

# On the Value of Corporate Social Responsibility Disclosure: An Empirical Investigation of Corporate Bond Issues in China

Guangming Gong<sup>1</sup> · Si Xu<sup>1</sup> · Xun Gong<sup>2</sup>

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**Abstract** We provide the first comprehensive and robust evidence on the relationship between CSR disclosure quality and the costs of corporate bonds in China. We find that firms with high CSR disclosure quality are associated with lower costs of corporate bonds. Our findings are robust to endogeneity issues arising from reverse causality, omitted variable bias, and the interdependencies between price and non-price terms. The negative relationship between CSR disclosure quality and the costs of corporate bonds is stronger in weak corporate governance firms and in firms located in regions with weak institutional environments. We also find that firms' misconduct significantly mitigates the influence of CSR disclosure quality. In the additional analyses, we provide evidence that CSR disclosure can offer incremental information beyond the credit ratings. Regarding non-price terms, we conclude that firms with higher quality of CSR information are less likely to be subject to collateral terms, but they tend to include more restrictive covenants. Further analyses also show that compared with low-quality or mandatory CSR disclosure firms, bond investors perceive firms with CSR disclosures rated above "A" categories or voluntary CSR disclosure as less likely to cause asymmetric information problems and thus charge lower risk premiums. Overall, this study demonstrates that CSR disclosure quality is an important determinant that affects both price and non-price bond contract terms.

**Keywords** Corporate bonds · Corporate social responsibility · Costs of corporate bonds · Bond contract terms

## Abbreviations

CSR Corporate social responsibility  
CSRC China securities regulatory commission

## Introduction

The increasing global awareness of CSR has led to a significant increase in the publishing of CSR reports around the world. Trends in CSR reporting naturally raises the following question among researchers: What is the rationale behind this type of disclosure? A strand of literature investigates this issue from the perspective of financing cost. Most former studies in this area focus on the impacts of CSR on equity financing cost and bank loan cost. El Ghouli et al. (2011) and Dhaliwal et al. (2011) find that firms with better CSR scores exhibit less expensive equity financing. Goss and Roberts (2011), Chava (2014), and Du et al. (2015) consistently show that firms with social responsibility concerns or environmental concerns are associated with higher costs of bank debt. Using China market data, Ye and Zhang (2011) document a U-shaped relationship between CSR and the cost of bank debt. Recently, scholars have shown interest in the link between CSR and the cost of debt in the corporate bond market. However, this line of research has produced mixed findings on the CSR effect. Ge and Liu (2015), Attig et al. (2013), and Jiraporn et al. (2014) find that better CSR performance is associated with higher credit ratings and lower bond yield spreads. Menz (2010) documents a weak positive relationship between CSR and European bond

✉ Si Xu  
b1214s003@hnu.edu.cn

<sup>1</sup> Business School of Hunan University, Changsha 410079, China

<sup>2</sup> College of Finance and Statistics, Hunan University, Changsha 410079, China

spreads. Sharfman and Fernando (2008), in contrast, find that firms with good environmental performance bear higher bond yields but also have higher leverage.

These mixed results reflect the contrasting views on the relationship between CSR and the costs of corporate bonds. One question that arises is, in the Chinese corporate bond market, which viewpoint is supported? In our study, we examine the relation between CSR disclosure quality and the costs of corporate bonds using a sample of 344 corporate bonds issued by Chinese public firms over the sample period 2010–2013. Using OLS regression, our results show that firms with higher CSR disclosure quality are associated with lower costs of corporate bonds. Furthermore, we realize that the estimated relation may suffer from endogeneity problems. More specifically, we address endogeneity arising from three different sources. First, the endogeneity may be caused by the reverse causality that runs from bond costs to CSR disclosure quality. Firms with low costs of corporate bonds would be financially sound and arguably less motivated to disclose high-quality CSR reports. In other words, although better CSR disclosure quality decreases the costs of corporate bonds, low bond costs may lower the need to disclose high-quality CSR information. Another potential cause is the omitted variable bias. It is possible that some (measurable or immeasurable) variables may simultaneously affect the costs of corporate bonds and the quality of CSR disclosure. Finally, the disclosure quality may simply proxy for some non-price terms in the bond contract. It is possible that disclosure quality is correlated with some non-price terms in the bond contract, which, in turn, may be correlated with the bond spreads if the interdependence between price and non-price terms is not properly attended to. To address the reverse causality, we use instrumental variable (IV) regression analysis. We also include possibly omitted variables to mitigate omitted variable bias. To address the interdependence issue, we adopt three different approaches following prior literature. A battery of tests suggests that the negative association between CSR disclosure quality and the costs of corporate bonds is robust to possible endogeneity issues.

