

Do Bondholder Relations Efforts Pay Off for German Firms? An Empirical Approach

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Abstract

This study investigates the link between corporate disclosure and cost of debt on the German corporate bond market. With a large number of medium-sized bond issuers emerging over the last few years, transparency considerations have become increasingly important. Until now, there has been mainly anecdotal evidence among German bond issuers on whether an increase in disclosure is actually perceived by market participants and, consequently, reflected in lower yield spreads. In contrast to previous studies in this field, I use a very specific bondholder relations measure in addition to a conventional disclosure index. This enables me to examine the relationship between informational efforts directed at the bond market and disclosure that is primarily targeted at shareholders, as respects their influence on bond values. Using an exhaustive list of firm- and bond-related control variables, the multivariate findings confirm a strong negative relationship between disclosure and cost of debt, nearly irrespective of which ranking variable is used. Applying various alternative estimations, I find these results to be robust to potential endogeneity biases.

Zahlt sich Anleihekommunikation für deutsche Emittenten aus? Eine empirische Auswertung

Zusammenfassung

Diese Studie untersucht den Zusammenhang zwischen Unternehmenspublizität und Fremdkapitalkosten auf dem deutschen Markt für Unternehmensanleihen. Mit der steigenden Anzahl mittelständischer Anleiheemittenten wuchs in den

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letzten Jahren auch die Bedeutung von Transparenzüberlegungen in diesem Markt. Es unterliegt bis heute vor allem anekdotischer Evidenz, ob eine Verbesserung der Offenlegung von Marktteilnehmern wahrgenommen wird und sich folglich in geringeren Renditeaufschlägen niederschlägt. Ich verwende neben einem herkömmlichen Ranking-Index für Transparenz, wie sie von Aktienanalysten wahrgenommen wird, vor allem ein auf die Informationsbedürfnisse von Anleihegläubigern abzielendes Maß der Offenlegung über die Unternehmenswebseiten. Auf diese Weise kann ich die Beziehung zwischen eigentlicher Anleihekommunikation und einer Offenlegung, die in erster Linie an die Aktionäre gerichtet ist, bewerten. Mit einer erschöpfenden Auswahl an unternehmens- und anleihe-spezifischen Kontrollvariablen ist es mir möglich, einen stark negativen Zusammenhang zwischen Offenlegung und Fremdkapitalkosten auf dem deutschen Anleihe-markt, welcher fast unabhängig von der verwendeten Ranking-Variablen ist, nachzuweisen. Robustheitsschätzungen bestätigen, dass die Ergebnisse kaum von Endogenität beeinflusst sind.

Keywords: bondholder relations, investor relations, cost of debt, yield spreads

JEL Classification: D82, G12, G30

I. Introduction

The German market for corporate bonds experienced a rapid growth in size and coverage by media and scholars. Between 2000 and the end of 2012, the volume of bonds issued by domestic non-financial corporations increased from € 13.6bn to € 220.5bn (Deutsche Bundesbank (2013)). In addition to frequent issuers who had traditionally dominated the market, the majority of new bonds were issued by firms being newcomers in the bond market. The latter may be described as rather unexperienced with the requirements of sufficient bondholder relations. This development gives rise to the link between corporate disclosure and cost of debt, which I examine in this study. The sample includes frequent German bond issuers, mostly excelling in investor relations, and more inexperienced firms. Scholarly literature maintains that corporate disclosure has a positive effect on equity and debt values as it reduces information asymmetry and, hence, estimation risk and agency costs for investors. While there is a substantial body of research focusing on stock markets, insights into disclosure effects on bond markets have been comparatively scant until now.

The results of my analysis are thought to add to the limited findings related to the effect of disclosure on a firm's cost of public debt. *Sengupta* (1998) was the first to analyze the relationship between corporate disclosure quality and cost of debt. He uses evaluations published by the

Association for Investment Management and Research as a main predictor and yield to maturity as well as total interest cost of new debt issues as dependent variables. He finds a change of one point in the disclosure ranking (maximum of 100 points) to reduce the bond yield by 1.2 basis points and total interest cost by 2.1 basis points. *Nikolaev/van Lent* (2005), having improved his estimation model, document that an increase of one percentage point in their total disclosure rank reduces the bond yield by 40 basis points. Subsequent studies employ other transparency proxies, such as accounting disclosure (*Francis et al. (2005)*), change to international financial reporting (*Kiefer/Schorn (2009)*), web-based non-financial disclosure (*Orens et al. (2010)*), or analyst coverage (*Mansi et al. (2011)*), and confirm reduced cost of debt when transparency is increased.

This study is the first to focus on German bond issuers, complementing similar research on the stock market (*Leuz/Verrecchia (2000)*, *Rieks/Lobe (2009)*). Moreover, it unprecedentedly concentrates on bondholder relations (BR) as distinct from overall investor relations (IR) activities or those directed at shareholders, respectively. I employ a new disclosure ranking, developed by *Degenhart/Janner (2012)*, which captures BR efforts of German non-financial firms. Its use allows more consistent conclusions on the effect of disclosure that is exclusively targeted at bondholders. Theory implies that bondholders and shareholders diverge in their informational needs (*Ettredge et al. (2002)*). On the other hand, both kinds of disclosure transmit the same firm-specific data and, according to the view of IR professionals, there are only slight differences in the emphasis that is placed on certain contents. Following these assumptions, I will compare the BR measure to a conventional, stock-related IR ranking. The research focus is, hence expanded to include the question whether the performance in one of the rankings has a different effect on the cost of debt than in the other.

The empirical results confirm a strong negative relationship between corporate disclosure and cost of debt, proxied by the yield spread of bonds. Taken together, the findings suggest that German bond issuers benefit from increased efforts in communicating with their bondholders and information intermediaries, regardless of firm size, default risk, or other firm- and bond-specific characteristics. They also show that the performance in either of the two rankings exerts a comparable influence on the cost of debt. There is a strong correlation between both ranking scores for the same sample firm observations and the specific BR ranking

has only a slightly larger effect on the cost of debt. Corporate managers may thus consider interest cost reductions when reviewing the costs and benefits of their voluntary disclosure. The remainder of this study is organized as follows. The next section deals with the theoretical background and develops hypotheses. The third section describes the data input and defines the model variables. The fourth section presents empirical results and discusses their implications. Finally, the paper is summarized against the background of its practical and scholarly relevance.

II. Development of Hypothesis and Further Research Questions

The IR profession builds on information asymmetries and conflicts potentially arising from the separation of ownership rights and pecuniary claims from the control over a firm's assets. Based on this, the main task of IR is to provide corporate information that enables investors as well as financial and information intermediaries to make proper investment decisions or advices (*Bassen et al. (2010)*). In order to meet this requirement, disclosure must be made as promptly, consistently, and substantially as possible (*Byrd et al. (1993)*, *Farragher et al. (1994)*). Fulfilling these criteria entails various direct and indirect costs. On the other side, offering private information reduces an investor's estimation risk (*Barry/Brown (1986)*, *Botosan (1997)*) or enhances the market liquidity (*Diamond/Verrecchia (1991)*), depending on the theoretical model applied. In either way, disclosure is assumed to influence a firm's cost of capital (*Healy/Palepu (2001)*, *Bassen et al. (2010)*). Trading off between costs and benefits of disclosure, firm managers have to determine an optimal level of disclosure (*Verrecchia (1983)*, *Healy/Palepu (2001)*).

Bondholders and shareholders differ in the nature of their claims and rights. Firm managers are primarily accountable to shareholders so that creditors are faced with a risk of detrimental managerial behavior in addition to the estimation risk, which they have to deal with anyway. As *Black (1976, p. 7)* puts it, "there is no easier way for a company to escape the burden of a debt than to pay out all of its assets in the form of a dividend, and leave the creditors holding an empty shell". Hidden intentions and actions add to the challenge of assessing a firm's creditworthiness. Bondholders seek mitigation by writing covenants and requesting information in the form of credit ratings or corporate disclosure. *Degenhart/Janner (2012)* document that only 58 percent of all German firms had issued a credit rating in 2011, giving rise to the importance of corporate disclosure. Following the arguments on voluntary disclosure that I

laid out in the beginning, firm managers may reduce the yield premium by helping bondholders evaluate the risk of default and by disclosing their intentions and actions. This leads to the key hypothesis of this study.

