinese and Portuguese non-listed firm setting.

Examining German firms is interesting because Germany is the largest economy in Europe and the fourth largest economy in the world (Germany Trade & Invest, 2018). Most of the German firms are non-listed firms (Germany Trade & Invest, 2018). Debt financing is crucial for such firms since bond and equity financing are limited or not available. Non-listed firms are likely to use a lot of debt financing, this is why it is relevant to investigate the relationship between earnings quality and the cost of debt. However, as far as known, no research (in both English and German literature) has been done in examining the relationship between earnings quality and the cost of debt

for non-listed German firms. This research reduces the gap in the literature about earnings quality of Germans non-listed firms.

The main question in this study is: “What is the impact of earnings quality of non-listed German firms that influence the cost of debt?". To answer this question, this study examines the relationship between earnings quality and the cost of debt, in a sample of German non-listed firms.

In addition, this study examines whether leverage has an indirect and/or direct effect on the relationship between earnings quality and non-listed firm’s cost of debt, by using moderation and mediation analysis. This is an interesting subject for further examination because of scarce evidence.

The data includes non-listed firms from Germany over the period from 2008 to 2016, the government, financial and utility sector are excluded. Firm-year observations with extreme increase or decrease in the total assets are excluded. Next, restrictions associated with the calculation of the cost of debt and accrual quality (AQ) variables and missing values for the control variables are excluded. The final sample includes 6,821 unique non-listed German firms in a total of 12,922 firm-year observations between 2013 and 2015.

The purpose of this study is to contribute to the literature by testing whether and to what extent firms’ earnings quality influences the cost of debt and whether leverage influences this relationship. The practical contribution is that this study helps managers in understanding how important the role of financial report quality is for lenders in predicting the repaying capacity and interest of a loan. It is expected that higher earnings quality (better financial information) leads to a lower cost of debt for firms. If this can be proven, firms could take their advantage by increasing their own earnings quality to reduce their cost of debt.

The remainder of this paper is structured as follow. The second section of this paper conducts a literature review, including theories and outcomes of previous studies. Based on the literature the hypotheses are formulated. Section three describes the methodology, in which the research model and its variables are defined. This section ends with discussing the data collection and sampling. Section four presents the results. The fifth and last section focuses on the conclusion and discussion of the results. Limitations of this research and suggestions for further research are also stated.

2. Literature review

This chapter reviews the literature about earnings quality, the cost of debt and leverage. In the first three paragraphs of this chapter earnings quality, cost of debt, leverage and the relations between these three subjects are described. In the fourth paragraph follows a part about information risk and agency cost, including a description of the role of financial information. Furthermore, empirical evidence of the impact of accrual quality on non-listed firms' cost of debt is described. Finally, this chapter ends with a hypothesis section.

2.1 Earnings quality

Accounting information plays an important role in firms decisions. Sarun (2016) argues that the cost of the capital can be affected by financial report information in three ways: (1) financial information should reduce estimation risk and thereby cost of capital, because it should provide useful information, both directly to managers and debt holders about investment opportunities; (2) financial information can be used as a direct input of corporate control mechanisms and can reduce cost of capital, and; (3) financial information can reduce information asymmetry among diverse debt holders which can reduce liquidity risk and thereby cost of capital. Consistent to the idea that financial reports are the most important output of the accounting system, Sarun (2016) and Francis et al. (2005) argue that the most significant accounting item prepared and presented in financial reports is the "earnings". Earnings are considered as a key factor in determining the dividend policy and serve as a guideline for investment and decision making. It is also a core measure of a firm's performance and an effective criterion in the stock pricing. Finally, it serves as an instrument for future predictions. To use earnings to predict the future, the quality of information is very important for managers and debt holders.

The concept of earnings quality is fundamental in accounting and financial economics. However, there is a difference in how to define and measure earnings quality. Earnings are a summary measure of firm performance produced under accounting accrual basis (Dechow, 1994) and are important sources of firm-specific information in the financial statements (Lev, 1989). The earnings are used in stakeholders' decisions, for example in debt contracting, equity valuation or executive compensation plans. In addition, the definition of earnings quality depends on the decision makers' objectives and on the role earnings play in the decision model (Dechow, Ge, & Schrand, 2010). In general, earnings quality is associated with characteristics like the magnitude of accruals, predictability, persistence, smoothness, value relevance and timeliness (Dechow et al., 2010; Dichev, Graham, Harvey, & Rajgopal, 2013).

According to Dechow et al. (2010) earnings quality provides information about the features of a firm's financial performance that are relevant to a specific decision made by a specific decision-maker. Dechow et al. (2010) and Dichev et al. (2013) divide the

earnings quality into three categories: (1) the reported earnings should reflect the current performance, (2) the reported earnings should be a good indicator of future performance and (3) it should a measure of the intrinsic value of the firm.

In prior studies, Dechow (1994) and Dechow, Kothari, and Watts (1998) find that earnings are a better measure of performance because it reflects more closely the expected cash flows and predicts better future operating cash flows than current cash flows. The reason for preferring earnings over current cash flows in predicting future cash flows is that accruals mitigate timing and mismatching problems in measuring cash flows over short time intervals (Dechow, 1994; Dechow et al., 1998).

Dechow and Dichev (2002) argue that accruals are based on assumptions and estimates. If the assumptions and estimates are wrong, it must be corrected in future accruals. For example, if actual receivables are less than the original estimate, then both the actual cash collected and the correction of the estimation error must be recorded. In addition, Healy and Wahlen (1999) report that managers can have incentives to manipulate earnings which results in less informative accruals. Thus, intentional, as well as unintentional errors, create noise in accruals which reduces the beneficial role of accruals (Dechow & Dichev, 2002).

The concept of measuring accruals focusses on providing information that is relevant and reliable for specific needs of decision makers. Information risk is in particular referred by Francis et al. (2005) as a non-diversifiable risk factor and to the likelihood that firm-specific information that is pertinent to investor pricing decisions is of poor quality. They recognized accruals quality as a measure of information risk, which is associated with accounting earnings and priced in both cost of debt and equity capital. Consistent with prior studies, this study used an accrual-based performance to measure earning quality.

2.2 Cost of debt

Firms search for access to external capital with an acceptable cost of capital. The costs paid to provide new capital funds are defined as the cost of capital (Leach & Melicher, 2014). Cost of capital includes two components; the cost of equity and the cost of debt. The cost of equity refers to the cost if a firm is financed through equity. The cost of debt is the interest rate the firm pays for borrowed funds (Leach & Melicher, 2014). This study focuses on the cost of debt because debt financing is a key source of finance for non-listed firms (Berger & Udell, 1998).

Lenders try to determine the cost of debt based on the creditworthiness. In general, the cost of debt tends to be higher for firms with lower creditworthiness, because these firms are considered riskier or more speculative. To determine the creditworthiness lenders needs information of the firm, like which entrepreneur they have to deal with, the repay capability of the loan, the amount of equity and collateral

(Ding et al., 2016). However, it could happen that firms provide incomplete or/and incorrect information. According to Jensen and Meckling (1976), management could incentive to act in their own interest, this influences the financial information quality, which increases information risk and agency cost. In addition, other factors could influence the cost of debt, for example firms size, age and the amount of cash flow. Larger, more maturity and more cash-generating firms are more diversified and are more likely to have established a respectable reputation, the expectation to go bankrupt is less than for smaller firms (Psillaki & Daskalakis, 2009). This results in a lower cost of debt. Also, leverage is a factor that could influence the cost of debt, since financial risk increases with leverage. Higher leverage firms expect to pay a higher average interest rate because leverage is positively associated with debt-related agency conflicts and financial risk. Next, the extent of tangible assets is important because tangible assets could be liquidated to repay outstanding debts in event of default (Minnis, 2011). In addition, Minnis (2011) studied the effect of voluntary external audits on the cost of debt. He finds that firms who volunteer their financial statements to external audits received a more attractive interest rate. A similar result, Bharath et al. (2008) reported that firms with more opaque financial statements face higher interest rates. Both studies used a sample of US non-listed firms. Auditing increases the quality of financial information, it helps to reduce agency conflicts and information asymmetry and, hence, helps to decrease the cost of debt. In general, cost of debt is influenced by many factors: creditworthiness; information quality; agency cost; size and age of the firms; the amount of cash flow, tangible assets and volunteering financial statements to external audits. In this study, a view of these influences will be examined, although the focus will be at the relationship with earnings quality and leverage.

2.2.1 Link between earnings quality and the cost of debt

Lenders price the firm's debt by reflecting the difficulties in ensuring the validity of the lending agreement. Lending agreements are mostly based on financial information. If the financial information is free of error, the lender can better predict the repaying capacity of a loan and assess the performance and financial position of the borrower. At any rate, the quality of financial information is very important to determine the cost of debt. Previous studies (Carmo et al., 2016; Ding et al., 2016; Vander Bauwhede et al., 2015) studied the impact of the quality of financial information on non-listed firms' cost of debt and used earnings quality to proxy for information quality. Consistent these studies, higher earnings quality will be more representative of future cash flows when the accruals are less influenced by estimation errors. This leads to advantages for lenders because higher earnings quality enables lenders to make a better, more accurate, assessment of default risk and hence reduce information asymmetry. These advantages lead to a lower cost of debt for firms.

2.3 Leverage

Firms can finance through equity or debt. Modigliani and Miller (1958) argued that, in a 'perfect' world, the choice between equity and debt is irrelevant. However, when tax and friction market are involved, the choice between debt or equity financing is relevant. Firms will increase their debt until the advantage of tax deducing of interest expenses balance, the disadvantage of friction market such as bankruptcy costs. Leverage refers to the amount of debt a firm uses to finance assets. When a firm is "highly leveraged," it means that the firm has more debt than equity.

Given the goal, whether leverage has an indirect and/or direct effect on the relationship between earnings quality and non-listed firm's cost of debt. This study is limited to the in-depth information only of leverage and earnings quality and leverage and the cost of debt.

2.3.1 Link between leverage and earnings quality

Debt holders have the incentives to continuously monitor firms throughout the maturity period because they can continually assess the creditworthiness of borrowers. To assess the creditworthiness, debt holders demand high information quality, especially earnings. When earnings predict future cash flows more accurately, debt holders have lower risk, because they can estimate solvency risk, liquidity risk and bankruptcy risk more precisely (Ghosh & Moon, 2010; Jensen, 1986). This means that firms in debt are forced to deliver high-quality information. In addition, firms also have incentives to supply high-quality information to reduce the cost of debt. Next to that, Jensen (1986) argues that contractual debt payments reduce free cash flows. Repaying debt results in a lower part in the total cash flows that a firm can manipulate. These arguments suggest that debt has a positive influence on earnings quality.

Debt can also have a negative influence on earnings quality because of agency conflicts between managers and debt holders. Debt holders use contracts with covenants, that are often based on accounting information like financial accounting ratios, to reduce expropriation of wealth by managers (Ghosh & Moon, 2010). Bond covenants are contractual arrangements that protect the lender and restrict the actions of the borrower. Debt holders are likely to impose stricter covenants when debt increases to mitigate agency conflicts. Managers have incentives to use accounting methods to manipulate their true situation. The reason is to avoid covenant violations when the costs of violating covenants are sufficiently large. In this case, managers are willing to forego lower borrowing costs from reporting high quality to avoid even costlier covenant violations (Dichev & Skinner, 2002). The likelihood that managers are incentivized to use manipulated methods increases with financial leverage. Prior researches provide evidence that leverage is associated with closeness to debt constraints on earnings, leverage and working capital (Ghosh & Moon, 2010).