In subsequent analyses, we find that the negative relation between CSR disclosure quality and the costs of corporate bonds is more pronounced for firms with weak corporate governance and for firms located in weak regional institutional environments. We also find that firms' misconduct significantly mitigates the influence of CSR disclosure quality, suggesting that firms engaged in misconduct have more information problems and their CSR information may be questionable under such conditions, and subsequently reduces the sensitivity of bond spreads to CSR disclosure quality. Moreover, we investigate whether the identity of the party that reveals the misconduct differentially affects the relationship between

CSR disclosure quality and the costs of corporate bonds. The unreported results show that the value of CSR disclosure decreases after misconduct regardless of who promulgates the news, and we further observe that the misconduct promulgated by CSRC or stock exchanges represents stronger negative signals than those promulgated by the company itself.

Additional analyses provide strong evidence that CSR disclosure can offer incremental information beyond credit ratings and this incremental information is important in lowering the costs of corporate bonds. Moreover, we find that CSR disclosure quality affects non-price bond contract terms. Specifically, we find that firms with higher quality of CSR information are less likely to be subject to collateral terms, but they tend to include more restrictive covenants. However, we do not find a significant difference in bond maturity between firms with higher CSR disclosure quality and firms with less or no CSR disclosure. We also find that firms that disclose high-quality CSR information benefit from lower costs of corporate bonds, whereas there is no difference between firms with low-quality CSR information and firms that do not disclose relevant information on CSR. Additional analyses further show that the signaling effect of mandatory CSR disclosure is much weaker than the voluntary CSR disclosure because bond investors regard mandatory CSR disclosure as simply accomplishing regulatory CSR obligations.

Our study is important because there are many differences between the corporate bond market of China and the corporate bond markets of developed countries (such as the U.S. and European countries). First, in China, corporate bonds are generally issued by listed and financial health firms according to the corporate bond issuance rules published by the CSRC in 2007, whereas in developed countries, there is no related restriction. Second, the CSRC also requests that only corporate bonds that are rated above the investment grade can be publicly issued, whereas in developed countries, there are a great number of bonds below investment grade, particularly in the "very speculative" category. Third, at present, the laws and regulations on CSR disclosure in China are still under development, whereas those in developed countries are relatively comprehensive and mature. To summarize, corporate bonds in China tend to be issued by mature firms and firms with sound financial status, and the information asymmetry of these firms is usually lower. In addition, there are relatively weak regulations on CSR disclosure in China, and thus the information reliability may be questioned, which would reduce investors' dependence on CSR information. Therefore, whether CSR disclosure can provide incremental information in Chinese corporate bond market deserves further exploration.

Our study contributes to the existing literature in several ways. First, unlike most prior studies that find a homogenous effect of CSR disclosure quality on the cost of debt, our

analyses show that the effect of CSR disclosure quality on the cost of debt is in fact heterogeneous. We provide evidence that the relationship between disclosure quality and the cost of debt varies with the firm's corporate governance and the regional institutional environment in which the firm is located. We also find that firms' misconduct significantly mitigates the influence of CSR disclosure quality.

Second, we examine multiple dimensions (instead of a single dimension) of the bond contract, which allows us to investigate bondholders' reactions to CSR disclosure more comprehensively. According to Bharath et al. (2008), bond contracts are a package of n-contract terms that cannot be split and traded separately. The contract terms include not only the price term but also non-price terms such as bond maturity, collateral requirements, covenants, etc. By examining the multi-faceted features of bond contracts, we document that CSR disclosure affects not only the price but also the non-price terms in the Chinese corporate bond market.

Finally, this study is the first to use the context of China, the largest emerging market and the second largest economy, to examine the impacts of CSR disclosure on bondholders' decisions. Previous studies have focused on developed countries such as the U.S. and European countries (Menz 2010; Ge and Liu 2015; Jiraporn et al. 2014) to examine the economic consequences of corporate social performance. However, because of the differences in the institutional settings between developed and developing countries (Du et al. 2015), findings derived from developed countries may not fit well with those from underdeveloped or developing countries. As a result, focusing on the context of China, our study adds to the extant literature on the economic consequences of CSR by examining the influence of CSR disclosure quality on the costs of corporate bonds.

The remainder of this paper is organized as follows. In the second section, we introduce the institutional background, review extant literature, and develop research hypotheses. The third section provides model specifications and variable definitions. The fourth section describes our sample and reports results of descriptive statistics and Pearson correlation analysis. The fifth section reports empirical results and our main findings. The sixth section includes additional analyses and a variety of robustness checks. Finally, we summarize conclusions of our study.

## Institutional Background, Literature Review, and Hypotheses Development

### Institutional Background

With the promulgation of a series of policies, the number of CSR reports released by Chinese firms experienced explosive growth. In 2014, the CSR reports released in

China amounted to 2357, accounting for one-third of total CSR reports all over the world. This growth has largely been driven by mandatory disclosure requirements imposed by regulatory authorities (Wang and Li 2015). According to the *Notice on Doing a Good Job on 2008 Annual Reports (Notice thereafter) by Listed Companies* released by the Shanghai Stock Exchange and the Shenzhen Stock Exchange in December 2008, financial institutions and companies that are included in the Shenzhen 100 Index, Shanghai Corporate Governance Index or cross-listed on overseas stock exchanges are required to disclose CSR reports. This *Notice* plays an important role in the preliminary establishment of China's CSR information disclosure system.