Hypothesis: A firm's cost of public debt is negatively associated with level of disclosure.

The allocation of rights and risks also concerns the informational needs of shareholders and bondholders. Put simply, shareholders are keen to evaluate their management's ability to increase the firm value by investing in projects that offer profitable growth opportunities. Bondholders, on the other hand, focus on their downside risk since they have no upside potential. As a consequence, most bond issuers have split up their capital market communications, establishing BR as a subfield of general IR. Prior research has dealt with informational needs of certain participants in the market for information, such as fund managers and analysts (e.g. *Eccles/Mavrinac* (1995), *Barker* (1998)). It has built on the assumption that firm managers determine the level of disclosure by considering the demand from individual target groups. However, so far no study has addressed differences in demand between shareholders and bondholders. Professionals argue that bond-related disclosure and stock-related disclosure use the same capital market story. They may, however, differ in the content priorities and in the level of efforts that are made to reach a specific target group (e.g. *Lewis/Streuer* (2011)). Moreover, the principle of equal treatment for participants in the capital market forces firms to be careful with the prioritization of content. As pointed out above, there have been no scientific findings on this topic until now. While the main focus of this study is on the effect of disclosure on the cost of debt, I will also look at the relationship between BR and overall IR, which is dominated by disclosure directed at shareholders. The key hypothesis is amended by two research questions: How strong is the relationship between BR and IR activities, capturing shareholder-related disclosure? Do they exert a comparable influence on the cost of debt?

III. Data and Variables

1. Firm Sample

The overall research period covers seven years for stock and balance sheet data (2005 to 2011) as well as disclosure ranking and bond data (2006 to 2012). The reason for this temporal deviation is explained in the

sections below. The collection process has run through two steps. First of all, websites of German exchanges as well as other European places (Amsterdam, Dublin, Luxemburg, and Zurich) were scanned for bond entries of firms with headquarters in Germany. I then collected firm data, bond yields, and sensitivity measures from the Bloomberg database, being noted for its special focus on debt securities. I excluded financial firms since their equity and debt values had been largely affected by the financial crisis and the subsequent sovereign debt crisis. In total, I found 220 German non-financial firms to have issued public debt between 2006 and 2012. This firm sample is reduced for three reasons. First, the IR measure is only available for around 200 firms with shares listed in one of the major German stock market indices. Second, the firm sample composition is influenced by restrictions on the bond data. I only keep senior bonds with fixed coupon payments and without conversion or any other kind of embedded options. This decreases the influence of bond-specific features on the price development. Due to restrictions for the sovereign bond data, market values of long-term bonds, having a remaining time to maturity of more than ten years, are not included. Prices and yields for the first 30 days and the last year of a bond's life are ignored in order to eliminate the influence of biased values. Firms without bonds that fulfill the outlined criteria are deleted. Third, firms are not included when their bond, stock, or balance sheet data are not available. The final sample consists of 45 stock-listed firms.

2. Cost of Debt

Cost of debt is the dependent variable. It is essential to control for factors that influence bond yields, other than disclosure. First of all, the return of an equivalent government bond portfolio is deducted from each bond's yield to maturity. Consequently, cost of debt is defined as the yield spread over the risk-free rate of return, proxied by the current yields to maturity of exchange-traded German government bonds with corresponding maturities. These data are collected from statistics provided by the German Federal Bank. Corporate bonds are individually assigned to one of ten maturity intervals with a length of one year.

Instead of focusing on new issues, as done by *Sengupta* (1998) and *Nikolaev/van Lent* (2005), I consider a firm's total portfolio of outstanding bonds. For doing so, I apply the approach of *Klock et al.* (2005), which entails the challenge of defining one single value in case of several out-

standing bonds per firm. Following *Bessembinder et al. (2009)*, the firm level approach appears to be the best choice as it integrates all debt securities of a firm, but not as individual observations. Hence, it avoids severe problems caused by correlation between observations and overweighting of firms with a large amount of bonds. Individual yield spreads are weighted by their specific market value in relation to each firm's total market value of standard bonds. This increases the impact of bonds with higher issue volumes or market prices, which are likely to be traded more often, so that yields are less influenced by illiquidity (*Amihud/Mendelson (2006)*, *Bao et al. (2011)*). The approach, as used in this analysis, provides one value-weighted mean yield spread (YS) for each firm:

$$YS_k = \sum_{i=1}^N YS_i \cdot w_i ,$$

where w_i depicts the weight of bond i 's market value within a portfolio of N bonds for firm k . The value-weighted mean yield spreads are transformed into logged values as they suffer from a high positive skewness (see Table 2 further below). The dependent variable is denoted by Spread. It is a value from the first trading day of July in the following year (e.g. the Spread value for 2011 is from the 2nd of July, 2012). The same applies to bond-specific control variables unlike firm-specific control variables, as introduced later. This is important in order to avoid a simultaneity bias between disclosure and cost of debt.

3. Level of Disclosure

I use two different disclosure measures throughout the analysis. The first ranking is specifically linked to the context of BR. It has been developed to evaluate bondholder-related activities of German firms (*Degenhart/Janner (2012)*) and covers Internet bondholder relations (IBR), consisting of 50 items usually found on corporate websites and deemed to be relevant for bond market participants. These items may be assigned to several categories: Access to IR (contact details and news feeds), Corporate information (portrait, strategy, and factbook), Financial reporting (annual and interim reports), Corporate governance (management and ownership details), Communication (press and IR news, financial calendar), Bond data (e.g. issue details, finance structure, rating, and prospectus), and Presentation (accessibility of BR contents). The total ranking has been further divided into two sub-rankings, one of which covers

items that are not demanded by legislation while the other is even narrower as it includes information that is thought to be relevant only for bondholders (details on bond issues, for instance). It is sufficient to use the total ranking as it is highly positively correlated to the sub-rankings ($\rho = 0.98$ and $\rho = 0.88$ for the year 2011, respectively).

Assessing web-based activities is more objective and better reproducible than the traditional approach that relies on expert opinions. It, however, captures only a part of a firm's efforts. Under this research project, representatives from all 183 German non-financial firms with exchange-traded bonds issued as at the 1st of January, 2012, were asked to fill out a questionnaire. It covered the importance of BR, BR instruments, and target groups in particular. A link to the online questionnaire was sent out on the 19th of January, 2012, and two reminders followed. In total, 69 firms participated in the survey. The results, which are partly used in another, more in-depth analysis, enable me to assess the IBR measure's representativeness in this context. One should note, however, that the survey's representativeness cannot be determined, as it was conducted only once. On average, roadshow one-on-ones are by far most (mean scale value of 4.23 on a five-point scale) and annual general meetings least important (2.10), apart from other instruments. Web-based communication has a mean scale value of 3.75 and lies in the middle of all instruments. Table 1 displays to which degree the importance of Internet communication instruments is correlated with the importance of general BR, other BR instruments and target groups, as stated by the survey respondents. The results suggest IBR to be a sufficiently good proxy for general BR, both before and after the security is placed. As respects their significance, Internet communication instruments are more closely related to communication efforts in the placement phase than any other instrument. They show moderate/strong positive correlations to all other instruments, except to annual general meetings. Surprisingly, there is no significant relationship between the importance of IBR and private investors. Professional market participants have better access to private information due to their insights and firm contacts so as to be considered less reliant on the information a firm discloses on its website. The survey results refute this assumption as the significance of Internet disclosure increases when, for instance, sell-side analysts are valued higher. Taken together, the bivariate correlations indicate that IBR reasonably represents a firm's total efforts in BR. It is included as an explanatory variable in the analysis, denoted by BR quality.

Table 1
Representativeness of an IBR Measure

| <i>N</i> = 69 | | <i>Correlation of importance of website, newsletters, mailing lists with the importance of ...</i> | | | | | | |
|----------------------|---------------------------|--|---------------------|-------------------------|-------------------------------|-----------------------|---------------------------|-------------------|
| <i>General BR</i> | During the bond placement | After the bond placement | | | | | | |
| | 0.40 ^a | 0.31 ^b | | | | | | |
| <i>Instruments</i> | Annual reports | Annual general meetings | Press communication | Phone, e-mail enquiries | Group sessions, presentations | Road-show one-on-ones | | |
| | 0.33 ^a | 0.19 | 0.41 ^a | 0.37 ^a | 0.36 ^a | 0.33 ^a | -0.02 | |
| <i>Target Groups</i> | Private investors | Institutional investors | Sell-side analysts | Rating analysts | Business press | Credit analysts | Credit reporting agencies | Credit insurers |
| | 0.13 | 0.29 ^b | 0.42 ^a | 0.28 ^b | 0.20 ^c | 0.21 ^c | 0.20 ^c | 0.23 ^c |

The table shows Spearman's rank correlation coefficients. ^a, ^b, and ^c denote significance at 1-, 5-, and 10-percent levels, respectively.