Ghosh and Moon (2010) examine the relationship between debt and earnings quality. They find a dual role of debt that the interactions of the positive and negative influences of debt ultimately determines earnings quality. Firms with high debt are negatively associated with earnings quality. This is because of the negative influence dominates the positive influence. Although, firms continue to have incentives to report high-quality earnings to reduce the cost of debt. When debt is high, firms also have a high risk of violating covenants. As a result, firms with more debt are more prone to manage earnings to hide their true economic and financial condition to debt holders to avoid covenant violations. Thus, when the costs of violating covenants are sufficiently large, managers are willing to forego lower borrowing costs from reporting high quality to avoid even costlier covenant violations.

In contrast, firms with less debt are expected to have fewer debt covenants which reduce the risk of a covenant breach. Therefore, managers are less likely to manipulate and report low-quality earnings, when the risk of breaching a covenant is low or non-existent. Next to that, firms with less debt have incentives to increase earnings quality in order to provide debt holders with better information about future cash flows, reducing information risk and thereby reducing agency conflicts. Therefore, firms with less debt are positively associated with earnings quality because of the positive influence of debt outweighs the negative influence. So debt could have a positive and negative influence on debt earnings quality.

2.3.2 Link between leverage and the cost of debt

Since financial risk increases with leverage, a high degree of leverage increases the probability of bankruptcy. In the first place, the riskiness of the overall earnings stream increase when leverage increases. This is associated with bankruptcy. In addition, an excessive degree of leverage can reduce the total value of the firm. The risk of bankruptcy is not likely to be linear with debt. Baxter (1967) argues that when leverage is low, an increase in debt is not likely to exert a significant effect on the probability of bankruptcy. When there is considerable debt in the capital structure, leverage is likely to have a much greater effect on the cost of debt. The risk of bankruptcy becomes increasingly important as the degree of financial leverage increases (Baxter, 1967). Therefore, the cost of debt will rise only very slowly, when leverage is low. However, when there is considerable more debt in the capital structure, the cost of debt may begin to increase because the capital structure becomes riskier.

Secondly, leverage is positively associated with debt-related agency conflicts and financial risk. For example, owners with little equity have greater incentives to engage in asset substitution (Jensen & Meckling, 1976). As a result, lenders increase their expected returns, because there are more risks. At the same time, leverage could also have a negative association with the cost of debt because firms that borrow large amounts experience an advantage in attractive interest rates (Francis et al., 2005; Minnis, 2011; Vander Bauwhede et al., 2015). Overall, leverage has a positive impact

on the cost of debt, which means that the cost of debt increases when the degree of leverage increases.

2.3.3 The impact of leverage on the relationship between earnings quality and the cost of debt

There are theoretical links between leverage and the cost of debt and leverage and earnings quality. However, there is no clear theoretical evidence if leverage influences the relationship between earnings quality and the cost of debt. There is only one study that examined the impact of leverage on the relation between earnings quality and cost of debt. Carmo et al. (2016) find that the relationship does not change by debt level. They argue that the likelihood of incentives to manipulate earnings in order to hide the financial and economic situation, increase when firms leverage is higher. However, they argue that the earnings quality measurements will pick up hidden information. The arguments of Carmo et al. (2016) are only based on empirical evidence. On the one hand, it can be concluded that leverage could influence the relation between earnings quality and the cost of debt, because of the relationships of leverage on earnings quality and on the cost of debt. On the other hand, the study of Carmo et al. (2016) argues that there is no impact on the relationship between earnings quality and the cost of debt. Because of the scarce of evidence, it is an interesting subject for further examination that could be useful in this study.

2.4 Information risk and agency cost

In the section before, is mentioned that leverage could have an impact on the relationship between earnings quality and the cost of debt. Furthermore, there is also literature that describes the influence of information risk and agency cost on determining the cost of debt. It is mentioned before, that management could incentive to act in their own interest, which influences the financial information quality and this will increase information risk and agency cost (Jensen & Meckling, 1976). In contrast, Lin and Hwang (2010) mention that financial statements should reflect the true economic condition and operating results of the entity. The value of a firm is based on the current economic situation and operating results and the future valuation of the firm. This means that the value of a firm is partly determined by the reported financial statements. However, the fact that a firm’s value is partly determined by its financial statements creates incentives for management to manipulate the financial statements. Aldamen and Duncan (2013); Easley and O'Hara (2004); Lambert, Leuz, and Verrecchia (2007, 2011) argue that owners and/or managers have better inside information than debt holders. The presence of information risk leads to a disadvantage for lenders. As a result, lenders demand a higher return on the investment to cover the information risk, which leads to increased interest costs. Lambert et al. (2007) argue that information risk reflects the precision of information. They suggest that the quality of accounting information directly impacts the ability to assess future cash flows and indirectly impacts the firm's real decisions. According to Carmo et al. (2016), information risk represents the

likelihood that firm-specific information is not available (asymmetric information) or is of poor quality (inaccurate information). This can lead to debt holders not lending, lending at higher interest rates or requiring the provision of guarantees. The presence of information risk leads to poor information quality. So, information risk is important because of its influence on the quality of financial information and probably also indirect to the cost of debt.

The information risk could increase when owners and managers act to maximize the firm's value and/or manager's personal wealth instead of the actual situation. Which increases agency conflict between managers and debt holders (Jensen & Meckling, 1976; Matsumoto, 2002).

Managers and debt holder anticipate each other. According to Fama and Miller (1972); Jensen and Meckling (1976) and Myers (1977), three central ideas emerge from the agency-theory. In the first place, managers have incentives to take actions in their own interests to the disadvantage of debt holders. In anticipation of this behavior, debt holders will protect their claims by increasing their expected returns. As a result, managers react to the increases and are willing to make monitoring and bonding costs to restrict their ability to engage.

Expanding on these ideas, Armstrong et al. (2010) and Smith and Warner (1979) mention four major sources of conflict which arise between debt holders and equity holders. The first agency conflict is a conflict of interest between these two stakeholders over dividends and adding additional shares. Debt holders are afraid that equity holders could increase their dividend payments or add additional shares, followed by a reduction of available resources to pay off debt holders' claims. As a result, the claims are worthless. The second source of conflict is related to debt levels. When a firm increases its debt level, it reduces the probability that the firm will repay a loan. The third conflict is asset substitution. Firms often have incentives to shift their asset mix toward riskier investments. As a result, the wealth transfers from debt holders to equity holders. The fourth source of conflict is related to the net present value (NPV) projects. Firms with risky debt may forgo positive (NPV) projects if a part or the whole amount of the value of the project goes toward the debt holders. These different conflicts ensure that information asymmetry arises between debt holders and equity holders.

2.5 Role of financial information

Financial information plays an important role in reducing information asymmetries and agency conflicts between equity holders and debt holders. Armstrong et al. (2010) and Shivakumar (2013) emphasize that debt contracts with containing covenants most of the time are used in case of debt financing. These covenants are often based on accounting information. These can restrict firms to increase dividend payments or the issuance of additional debt. In addition, lenders can prevent borrowers from shifting risk by using security agreements to collateralize the firm's assets. This limits firms' capital expenditure and asset sale because, in case of default of repaying the debt, the collateral assets are required to be sold and used to pay the firm's debt. However, it is more difficult to design debt contracts based on accounting information that will force firms to commit to invests in all positive NPV projects or to maintain a given risk profile when exercising future growth options. Therefore, lenders use price protection through interest rates or reduction in the debt's maturity, to reduce the costs that arise from underinvestment.

However, even in the absence of debt covenants, financial information plays a role in credit decisions, since banks assess the firms' default risk based on financial information, in particular on earnings. The earnings quality is seen as a feature that enables lenders to predict better firms' future earnings and cash flows. As result, lenders assess more accurately firms' default risk. The lenders value the earnings quality so high that it is reflecting the cost of the debt because higher earnings quality is expected to reduce lenders' information risk (Carmo et al., 2016). Same as for default risk, information risk can lead to different decisions: not to lend, lend at higher interest rates or require the provision of guarantees. Consistent with the importance of financial information in credit decisions, Bharath et al. (2008) find that borrowers with more opaque financial statements face higher interest rates. A similar result is found by Minnis (2011), who studied a sample of US non-listed firms and pointed out that firms who volunteer their financial statements by audit are likely to get more attractive interest rates.

2.6 Empirical evidence

Literature is consulted, to get a general impression of empirical evidence about the impact earnings quality has on the cost of debt and the impact of leverage on the cost of debt and leverage. Firstly, the literature provides mixed predictions on the demand for high earnings quality of listed- and non-listed firms. Hope et al. (2013) explored the demand for high financial reporting quality between listed- and non-listed firms in the US. They argue that because listed firms have greater ownership dispersion, greater owner-manager separation, and less managerial ownership on average than non-listed firms, the demand for high-quality information is greater for listed firms. These ownership characteristics create more information asymmetry, while non-listed firms have mostly only a few stakeholders, such as inside managers and debt holders. Thus, managers have incentives to provide highly reliable financial reporting quality of listed

firms. However, Ball et al. (2008) and Ding et al. (2016) disagree because debt holders of non-listed firms, in general, have fewer information channels about firms financial information than listed firms stakeholders (e.g., analysts, credit rating agencies, media, institutional investors). They concluded that financial reporting quality is more important for non-listed firms. In addition, Givoly et al. (2010) suggest that listed firms are subject to capital market pressures which increase their incentives to manipulate accruals to meet earnings targets. Resulting in a decrease in financial reporting quality of public firms. So, there are mixed arguments in on the level of financial reporting quality of listed- and non-listed firms. However, even when the level of financial reporting quality of non-listed firms is lower than listed firms, it does not mean that the level of financial reporting quality is poor. Financial reporting quality could also be important for non-listed firms in determining the cost of debt.

Previous studies show that non-listed firms with earnings quality enjoy a lower cost of debt. Carmo et al. (2016); Vander Bauwhede et al. (2015) and Ding et al. (2016) examined the relationship between earnings quality and non-listed firms' cost of debt, respectively Portuguese, Belgium and Chinese non-listed firms. They found that better earnings quality increases non-listed firms' access to debt financing and lowers their cost of debt. Ding et al. (2016) note that these effects are greater in under-developed provinces. Regarding the relationship between leverage and earnings quality and leverage and the cost of debt. Ghosh and Moon (2010) examine the relationship between debt and earnings quality and find a dual role of debt. They find that when leverage is low the impact of leverage is positively related to earnings quality and when leverage is relatively high, leverage has a negative influence on earnings quality. The literature reports that leverage is positively is related to the cost of debt because a high degree of leverage increases the probability of bankruptcy. Although, empirical studies (Carmo et al., 2016; Ding et al., 2016; Francis, Nanda, et al., 2008; Minnis, 2011; Vander Bauwhede et al., 2015), find overall negative coefficients of leverage.

So far three studies examined the relationship of the relation between earnings quality and cost of debt and only one study, (Carmo et al., 2016), examined the impact of leverage on the relation between earnings quality and cost of debt. They find that the relationship does not change by the debt level.

2.7 Hypotheses development

In pursuit of answering the research question, a few hypotheses are developed based on the theory and evidence of prior results in examining the relationship between earnings quality and the cost of debt. Financial information plays an important role in reducing information risk and agency conflicts between borrows and lenders (Armstrong et al., 2010; Shivakumar, 2013). In addition, Ball et al. (2008); Carmo et al. (2016) and Minnis (2011) suggest that improved quality and transparency of financial information alleviates information risk, which leads to reduced limitations in access to external financing. Financial reporting quality represents firms' information quality,

the higher the information quality, the lower the information asymmetry between lenders and borrowers. Both listed and non-listed studies (e.g. Ball & Shivakumar, 2005; Carmo et al., 2016; Ding et al., 2016; Gray et al., 2009; Hope et al., 2013; Hope & Vyas, 2017; Minnis, 2011; Vander Bauwhede et al., 2015) report that firms with high earnings quality enjoy lower cost of debt. Suppose the financial information quality is reflected in interest rates, firms with earnings quality would have a lower cost of debt. Therefore the following hypothesis is proposed:

H1: Earnings quality has a negative impact on non-listed firm's cost of debt.