Even though the number of CSR reports has rapidly increased, actual CSR performance and the disclosure quality of CSR reports are still poor in China. According to the *Top 300 China Firms CSR Development Index* reported in *Corporate Responsibility Reporting in China 2014* (Zhong et al. 2015), the average index score of the top 300 Chinese firms is 32.9, which indicates that CSR development in China is still in the start-up phase. Among thousands of published CSR reports, only 280 of them claim to follow GRI standards, and only 143 of them are certified by third parties (auditors, NGOs, and other certificate authorities). Moreover, the homogenization of the design and organization of CSR reports is serious, which makes it difficult for stakeholders to easily distinguish firms from others and accordingly reduce the value of CSR information. People are tired of monotonous summary and bromidic boast. They may be more concerned about firms' faults and introspection, which are seldom mentioned in the CSR reports. In 2014, 598 firms in China disclosed negative information in the CSR reports, and only 97 of them comprehensively reviewed the reasons for negative events and suggested precaution measures.

Recently, the disclosure quality of CSR reports in China has attracted increasing public attention. Although encouraged by the rapid growth of CSR disclosure initiatives in China, CSR advocates also cast doubt on whether CSR disclosure initiatives are distrustful attempts at "window dressing" to "appear" socially responsible and thus improve firm image but without any effective activities.<sup>1</sup> Some scholars critique that a few firms boast themselves in the CSR reports and refuse to fulfill their promises in practice. The greenwashing activities introduced by Du (2015) are good examples. Du (2015) introduces an example

<sup>1</sup> We are especially grateful to the referee for his/her suggestion that we should focus more on the "window dressing" purpose of CSR reporting. In response, in addition to discussing this topic in the institutional background, we also conduct analyses to explore this possibility in "Does CSR reporting serves the "window dressing" purpose surrounding bond issuance?" section.

that some Chinese listed firms spend substantial advertising money to shape their green and environmentally friendly images while actually using numerous additives and toxic materials in production. Because China lacks an independent and efficient judicial system, the situation is further exacerbated. To date, the CSRC and the two stock exchanges have not stipulated sanctions for non-compliance behaviors in mandatory CSR reporting required by the *Notice*. Nevertheless, the regulators in China still insist that the motivation of all the initiatives is based on the belief that “CSR is not window dressing, but a requirement for corporate long-term development.” They believe that firms can utilize CSR disclosure as a means to interact with stakeholders in a timely fashion and proactively subject themselves to the supervision of stakeholders.

### CSR Disclosure Quality and the Costs of Corporate Bonds

As capital providers, bondholders are interested in ensuring the timely repayment of the principal and interests that are claims on the borrower’s future cash flow and assets. Before purchasing a bond, bondholders generally analyze the risk of default, estimate the market value and liquidation values of assets, and evaluate the management’s character and ability.

The disclosure literature suggests that CSR disclosure may provide information incremental to traditional financial reports for investors to assess the risk associated with a firm’s future performance and the level of its expected future cash flows (Wang and Li 2015; Verrecchia 2001).<sup>2</sup> Therefore, compared with firms without CSR disclosure or firms with less CSR information disclosure, firms with high-quality CSR disclosure can significantly decrease the degree of information asymmetry among investors and issuing firms, reduce investors’ doubt, and thus avoid the high financing costs caused by the increase in risk premiums. In addition, greater disclosure increases investors’ awareness of a firm’s existence and enlarges the firm’s investor base, which may improve risk-sharing and reduce

the firm’s financing costs (Merton 1987; Wang and Li 2015). Merton (1987) further demonstrates that the effectiveness of information disclosure in enlarging the investor base relies on whether it can capture widespread attention among investors. From this perspective, we expect that compared with firms without CSR disclosure or firms with less CSR information disclosure, firms with high-quality CSR disclosure are able to attract more investors to follow the firm and thus lower the cost of debt. Moreover, firms disclosing CSR information, to some extent, can signal superior CSR performance (Prado-Lorenzo and Garcia-Sanchez 2010; Wang and Li 2015). Given that CSR activities are subject to relatively high managerial discretion and often depend on the availability of excess funds (McGuire et al. 1988), a firm’s release of CSR reports may signal to the market that it exhibits sound financial performance and its management has confidence in its future prospects, which will also decrease the cost of debt. The foregoing discussion leads to our first hypothesis:

**H1** The quality of CSR disclosure is negatively associated with the costs of corporate bonds.

### CSR Disclosure Quality, Firms’ Corporate Governance, and the Costs of Corporate Bonds

Bhojraj and Sengupta (2003) argue that stronger governance can result in a reduction in bond default risk due to reduced information asymmetry and improved monitoring. Management in stronger governance firms will be more responsive to the information demands of the investor groups and will therefore produce higher-quality (more numeric, proactive, and forward-looking) information. For example, El-Gazzar (1998) argues that large institutional ownership may induce a higher level of voluntary disclosure. Hence, we conjecture that firms with weak corporate governance have potentially higher information problems and default risks compared with firms with strong corporate governance.