The second disclosure variable contains scores from a former ranking that had been annually published by the Society of Investment Professionals in Germany (DVFA) and the journal *Capital* until 2011. Over the years, the ranking has consistently followed the conventional approach of asking fund managers and stock analysts about their impressions on IR efforts of around 200 firms having listed their shares in one of the major German stock indices. From 2000 on, firms have been assigned a score between 0 and 500. The ranking process has been scientifically supported and the IR scores have been used in stock-related analyses (*Leuz/Verrecchia* (2000), *Rieks/Lobe* (2009)). In the subsequent analysis, the explanatory variable, based on this ranking, is denoted by IR quality.

BR quality and IR quality scores are defined in different ways, which is why I normalize them using their empirical minimum (18 for BR quality and 143 for IR quality) and maximum values (46 and 456, respectively). The two disclosure measures also differ in their temporal coverage, as BR quality is available for the years 2011 and 2012, while IR quality covers the years 2006 to 2011. However, they have to be applied to the same sample of observations in order to make the results comparable. This can be done by extending the BR quality values over the preceding years, but only when the over-time variance is not too high. Examining the original sample of 59 firms, I find that the overall probability of a year-to-year change in BR quality is very low. Only eight firms have experienced a

Table 2
Summary Statistics for Cost of Debt and the Disclosure Measures

| <i>N</i> = 192 | <i>Mean</i> | <i>Median</i> | <i>Std. dev.</i> | <i>Min.</i> | <i>Max.</i> | <i>Skewness</i> |
|-------------------------------|-------------|---------------|------------------|-------------|-------------|-----------------|
| <i>Spread, in bps.</i> | 204.11 | 107.49 | 457.23 | 20.99 | 4,341.60 | 7.91 |
| <i>Spread (ln)</i> | 4.82 | 4.68 | 0.81 | 3.04 | 8.38 | 1.06 |
| <i>BR quality, absolute</i> | 35.51 | 37.00 | 5.49 | 18.00 | 46.00 | -0.56 |
| <i>BR quality, normalized</i> | 0.63 | 0.68 | 0.20 | 0.00 | 1.00 | -0.56 |
| <i>IR quality, absolute</i> | 338.04 | 337.93 | 52.16 | 142.90 | 455.90 | -0.46 |
| <i>IR quality, normalized</i> | 0.62 | 0.62 | 0.17 | 0.00 | 1.00 | -0.46 |

change of at least five points in their ranking performance between 2011 and 2012, which corresponds to 10 percent or more of the maximum score. Movements occur mainly in the midfield of the ranking distribution. The findings suggest that it is justifiable to employ a constant value for years that are not covered by BR quality. Provided that there is a value for IR quality, I use mean percentage scores of each firm over the years 2011 and 2012 for the missing years from 2005 to 2010. Similarly, I use the firms' mean IR quality score over the preceding years for 2012 as there are no values for this year. Single missing values in the years before 2011 are replaced by taking the mean of the two scores from the preceding and the subsequent year. This approach yields 194 firm year observations for 45 firms in the final sample. Since BR and IR rankings have been generated in the first quarter of each year, I assign their values to the preceding year. The sample is reduced by two observations with negative market-to-book ratios to 192 (see next section).

As displayed in Table 2, the median yield spread is 107 basis points, lying between the values of comparable studies (*Klock et al. (2005), Qi et al. (2010)*). *Rottman/Seitz (2008)* present lower values for German corporate bonds, which is due to a slightly different calculation method and the fact that they analyzed a time period (1996 to 2003) during which only very large and, thereby, less risky firms had issued bonds in Germany. As outlined above and shown by the statistics, logged yield spreads are less skewed than absolute values. What is more, the two rankings are better comparable when their values are normalized. The mean (median) BR quality and IR quality ranking scores are around 0.63 (0.68) and 0.62 (0.62), respectively. Having quartile coefficients of dispersion (interquartile range divided by the median) of 37 and 36 percent, both measures are found to have a similar, moderate dispersion.

4. Control Variables

In previous research, a broad variety of variables, other than corporate disclosure, has been used to capture firm- and security-specific influences on the cost of debt. The selection of control variables follows, if not further specified, the basic model of *Sengupta* (1998). I add variables jointly determining disclosure and cost of debt, as suggested by *Nikolaev/van Lent* (2005) and others, in order to capture a firm's optimal level of disclosure. Connected to this, I deal with omitted variables, potentially causing endogeneity, in the post-estimation analyses. Particularly the default risk, which is supposed to make up a large part of the yield spread (see *Driessen* (2005) and see *Rottmann/Seitz* (2008) for an exemplary study on German corporate bonds), has to be factored out. *Sengupta* (1998) argues that including the credit rating induces high multicollinearity since disclosure behavior is typically accounted for when a credit rating is assigned. Beyond that, not all firms have been issued a credit rating so that applying this measure would further reduce the firm sample. I employ two alternative measures instead. The applied stock beta, as offered by *Bloomberg*, captures the systematic, non-diversifiable market risk of a firm (also used by *Bhojraj/Sengupta* (2003), *Crabtree/Maher* (2005), and *Orens et al.* (2010) in similar contexts). Additionally, the standard deviation of the return on equity (earnings before taxes divided by the book value of total equity) over the preceding five years is applied as an accounting measure for firm risk (following *Mansi et al.* (2011)). It may be regarded as a proxy for performance stability (*Kross et al.* (1994)).

Beside performance stability, the current firm performance is a strong determinant of default risk and may be considered as related to disclosure. However, the relationship's direction remains unclear, even though numerous empirical studies have been carried out to examine whether better performing firms are more likely to disclose more in order to stand out or to disclose less in order to conceal from competitors (see *Degenhart/Janner* (2012) for a more detailed discussion). I include a dichotomous variable, which takes the value 1 in case of a loss, and 0 otherwise. Negative net income indicates low creditworthiness so that these firms may be assumed to have higher cost of debt. Beyond that, I use return on sales (earnings before interest, taxes, depreciation, and amortization divided by sales) as an indicator of operating performance. I assume firms with a higher margin to enjoy a lower yield spread accordingly. Finally, I use firm leverage (ratio between long-term debt and total assets) as a proxy for financial constraint, which is expected to positively influence

Spread. *Sengupta* (1998) and *Nikolaev/van Lent* (2005) additionally include the interest coverage ratio, measuring a firm's ability to meet its debt obligations. I do not use this variable because it overlaps with firm leverage and performance indicators.

Firm size, proxied by the natural logarithm of total firm assets, is relevant for the extent of disclosure activities and a firm's cost of debt. Larger firms are able to use economies of scale in their external relations (*Ashbaugh et al.* (1999)) and their costs associated with the publication of private information tend to be lower since they are in the center of public attention anyway (*Watts/Zimmerman* (1978)). Moreover, the size of a firm comes along with business complexity, which in turn increases an investor's difficulty to determine the default risk and potential agency conflicts. In order to mitigate this, larger/more complex firms assumedly seek to be more transparent (*Bassen et al.* (2010)). Higher complexity (e.g. in terms of industry classification, as defined by *Degenhart/Janner* (2012)) also means better diversification, which is beneficial for investors as it reduces a firm's total risk (*Nikolaev/van Lent* (2005), referring to *Fama/French* (1992), *Fama/French* (1993)).

Orens et al. (2010) use capital intensity (gross plant, property, and equipment to total assets) as a proxy for entry barriers of a firm's industry. Firms in capital-intensive industries supposedly feel less pressure by potential competition and are less reluctant to disclose to the public. Moreover, capital intensity is frequently associated with financing needs (*Leuz/Verrecchia* (2000), *Cohen* (2008)), suggesting that firms with a higher ratio are more dependent on external financing. On the other hand, capital intensity may also be assumed to reduce information asymmetries related to firm strategy and investment opportunities and, thereby, the need to disclose. Using capital expenditure, *Nikolaev/van Lent* (2005), hence, predict a negative influence on cost of debt. For the purpose of my analysis, I apply the ration of gross plant, property, and equipment to total assets as a measure for capital intensity.