In general, firms with lower creditworthiness tend to have a higher the cost of debt, because they are riskier or speculative which increases the financial risk. Since financial risk increases with leverage, higher leverage firms expect to pay a higher average interest rate (Jensen & Meckling, 1976). However, results of empirical studies give also negative relations between leverage and the cost of debt encountered (Carmo et al., 2016; Ding et al., 2016; Francis, Nanda, et al., 2008; Minnis, 2011; Vander Bauwhede et al., 2015). This could explain that firms that borrow large amounts experience more attractive interest rates. In this study, it is expected that leverage is positively related to the cost of debt. Therefore the following hypothesis is proposed:

H2: Leverage has a positive impact on non-listed firm's cost of debt.

Debt could have a positive and negative influence on earnings quality. In the first place, debt can have a negative influence on earnings quality because of agency conflicts between managers and debt holders, which results in the incentives to manipulate their earnings, trying to avoid covenant violations. In the second place, debt can have a positive influence on earnings quality because firms with less debt are expected to have fewer debt covenants which reduce the risk that managers manipulate their earnings to avoid covenant violations. Next to that, firms with less debt have incentives to increase earnings quality in order to provide debt holders with better information about future cash flows, reducing information risk and thereby reducing agency conflicts. Accordingly, it is hypothesized that earnings quality first increases and then declines with increasing debt levels. Because there is no guiding theory, the data will be used as evidence in order to see when the negative influence of debt outweighs the positive influence.

H3: Leverage is non-linear related to non-listed firm's earnings quality.

The literature review argues that there are theoretical links between leverage and the cost of debt and leverage and earnings quality. However, there is no clear theoretical link that leverage has an influence on the relationship between earnings quality and the cost of debt. In only one study, Carmo et al. (2016), examined the influences of

leverage on the relationship between earnings quality and the cost of debt, but their arguments are based on empirical evidence and not theoretically substantiated. Based on the mediation and moderation model of Baron and Kenny (1986), the relations between different variables will be investigated and causal relations among variables will lead to the outcome. The models will support answering the second research question "Has leverage an indirect or direct effect on the relationship between earnings quality and non-listed firm's cost of debt?". It is expected that leverage has an indirect and/or direct effect on the relationship between earnings quality and non-listed firm's cost of debt. Therefore the following hypotheses are proposed:

H4: Leverage moderates the relationship between earnings quality and non-listed firm's cost of debt.

H5: Leverage mediates the relationship between earnings quality and non-listed firm's cost of debt.

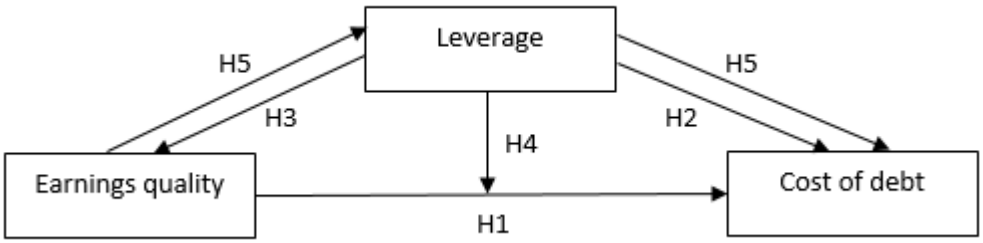

Figure 1: Conceptual model with associated hypotheses.

3. Methodology

This chapter focuses on the methodological part of this research. It starts with a discussion of the dependent, independent and control variables and the way to measure these variables. An overview of the definitions of the variables in the research model can be found in Table 1. This part ends with discussing the data collection and sampling.

3.1 Research Model

The multiple regression model is widely used in financial studies. With this method, it is possible to determine the relationship between a dependent metric variable and two or more independent metric variables. Also if there are variables that are non-metric, it is possible to use it in the multiple regression. Non-metric variables must be changed in dummy variables, with a value of 1 if it meets the requirement and 0 if it does not meet the requirement. The value of each dependent variable is related to the independent variable based on a positive or negative parameter, predicted by the regression (Hair, Black, Babin, & Anderson, 2009).

In this study, the univariate statistics (descriptive statistics) are analyzed by looking at the mean, median, standard deviation, quartiles, minimum and maximum, before testing the hypotheses. This provides an overview of the variables and will help to discover any potential problems or missing data. Next, the bivariate statistics are analyzed which includes pair-wise correlation coefficients of the dependent and independent variables to determine positive or negative relationships. To test whether the quality of German non-listed firm earnings are related to the cost of debt, an Ordinary Least Squares (OLS) regression is conducted. This is in line with previous studies (e.g., Carmo et al., 2016; Ding et al., 2016; Francis et al., 2005; Gray et al., 2009; Minnis, 2011; Vander Bauwhede et al., 2015), that also used an OLS regression model, for testing the relationship between earnings quality and the cost of debt. The dependent variable in this research is the cost of debt and the independent variable is earnings quality (AQ). The model also includes a set of variables in order to control the effect of other determinants of the cost of debt. The regression model can be specified as follows, where *i* and *t* index firms and year, respectively.

$$\text{Cost of debt}_{i,t} = \beta_0 + \beta_1 * \text{AQ}_{i,t-1} + \beta_2 * \text{Leverage}_{i,t-1} + \beta_3 * \text{Size}_{i,t-1} + \beta_4 * \text{CF performance}_{i,t-1} + \beta_5 * \text{Age}_{i,t-1} + \beta_6 * \text{Interest coverage}_{i,t-1} + \beta_7 * \text{Asset tangibility}_{i,t-1} + \beta_8 * \text{Negative equity}_{i,t-1} + \beta_9 * \text{Growth}_{i,t-1} + \beta_{10} * \text{Maturity}_{i,t-1} + \beta_{11} * \text{Industry}_{i,t} + \beta_{12} * \text{Year}_{i,t} + \varepsilon_{i,t} \quad (1)$$

To test whether leverage is related to the cost of debt, the same OLS regression as in equation (1) is used, the independent variable is now leverage. To test whether leverage is related to earnings quality, a new equation (2) is shown below.

$$AQ_{i,t-1} = \beta_0 + \beta_1 * Leverage^{H}_{i,t-1} + \beta_2 * Leverage^{L}_{i,t-1} + \beta_3 * Cost\ of\ debt_{i,t} + \beta_4 * Size_{i,t-1} + \beta_5 * CF\ performance_{i,t-1} + \beta_6 * Age_{i,t-1} + \beta_7 * Asset\ tangibility_{i,t-1} + \beta_8 * Negative\ equity_{i,t-1} + \beta_9 * Growth_{i,t-1} + \beta_{10} * Industry_{i,t}\ \beta_{11} * Year_{i,t} + \varepsilon_{i,t} \quad (2)$$

To test the fourth and fifth hypotheses, moderation and mediation analyses are used. These analyses examine whether a third variable influences directly and/or indirectly the direction and strength of the relationship between the independent variable and the dependent variable. This study used regression analysis with an interaction term, to test the moderator hypothesis. The interaction term tests whether there is an interaction effect. The mediation analysis examines the process through which the independent variable exercises the impact on dependent variable through a mediating variable (mediator).

By including moderation and mediation in this study, it is possible to provide insight into how a third variable plays a role. The moderators provide information about the conditions under which effects are presented, while the mediators take the mechanisms with which an effect takes place. A more detailed overview is described in the next section.

3.2 Moderation and mediation analysis

In order to investigate whether a third variable influences a relation between two variables, Baron and Kenny (1986) designed mediation and moderation models. The goal of these models is to analyse and detect possible causal relations among variables, leading to the outcome. Moderator effects indicate whether the prediction of a dependent variable (Y), from an independent variable (predictor, X), differs across levels of a third variable (Z). This third variable is called a moderator (Baron & Kenny, 1986). Moderator variables affect the direction and/or strength of the relationship between a predictor and an outcome: enhancing, reducing, or changing the influence of the predictor (Fairchild & MacKinnon, 2009). Generally, moderator effects are indicated by the interaction of the predictor variable X and the moderator variable Z in explaining the dependent variable Y.

Figure 2 shows the three causal paths that feed into the outcome variable (Y): the impact of the independent variable (X, path a), the impact of the moderator (Z, path b) and the interaction of these two (X*Z, path c). Moderation effects are tested with multiple regression analysis, where the predictor variables (X and Z) and their interaction terms are centered in one model estimation (Baron & Kenny, 1986; Fairchild & MacKinnon, 2009). The following multiple regression equation is estimated:

$$Y = \beta_0 + \beta_1 * X + \beta_2 * Z + \beta_3 * XZ + \varepsilon_1 \quad (3)$$

where β_o is the intercept in the equation, β1 the coefficient relating the independent variable, X, to the outcome, β2 is the coefficient relating the moderator variable, Z, to the outcome, and ε_1 is the residual in the equation.

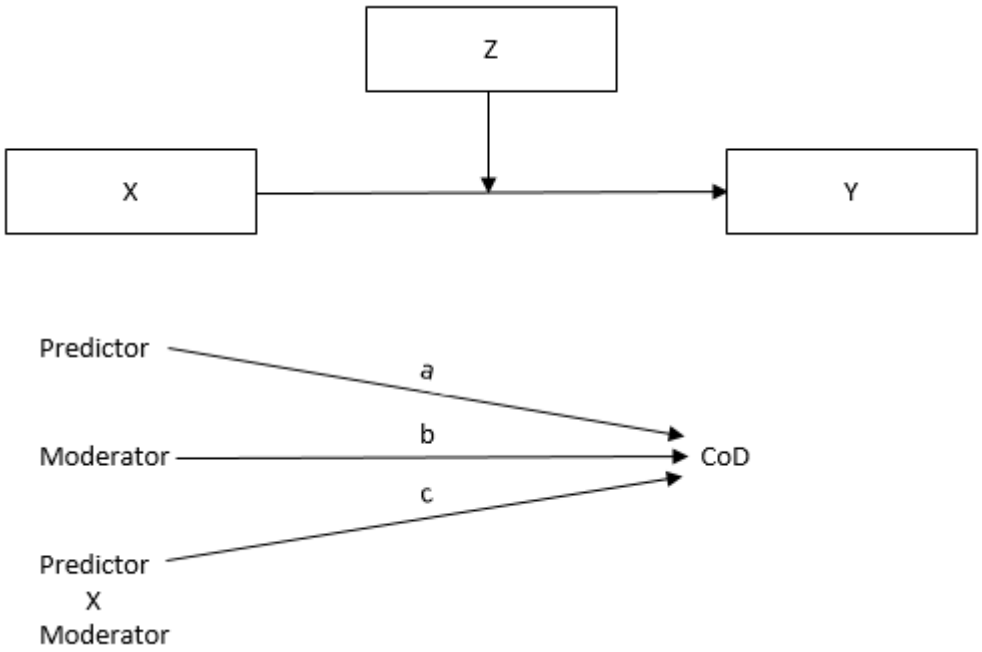

Figure 2: Detail overview form Baron and Kenny's (1986) moderator model.