A typical CSR report contains a great amount of information, such as expenditures related to environmental protection and supplier relations, charity donations, and employee welfare—all of which are typically not reported in financial statements but bear significant implications for assessing firm value (Dhaliwal et al. 2014). We can infer that disclosing high-quality CSR reports can significantly mitigate information asymmetry problems that are more prevalent in weak governance firms. In support of this argument, Dhaliwal et al. (2014) suggest that CSR disclosures can be viewed as a substitute for financial disclosures in terms of improving a firm’s information environment. Lanis and Richardson (2012) show that higher levels of CSR disclosure are associated with lower tax avoidance, suggesting increased transparency. Thus, we

<sup>2</sup> It is important to note that most prior studies do not distinguish clearly between CSR performance and CSR information disclosure. Whether superior CSR performance will generate more benefits depends on the view of investors, which leads to inconsistent results reported in previous research (Ye and Zhang 2011; Goss and Roberts 2011; Qian et al. 2015). For example, some regard firms with superior CSR performance as having a more favorable risk profile, whereas others regard investments in CSR, such as corporate donations, as a waste of scarce resources. However, from the perspective of CSR disclosure, we consistently conclude that adequate information disclosure can decrease information asymmetry, which significantly benefits investors. In our study, we obtain CSR data from RKS, which evaluates firms’ CSR reports mainly based on information disclosure. Therefore, we develop our hypotheses based on information theory.

expect CSR disclosure in weak corporate governance firms to contain more information needed by investors to monitor and evaluate firms and hence reduce the cost of debt to a greater extent than in strong corporate governance firms. This reasoning leads to our second hypothesis:

**H2** The negative association between CSR disclosure quality and the costs of corporate bonds is more pronounced for firms with weak corporate governance.

### CSR Disclosure Quality, Institutional Environments, and the Costs of Corporate Bonds

A significant characteristic of China's reform process is the uneven distribution of wealth, growth, and legal development between the different provinces (Démurger et al. 2002). Wei et al. (2011) also indicate that, when researching on China-related issues, the differences in institutional environment across provinces cannot simply be ignored. We expect that the relationship between firms' CSR information disclosure and the costs of corporate bonds is also affected by the institutional environment of the regions in which the firms are located.

Firms in weak regional institutional environments are supervised by relatively bad legal systems and monitored by less professional government agencies (Wei et al. 2011), which would lead to weak information environment. Therefore, CSR-related information will be more useful to investors in making decisions for firms in a weak institutional environment. Moreover, Gelb and Strawser (2001) argue that firms with better CSR disclosures exhibit better financial and CSR performance. In a weak regional institutional environment, firms are less likely to experience great pressure from local governments to disclose relevant information. Therefore, the willingness of those firms to disclose more CSR information will convey a greater positive signal (that is, they will exhibit relatively superior CSR performance) to the public. In this condition, firms can use high-quality CSR disclosure to favorably distinguish themselves from other firms, thereby increasing demand for their corporate bonds and lowering their bond costs. Based on this reasoning, we formulate the following hypothesis:

**H3** The negative association between CSR disclosure quality and the costs of corporate bonds is more pronounced for firms located in regions with a weak institutional environment.

### CSR Disclosure Quality, Firms' Misconduct, and the Costs of Corporate Bonds

One of the important roles of CSR disclosure is to reduce information asymmetry between firms and investors by providing incremental information beyond the traditional

financial reports. Chen et al. (2016) indicate that a pre-condition for using financial information or non-financial information is the assurance that the information reflects the firm's actual performance. Specific to CSR reports, there is a common concern about the usefulness of this type of disclosure because of information reliability issues and the opportunistic behaviors of firms (Ingram and Frazier 1980; Hobson and Kachelmeier 2005). Pflugrath et al. (2011) provide experimental evidence that CSR information is more credible when it is assured. If information quality is questionable, bondholders may use other instruments, such as third-party guarantees that do not rely on the firms' CSR reports.

Corporate misconducts are defined as corporate acts that deviate from the prevailing legal or social norms of corporate behavior (Qian et al. 2015). Prior research shows that firm shareholders endure great losses when their firms are accused of misconduct (Karpoff et al. 2008). Fombrun (1996) and Kravet and Shevlin (2010) indicate that firms' past behaviors and positions will influence stakeholders' beliefs about the precision of information. As clear negative signals, misconduct cases bring into question the integrity of firms and executives and therefore damage firms' reputation and credibility (Qian et al. 2015). When firms are found to perform misconduct behaviors, investors reassess their perceptions about the quality of those firms' information. Graham et al. (2008) prove that, compared with non-misconduct firms, misconduct firms experience more severe information problems. As an important source of non-financial information, the CSR disclosure may also be questioned. Moreover, the investors may have more concern on the likelihood that the management discloses the CSR information to serve the "window dressing" purpose. In this condition, the CSR information provided by firms with damaged reputation may be less credible, which plays a minor role in reducing the information asymmetry problem.