Following the work of *Nikolaev/van Lent* (2005), I use the market-to-book ratio as a measure for growth perspectives that increase information asymmetries (*Francis et al.* (2005), referring to *Nagar et al.* (2003)). However, a high ratio is also a signal for future financial stability, which in turn reduces Spread (*Chen/Zhao* (2006)). Firm observations with negative market-to-book values are eliminated from the sample.

Nikolaev/van Lent (2005) claim that it is important but nearly impossible to consider the influence of investor sophistication on the optimal

level of corporate disclosure. *Degenhart/Janner* (2012) use the denomination level of bonds to proxy for bondholder sophistication. Firms normally issue bonds with lot sizes of € 1,000 or less in order to include private investors, who are less sophisticated than institutional bondholders. The authors predict a negative relationship between lot sizes and the level of disclosure, which they discover to be statistically weak. As respects the cost of debt, unsophisticated bondholders are assumed to be more uncertain about the content of disclosure, about whether or not a firm discloses all relevant information, and the reasons for non-disclosure so as to expect a higher return (*Verrecchia* (2001), *Nikolaev/van Lent* (2005), who refer to *Dye* (1985), *Jung/Kwon* (1988), *Dye* (1998)). On the other hand, the tradability of bonds decreases with their denomination level. I assume bondholders to demand a higher illiquidity premium. Hence, the relationship between denomination level and Spread remains ambiguous.

Since all sample firms are stock-listed and bondholders benefit from public disclosure to shareholders, it is reasonable to additionally include a proxy from stock market research. The degree of institutional ownership is frequently employed to capture shareholders' inside knowledge. *Degenhart/Janner* (2012) use family ownership, which is a similar governance variable with strong implications for the degree of BR. However, data sources did not provide sufficient statistics for the research period of my analysis. I use the free float of shares instead, which proxies for the dispersion of a firm's shareholder structure. *Leuz/Verrecchia* (2000) argue that it is well suited for German firms since they do not have the same level of institutional ownership as US-American firms, for instance. The degree of free float increases information asymmetries between shareholders and firm management so as to positively affect the need to publicly disclose. Beyond that, agency conflicts from dispersed ownership evidentially increase the cost of debt (*Anderson et al.* (2003)) so that I assume a positive relationship between Free float and Spread.

Nikolaev/van Lent (2005) further suggest the use of a bond offer variable. Firms preparing a security issue may be assumed to intensify their disclosure activities in order to reduce information asymmetries. The authors base their arguments on the thoughts of *Myers/Majluf* (1984) and several studies that empirically confirm this effect for debt and/or equity securities (*Lang/Lundholm* (1993), *Frankel et al.* (1995), *Healy et al.* (1999)). *Degenhart/Janner* (2012) find that frequent bond issuers tend to

provide significantly more BR information on their websites than irregular issuers. Referring to *Myers/Majluf* (1984), *Nikolaev/van Lent* (2005) further argue that regular security offers are a signal for positive firm performance, thereby reducing the default premium demanded by bondholders. I apply a dummy variable (*Offer*), indicating whether or not the firm offered a bond in the respective or subsequent year.

Bond yield spreads are also affected by market liquidity. Apparent determinants of a bond's tradability are its currency and its issue size. The currency effect is no longer relevant since I have considered only Euro-denominated securities. I then use the natural logarithm of a firm's mean issue size as a control variable for economies of scale in underwriting (*Sengupta* (1998)) and for market liquidity. It is expected to negatively influence the yield spread. Finally, I consider the interest rate sensitivity of each sample bond, following *Klock et al.* (2005). Most typically, a bond's duration is applied to measure its risk associated with yield changes. *Bloomberg* calculates effective duration by using option-adjusted spreads and shifting the entire yield curve. This approach is more precise for callable bonds than conventional duration measures. Longer durations are expected to induce higher yield spreads. Convexity captures the curvature of the price-yield curve as it is the second derivative of the bond price with respect to yields. This measure is, in contrast to the linear duration line, better applicable to account for sensitivity to large yield changes. Another advantage is that it captures early redemption. Negative values mostly indicate that the issuer will call the bond with high probability. I use the *Bloomberg* convexity measure based on option-adjusted spreads in this analysis.

Table 3 summarizes the characteristics of all control variables. The median Beta is slightly less than 1. Only 8 percent of all firm observations report a loss. This figure is close to those reported by *Nikolaev/van Lent* (2005) but considerably smaller than in *Orens et al.* (2010). The median firm has total assets worth € 25bn, implying that the sample is dominated by (very) large firms. The variable is skewed to the right because of few extraordinarily large firms and logged values are used instead. About 77 percent of all cases have offered a bond in the respective or subsequent year and the median issue size is around € 750m. This implies that conventional benchmark bonds are predominant. The median lot size is € 1,000 and nearly 71 percent of all observations have this exact value.

Table 3
Summary Statistics for the Control Variables

| <i>N</i> = 192 | <i>Mean</i> | <i>Median</i> | <i>Std. dev.</i> | <i>Min.</i> | <i>Max.</i> |
|----------------------------|-------------|---------------|------------------|-------------|-------------|
| <i>Beta</i> | 0.96 | 0.94 | 0.21 | 0.46 | 1.64 |
| <i>Return volatility</i> | 0.11 | 0.08 | 0.11 | 0.01 | 1.00 |
| <i>Loss</i> | 0.08 | 0.00 | 0.28 | 0.00 | 1.00 |
| <i>Return on sales</i> | 0.16 | 0.14 | 0.09 | 0.02 | 0.55 |
| <i>Leverage</i> | 0.35 | 0.35 | 0.11 | 0.01 | 0.88 |
| <i>Asset, in bn €</i> | 52.37 | 25.23 | 59.11 | 0.98 | 262.96 |
| <i>Asset (ln)</i> | 23.89 | 23.95 | 1.43 | 20.71 | 26.30 |
| <i>Capital intensity</i> | 0.57 | 0.57 | 0.30 | 0.00 | 1.56 |
| <i>Market-to-book</i> | 1.90 | 1.71 | 1.08 | 0.29 | 11.37 |
| <i>Lot size, in €</i> | 5,914.94 | 1,000.00 | 12,089.49 | 608.81 | 50,000.00 |
| <i>Lot size (ln)</i> | 7.53 | 6.91 | 1.25 | 6.41 | 10.82 |
| <i>Free float</i> | 0.73 | 0.76 | 0.24 | 0.10 | 1.00 |
| <i>Offer</i> | 0.77 | 1.00 | 0.42 | 0.00 | 1.00 |
| <i>Issue size, in bn €</i> | 0.77 | 0.75 | 0.38 | 0.15 | 2.00 |
| <i>Issue size (ln)</i> | 20.33 | 20.44 | 0.54 | 18.83 | 21.42 |
| <i>Duration</i> | 4.00 | 4.00 | 1.08 | 1.57 | 7.38 |
| <i>Convexity</i> | 0.21 | 0.21 | 0.18 | -0.98 | 0.70 |

IV. Regression Analyses

To examine the relationship between corporate disclosure and the cost of debt, I deploy a pooled, multiple OLS regression with the following model structure in a first step:

$$\begin{aligned}
 \text{Spread}_{i,t+0.5} = & \beta_0 + \beta_1 \text{BR/IR quality}_{i,t} + \beta_2 \text{Beta}_{i,t} + \beta_3 \text{Return volatility}_{i,t} \\
 & + \beta_4 \text{Loss}_{i,t} + \beta_5 \text{Return on sales}_{i,t} + \beta_6 \text{Leverage}_{i,t} + \beta_7 \text{Asset}_{i,t} \\
 & + \beta_8 \text{Capital intensity}_{i,t} + \beta_9 \text{MtB}_{i,t} + \beta_{10} \text{Lot size}_{i,t+0.5} \\
 & + \beta_{11} \text{Free float}_{i,t} + \beta_{12} \text{Offer}_{i,t} + \beta_{13} \text{Issue size}_{i,t+0.5} \\
 & + \beta_{14} \text{Duration}_{i,t+0.5} + \beta_{15} \text{Convexity}_{i,t+0.5} + \varepsilon_{i,t}.
 \end{aligned}$$

OLS analyses by default require the regression errors to be independent and identically distributed. However, since there are various observations for most firms, individual errors may be correlated over time when pooled OLS is applied. Furthermore, *Rottmann/Seitz* (2008) point out the possible effect of heteroskedasticity in errors in this context. I therefore use Newey-West standard errors to relax these fundamental assumptions of OLS. The sample size of 192 observations is reduced after applying

Cook's distance measure for detection of outliers. The cut-off value for the distance measure is defined as $D_i > 4/N$. I further control for common aggregate shocks to the bond market by including year dummies (with 2010 as the reference year containing the largest number of observations).