The regression coefficient for the interaction term, β3, provides an estimate of the moderation effect. If β3 (the interaction, path c) is statistically different from zero, there is significant moderation of the X-Y relation in the data (Baron & Kenny, 1986; Fairchild & MacKinnon, 2009). However, there are no conditions whether the coefficient β1 (path a) and β2 (path b) must be significant.

On the basis of figure 2, the model is specified for this study. This clarifies that the three causal paths that feed into the dependent variable (CoD) are caused by three variables: the impact of the independent variable (AQ, path a); the impact of the moderator (Lev, path b) and the interaction of these two (AQ*Lev, path c). The moderator hypothesis is supported if the interaction (path c) is significant (Baron & Kenny, 1986). The following multiple regression equation is estimated:

$$\text{Cost of debt}_{i,t} = \beta_o + \beta_1 * AQ_{i,t-1} + \beta_2 * \text{Leverage}_{i,t-1} + \beta_3 *(AQ_{i,t-1} * \text{Leverage}_{i,t-1}) + \beta * (\text{control variables}_{i,t-1}) + \varepsilon_1 \quad (4)$$

Mediation analysis is a process through which an independent variable (X) affects a dependent variable (Y) through a third variable considered a mediator (M). A mediator is expected to transmit the effect of an independent variable to a dependent variable. A mediating effect is often used to indicate if there is an indirect effect because this variable influences the effect of the independent variable on the dependent variable through the mediator. Mediation analysis goes beyond the description of the impact

of the independent variable upon the dependent variable (MacKinnon, Coxe, & Baraldi, 2012). Figure 3 shows a detailed overview of Baron and Kenny's (1986) mediation model. The direct effect of X on Y is shown by "c", whereas the indirect effect through the mediating M can be calculated by the product of "a" and "b" paths as "c' ". Baron and Kenny (1986) used a strategy to test mediation effects. They used four steps to check if the mediation met the following conditions:

1. A significant relationship must be found between the variables X and Y (path c). This condition is verified using a regression analysis of Y over X:

$$Y = \beta_0 + \beta c * X + \varepsilon_1 \qquad (5)$$

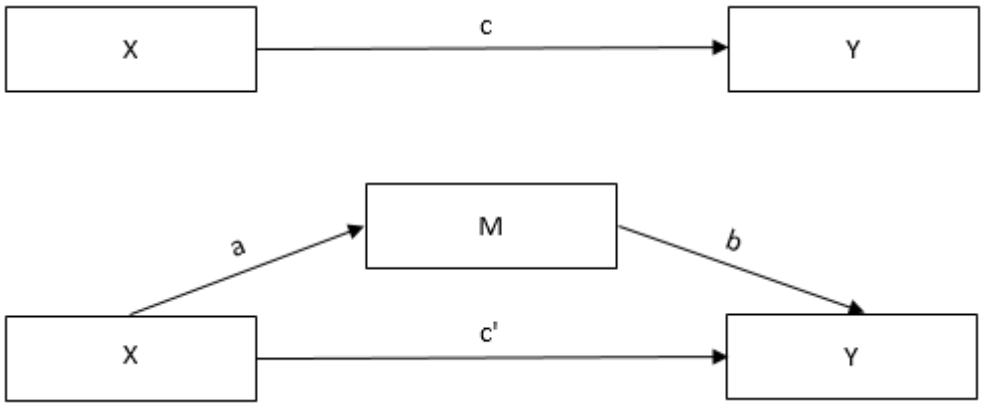

Figure 3: Detail overview form Baron and Kenny's (1986) mediation model.

where β_0 is the constant term, βc is the regression coefficient that relates X to Y and ε is the random error (the part of Y that is not explained by X).

2. A significant relationship must be found between the variables X and M (path a). This condition is verified using a regression analysis of M over X:

$$M = \beta_0 + \beta a * X + \varepsilon_2 \qquad (6)$$

3. A significant relationship must be found between the variable M and Y (path b) This condition is verified using a regression analysis of Y over X and M:

$$Y = \beta_0 + \beta c' * X + \beta b * M + \varepsilon_3 \qquad (7)$$

4. If the previous conditions are met, the relationship between the X and Y must be reduced or disappear when the mediator is added. In the first case, there is partial mediation and in the second case, there is full mediation.

Note that it is important to report the statistical test of the relation of X to Y. However, according to MacKinnon et al. (2012), it is not required that c is significant to explain if mediation exists. When there is not a statistically significant relation of X to Y, a test of mediation may be more important because testing c' gives a more precise

explanation of how X affects Y. The Sobel test is an example of a reliable mediation test. This Sobel test measures whether the effect of M differs significantly from zero via the mediator.

To test the final hypothesis, a mediation analysis is used. In case of this study, the effects of earnings quality (AQ) on firm's cost of debt (CoD) are decomposed into direct and indirect effects. The direct effect of AQ on CoD is shown by c, whereas the indirect effect through the mediating variable (leverage, Lev) can be calculated by the product of the paths a and b as c'. The three conditions for mediation must be met (Baron & Kenny, 1986). A significant correlation must be found between the independent and dependent variable (path c). Next, a significant correlation must be found between the independent variable and the mediating variable (path a). In addition, a significant correlation must be found between the mediating variable and the dependent variable (path b). To test if the conditions are met, the following regressions are used:

$$\text{Cost of debt}_{i,t} = \beta_0 + \beta_1 * AQ_{i,t-1} + \beta * (\text{control variables}_{i,t-1}) + \varepsilon_1 \quad (8)$$

$$\text{Leverage}_{i,t-2} = \beta_0 + \beta_1 * AQ_{i,t-1} + \beta * (\text{control variables}_{i,t-1}) + \varepsilon_2 \quad (9)$$

$$\text{Cost of debt}_{i,t} = \beta_0 + \beta_1 * AQ_{i,t-1} + \beta_2 * \text{Leverage}_{i,t-1} + \beta * (\text{control variables}_{i,t-1}) + \varepsilon_3 \quad (10)$$

To control the endogeneity problem in equation (9) leverage will be two years lagged in the regression since this is the most pronounced way to deal with the endogeneity problem. Another way to control for endogeneity is by using a two stage least squares regression (2SLS).

3.3 Variables definitions

3.3.1 Dependent variable

The dependent variable in this study is the cost of debt. Since information on the interest rates charged on bank loans is not available, the measurement of the cost of debt is measured as follows: interest expense in year t divided by the average interest-bearing debt outstanding during years t and t-1. According to Carmo et al. (2016); Ding et al. (2016); Francis et al. (2005); Gray et al. (2009), this ratio is a good proxy for the cost of debt. Francis et al. (2005) noted that this measurement is prone to outliers. This study follows prior studies by Gray et al. (2009); Minnis (2011); Vander Bauwhede et al. (2015) that winsorized the cost of debt at the 5th and 95th percentiles because of the prone to outliers in the variable.

An alternative measurement to calculate the cost of debt could be by splitting the interest-bearing debt into long-term debts and loans. However, the rates of interest expense that belong to long-term debts or loans are unknown.

3.3.2 Independent variable

In fact, there are two independent variables. The most important is AQ. Next to AQ, leverage is the other independent variable to test hypotheses 2 and 3. Firstly, AQ is explained in detail, including the research method. Then the independent variable leverage is briefly explained.

3.3.2.1 Accrual quality

The independent variable is AQ. The approach to measuring the precision of financial statement information is based on the accruals model. The accruals are split into two components: normal (or non-discretionary) accruals and abnormal (or discretionary) accruals. Normal accruals are meant to capture adjustments that reflect the firm's fundamental performance, while the abnormal accruals capture estimation error (Carmo et al., 2016; Dechow et al., 2010). The model by Jones (1991), defines the accrual process (working capital accruals and depreciation) as a function of sales growth and PPE (property, plant and equipment). The sales growth and investment in PPE represent the drivers of firm value. The estimation of the Jones model confirms a correlation between these fundamental firm attributes and accruals. However, the explanatory power of the Jones model is low (Dechow et al., 2010). Dechow, Sloan, and Sweeney (1995) modified the Jones model to exclude growth in credit sales. This modification increases the power of the Jones model because credit sales are frequently manipulated (Dechow et al., 2010). However, the modified Jones model still suffers misclassification errors in the representation of fundamental performance (Dechow et al., 2010). According to Kothari, Leone, and Wasley (2005), it is crucial to control the impact of performance on accruals. They design a model that matches firm-year observation with the same industry and year with the closest ROA (return of assets). However, this approach is likely to add noise to the measure of discretionary accruals, which can reduce the explanatory power. For example, firm A and B have a ROA of 15%, but firm A uses discretionary accruals to boost its ROA by 2% to report 15%. Firm B has achieved 15% ROA without manipulating earnings. Matching firm A to B is incorrect because the correct match should be a firm with a ROA of 13%.

Dechow and Dichev (2002) noted that matching accruals to cash flows is primary importance. The advantage of this model is that the measure focuses on the strength of the relationship between current accruals and past, present, and future cash flows. The model recognizes that matching the timing of firm's economic results often differ from the timing of the related cash flows (Gray et al., 2009). McNichols (2002) modified the Dechow and Dichev model and added the change in revenue and the level of PPE in the model. McNichols (2002) argued that the change in sales and PPE is important in determining current accruals. She shows that adding these variables to the Dechow and Dichev model, the explanatory power significantly increases and reduces measurement error. Thus, the modified Dechow and Dichev model is used in this study. The model recognizes the timing of firm's cash flows and has a high

explanatory power compared to the other models. In addition, Francis et al. (2008) argued this measurement to be a good proxy for overall earnings quality.

The accruals quality is measured in two steps. The first step is following the equation (11) that estimates the residuals, which form the basis for the accruals quality. This step is necessary to calculate the residual of this regression that reflects the accruals that are not related to cash flows realized in the current, prior or future year, nor to the change in net sales and the gross value of property, plant and equipment. The larger the absolute value of the residual, the greater the accrual estimation errors.

$$TCA_{i,t} = \alpha_0 + \alpha_1 * CFO_{i,t} + \alpha_2 * CFO_{i,t-1} + \alpha_3 * CFO_{i,t+1} + \alpha_4 * \Delta REV_{i,t} + \alpha_5 * GPPE_{i,t} + \varepsilon_{i,t} \quad (11)$$

where TCA i,t = ($\Delta CA_{i,t}$ - $\Delta CL_{i,t}$ - $\Delta Cash_{i,t}$ + $\Delta STDEBT_{i,t}$) is firm i's total current accruals in year t, $\Delta CA_{i,t}$ is firm i's change in current assets between year t - 1 and year t, $\Delta CL_{i,t}$ is firm i's change in current liabilities between year t - 1 and year t, $\Delta Cash_{i,t}$ is firm i's change in cash between year t - 1 and year t, $\Delta STDEBT_{i,t}$ firm i's change in debt in current liabilities between year t - 1 and year t; CFO t, CFO t-1 and CFO t+1 are the cash flows from operations in year t, t - 1, and t + 1, respectively; $\Delta REV_{i,t}$ the change in total revenue and GPPE i,t, the gross property, plant, and equipment. All the variables are standardized by average total assets of year t, and winsorized, at the 1st and 99th percentiles each year to mitigate the impact of outliers (Francis et al., 2008).

In the second step, the AQ measures are computed as the standard deviation of the residuals for a firm in any given year. The standard deviation of its residuals (ε) from the equation (11) is computed over five years from years t-4 to t. The standard deviations of residuals are preferred instead of the absolute values of the residual. Francis et al. (2005) argue that when a firm has consistently large residuals each year, the standard deviation of those residuals will be small. The firm has a relatively good accruals quality because there is little uncertainty about its accruals. In addition, the sizeable residuals could be firm- or industry-specific. This method limits the information risk. This study follows prior studies (Francis et al., 2005; Vander Bauwhede et al., 2015) to measure the standard deviations of residuals using four preceding years. The use of more than 4 preceding years is not recommended because of the limited data in this study. The value of a greater standard deviation is considered to reflect lower AQ because the high uncertainty about its accruals over the years lead to bad AQ. The measured AQ from the model must be multiplied with -1 to verify the assumption that the higher AQ numbers signal higher AQ. So, the closer the AQ number to 0 the higher the AQ.