Therefore, we expect CSR disclosure in misconduct firms to contain less credible information required by investors to evaluate and monitor firms and hence reduce the costs of corporate bonds to a smaller extent than in non-misconduct firms. This reasoning is captured in our fourth hypothesis:

**H4** The negative association between CSR disclosure quality and the costs of corporate bonds is less pronounced for firms that are found to have committed misconduct.

## Variables and Model Specification

### Model Specification for Hypothesis 1

In Hypothesis 1, we examine the effect of firms' CSR disclosure quality on the costs of corporate bonds,

controlling for firm and bond characteristics. The main empirical model is as follows<sup>3</sup>:

$$\begin{aligned} \text{LogSpread}_{i,t} = & \beta_0 + \beta_1 \text{CSR}_{i,t-1} + \beta_2 \text{Size}_{i,t-1} \\ & + \beta_3 \text{Leverage}_{i,t-1} + \beta_4 \text{Tangibility}_{i,t-1} \\ & + \beta_5 \text{ROA}_{i,t-1} + \beta_6 \text{LossInc}_{i,t-1} + \beta_7 \text{MB}_{i,t-1} \\ & + \beta_8 \text{Growth}_{i,t-1} + \beta_9 \text{Big4}_{i,t-1} + \beta_{10} \text{SOE}_i \\ & + \beta_{11} \text{Accruals}_{i,t-1} + \beta_{12} \text{LogBondAmt}_{i,t} \\ & + \beta_{13} \text{LogMaturity}_{i,t} + \beta_{14} \text{Put}_{i,t} \\ & + \beta_{15} \text{Collateral}_{i,t} + \beta_{16} \text{RatingDummy}_{i,t} \\ & + \beta_i \text{IndustryDummy} + \beta_y \text{YearDummy} + \varepsilon_{i,t}. \end{aligned} \quad (1)$$

Please refer to “Appendix” for detailed definitions of all variables in Eq. (1). In Eq. (1),  $i$  and  $t$  represent the firm and time subscript indicators, respectively.

Following the prior literature (Sengupta 1998; Reisel 2014; Ge and Kim 2014), we use *LogSpread*, the natural logarithm of initial bond spreads (i.e., coupon rate minus Treasury bond yields of comparable maturity), as a proxy for the costs of corporate bonds.<sup>4</sup> *CSR score* represents the firm’s total CSR disclosure and is our main variable of interest in this regression model. We also use three dimensions of CSR measurements: overall evaluation (*Overall score*), content evaluation (*Content score*), and technical evaluation (*Technical score*), to measure CSR disclosure quality. Moreover, we use *CSR dummy*, an indicator variable that equals one if issuers release a CSR report to denote CSR disclosure quality. If the regression coefficient on CSR ( $\beta_1$ ) is significantly negative, our empirical results support Hypothesis 1.

To control for firm characteristics, we use *Size*, the natural logarithm of the firm’s total assets, to measure firm size. Larger firms tend to have a longer history and to be more established. Thus, the information asymmetry is less severe between a large firm and its bond investors, resulting in a more favorable price term for such firms (Rahaman and Al Zaman 2013). We use *Leverage*, calculated as the total debt divided by total assets, to control for the firm’s

existing debt level. On average, firms with higher leverage ratios have higher default risk and are thus expected to have higher borrowing costs. Prior studies document that tangible assets and firm profitability significantly affect the cost of debt (Bharath et al. 2008; Ge et al. 2012). Therefore, we include three variables, i.e., *Tangibility*, *ROA*, and *LossInc*, in our estimations. *Tangibility*, computed as tangible assets divided by total assets, is included to control for the easier recoverability of tangible assets in the case of default and thus leads to lower borrowing costs for firms with more tangible assets. *ROA* is measured as net income divided by total assets. *LossInc* is calculated as the proportion of income losses over the past eight quarters. On average, firms with higher profitability ratios have lower default risk, and accordingly the cost of debt is lower.

We also employ the variables *MB* and *Growth* to proxy for the firm’s growth opportunity. *MB* is measured as the market value divided by the book value of equity; *Growth* is computed as ending sales revenue divided by one-year lagged sales revenue. Intuitively, high-growth firms have a greater potential to experience an increase in future cash flow, which may lower their financing costs. However, several accounting studies suggest that growth firms may be more vulnerable to financial distress and to information asymmetries; thus, the effect on the costs of corporate bonds is unclear. Additionally, considering that investors may expect that SOE firms are more inclined to receive government bailouts, we also include the *SOE* variable, a dummy variable that equals one if the firm is a state-owned enterprise and zero if it is an NSOE. We classify borrowers as SOEs and NSOEs based on the ownership type of their ultimate controlling shareholders.<sup>5</sup> We also include *Big4*, an indicator variable that equals one if the firm’s auditor is one of the Big 4 and zero otherwise. Finally, *Accruals*, following Bharath et al. (2008) and Hasan et al. (2012), is included to further control for the discretionary accruals of a firm. *Accruals* is computed as the absolute residual using the methodology described by Dechow and Dichev (2002).<sup>6</sup> A high value of *Accruals* indicates a worse earning quality and higher default risk of debt for a firm.