All estimations (Table 4) show a negative relationship between ranking scores and bond yield spreads, which is statistically significant at a level of one percent for BR quality (first estimation). With regards to IR quality, the null hypothesis of no negative effect can be rejected on a statistical level of five percent (second estimation). Similarly, its economic significance is marginally lower. The difference between both coefficients is statistically not significant ($z = 0.3154$). An improvement of one percentage point reduces the mean yield spread by around 0.62 percent when BR quality is applied and 0.52 percent for IR quality. Varying the two predictors by one standard deviation would result in a yield spread change of 12.4 and 8.8 percent, which corresponds to around 25 and 18 basis points, respectively. Using non-logged instead of logged yield spreads results in even higher values of 180 and 183 basis points per percentage point of change in BR quality and IR quality, respectively. Conducting the estimation with another BR ranking score from *Degenhart/Janner* (2012), developed to capture website contents that are exclusively interesting for bondholders, yields similar results (coefficient of -0.686 with high statistical significance).¹ When the estimations are limited to the years for which original ranking data was available (without the extended periods), both disclosure variables are significant at a level of one percent with higher coefficients (BR quality: -0.843 , IR quality: -0.608).

Communication efforts towards bondholders exert only a slightly larger influence on the cost of debt than IR performance, as perceived by fund managers and stock analysts. The coefficient estimates of both variables are close to each other. Bearing in mind that the rankings have been generated by different methods, it is not reasonable to interpret marginal differences in their economic significance. However, when using both variables together, as done in the third estimation, IR quality loses all of its explanatory power, while the effect of BR quality remains strong. In this setting, the specific BR measure dominates the conventional IR ranking. Nonetheless, it is worth noticing that disclosure negatively in-

¹ I did not use this sub-ranking because its variation is low and because it has a very high correlation to BR Quality.

Table 4
Results of Pooled OLS Regression

| | <i>Expected</i> | <i>(1)</i> | | <i>(2)</i> | | <i>(3)</i> | |
|---------------------------|-----------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|
| | <i>sign</i> | <i>Coeff.</i> | <i>T-value</i> | <i>Coeff.</i> | <i>T-value</i> | <i>Coeff.</i> | <i>T-value</i> |
| <i>BR quality</i> | – | –0.620 | –2.59 ^a | | | –0.543 | –2.39 ^b |
| <i>IR quality</i> | – | | | –0.519 | –2.13 ^b | –0.215 | –0.90 |
| <i>Beta</i> | + | 0.346 | 2.12 ^b | 0.417 | 2.64 ^a | 0.331 | 1.99 ^b |
| <i>Return volatility</i> | + | 0.997 | 3.50 ^a | 0.861 | 2.55 ^b | 0.973 | 3.00 ^a |
| <i>Loss</i> | + | 0.669 | 5.98 ^a | 0.519 | 3.52 ^a | 0.625 | 4.69 ^a |
| <i>Return on sales</i> | – | –0.665 | –1.67 ^c | –0.681 | –1.54 | –0.712 | –1.76 ^c |
| <i>Leverage</i> | + | 1.703 | 5.23 ^a | 1.556 | 4.60 ^a | 1.736 | 5.21 ^a |
| <i>Asset (ln)</i> | – | –0.018 | –0.41 | –0.056 | –1.12 | –0.028 | –0.63 |
| <i>Capital intensity</i> | – | –0.387 | –3.07 ^a | –0.306 | –2.12 ^b | –0.369 | –2.46 ^b |
| <i>Market-to-book</i> | – | –0.074 | –2.07 ^b | –0.087 | –1.92 ^c | –0.061 | –1.58 |
| <i>Lot size (ln)</i> | +/– | 0.074 | 3.11 ^a | 0.054 | 2.19 ^b | 0.074 | 3.05 ^a |
| <i>Free float</i> | + | –0.272 | –1.93 ^c | –0.324 | –2.06 ^b | –0.288 | –1.97 ^c |
| <i>Offer</i> | – | 0.070 | 1.33 | 0.119 | 2.21 ^b | 0.084 | 1.61 |
| <i>Issue size (ln)</i> | – | –0.466 | –4.20 ^a | –0.446 | –3.50 ^a | –0.466 | –4.11 ^a |
| <i>Duration</i> | + | 0.143 | 4.28 ^a | 0.147 | 3.76 ^a | 0.139 | 3.96 ^a |
| <i>Convexity</i> | +/– | –0.739 | –4.28 ^a | –0.682 | –3.22 ^a | –0.723 | –4.09 ^a |
| <i>Constant</i> | | 13.656 | 9.57 ^a | 14.213 | 9.04 ^a | 13.989 | 9.53 ^a |
| <i>N</i> | | 174 | | 180 | | 176 | |
| <i>adj. R²</i> | | 0.823 | | 0.800 | | 0.824 | |
| <i>F-statistics</i> | | 75.09 | | 102.14 | | 96.88 | |

Year dummies are included. *T*-statistics are calculated using Newey-West standard errors. ^a, ^b, and ^c denote significance at 1-, 5-, and 10-percent levels, respectively (one-tailed tests for variables with directional predictions, two-tailed tests otherwise).

influences cost of debt, irrespective of whether the focus lies on BR or on fund managers' and stock analysts' opinions. This is an answer to the second research question and a confirmation for the view that is shared by a large part of IR professionals.

Dominant control variables in terms of their influence on the disclosure variables are Return volatility, Loss, Leverage, the measures of bond price sensitivity, and Issue size. The coefficients of almost all control variables show signs as predicted in the preceding section and displayed in the second column of Table 4. Only Free float and Offer have an opposite than expected sign. Both variables influence a firm's level of disclosure by measuring shareholders' inside knowledge and the need for disclosure due to regular bond offerings.

Table 5
Results of Alternative Pooled OLS Regression

| | <i>Expected sign</i> | (4) | | (5) | | (6) | | (7) | |
|---------------------------|--------------------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|
| | | <i>Coeff.</i> | <i>T-value</i> | <i>Coeff.</i> | <i>T-value</i> | <i>Coeff.</i> | <i>T-value</i> | <i>Coeff.</i> | <i>T-value</i> |
| <i>BR quality</i> | - | -0.568 | -1.95 ^c | -0.537 | -1.87 ^c | -0.866 | -4.15 ^a | -0.639 | -2.75 ^a |
| <i>IR quality</i> | - | | | | | | | 0.446 | 2.55 ^b |
| <i>Beta</i> | + | 0.378 | 1.75 ^c | 0.470 | 2.31 ^b | 0.331 | 2.16 ^b | 0.446 | 2.55 ^b |
| <i>Return volatility</i> | + | 0.413 | 1.10 | 0.365 | 1.11 | 0.923 | 2.72 ^a | 0.612 | 1.72 ^c |
| <i>Loss</i> | + | 0.743 | 3.70 ^a | 0.695 | 3.38 ^a | 0.794 | 7.20 ^a | 0.797 | 5.66 ^a |
| <i>Return on sales</i> | - | -0.086 | -0.15 | 0.060 | 0.10 | | | | |
| <i>Leverage</i> | + | 1.226 | 2.46 ^b | 1.115 | 2.25 ^b | 1.796 | 5.46 ^a | 1.294 | 3.74 ^a |
| <i>Asset (ln)</i> | - | -0.045 | -0.82 | -0.074 | -1.28 | | | | |
| <i>Capital intensity</i> | - | -0.206 | -1.22 | -0.152 | -0.85 | -0.356 | -2.70 ^a | -0.225 | -1.56 |
| <i>Market-to-book</i> | - | -0.076 | -2.02 ^b | -0.073 | -1.91 ^c | | | | |
| <i>Lot size (ln)</i> | +/- | 0.072 | 1.95 ^c | 0.052 | 1.56 | 0.079 | 3.24 ^a | 0.047 | 1.80 ^c |
| <i>Free float</i> | + | -0.214 | -1.22 | -0.274 | -1.45 | | | | |
| <i>Offer</i> | - | 0.118 | 1.69 ^c | 0.175 | 2.56 ^b | | | | |
| <i>Issue size (ln)</i> | - | -0.483 | -3.91 ^a | -0.486 | -3.60 ^a | -0.510 | -7.03 ^a | -0.559 | -8.79 ^a |
| <i>Duration</i> | + | 0.087 | 1.46 | 0.089 | 1.52 | 0.140 | 3.97 ^a | 0.184 | 4.41 ^a |
| <i>Convexity</i> | +/- | -0.682 | -2.84 ^a | -0.687 | -2.90 ^a | -0.848 | -4.79 ^a | -0.981 | -5.03 ^a |
| <i>Constant</i> | | 14.66 | 8.08 ^a | 15.50 | 8.29 ^a | 13.84 | 10.09 ^a | 14.86 | 11.59 ^a |
| <i>N</i> | | 192 | | 192 | | 176 | | 179 | |
| <i>adj. R²</i> | | 0.731 | | 0.729 | | 0.811 | | 0.774 | |
| <i>F-statistics</i> | | 25.73 | | 25.51 | | 47.94 | | 39.31 | |