3.3.2.2 Leverage

For testing hypothesis 2 and 3, the independent variable is leverage. The measurement of leverage is as follows: total interest bearing debt divided by total assets. Leverage^{H} is above the median and Leverage^{L} is below the median of leverage.

3.3.3 Control variables

Prior studies (e.g., Carmo et al., 2016; Ding et al., 2016; Francis et al., 2005; Gray et al., 2009; Minnis, 2011; Vander Bauwhede et al., 2015), that have examined the relationship between quality of non-listed firm earnings and the cost of debt include firm-level control variables. In this study, the control variables are firm size, cash flow (CF) performance, firm age, leverage, interest coverage, asset tangibility, negative equity, firm growth, maturity and industry dummies.

Larger firms in general bear less financial risk. Larger firms are more diversified and are more likely to have established a respectable reputation, the expectation to go bankrupt is less than for smaller firms (Psillaki & Daskalakis, 2009). However, larger firms are likely to face more significant agency conflicts and have a greater need for monitoring (Jensen & Meckling, 1976), which increases the cost of debt. So, the prediction coefficient of size could be positive or negative. Size is measured as the natural logarithm of total assets.

Cash flow is expected to be negative to the cost of debt. More cash-generating firms have enough financial materials to maintain the firm, which makes them bear less financial risk. CF performance is computed as the cash flow from operations divided by total assets.

Just like larger and more cash-generating firms, more matured firms bear in general less financial risk. Mature firms have longer standing relationships with their banks and are more likely to have established a respectable reputation, the expectation to go bankrupt is less for younger firms (Psillaki & Daskalakis, 2009). However, Howorth and Moro (2012) reported a negative relationship between firm age and interest cost. They proved that more mature firms do not benefit from the advantage of a lower interest rate because the reduction is not transferred to small businesses because of monopoly relationships or the interest rate increases with the length of the relationship. So, predicting the coefficient of firm age to the cost of debt is mixed. Firm age is defined as the natural logarithm of the number of years a firm has been in business.

Higher leverage firms are expected to pay a higher average interest rate because leverage is positively associated with debt-related agency conflicts and financial risk. For example, owners with little equity have greater incentives to engage in asset substitution (Jensen & Meckling, 1976). However, firms that borrow large amounts experience an advantage in attractive interest rates (Francis et al., 2005; Minnis, 2011;

Vander Bauwhede et al., 2015). The measurement of leverage is as follows: total interest bearing debt divided by total assets.

Higher values of interest coverage and asset tangibility indicate less financial risk (Vander Bauwhede et al., 2015). The extent of tangible assets is important because tangible assets could be liquidated to repay outstanding debts in event of default (Minnis, 2011). The expectation is that both variables have a negative coefficient. The measurement of interest coverage is calculated as follows: earnings before interest and depreciation and amortization (EBITDA) divided by interest expense. Asset tangibility is calculated as the net value of property, plant and equipment divided by total assets.

According to Minnis (2011), the unique characteristics of firms with negative equity positions must be taken into account. A negative equity position indicates negative past performance. As a result, the firm is assessed riskier. The effect of negative equity expects a positive influence on the cost of debt. Negative equity is measured using a dummy variable which equals 1 if the book value of equity is negative, 0 otherwise.

A rapid growth is associated with more agency problems and risk. Through growth opportunities firms take more risks in their investments (Minnis, 2011; Myers, 1977; Vander Bauwhede et al., 2015). Furthermore, firms with more stable future cash flows are more likely to predict capital requirements than firms with growth potential (Psillaki & Daskalakis, 2009). Growth is expected to have a positive effect on the cost of debt. Growth is measured as the year-over-year percentage growth in sales.

Further, based on prior studies (Bharath et al., 2008; Dennis, Nandy, & Sharpe, 2000; Vander Bauwhede et al., 2015), the model includes a measurement of debt maturity. Debt maturity is included for two reasons. First, to control potential interdependencies between the interest rate and maturity (Dennis et al., 2000). Second, to control the prior finding that in the case of private debt (compared to public debt), financial information quality not only impacts debt pricing but also debt maturity (Bharath et al., 2008). There is no prediction relationship between the cost of debt and debt maturity, because of conflicting theories on debt maturity. The calculation of debt maturity is calculated as the debt longer than 1 year divided by total debt.

The final control variables are industry and year dummy, it is included to control industry and year effect. The industry dummies are based on the sections of the Primary NACE Rev. 2 codes. Just as in previous studies (Minnis, 2011; Vander Bauwhede et al., 2015), the independent variable and all control variables, except for firm age, are winsorized at the 1st and 99th percentile, to mitigate the impact of outliers.

Table 1: Variable definitions

Variables	Measurement
Cost of debt	Interest expense $_{t}$ / average interest-bearing debt outstanding during $_{t-1}$ and $_{t}$ (long term debt and current liabilities)
Size	Ln [Total assets $_{t-1}$]
CF performance	Cash flow from operations $_{t-1}$ / total assets $_{t-1}$
Age	Ln [1 + (year observation - year incorporation) $_{t-1}$] The natural logarithm of the number of years a firm has been in business.
Leverage	Total interest bearing debt $_{t-1\ (t-2)}$ / total assets $_{t-1\ (t-2)}$
Interest coverage	EBITDA $_{t-1}$ / Interest expense $_{t-1}$
Asset tangibility	Net property, plant and equipment $_{t-1}$ / total assets $_{t-1}$
Negative equity	Dummy variable taking 1 if book value of equity is negative and 0 otherwise
Growth	Year-over-year percentage growth in sales (Sales $_{t}$ - Sales $_{t-1}$) / Sales $_{t-1}$
Maturity	Debt with maturity of more than 1 year $_{t-1}$ / debt $_{t-1}$
Industry dummies	Dummy variables taking 1 if the observation belongs to the industry coded, 0 otherwise
Year dummies	Dummy variables taking 1 if the observation belongs to the year coded, 0 otherwise
DLev	Dummy variables taking 1 if the leverage is above the median of the sample, 0 otherwise

Notes: This study used one year lagged and/or two years lagged to control endogeneity problems.

3.4 Data collection and sampling

The sample includes 15,849 non-listed firms from Germany over the period from 2008 to 2016. The financial data is gathered from the Orbis database[1]. Table 2, panel A, shows the details of the sample selection process. First, all firm-year data is collected in the industry classification (NACE REV.2) between 01 to 59 over the period 2008-2016. The sample drops from 142,641 to 126,360 firm-year observations through by excluding the government, financial and utility sector. Further, firm-year observations are excluded whenever total assets increase or decrease with a factor of two or more. For example, a firm-year observation is excluded when the total assets increase by more than 100% or decrease by more than 50% compared to the previous year. The reason behind this is to exclude the influence of restructuring activities (Vander Bauwhede et al., 2015). At this point, the sample counts 90,025 firm-year observations. After calculating the cost of debt and AQ, the sample drops to 13,224 firm-year observations. This drop is mainly due to the fact that the calculation of AQ entails severe data demands, i.e., data over multiple years on non-cash working capital, cash flow from operations, net sales, and gross property, plant and equipment and/or observation without debt. Furthermore, the drop is also due to the fact that the five-year standard deviation and the leads and the lags to calculate the company-specific AQ can only be determined for firm-year observations within the 2013–2015 period. Finally, those observations with missing values of the control variables in the cost of debt regressions were excluded. The sample selection leads to a final sample of 6,821 unique non-listed German firms in a total of 12,922 firm-year observations.

[1] The database Orbis is provided by Bureau van Dijk (BvD), one of the largest providers of business data that contains financial data of more than 200 million companies around the world.

Table 2 panel B and C shows a breakdown of the industry classification groups. The majority of the observations are on firms operating in the retailing and manufacturing industries.

Table 2: Sample selection

Panel A: Firm-Year Selection	
	Observations
Firm-year observations collected in the industry classification (NACE REV.2) between 01 to 59 over the period 2008-2016.	142,641
After excluding industries for the government, financial and utility sector	126,360
After excluding firm-year observations whenever total assets increase or decrease with a factor of two or more.	90,025
Observations after imposing the restrictions associated with the calculation of the cost of debt and AQ variables	13,224
After excluding observations those with missing values for the control variables	12,922

Panel B: By industry (NACE REV.2)			
	N firms	N observations	% observations
Agriculture, forestry and fishing (AFF industry)	38	74	0.6%
Mining and quarrying	34	58	0.4%
Manufacture	3,303	6,102	47.2%
Construction	428	780	6.0%
Retailing	2,402	4,698	36.4%
Transportation and storage (Transport)	543	1,071	8.3%
Accommodation and food service activities (Services)	73	139	1.1%
Total	6,821	12,922	100%

Panel C: By year	
	N observations
2013	5,073
2014	5,325
2015	2,527
Total	12,922

4. Results

This section discusses the results of this study, containing descriptive statistics, correlation matrix, the results of the different regressions and robustness tests.

4.1. Descriptive statistics

Table 3 provides the descriptive statistics of all variables. These include the mean, standard deviation, minimum, 25th, median 75th percentiles, maximum and the number of observations. This univariate analysis helps to discover any potential problems or missing data. The data is compared with other studies that examine the relationship between earnings quality and the cost of debt with the same measure of the variables. The mean of the variable cost of debt is about 2.9%, which means that in the sample of this study a firm pays on average 2.9% interest on a loan. This result is very similar compared to the Chinese non-listed firms of 3.1% (Ding et al., 2016). However, compared to the values reported by Carmo et al. (2016) and Vander Bauwhede et al. (2015) (11.1% and 9.6%, respectively), the values are lower. The mean (median) of the AQ in this study is -0.106 (-0.083). The value is lower than the values of the non-listed firms in the studies of Carmo et al. (2016) and Vander Bauwhede et al. (2015) that reported -0.03, (-0.02) and -0.045, (-0.037), respectively. Since higher absolute values indicate lower AQ, the AQ of German non-listed firms is low. The AQ of German non-listed firms is also lower compared to prior studies on American and Australian listed firms (Francis et al., 2005; Gray et al., 2009), 0.044 (0.031) and 0.081 (0.037), respectively.

Table 3: Descriptive statistics

Descriptive statistics on key variables for the sample of firm-years from 2013-2015. N is the number of firm-year observations, and 25th and 75th are the percentiles. All variables are defined in Table 1.