We also control for bond characteristics that are related to corporate bond prices. *LogBondAmt* is the natural logarithm of the amount of a single bond; bond size is a measure of marketability and is expected to be inversely related to risk premiums. *LogMaturity* is the natural logarithm of bond maturity measured in months; longer-term

<sup>3</sup> Generally, issuing bonds begins by the borrower appointing the lead underwriter, who conducts due diligence and establishes non-price bond features such as amount, maturity, and covenants with the borrower and leaves the final price to be determined. At this stage, the lead underwriter would formally poll potential investors to gauge the level of coupon rate in the bond. This process is referred to as the “book-building mechanism”, and it has been adopted in selling public bonds, which is similar to the loan syndication process described by Bharath et al. (2011). Thus, this description of the bond issuing process makes our assumption of yield spreads being determined after all other non-price terms have been settled quite realistic.

<sup>4</sup> Notably, all Chinese corporate bonds are requested to be issued at their par value by the CSRC, which means that discount issuing is forbidden. Therefore, the coupon rate can accurately measure the real financing cost of bond issuer.

<sup>5</sup> SOEs are defined as those borrowers directly or indirectly owned or controlled by state asset management bureaus or other state-owned enterprises controlled by the central government or local governments (Chen et al. 2013).

<sup>6</sup> In an unreported analysis, we also use the methodology reported by Francis et al. (2005) and Ball and Shivakumar (2006) to measure accruals, and the results remain qualitatively unchanged.

debt tends to be charged higher bond spreads because of its higher interest risk exposure. *Collateral* is a dummy variable indicating whether a bond is collateralized. A put option on a bond allows bondholders to have the right to force the issuer to pay back the principal before maturity. Therefore, *Put* is expected to be inversely correlated with bond spreads. *Put* is an indicator variable that equals one if a bond issue has a put option and zero otherwise. Furthermore, credit ratings may contain information about firm performance beyond those provided by publicly available financial ratios (Dichev and Piotroski 2001). Thus, we run our regressions with credit ratings as dummies.

Industry and macroeconomic conditions also have an important bearing on the pricing of public debt. For example, firms in more competitive industries may have a lower likelihood to survive and hence have higher default risk (Rahaman and Al Zaman 2013). Market-wide default risk increases during recessions, resulting in higher bond spreads. Thus, we include year and industry indicators to control for year and industry effects. We follow Petersen (2009) and correct for possible serial correlation and heteroskedasticity by clustering at the firm level.

### Model Specification for Hypothesis 2

To test Hypothesis 2, we construct two variables, *Top5* and *Institutional*, and then estimate Eq. (2) to examine how firm-level governance interacts with a firm's CSR disclosure quality in determining bond spreads.

$$\begin{aligned} \text{LogSpread}_{i,t} = & \beta_0 + \beta_1 \text{CSR}_{i,t-1} + \beta_2 \text{Governance}_{i,t-1} \\ & + \beta_3 \text{CSR}_{i,t-1} \times \text{Governance}_{i,t-1} \\ & + \beta_4 \text{Size}_{i,t-1} + \beta_5 \text{Leverage}_{i,t-1} \\ & + \beta_6 \text{Tangibility}_{i,t-1} + \beta_7 \text{ROA}_{i,t-1} \\ & + \beta_8 \text{LossInc}_{i,t-1} + \beta_9 \text{MB}_{i,t-1} \\ & + \beta_{10} \text{Growth}_{i,t-1} + \beta_{11} \text{Big4}_{i,t-1} + \beta_{12} \text{SOE}_i \\ & + \beta_{13} \text{Accruals}_{i,t-1} + \beta_{14} \text{LogBondAmt}_{i,t} \\ & + \beta_{15} \text{LogMaturity}_{i,t} + \beta_{16} \text{Put}_{i,t} \\ & + \beta_{17} \text{Collateral}_{i,t} + \beta_{18} \text{RatingDummy}_{i,t} \\ & + \beta_i \text{IndustryDummy} + \beta_y \text{YearDummy} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

In Eq. (2), the moderating variable is corporate governance, labeled as *Top5* and *Institutional*. *Top5* is the percentage of shares held by the top five shareholders, and *Institutional* is the percentage of shares held by the institutional investors. Both measures are used by Wang et al. (2004), Dittmar and Mahrt-Smith (2007), and Wu et al. (2014) as proxies for corporate governance. Based on our prior analysis, if the coefficient on the interaction term ( $\beta_3$ ) is significant and positive, Hypothesis 2 is supported by our

empirical evidence. All control variables in Eq. (2) are the same as those in Eq. (1).