Year dummies are included. *T*-statistics are calculated using Newey-West standard errors. ^a, ^b, and ^c denote significance at 1-, 5-, and 10-percent levels, respectively (one-tailed tests for variables with directional predictions, two-tailed tests otherwise).

Table 6
Variance Inflation Factors

| | (1) N = 174 | (2) N = 180 |
|--------------------------|----------------|----------------|
| <i>BR quality</i> | 1.91 | |
| <i>IR quality</i> | | 1.71 |
| <i>Beta</i> | 1.41 | 1.33 |
| <i>Return volatility</i> | 1.44 | 1.51 |
| <i>Loss</i> | 1.23 | 1.42 |
| <i>Return on sales</i> | 1.64 | 1.61 |
| <i>Leverage</i> | 1.86 | 1.82 |
| <i>Asset (ln)</i> | 4.22 | 4.04 |
| <i>Capital intensity</i> | 1.67 | 1.84 |
| <i>Market-to-book</i> | 1.72 | 1.76 |
| <i>Lot size (ln)</i> | 1.51 | 1.54 |
| <i>Free float</i> | 1.37 | 1.29 |
| <i>Offer</i> | 1.33 | 2.31 |
| <i>Issue size (ln)</i> | 4.17 | 4.38 |
| <i>Duration</i> | 3.05 | 2.89 |
| <i>Convexity</i> | 2.64 | 2.62 |
| <i>Mean VIF</i> | 1.97 | 1.98 |

In alternative estimations, I include all 192 observations for a robustness test. The results from estimations (4) and (5), as shown in Table 5, indicate that the outliers that had been excluded do not considerably influence the size of BR quality's and IR quality's coefficients. Their statistical significance, however, is lower due to higher disturbance caused by the outliers. The last two estimations, whose results are presented in Table 5, have been run excluding all variables with coefficients that showed a low statistical significance in the main regressions (Return on sales, Asset, Market-to-book, Free float, and Offer). This most notably increases the explanatory power of BR quality. It thus appears as if the quality of bondholder relations efforts, capturing other effects, was a stronger determinant than IR efforts in this reduced model.

Taken together, the regression model has a high goodness of fit since the adjusted coefficients of determination from all estimations are 80 percent at minimum. The regression diagnostics confirm that the models are well specified and that all assumptions concerning the predictors and residuals are fulfilled. Variance inflation factors (VIFs) show that the ranking variables are not influenced by multicollinearity (Table 6). To-

gether with the sensitivity measures, only firm size (Asset) and the mean volume of bond portfolio (Issue size) exceed the conservative inflation threshold of 2.50. Centering these variables does not sufficiently reduce the correlation.

V. Endogeneity in the Relationship Between Disclosure and Cost of Debt

Nikolaev/van Lent (2005) examine biases arising from endogeneity in the causal relationship between disclosure and cost of debt. Simultaneity, as a first source, accrues from the fact that cost of debt may be regarded as interdependently determined with disclosure quality. However, the authors point out that this “equilibrium feedback mechanism”, as defined by *Griffiths* et al. (1993), does not severely influence regression outcomes, referring to the findings of *Welker* (1995) and *Hail* (2002). Omitted-variable bias, as a second source of endogeneity, occurs when variables that are correlated with both the dependent and one or more independent variables (joint determinants) are not included in the model. In order to reduce the risk of a bias, I used a set of variables that jointly determined cost of debt and disclosure, as suggested by *Nikolaev/van Lent* (2005) and other authors.

In some cases, it is impossible to directly observe a relevant source of firm heterogeneity or to find variables that proxy for it. *Nikolaev/van Lent* (2005) suggest two unobservable firm characteristics. First, they assume investors to differ in their sophistication. In the estimations carried out above, investor sophistication was proxied by observable firm (Free float) and security characteristics (Lot size). It remains, however, uncertain whether bondholder and shareholder sophistication is adequately captured, given the variables’ puzzling impact in the estimations. Second, management talents differ and signals to the market are assumed to vary in consequence. Managers are moreover uncertain about the reaction of market participants to (non-)disclosure. These characteristics are truly unobservable for researchers, but there are two solutions; either instrumental variables (IV) are used or the analysis is shifted to a time-series focus, e.g. using first difference (FD) estimation. In the following, I apply both approaches to carry out different endogeneity tests.

It is essential to find instruments that are strongly correlated with BR quality and IR quality but unrelated to Spread and the error term. *Orens* et al. (2010) and *Klock* et al. (2005) suggest total assets and firm leverage,

which I found to be of limited suitability due to their correlation with Spread. Based on the multiple regression results, Return on sales, Market-to-book, and Offer (in the BR quality estimation) are weakly or not at all linked to Spread. These are common predictors for the level of disclosure and show a strong correlation with BR quality and IR quality. Other variables used by *Orens et al. (2010)* and *Klock et al. (2005)* turn out to be weakly linked to the disclosure measures (sales growth and capital intensity) or not available (CEO ownership and media exposure).

The first four columns of Table 7 contain IV regression results, using a limited information maximum likelihood (LIML) estimator. For a better comprehensibility, both IV stages are displayed. The results suggest that BR quality and IR quality explain greater changes in the yield spread when instrumented, confirming results of *Orens et al. (2010)*. An improvement of one percentage point in BR quality reduces the mean yield spread by around 1.7 percent (1.6 percent for IR quality), which is around three times the effect from the pooled OLS estimations. The differences between the two models are statistically slightly significant for BR quality ($z = -1.934$) and insignificant for IR quality ($z = -1.192$).

The *Durbin-Wu-Hausman* test indicates that both main predictors are slightly endogenous in the original model (p -values of 0.026 and 0.137, respectively, under the null hypothesis of exogeneity). IV results are prone to biases caused by instruments that are too weak or correlated with either the error term or Spread. The LIML estimator is more robust in this respect than a 2SLS estimator and the instruments are found to exceed critical F-values. However, Market-to-book, as the strongest instrument, is not truly unrelated to Spread and the *Sargan-Hansen* test indicates that the null hypothesis of no correlation with the error term may be rejected at a level of five percent for the instruments of IR quality. The IV estimation is nonetheless qualified as a robustness test, suggesting the direction of coefficient signs in the pooled OLS model to be valid.