	Mean	Std.Dev	Min.	25th	Median	75th	Max.	N
Cost of debt	0.029	0.027	0.000	0.009	0.022	0.038	0.106	12922
AQ	-0.106	0.083	-0.366	-0.142	-0.083	-0.048	-0.011	12922
Leverage	0.494	0.249	0.037	0.293	0.493	0.693	1.028	12922
Size	10.536	1.275	8.259	9.598	10.436	11.272	14.280	12922
CF performance	0.121	0.107	-0.213	0.059	0.111	0.176	0.468	12922
Age	3.471	0.750	0.693	2.944	3.367	4.007	5.352	12922
Interest coverage	166.144	615.0	-41.017	3.910	9.899	30.366	4459.8	12922
Assets tangibility	0.251	0.217	0.000	0.070	0.201	0.378	0.909	12922
Negative equity	0.026	0.159	0.000	0.000	0.000	0.000	1.000	12922
Growth	0.028	0.150	-0.419	-0.037	0.020	0.080	0.701	12922
Maturity	0.183	0.242	0.000	0.000	0.048	0.320	0.907	12922

This is consistent with the finding of Ball and Shivakumar (2005) and Hope et al. (2013) that non-listed firms typically have lower earnings quality. The reported mean (median) of the leverage in this study is 0.49 (0.49), which means that in this sample a firm has 0.49 Euros of debt compared to one euro of total assets. Around the half of firms, financial structure is financed by debt, this demonstrates the importance of lenders and creditors in the financial structure of the firms analyzed. The reported mean (median) of leverage in this study is a bit higher compared to the study of Vander Bauwhede et al. (2015) which reported 0.27 (0.22). However, compared to the study of Carmo et al. (2016), it is lower because this reported 0.68 (0.70). The maximum value in this study is 1.028. This can be explained by the fact that the firm has negative equity resulting in a leverage higher than 1. Most control variables are very similar compared to the previous studies.

The first control variable used in this study is total assets, to measure the size of the firms in the sample. The mean asset size is € 157.000 and the median is € 34.000, this suggests that the variable is highly skewed. Just like prior studies, the natural logarithm of total assets was used during this study. The mean (median) of the natural logarithm of total assets is 10.54 (10.44), which is slightly higher than the values reported by Carmo et al. (2016) and Vander Bauwhede et al. (2015) 8.8% (8.6%) and 9.2% (9.3%) respectively. This difference could be explained because the sample of Vander Bauwhede et al. (2015) consists only SME non-listed firms and Germany is, in general, a greater economic country than Belgium and Portugal are. The minimum and maximum for firm age are respectively one year and 210 year. For instance, E. Michaelis & Co. (GmbH & Co.) KG is founded in 210 years ago and there are also firms that have just been established. The value of the control variable interest coverage is different than in previous studies. The mean (median) of interest coverage is 166.0 (9.9), which is very high compared to the values reported by Carmo et al. (2016) and Vander Bauwhede et al. (2015) 15.6 (3.2) and 4.6 (3.0) respectively. In all of the studies, there is a high skewness. However, the interest coverage in this study is very high. This may indicate that the sample of this study has a lower interest expense or higher EBITA than the previous studies. The proportion of long-term debt in total debt in this study is 0.18 compared to 0.63 of the sample of Vander Bauwhede et al. (2015). This indicates that the firms in this study have a considerably less long-term debt to satisfy their financial needs than the firms do in the study of Vander Bauwhede et al. (2015).

To sketch a first picture of the relationship between the cost of debt and AQ. The mean cost of debt is compared across the AQ quintiles (Francis et al., 2005; Vander Bauwhede et al., 2015). Table 4 shows the mean cost of debt for each quintile of the ranked AQ distribution. The 20% observations with the best AQ (Q5) have on average a 0.11% lower cost of debt compared to the 20% observations with the worst AQ (Q1).

Table 4: Link between AQ and cost of debt

Quintile	Average cost of debt	N
Q5	0.0283	2584
Q4	0.0295	2585
Q3	0.0282	2584
Q2	0.0289	2585
Q1	0.0294	2584
Q5-Q1	-0.0011	12922
T statistic	-1.389	
Prob > T	0.165	

* Statistically significant at the 10% level
** Statistically significant at the 5% level
*** Statistically significant at the 1% level

The difference between Q5 and Q1 is not statistically significant. Also, the differences between the other groups are tested. Only the difference between Q4 to Q3 and between Q3 to Q1 are slightly statistically significant at the 10% level. The results of this bivariate analysis do not fit with the expectation that the cost of debt decreases as a function of AQ. However, no conclusions can be drawn based on only these results. It is important to extend this bivariate analysis with other factors that impact the cost of debt (Francis et al., 2005).

Table 5 provides the pairwise correlation coefficients between all variables. The correlation between the cost of debt and AQ is -0.002, which is consistent with the expectation that the cost of debt decreases in AQ. However, the relationship is not significant, which is consistent with the result of Table 4, that confirms a doubtful conclusion that the cost of debt decreases linearly in AQ. The positive coefficient between the cost of debt and size (0.164 significant positive correlation) may indicate that larger firms do not benefit from longer-standing relationships but face more agency conflicts. The negative coefficients between the cost of debt and CF performance (-0.051 significant negative correlation) indicate that firms with more cash-generating ability have a lower interest cost. The negative coefficients between the cost of debt and leverage (-0.326 significant negative correlation) indicate that firms that are more leveraged face lower interest costs. A positive correlation is found between the cost of debt and assets tangibility (0.078 significant positive correlation), which indicates that when there are more tangible assets the cost of debt will be increased. This is surprising because tangible assets could be liquidated to repay outstanding debts in event of default. So there is more certainty that a lender receives the money back in event of default that a borrower, but the interest increases when the asset tangibility increases.

Table 5: Correlation matrix

The table provides the pairwise Pearson correlation coefficients between all variables. **, and * indicates a significance at 1% and 5% respectively. All variables are defined in Table 1.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Cost of debt	1										
(2)	AQ	-0.002	1									
(3)	Size	0.164**	0.124**	1								
(4)	CF performance	-0.051**	0.061**	-0.109**	1							
(5)	Age	0.129**	0.138**	0.167**	-0.020*	1						
(6)	Leverage	-0.326**	-0.093**	-0.187**	-0.105**	-0.140**	1					
(7)	Interest coverage	-0.249**	0.050**	-0.158**	0.210**	-0.133**	0.032**	1				
(8)	Assets tangibility	0.078**	0.186**	0.104**	0.086**	0.081**	-0.003	-0.154**	1			
(9)	Negative equity	0.049**	-0.145**	-0.066**	-0.157**	-0.089**	0.245**	-0.037**	-0.024*	1		
(10)	Growth	-0.035**	-0.025**	0.007	-0.030**	-0.023**	0.007	0.000	-0.001	-0.010	1	
(11)	Maturity	0.137**	0.088**	0.126**	-0.048**	0.097**	0.087**	-0.173**	0.468**	0.038**	0.018**	1

The pairwise correlation coefficients also indicate that there are significant correlations between many independent variables (variables 2 – 11), which may indicate the presence of multicollinearity between independent variables. Although, the highest value is 0.47 for the correlation between maturity and assets tangibility, these are under the recommended limit: 0.50 (Vatcheva, Lee, McCormick, & Rahbar, 2016). To ensure that there is no presence of multicollinearity. The multicollinearity is also tested by measuring the variance inflation factor of the independent variables. The highest VIF measure is 1.356 for asset tangibility and this confirms that all of the measurements are below the recommended maximum of 5 as proposed by Hair et al. (2009) and Vatcheva et al. (2016).

4.2 Regression results

Before running the regression in equation (1), a pooled OLS model with AQ*t* as the dependent variable and AQ*t*-1 as the independent variable is run. The purpose of running this regression is to take into account the stability of the test variable over time. The estimated coefficient on AQ*t*-1 can be considered as an indication for the stability in the firm-specific AQ measure. The tables in Appendix A1 and A2 shown the results of the regression and the Pearson correlation. The significant coefficient of 0.861 interprets that the AQ measure being subject to a substantial degree of persistence over time. The Pearson correlation between AQ*t* and AQ*t*-1 (0.872,p\0.01) confirms that the AQ of a company does not fluctuate considerable over time.

4.2.1 Relation leverage and AQ on the cost of debt

Table 6 presents the results of the OLS regressions for determining the relationships between the AQ and the cost of debt (hypothesis 1) and between leverage and the cost of debt (hypothesis 2) in the sample of German non-listed firms. The basic model reports the results from estimating a model in which only the control variables from equation (1) are included. In model 2, the basic model is extended with AQ in order to test the first hypothesis. In model 3, leverage is added to the basic model. The results represent the answer to the second hypothesis. In the full model, both AQ and leverage are added to the basic model.

Model 2 shows a negative coefficient between AQ and the cost of debt. However, the coefficient is not significant. This result does not fit with the expectation that the cost of debt decreases as a function of AQ. However, in the full model was also leverage included, AQ shows a negative significant coefficient. Since higher values for the AQ measure imply higher AQ, which means that the cost of debt is lower if AQ is higher. This result supports the hypothesis. The negative coefficient of -0.006 indicates that a one-standard deviation increase in AQ translates to a decrease in the cost of debt by 0.006%. The negative relationship between AQ and the cost of debt, reported by Carmo et al. (2016); Ding et al. (2016) and Vander Bauwhede et al. (2015), for Portuguese, Chinese and Belgium non-listed firms also counts for German non-listed firms. In addition, the explanatory power of the model in terms of R^2 slightly increases

when AQ is added in model 2 and in the full model. This confirms that AQ is able to explain some of the variations in the cost of debt for German non-listed firms. Note that the significance of AQ comes up when leverage is added to the model. That is why it is interesting to know what the relation of leverage is with AQ and the effect of leverage on the relationship between AQ and the cost of debt.

Table 6: Effect AQ and leverage on Cost of debt

Notes: This table presents the OLS regression results. Figures in parentheses represent the t-statistics. * Indicates significance at the 10% level; **Indicates significance at the 5% level; *** Indicates significance at the 1% level. All variables are defined in Table 1. The largest industry (Manufacture) serves as base case. The sample includes 12,922 firm-year observations between 2013 and 2015 of German non-listed firms.

	Exp sign	Basic Model			Full Model
		Model 1	Model 2	Model 3	Model 4
Constant		0.008***	0.008***	0.035***	0.034***
		(3.600)	(3.461)	(15.912)	(14.782)
AQ	-		-0.001		-0.006**
			(-0.284)		(-2.022)
Leverage	+			-0.034***	-0.034***
				(-36.358)	(-36.418)
Size		0.002***	0.002***	0.001***	0.001***
		(9.916)	(9.856)	(5.007)	(5.171)
CF performance		-0.000	-0.000	-0.007***	-0.006***
		(-0.217)	(-0.219)	(-3.141)	(-3.106)
Age		0.003***	0.003***	0.002***	0.002***
		(8.572)	(8.505)	(5.275)	(5.461)
Interest coverage		-0.000***	-0.000***	-0.000***	-0.000***
		(-20.498)	(-20.429)	(-21.345)	(-21.092)
Assets tangibility		-0.003***	-0.003***	-0.002	-0.002
		(-2.841)	(-2.820)	(-1.665)*	(-1.311)
Negative equity		0.009***	0.009***	0.020***	0.020***
		(6.551)	(6.516)	(14.715)	(14.427)
Growth		-0.006***	-0.006***	-0.006***	-0.006***
		(-4.365)	(-4.336)	(-4.312)	(-4.353)
Maturity		0.008***	0.008***	0.013***	0.013***
		(7.839)	(7.861)	(13.013)	(13.047)
Industry dummy		Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes
Observations		12922	12922	12922	12922
Adjusted R^2		0.380	0.381	0.473	0.474

Leverage has a significant negative value in model 3 and the full model, which depicts that it has a negative relationship with the cost of debt. The more leverage a firm has,

the lower the firm's interest rate. A coefficient of -0.034 depicts this negative relationship. The negative coefficient is against the hypothesis and expectation because, in general, firms with higher leverage are riskier. However, in all of the prior studies (Ding et al., 2016; Vander Bauwhede et al., 2015), also negative coefficients between the cost of debt and leverage are reported. An explanation for this is that firms that borrow large amounts experience an attractive interest rate.