### Model Specification for Hypothesis 3

To examine whether the association between CSR disclosure quality and the costs of corporate bonds is conditional on the strength of a region's institutional environment, we add the *Market* variable and the interaction term of *CSR disclosure quality*  $\times$  *Market* in Eq. (3):

$$\begin{aligned} \text{LogSpread}_{i,t} = & \beta_0 + \beta_1 \text{CSR}_{i,t-1} + \beta_2 \text{Market}_{i,t-1} \\ & + \beta_3 \text{CSR}_{i,t-1} \times \text{Market}_{i,t-1} + \beta_4 \text{Size}_{i,t-1} \\ & + \beta_5 \text{Leverage}_{i,t-1} + \beta_6 \text{Tangibility}_{i,t-1} \\ & + \beta_7 \text{ROA}_{i,t-1} + \beta_8 \text{LossInc}_{i,t-1} + \beta_9 \text{MB}_{i,t-1} \\ & + \beta_{10} \text{Growth}_{i,t-1} + \beta_{11} \text{Big4}_{i,t-1} + \beta_{12} \text{SOE}_i \\ & + \beta_{13} \text{Accruals}_{i,t-1} + \beta_{14} \text{LogBondAmt}_{i,t} \\ & + \beta_{15} \text{LogMaturity}_{i,t} + \beta_{16} \text{Put}_{i,t} \\ & + \beta_{17} \text{Collateral}_{i,t} + \beta_{18} \text{RatingDummy}_{i,t} \\ & + \beta_i \text{IndustryDummy} + \beta_y \text{YearDummy} + \varepsilon_{i,t}. \end{aligned} \quad (3)$$

In Eq. (3), the moderating variable is institutional environment, labeled as *Market*. Following previous studies, we use the comprehensive development index (*Market*) compiled by Fan et al. (2011) as a proxy for the institutional environment of each province (Wu et al. 2014; Du et al. 2015).<sup>7</sup> The higher the values of *Market*, the faster the process of regional marketization and the better the regional institutional environment.<sup>8</sup> In Eq. (3), if the coefficient on *CSR*  $\times$  *Market* is significantly positive, our empirical results support Hypothesis 3. All control variables in Eq. (3) are the same as those in Eq. (1).

<sup>7</sup> The index captures the characteristics of each regional institutional environment by analyzing the following aspects: (1) the relationship between the government and the markets, shown by factors such as the role of markets in allocating resources and the enterprise burden in addition to normal taxes; (2) the development of non-state business, as measured partly by the ratio of industrial output from the private sector to total industrial output; (3) the development of product markets, indicated by features such as regional trade barriers; (4) the development of factor markets, measured by indicators such as foreign direct investment (FDI) and mobility of labor; and (5) the development of market intermediaries and the legal environment, captured through measures such as the protection of property rights.

<sup>8</sup> We measure the institutional environment using the lagged marketization index at the end of the fiscal year before bond issuance. However, because Fan et al. (2011) provide data for the marketization index across various regions in China from 2001 to 2009 only, we use the regional marketization index measured in 2009 for bonds issued after 2010.

## Model Specification for Hypothesis 4

To investigate whether a non-misconduct firm's CSR disclosure leads to a larger decrease in the costs of corporate bonds than that of misconduct firm, we include *Misconduct* and the interaction term *CSR disclosure quality*  $\times$  *Misconduct* in Eq. (4). *Misconduct* is a dummy variable equal to one if the firm is found to have committed misconduct in the previous year before bond issuance.<sup>9</sup>

$$\begin{aligned} \text{LogSpread}_{i,t} = & \beta_0 + \beta_1 \text{CSR}_{i,t-1} + \beta_2 \text{Misconduct}_{i,t-1} \\ & + \beta_3 \text{CSR}_{i,t-1} \times \text{Misconduct}_{i,t-1} \\ & + \beta_4 \text{Size}_{i,t-1} + \beta_5 \text{Leverage}_{i,t-1} \\ & + \beta_6 \text{Tangibility}_{i,t-1} + \beta_7 \text{ROA}_{i,t-1} \\ & + \beta_8 \text{LossInc}_{i,t-1} + \beta_9 \text{MB}_{i,t-1} \\ & + \beta_{10} \text{Growth}_{i,t-1} + \beta_{11} \text{Big4}_{i,t-1} \\ & + \beta_{12} \text{SOE}_i + \beta_{13} \text{Accruals}_{i,t-1} \\ & + \beta_{14} \text{LogBondAmt}_{i,t} + \beta_{15} \text{LogMaturity}_{i,t} \\ & + \beta_{16} \text{Put}_{i,t} + \beta_{17} \text{Collateral}_{i,t} \\ & + \beta_{18} \text{RatingDummy}_{i,t} + \beta_i \text{IndustryDummy} \\ & + \beta_y \text{YearDummy} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

In Eq. (4), if the coefficient on *CSR*  $\times$  *Misconduct* is significant and positive, Hypothesis 4 is supported by our empirical results. All control variables in Eq. (4) are the same as those in Eq. (1).