First differencing allows me to capture the effect of unobserved firm heterogeneity as it concentrates on time-series variations within a firm. The analysis cannot be run for BR quality since its variation has been limited to the years 2010 and 2011. IR quality is found to have a statistically significant effect on Spread (last two columns of Table 7). The coefficient size is almost the same as in the OLS without first differences. These results deviate from findings of *Nikolaev/van Lent (2005)*, who document a greater influence of disclosure when over-time variations are in the focus. Using the between estimator, which focuses on changes be-

Table 7: Results of IV and First Difference Regressions

| | 1 st stage | | 2 nd stage | | 1 st stage | | 2 nd stage | | FD | |
|---------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|--------|--------------------|
| | Coeff. | T-value | Coeff. | Z-value | Coeff. | T-value | Coeff. | Z-value | Coeff. | T-value |
| BR quality | | | -1.689 | -3.31 ^a | | | | | | |
| IR quality | | | 0.148 | 0.71 | | | -1.637 | -1.81 ^b | -0.480 | -1.80 ^b |
| Beta | -0.185 | -2.15 ^b | 0.148 | 0.71 | -0.037 | -0.44 | 0.467 | 2.30 ^b | -0.267 | -1.84 ^b |
| Return volatility | 0.111 | 0.68 | 1.117 | 3.85 ^a | -0.288 | -2.74 ^a | 0.453 | 1.23 | 0.422 | 0.80 |
| Loss | 0.003 | 0.06 | 0.673 | 7.59 ^a | -0.132 | -2.31 ^b | 0.478 | 2.42 ^a | 0.226 | 1.71 ^b |
| Return on sales | -0.478 | -2.03 ^b | -1.183 | -2.89 ^a | -0.385 | -2.53 ^b | | | 0.500 | 0.53 |
| Leverage | 0.199 | 0.85 | 1.921 | 5.26 ^a | -0.050 | -0.24 | 1.231 | 2.84 ^a | 0.651 | 1.43 ^c |
| Asset (ln) | 0.057 | 2.28 ^b | 0.043 | 0.85 | -0.003 | -0.16 | -0.073 | -1.26 | -0.338 | -1.48 ^c |
| Capital intensity | 0.031 | 0.35 | -0.354 | -2.11 ^b | 0.189 | 2.73 ^a | -0.034 | -0.17 | -0.716 | -0.85 |
| Market-to-book | 0.068 | 2.88 ^a | | | 0.077 | 5.58 ^a | | | -0.053 | -0.78 |
| Lot size (ln) | 0.030 | 2.27 ^b | 0.105 | 4.75 ^a | -0.001 | -0.03 | 0.060 | 2.21 ^b | -0.009 | -0.41 |
| Free float | 0.164 | 2.08 ^b | -0.098 | -0.50 | 0.070 | 1.01 | -0.323 | -1.25 | 0.398 | 2.37 ^b |
| Offer | -0.070 | -2.38 ^b | | | 0.035 | 1.50 ^c | 0.140 | 2.52 | 0.050 | 0.86 |
| Issue size (ln) | 0.023 | 0.29 | -0.442 | -3.30 ^a | 0.041 | 0.67 | -0.393 | -2.30 ^b | 0.189 | 1.31 ^c |
| Duration | 0.014 | 0.72 | 0.158 | 4.60 ^a | 0.029 | 1.54 ^c | 0.168 | 4.05 ^a | 0.054 | 1.86 ^b |
| Convexity | -0.098 | -0.95 | -0.845 | -5.68 ^a | -0.172 | -1.79 ^b | -0.887 | -3.82 ^a | -0.156 | -1.44 |
| Constant | -1.488 | -1.36 | 12.056 | 5.61 ^a | -0.309 | -0.37 | 13.931 | 7.10 ^a | 0.124 | 5.81 ^a |
| N | 174 | | 174 | | 180 | | 180 | | 132 | |
| adj. R ² | 0.149 | | 0.781 | | 0.144 | | 0.749 | | 0.714 | |
| F-statistics | 9.51 | | 144.08 | | 16.80 | | 103.93 | | 129.13 | |

Year dummies are included. T- and z-statistics are calculated using Newey-West standard errors. ^a, ^b, and ^c denote significance at 1-, 5-, and 10-percent levels, respectively (one-tailed tests for variables with directional predictions, two-tailed tests otherwise). Market-to-book and Offer are instrumental variables determining BR quality. IR quality is instrumented by Return on sales and Market-to-book.

tween firm averages over time, on the other extreme, I find the negative coefficient of IR quality to be larger than in the pooled OLS. However, the between estimator may also be driven by changes in the composite error in addition to changes in each firm's mean IR quality over time. It is, quite the contrary, important to notice that conducting fixed and random effects estimations yields virtually the same effect sizes for IR quality as in the pooled OLS and in the FD models.² After all, the results of the pooled OLS model, which includes various joint determinants, seem to be consistent. Taken together, unobserved heterogeneity does not appear to be a severe issue in my analysis.

VI. Conclusions and Implications

Theory suggests that voluntary disclosure reduces information asymmetries between bond issuers and bondholders. It allows assessing the downside risk, evaluating characteristics of bond issuing firms and monitoring management behavior. German firms increasingly finance themselves through the market for public debt. They employ bondholder relations officers or advisors. Professional organizations engage themselves in defining best practices for the communication with bondholders and analysts. However, insights into disclosure effects on bond markets have been comparatively scant until now. Against this background, my analysis was committed to test the relationship between disclosure efforts and cost of debt for German bond issuers. I apply two different disclosure rankings to a single firm sample and compare their effect size; a newly developed ranking evaluating bondholder-specific Internet disclosure and a conventionally used ranking for the quality of general investor relations, as perceived by fund managers and stock analysts.

Professionals typically claim that bondholder relations and stock-related investor relations are based on the same capital market story, however emphasizing different aspects. Indeed, there is a strong relationship between both communication contents as I find them to be moderately to strongly correlated with each other, keeping in mind that their definitions are different. Multiple regression results reveal that the influence of both ranking scores on the cost of debt is on a comparable level. The economic significance of bondholder relations contents is only marginally

² These alternative regressions are carried out only for IR quality due to the lack of temporal variations in the BR quality variable. Detailed results are not reported.

higher. In accordance with prior research, particular emphasis is placed on potential endogeneity of the disclosure measures. The main analysis, an augmented pooled OLS model, is sufficient to capture biasing effects.

These results are relevant for scholars and for professionals. They fill an academic void on the debt side of German firms' capital market communication. So far, there have been few studies worldwide or in the European context dealing with corporate disclosure on the bond market. Generally, there is little evidence on the effectiveness of disclosure for German firms. Future research may compare the effect of investor relations on a firm's debt and equity values. Moreover, it would be interesting to know whether bondholder relations works differently for different firm types. Even without this special focus, corporate officers, who are engaged in communicating with bond market participants, may feel confirmed in the recognition of their own task by considering the results of this study.

References

- Amihud, Y./Mendelson, H.* (2006): Stock and Bond Liquidity and Its Effect on Prices and Financial Policies. *Financial Markets and Portfolio Management*, Vol. 20(1), pp. 19–32.
- Anderson, R. C./Mansi, S. A./Reeb, D. M.* (2003): Founding Family Ownership and the Agency Cost of Debt. *Journal of Financial Economics*, Vol. 68(2), pp. 263–285.
- Ashbaugh, H. S./Johnstone, K. M./Warfield, T.* (1999): Corporate Reporting on the Internet. *Accounting Horizons*, Vol. 13(3), pp. 241–257.
- Bao, J./Pan, J. U./Wang, J.* (2011): The Illiquidity of Corporate Bonds. *The Journal of Finance*, Vol. 66(3), pp. 911–946.
- Barker, R. G.* (1998): The Market for Information: Evidence from Finance Directors, Analysts and Fund Managers. *Accounting and Business Research*, Vol. 29(1), pp. 3–20.
- Barry, C. B./Brown, S. J.* (1986): Limited Information as a Source of Risk. *The Journal of Portfolio Management*, Vol. 12(2), pp. 66–72.
- Bassen, A./Basse Mama, H./Ramaj, H.* (2010): Investor Relations: A Comprehensive Overview, *Journal für Betriebswirtschaft*, Vol. 60(1), pp. 49–79.
- Bessembinder, H./Kahle, K. M./Maxwell, W. F./Xu, D.* (2009): Measuring Abnormal Bond Performance. *The Review of Financial Studies*, Vol. 22(10), pp. 4219–4258.
- Bhojraj, S./Sengupta, P.* (2003): Effect of Corporate Governance on Bond Ratings and Yields: The Role of Institutional Investors and Outside Directors, *The Journal of Business*, Vol. 76(3), pp. 455–475.