For all of the four models, the coefficient between the cost of debt and size is positively significant. This may indicate that larger firms do not benefit from longer-standing relationships but are faced with more agency conflicts. The coefficient in the full model indicates that a one-standard deviation increase in firm size translates to an increase in the cost of debt by 0.001%. In prior studies, only negative coefficients are reported (Carmo et al., 2016; Vander Bauwhede et al., 2015).

The negative significant coefficients between the cost of debt and CF performance indicate that firms with more cash-generating ability have a lower interest rate. The coefficient in the full model indicates that a one-standard deviation increase in firm size translates to a decrease in the cost of debt by 0.006%. This result confirms the expected relationship that firms with more cash-generating ability, in general, bear less financial risk.

The coefficient between the cost of debt and age is 0.002 and significant. Although Vander Bauwhede et al. (2015) reported also a positive coefficient which was not significant. Although, Ding et al. (2016) and Hyytinen and Pajarinen (2007) reported both a negative significant coefficient. The mixed results are consistent with the inconclusive nature of the relationship lending theory and the theory that not only age determines relationship lending.

The regression analysis shows, with a -0.002, that the asset tangibility has a negative relation to the cost of debt. This negative relation indicates that a larger proportion of tangible assets implies a higher liquidation value of the firm (more collateral). This may lead to a lower interest rate. Although, the negative coefficient of asset tangibility confirms the theoretical prediction that the coefficient is not significant in the full model.

The positive significant coefficient on maturity indicates that firms with longer loan maturities are faced with a higher cost of debt. The positive coefficient on maturity confirms the agency theory. Vander Bauwhede et al. (2015) argue that, besides higher interest rates, shorter maturities and more collateral are alternative answers to explain information asymmetry problems. Both could lower the interest rates. The negative coefficient of interest coverage and positive coefficient of negative equity are both significant and as expected.

Growth shows a significant coefficient of -0.006 to the cost of debt, which indicates that firms with growth in sales that face lower costs. The negative coefficient contradicts the expectation that the relationship between the cost of debt and growth should be positive because rapid growth is associated with more agency problems and risk. In addition, firms with more stable future cash flows are more viable in capital requirements than firms with growth potential. Also in prior studies, Minnis (2011) and Vander Bauwhede et al. (2015) reported a positive coefficient. A reason why growth could lower the interest cost is that when a firm has a higher growth in sales than expected, it could repay the loan faster. As a result, the firm could have less risk which may lead to a lower interest rate.

4.2.2 Relation leverage on AQ

Table 7 shows the results of the linear regressions with AQ as the dependent variable and leverage as the independent variable. Model 1 only includes the control variables. In model 2, leverage is added and shows a significant coefficient of -0.022 to AQ, which indicates that earnings quality decreases with debt. This result is consistent with the results of Ghosh and Moon (2010). Next, in model 4 and 5 leverage, high and low are included. The coefficients of $Leverage^{H}$ -0.022 and $Leverage^{L}$ -0.027 are both significantly negative. The results are not consistent with the hypothesis that firms are non-linear to earnings quality.

4.2.3 Effect of leverage on the relationship between AQ and the cost of debt

Model 1 and 2 in Table 8 shows a positive and statistically significant coefficient for DLev, which means that more indebted firms bear a higher cost of debt. This positive coefficient was expected, but is against the reported result in Table 6 that shows a negative coefficient for leverage. However, Carmo et al. (2016) show also a conflicting result. The coefficient of the AQ variable is negative and statistically significant, as in the full model in Table 6. The coefficient of DLev*AQ is not statistically significant, which means that the level of firms' debt does not directly affect the relation between AQ and the cost of debt. This result is consistent with the result of the study of Carmo et al. (2016) that also finds no moderation effect of leverage on the relationship between earnings quality and the cost of debt. As result, the moderation hypothesis is rejected.

To test the mediation hypothesis, the four steps strategy from Baron and Kenny (1986) was used. In these steps different regressions are run. The results are shown in Table 6 and 8. Firstly, model 3 in Table 8 and model 2 in Table 6 show that there is no significant correlation between AQ and the cost of debt. So, the first condition that there must be a correlation between the variables X and Y (path c) is not met. Next, a significant correlation between AQ and leverage (path a) is be found. The results are shown in model 5 and 6 in Table 8. The results in model 4 in Table 6 and 3 in Table 8 show that there is a significant correlation between leverage and the cost of debt. It

can be concluded that no all of the conditions are fulfilled. This would mean that according to Baron and Kenny (1986) there is no meditation. However, according to MacKinnon et al. (2012), there does not have to be a significant relationship between the independent and the dependent variable. In that case, a Sobel test could be performed to test whether mediation takes place. The Sobel test analysed whether there was a significant indirect effect of leverage on the relationship between earnings quality and the cost of debt. Table 9 presents the results of the Sobel test and showed a significant indirect effect of leverage on the relationship between earnings quality and the cost of debt. The t-test statistics are 10.257 and 6.266, respectively, without and with control variables. The results support the mediation hypothesis and this means that leverage has a significant indirect effect on the relationship between earnings quality and the cost of debt.

Table 7: Effect leverage on AQ

Notes: This table presents the OLS regression results. Figures in parentheses represent the t-statistics. * Indicates significance at the 10% level; **Indicates significance at the 5% level; *** Indicates significance at the 1% level. All variables are defined in Table 1. The dependent variable is AQ.

	Exp sign	Model 1	Model 2	Model 3	Model 4	Model 5
Constant		-0.227***	-0.210***	-0.218***	-0.143***	-0.259***
		(-35.076)	(-30.427)	(-32.943)	(-11.940)	(-29.281)
Leverage	-		-0.022***			
			(-7.175)			
Dlev				-0.009***		
				(-6.366)		
$Leverage^{H}$	-				-0.022***	
					(-2.631)	
$Leverage^{L}$	+					-0.027***
						(-3.947)
Cost of debt		-0.041	-0.096***	-0.074***	-0.345***	-0.037
		(-1.581)	(-3.573)	(-2.818)	(-5.901)	(-1.264)
Size		0.006***	0.005***	0.006***	0.002*	0.010***
		(10.782)	(11.681)	(10.120)	(1.891)	(13.842)
CF performance		0.029***	0.024***	0.025***	0.063***	-0.025***
		(4.565)	(3.773)	(3.987)	(6.955)	(-2.989)
Age		0.011***	0.011***	0.011***	0.008***	0.013***
		(12.184)	(11.681)	(11.921)	(5.955)	(11.214)
Assets tangibility		0.065***	0.068***	0.067***	0.068***	0.079***
		(19.890)	(20.613)	(20.436)	(13.975)	(17.348)
Negative equity		-0.058***	-0.050***	-0.055***	-0.047***	-0.042***
		(-13.642)	(-11.429)	(-12.800)	(-8.921)	(-3.643)
Growth		-0.010**	-0.010**	-0.010**	-0.016**	-0.000
		(-2.303)	(-2.318)	(-2.279)	(-2.458)	(-0.031)
Industry dummy		Yes	Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes	Yes
Observations		12922	12922	12922	6461	6461
Adjusted R^2		0.296	0.302	0.301	0.305	0.345

Table 8: Effect Leverage on the relationship between AQ and Cost of debt

Notes: This table presents the OLS regression results. The independent variable in model 1 to 4 is the cost of debt. The independent variable in model 5 and 6 is Leverage. Figures in parentheses represent the t-statistics. * Indicates significance at the 10% level; **Indicates significance at the 5% level; *** Indicates significance at the 1% level. All variables are defined in Table 1.

	Exp sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant		0.037***	0.036***	0.029***	0.045***	0.466***	0.787***
		(15.918)	(15.382)	(72.099)	(80.399)	(127.772)	(39.928)
AQ	-	-0.005*	-0.009**	-0.001	-0.011**	-0.328***	-0.227***
		(-1.939)	(-2.248)	(-0.280)	(-3.967)	(-11.850)	(-8.951)
Leverage	+	-0.047***	-0.047***		-0.036***		
		(-27.946)	(-27.933)		(-36.340)		
DLev	+	0.007***	0.008***				
		(9.066)	(8.162)				
DLev*AQ	+		0.007				
			(-1.276)				
Cost of debt							-2.573***
							(-33.924)
Size		0.001***	0.001***				-0.022***
		(5.219)	(5.292)				(-14.187)
CF performance		-0.006***	-0.006***				-0.083***
		(-3.041)	(-3.099)				(-4.441)
Age		0.001***	0.001***				-0.023***
		(5.167)	(5.196)				(-8.834)
Interest coverage		-0.000***	-0.000***				-0.000***
		(-21.246)	(-21.282)				(-6.970)
Assets tangibility		-0.002	-0.002				0.055***
		(-1.470)	(-1.469)				(5.213)
Negative equity		0.022***	0.022***				0.292***
		(15.657)	(15.709)				(23.746)
Growth		-0.006***	-0.006***				-0.069***
		(-4.430)	(-4.410)				(-5.493)
Maturity		0.013***	0.013***				0.159***
		(13.255)	(13.296)				(17.571)
Industry dummy		Yes	Yes	No	No	No	Yes
Year dummy		Yes	Yes	No	No	No	Yes
Observations		12922	12922	12922	12922	12922	12922
Adjusted R^2		0.479	0.479	0.002	0.328	0.104	0.498

Table 9: Sobel Test

	Test statistic	Std. Error	*p*-value
Without control variables	10.257	0.001	0.000
With control variable	6.266	0.001	0.000

4.3 Robustness tests

The tables in Appendix A3 and A4 present the results of some additional tests to examine the robustness of the results of the method. The test deals with the use of outliers, the distribution of the sample observations over industries and the measurement of FRQ. The first five robustness tests are presented in the table in Appendix A3 and the last four robustness tests in Appendix A4.

The first test concerns the treatment of outliers. In the primary analyses, the outliers were winsorized, which is an alternative method to deal with outliers to truncate or trim the data, i.e., removing influential cases. Parallel with the primary analyses, the cost of debt is truncated at the 5th percentile and the 95th percentile. All the independent variables, except for age, are truncated at the 1st and the 99th percentiles. The results of the first test for the test variable in regression (1) reported in the model (1) are similar to those in Table 6. Although the statistically significant level of AQ decreases from a 5% level to a statistically significant 10% level.

The second test examines whether the results are not driven by the two dominant industries in the sample of this study. In model 2, regression (1) is estimated using a subsample, excluding firm-year observations from the manufacturing and retailing industries. The results reported in model 2 show similar results to those in Table 6. Although, the statistically significant level of AQ increases from a 5% level to a statistically significant 1% level and control variables size and age lose the statistically significance. The results of the robustness test confirm that the two dominant industries do not affect the results.

The third test examines the robustness of the results to the proxy of FRQ. The regressions in Table 6 were repeated with the absolute residuals of one year from equation (11) instead of using the standard deviation of five years residuals. According to Dechow and Dichev (2002), the absolute residuals can serve as an alternative AQ measure for the standard deviation of residuals. The regression in model 3 is run on a larger sample because the requirement to measure the standard deviation of residuals is no longer have to be met. The results are similar to those in Table 6. The only difference is that assets tangibility becomes statistically significant.

In the fourth test, the sample is split into two parts, the estimation sample and the validation sample. The estimation sample contains 70% of the total sample. The estimated model is applied to the data in the validation sample to predict the values of the dependent variable for the observations in the validation sample. The results in model 4 are very similar to the results in Table 6.

The test in model 5 examines whether the results are not driven by the two dominant years in the sample of this study. In model 5, regression (1) is estimated using a subsample, excluding firm-year observations from the year 2014 and 2015. The results

reported in model 2 show similar results to those in Table 6. Although, the statistically significant level of AQ decreases from a 5% level to a statistically significant 10% level and control variables size and CF Performance lose the statistically significance. The results of the robustness test confirm that the two dominant years do not affect the results.

To test the robustness of hypothesis two, the sample is divided into two groups, based on leverage. The group of low leveraged firms consists of firms that have a lower leverage than the median leverage and the group highly leveraged firms consists of firms that have a higher leverage than the median. The first two models in Appendix A4 show the results of this subsample analysis. For both groups, low and high leveraged firms, leverage has a negative and significant impact on the cost of debt. These results are in line with the results of Table 6 and not support the hypothesis that leverage is positively associated with non-listed firm's cost of debt.

Model 3 and 4 show the results of the robustness of size, where the sample is divided into two groups, based on size. The group smaller size consists of the firms that have a smaller size than the median of size and the group bigger size consists of the firms that have a bigger size than the median. For both groups, smaller and bigger size, AQ has a negative and significant impact on the cost of debt. These results are in line with the results of Table 6 and support the hypothesis that earnings quality is negatively associated with non-listed firm's cost of debt, regardless of the firms' size.

Model 5 and 6 show the results of the robustness if the amount of CF Performance influences the relationship between earnings quality and the cost of debt. The sample is divided into two groups, based on CF Performance. The group low CF consists of the firms that have lower CF than the median and the group high CF consists of the firms that have higher CF than the median. For the group with low CF Performance, AQ has a negative and significant impact on the cost of debt. However, the group of high CF Performance, AQ has not a significant impact on the cost of debt.

In the last robustness test, the sample is split into two groups, based on positive or negative equity. The first group only consists of firms with negative equity and the second group consists of firms with positive equity. For both groups, the AQ has a negative and significant impact on the cost of debt, which means, for both groups, that AQ is important, regardless of the equity being positive or negative.

5. Conclusion

Firms search for access to external capital with an acceptable cost. It has been shown that debt financing is a key source of finance for non-listed firms, because of the lack of access to the public capital market and the limited available private equity for non-listed firms. In reducing information risk and agency conflicts between borrowers and lenders, financial information plays an important role. Next to the fact that debt contracts are often based on accounting information, plays financial information a role in credit decisions, since banks assess the firms' default risk based on financial information. Based on the earnings quality, lenders predict firms' future earnings and cash flows. The main questions in this study are: "What is the impact of earnings quality of non-listed German firms that influence the cost of debt?" and "Whether leverage has an indirect and/or direct effect on the relationship between earnings quality and non-listed firm's cost of debt?".

In a sample of 12,922 firm-year observations between the period 2013 and 2015, this study examined the impact of earnings quality of non-listed German firms that influence the cost of debt. This study also examined whether the relationship between financial reporting quality and the cost of debt are influenced by firms' leverage. Using OLS regressions, the relationship between earnings quality and the cost of debt is examined. Next to that, mediation- and moderation analyses are done in answering whether leverage has a direct and/or an indirect effect on the relationship between earnings quality and the cost of debt.

This study supports that poorer earnings quality (AQ) is associated with higher effective interest costs, which support the first hypothesis that earnings quality has a negative impact on non-listed firm's cost of debt. The results in this study are consistent with the idea that earnings quality is important for lenders to better predict default risk and the capacity to repay a loan. The less estimation error in accruals enhance earnings' ability to better predict future cash flows. However, the significance of AQ comes up when leverage is added. In addition, it is found that more leverage firms have a lower cost of debt. This is against the expectation of hypothesis 2 which predicted that leverage has a positive impact on non-listed firm's cost of debt because firms with higher leverage are in general riskier. Next to that, this study supports hypothesis 3, because leverage has a negative association with earnings quality. However, the finding that firms with low leverage face lower earnings quality does not support that low leverage firms have a positive impact on non-listed firm's earnings quality. Finally, this study found, through moderation- and mediation analyses, that leverage does not have a moderated effect, although this was predicted in hypothesis 4. However, hypothesis 5 is supported because of the (indirect) mediated effect. The result supports the last hypothesis that leverage mediates the relationship between earnings quality and non-listed firm's cost of debt.

This study contributes to current literature and shows that German non-listed firms with higher AQ have lower interest costs and leverage has an indirect influence on that relationship. Furthermore, the study has a practical economic benefit to help managers to understand the important role of earnings quality. The findings deliver evidence that lower estimation error in accruals earnings reduces the information risk between SMEs and their lenders through higher quality financial reporting. Firm managers can learn that managing earnings has the potential advantage of decreasing the interest costs. Preparing high-quality, transparent financial statements might therefore be worthwhile. In addition, the findings are relevant for lenders, because they indicate that the financial reporting information is used to predict risk, repay capacity and required provision of guarantees. Higher quality of financial reporting information helps lenders predict better the risk of a loan. As result, the lenders have less risk because there is a smaller chance of miscalculations.

This study has several limitations. The first limitation is the measurement of the cost of debt. Although, this study uses a good proxy of the cost of debt, is the interest rate charged by banks could be a better proxy to capture the cost of debt. The second limitation is that the sample for AQ has significantly been reduced in size. This reduction is mainly due to the fact that the calculation of AQ entails severe data demands. Additional research could focus on younger firms or different types of firms. The third limitation is that this study only uses measurements of earnings quality based on abnormal accruals. In future research, it would be relevant to address other measures of earnings quality, as conservatism or persistence. Further, future studies may investigate the relationship between earnings quality and the cost of debt in family ownership. Ding et al. (2016) mention that family ownership is popular among non-listed firms and that family ownership leads firms to disclose different quality in accounting information. In addition, this study did not investigate whether cash flow performance influences the relationship between earnings quality and the cost of debt. Investigating this relationship is interesting because cash flow performance could have a negative (when cash flow performance are high) or a positive (when cash flow performance are low) effect on the cost of debt. Further studies could examine if this effect influences the relationship between earnings quality and the cost of debt.

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Appendix

Appendix A1: Robustness check

The table presents the results of the OLS robustness test, with AQ*t* as the dependent variable and AQ*t*-1 as the independent variable. ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

	Coefficient
Constant	-0.009***
	(-12.287)
AQ	0.861***
	(147.556)
Observations	6865
Average R^2	0.872
F statistic	21772.864
Prob > F	0.000

Appendix A2: Correlation

The table provides the pairwise Pearson correlation coefficients between AQ*t* and AQ*t*-1. **, and * indicates a significance at 1% and 5% respectively.

		(1)	(2)
(1)	AQ*t*	1	
(2)	AQ*t*-	0.872**	1

Appendix A3: Robustness check

The table presents the results of four different OLS robustness test. ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. All variables are defined in Appendix A1.

	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Constant	0.027***	0.025***	0.032***	0.033***	0.031***
	(12.652)	(5.265)	(30.232)	(12.156)	(12.156)
AQ	-0.005*	-0.027***	-0.002**	-0.009**	-0.0010*
	(-1.743)	(-4.365)	(-2.225)	(-2.551)	(-1.789)
Leverage	-0.015***	-0.029***	-0.026***	-0.035***	-0.031***
	(-16.969)	(-13.505)	(-59.575)	(-31.317)	(-16.355)
Size	0.000**	0.001*	0.001***	0.001***	0.000
	(2.068)	(1.846)	(9.054)	(4.278)	(1.305)
CF performance	-0.007***	-0.011***	-0.011***	-0.007***	-0.006
	(-3.407)	(-2.623)	(-11.805)	(-2.821)	(-1.391)
Age	0.001***	0.001	0.001***	0.002***	0.002**
	(5.469)	(0.781)	(9.780)	(5.169)	(2.436)
Interest coverage	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(-19.319)	(-8.084)	(-31.237)	(-17.513)	(-9.020)
Assets tangibility	0.000	0.000	0.004***	-0.001	-0.003
	(-0.093)	(0.064)	(8.228)	(-0.372)	(-1.259)
Negative equity	0.016***	0.018***	0.015***	0.021***	0.017***
	(9.677)	(6.342)	(24.266)	(12.532)	(6.087)
Growth	-0.004***	-0.007***	-0.003*	-0.006***	-0.006*
	(-2.731)	(-3.075)	(-4.847)	(-3.747)	(-1.777)
Maturity	0.018***	0.018***	0.017***	0.013***	0.013***
	(19.206)	(8.550)	(38.562)	(10.679)	(6.627)
Industry dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	No
Observations	10216	2122	49056	9096	2527
Average R^2	0.413	0.433	0.439	0.482	0.481

Notes: industry dummies—the largest industry (manufacture) serves as base case in model 1, 3 and 4. In model 2, the industry transportation and storage serves as base case.

Appendix A4: Robustness check

The table presents the results of four different OLS robustness test. ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. All variables are defined in Appendix A1.

	Model (1) Low levered	**Model (2)** High levered	**Model (3)** Small size	**Model (4)** Big size	**Model (5)** Low CF	**Model (6)** High CF	**Model (7)** Negative equity	**Model (8)** Positive equity
Constant	0.029***	0.026***	0.030***	0.036***	0.041***	0.026***	0.090***	0.034***
	(7.392)	(10.522)	(6.201)	(7.959)	(12.816)	(7.912)	(5.277)	(14.666)
AQ	-0.010*	-0.008***	-0.010**	-0.008*	-0.013***	0.000	-0.037***	-0.005*
	(-1.840)	(-3.349)	(-2.503)	(-1.892)	(-3.195)	(0.108)	(-2.798)	(-1.748)
Leverage	-0.070***	-0.018***	-0.030***	-0.039***	-0.039***	-0.029***	-0.084***	-0.033***
	(-24.601)	(-10.962)	(-24.540)	(-27.194)	(-29.703)	(-21.531)	(-12.617)	(-35.036)
Size	0.002***	-0.000	-0.000	0.001***	0.000**	0.001***	0.001	0.001***
	(6.547)	(-0.074)	(-0.107)	(3.348)	(2.039)	(5.474)	(1.156)	(4.920)
CF performance	-0.011***	-0.004*	-0.010***	-0.003	-0.002	-0.010***	-0.028***	-0.007***
	(-3.134)	(-1.850)	(-4.037)	(-0.922)	(0.376)	(-2.692)	(-2.595)	(-3.090)
Age	0.003***	0.000	0.002***	0.001***	0.001***	0.002***	0.000	0.002***
	(7.052)	(0.863)	(5.823)	(2.883)	(2.671)	(4.965)	(-0.193)	(5.371)
Interest coverage	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**	-0.000***	-0.000	-0.000***
	(-18.416)	(-14.479)	(-15.202)	(-15.438)	(-12.359)	(-17.247)	(-0.962)	(-21.248)
Assets tangibility	-0.009***	0.006***	0.003*	-0.004**	-0.000	-0.003**	-0.001	-0.001
	(-4.436)	(5.441)	(1.902)	(-2.371)	(-0.153)	(-1.998)	(-0.109)	(-1.028)
Negative equity	0.045***	0.012***	0.017***	0.025***	0.020***	0.022***		
	(9.375)	(11.071)	(10.612)	(9.908)	(12.538)	(7.791)		
Growth	-0.009***	-0.002	-0.005***	-0.006***	-0.006***	-0.005***	-0.005	-0.006***
	(-3.756)	(-1.512)	(-2.797)	(-2.950)	(-3.544)	(-2.426)	(-0.654)	(-4.194)
Maturity	0.007***	0.022***	0.013***	0.013***	0.014***	0.012***	0.027***	0.013***
	(4.111)	(23.882)	(9.061)	(9.519)	(4.836)	(8.034)	(5.452)	(12.153)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6461	6461	6461	6461	6461	6461	337	12585
Average R^2	0.439	0.550	0.489	0.433	0.456	0.497	0.683	0.468