- Black, F.* (1976): The Dividend Puzzle. *Journal of Portfolio Management*, Vol. 2(2), pp. 5–8.
- Botosan, C. A.* (1997): Disclosure Level and the Cost of Equity Capital. *The Accounting Review*, Vol. 72(3), pp. 323–349.
- Byrd, J./Goulet, W./Johnson, M./Johnson, M.* (1993): Finance Theory and the New Investor Relations. *Journal of Applied Corporate Finance*, Vol. 6(2), pp. 48–53.
- Chen, L./Zhao, X.* (2006): On the Relation between the Market-to-Book Ratio, Growth Opportunity, and Leverage Ratio. *Finance Research Letters*, Vol. 3(4), pp. 253–266.
- Cohen, D. A.* (2008): Does Information Risk Really Matter? An Analysis of the Determinants and Economic Consequences of Financial Reporting Quality. *Asia-Pacific Journal of Accounting & Economics*, Vol. 15(2), pp. 69–90.
- Crabtree, A. D./Maher, J. J.* (2005): Earnings Predictability, Bond Ratings, and Bond Yields. *Review of Quantitative Finance and Accounting*, Vol. 25(3), pp. 233–253.
- Degenhart, H./Janner, S.* (2012): Internet Bondholder Relations: Explaining Differences in Transparency Among German Issuers of Corporate Bonds. *Kredit und Kapital*, Vol. 45(3), pp. 313–341.
- Deutsche Bundesbank* (2013): Capital Market Statistics – August 2013. Statistical Supplement 2 to the Monthly Report, retrieved from http://www.bundesbank.de/Redaktion/EN/Downloads/Publications/Statistical_Supplement_2/2013/2013_08_capital_market_statistics.pdf.
- Diamond, D. W./Verrecchia, R. E.* (1991): Disclosure, Liquidity, and the Cost of Capital. *The Journal of Finance*, Vol. 46(4), pp. 1325–1359.
- Driessen, J.* (2005): Is Default Event Risk Priced in Corporate Bonds? *The Review of Financial Studies*, Vol. 18(1), pp. 165–195.
- Dye, R. A.* (1985): Disclosure of Nonproprietary Information. *Journal of Accounting Research*, Vol. 23(1), pp. 123–145.
- (1998): Investor Sophistication and Voluntary Disclosures. *Review of Accounting Studies*, Vol. 3(3), pp. 261–287.
- Eccles, R. G./Mavrinac, S. C.* (1995): Improving the Corporate Disclosure Process. *Sloan Management Review*, Vol. 36(4), pp. 11–25.
- Ettredge, M./Richardson, V. J./Scholz, S.* (2002): Dissemination of Information for Investors at Corporate Web Sites. *Journal of Accounting and Public Policy*, Vol. 21(4–5), pp. 357–369.
- Fama, E. F./French, K. R.* (1992): The Cross-Section of Expected Stock Returns. *The Journal of Finance*, Vol. 47(2), pp. 427–465.
- (1993): Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics*, Vol. 33(1), pp. 3–56.
- Farragher, E. J./Kleiman, R./Bazaz, M. S.* (1994): Do Investor Relations Make a Difference? *The Quarterly Review of Economics and Finance*, Vol. 34(4), pp. 403–412.

- Francis, J. R./Khurana, I. K./Pereira, R. (2005): Disclosure Incentives and Effects on Cost of Capital around the World. *The Accounting Review*, Vol. 80(4), pp. 1125–1162.
- Frankel, R./McNichols, M./Wilson, G. P. (1995): Discretionary Disclosure and External Financing. *The Accounting Review*, Vol. 70(1), pp. 135–150.
- Griffiths, W. E./Hill, R. C./Judge, G. G. (1993): *Learning and Practicing Econometrics*. Wiley, New York.
- Hail, L. (2002): The Impact of Voluntary Corporate Disclosures on the Ex-Ante Cost of Capital for Swiss Firms. *European Accounting Review*, Vol. 11(4), pp. 741–773.
- Healy, P. M./Hutton, A. P./Palepu, K. G. (1999): Stock Performance and Intermediation Changes Surrounding Sustained Increases in Disclosure. *Contemporary Accounting Research*, Vol. 16(3), pp. 485–520.
- Healy, P. M./Palepu, K. G. (2001): Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature. *Journal of Accounting and Economics*, Vol. 31(1–3), pp. 405–440.
- Jung, W.-O./Kwon, Y. K. (1988): Disclosure When the Market Is Unsure of Information Endowment of Managers. *Journal of Accounting Research*, Vol. 26(1), pp. 146–153.
- Kiefer, K./Schorn, P. (2009): Auswirkungen der IFRS-Umstellung auf die Risikoprämie von Unternehmensanleihen: Eine empirische Studie für Deutschland, Österreich und die Schweiz, *Zeitschrift für Betriebswirtschaft*, Vol. 79(3), pp. 335–365.
- Klock, M. S./Mansi, S. A./Maxwell, W. F. (2005): Does Corporate Governance Matter to Bondholders? *Journal of Financial and Quantitative Analysis*, Vol. 40(4), pp. 693–719.
- Kross, W. J./Lewellen, W. G./Ro, B. T. (1994): Evidence on the Motivation for Management Forecasts of Corporate Earnings. *Managerial and Decision Economics*, Vol. 15(3), pp. 187–200.
- Lang, M./Lundholm, R. J. (1993): Cross-Sectional Determinants of Analyst Ratings of Corporate Disclosures. *Journal of Accounting Research*, Vol. 31(2), pp. 246–271.
- Leuz, C./Verrecchia, R. E. (2000): The Economic Consequences of Increased Disclosure. *Journal of Accounting Research*, Vol. 38(Suppl.), pp. 91–124.
- Louis, S./Streuer, O. (2011): *DIRK White Paper: Fixed Income Investor Relations* (2nd ed.). Deutscher Investor Relations Verband e.V. (DIRK), Hamburg.
- Mansi, S. A./Maxwell, W. F./Miller, D. P. (2011): Analyst Forecast Characteristics and the Cost of Debt. *Review of Accounting Studies*, Vol. 16(1), pp. 116–142.
- Myers, S. C./Majluf, N. S. (1984): Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have. *Journal of Financial Economics*, Vol. 13(2), pp. 187–221.
- Nagar, V./Nanda, D./Wysocki, P. (2003): Discretionary Disclosure and Stock-Based Incentives. *Journal of Accounting and Economics*, Vol. 34(1), pp. 283–309.

- Nikolaev, V./van Lent, L.* (2005): The Endogeneity Bias in the Relation between Cost-of-Debt Capital and Corporate Disclosure Policy. *European Accounting Review*, Vol. 14(4), pp. 677–724.
- Orens, R./Aerts, W./Cormier, D.* (2010): Web-Based Non-Financial Disclosure and Cost of Finance. *Journal of Business Finance & Accounting*, Vol. 37(9–10), pp. 1057–1093.
- Qi, Y./Roth, L./Wald, J. K.* (2010): Political Rights and the Cost of Debt. *Journal of Financial Economics*, Vol. 95(2), pp. 202–226.
- Rieks, J./Lobe, S.* (2009): Cutting Cost of Capital via Investor Relations: Evidence from the German Stock Market. Working Paper, retrieved from http://www.ibri.com.br/download/academicos/Cutting_costs_of_capital_via_IR_-_german_stock_market.pdf.
- Rottmann, H./Seitz, F.* (2008): Credit Spreads und ihre Determinanten: Eine empirische Analyse für Deutschland, *Kredit und Kapital*, Vol. 41(1), pp. 59–78.
- Sengupta, P.* (1998): Corporate Disclosure Quality and the Cost of Debt. *The Accounting Review*, Vol. 73(4), pp. 459–474.
- Verrecchia, R. E.* (1983): Discretionary Disclosure. *Journal of Accounting and Economics*, Vol. 5(1), pp. 179–194.
- (2001): Essays on Disclosure. *Journal of Accounting and Economics*, Vol. 32 (1–3), pp. 97–180.
- Watts, R. L./Zimmerman, J. L.* (1978): Towards a Positive Theory of the Determination of Accounting Standards. *The Accounting Review*, Vol. 53(1), pp. 112–134.
- Welker, M.* (1995): Disclosure Policy, Information Asymmetry, and Liquidity in Equity Markets. *Contemporary Accounting Research*, Vol. 11(2), pp. 801–827.