## Sample Selection and Descriptive Statistics

### Sample Identification and Data Source

Considering that the Shanghai Stock Exchange has standardized and guided listed firms in CSR report disclosure only since 2008, we select a sample for the period 2010–2013.<sup>10</sup> To examine the relationship between CSR disclosure and corporate bond contracting, we collect data from several sources. Following the literature on CSR reporting in China (Wang and Li 2015; Marquis and Qian

<sup>9</sup> We should note that firms' misconduct can be divided into three categories: (1) the misdeeds have been observed and disclosed by others, such as CSRC and Shanghai and Shenzhen stock exchanges; (2) the misdeeds have been observed and proactively disclosed by firms themselves; and (3) the misdeeds have occurred but they have not been detected. Because we observe only detected misdeeds, we have to neglect the third category.

<sup>10</sup> We use one-year lagged CSR. The common practice in the RKS (a CSR rating agency, which will be discussed later) is actually to assemble the various social/environmental data at the end of each calendar year and compile them into spreadsheets at the beginning of the next year. Therefore, lagging the CSR variables helps ensure that the ratings for each firm were public knowledge at time *t*.

2013; Xu et al. 2015; Lau et al. 2014), we start building our sample by obtaining CSR data from Rankins CSR Ratings (RKS).<sup>11</sup> For the firms that do not release a CSR report, we assign a value of zero to the *CSR score* variable. RKS assigns a score scale to each report based on 70 evaluation indicators, which are classified into three dimensions<sup>12</sup>: (1) overall evaluation, including a firm's CSR strategy, stakeholder participation, information comparability, reliability and transparency, and the innovativeness of a firm's CSR activities; (2) content evaluation, including a firm's CSR management system and the coverage and depth of the disclosure of specific CSR indicators relating to economic, environmental, and social performance; and (3) technical evaluation, including CSR reporting policy, compliance with guidelines, the clarity of the report, and the availability of CSR information. A composite CSR score is formulated based on the weighted average of the scores of these three categories.

Information of corporate bonds is obtained from the China Securities Markets and Accounting Research Database (henceforth CSMAR), which provides the offering yield, issued amount, offering date, maturity, collateral, and credit rating for each bond. We then use the Wind database to extract data on accounting variables and the purpose of the bond for the given firm.<sup>13</sup> All financial statements' data are measured at the end of the fiscal year before bond issuance.<sup>14</sup> Finally, we manually collect information on the use of covenants disclosed in firms' bond prospectus.

We only consider public bonds issued by China's industrial companies; therefore, we exclude bond issues by financial institutions because they are subject to different

<sup>11</sup> Referring to the ISO26000, the RKS, an independent third-party rating agency, builds a comprehensive score scale index to measure the CSR disclosure quality of Chinese listed firms from their disclosed CSR reports. According to the statement of RKS, this index is built to raise awareness of CSR disclosure quality, promote more quantitative information disclosure of CSR reports, and assist academic research on CSR disclosure.

<sup>12</sup> In the latest edition (2012), RKS incorporates the fourth dimension, the industrial dimension, which receives the lowest (10%) weight in the CSR index. Considering the consistency of CSR, we neglect the industrial dimension, that is, a CSR score is developed based on the former three dimensions.

<sup>13</sup> The CSMAR and Wind database were developed according to the international standards of databases to meet the requirement of academic research, and those databases were used in several recent studies. See, for example, Chen et al. (2013), Chen and Zhu (2013), and Gong et al. (2015).

<sup>14</sup> As suggested by Ge and Kim (2014), we use the lagged accounting variables, which offer two advantages. First, offering yield is more affected by past accounting information than by current accounting information, which ensures that accounting information is already available to bondholders at the time of bond issuance. Second, regression of current bond yields on lagged accounting information alleviates a potential endogeneity concern.



accounting rules and regulations. We then exclude all bond issues missing offering yield, offering date, maturity date, or accounting data. In short, we are careful to ensure that the sample includes corporate bonds with valid information about CSR disclosure and other bond characteristics. This procedure results in a sample of 344 bonds. We winsorize all continuous variables at the top and bottom 1 % to mitigate the influence of extreme observations.

## Descriptive Statistics

Panel A of Table 1 reports the descriptive statistics results of variables used in our study. The average *CSR score* is about 19.47, and the average bond yield spread equals 2.62 %. The average offering amount is approximately 1.42 billion RMB, with an average maturity of 68.7 months. The mean number of restrictive covenants included in each bond contract is about 0.64, suggesting that most sample bonds do not contain restrictive covenants. The mean of the indicator variable *Put* is 0.62, suggesting that 62 % of bond issues have a put option. On average, 54 % of bonds are secured. With respect to firm characteristics, the average *MB* is 1.5, and the average *Growth* is 23.41 %. The mean value of *Leverage* shows that, on average, the financing source of 52 % of total assets is from debt. SOEs comprise 58 % of the sample, and 19 % of bonds are audited by the Big 4 auditors. Various performance and risk measures indicate that, on average, our sample firms are financially healthy.

To shed more light on the differences between CSR disclosure firms and non-disclosure firms, we divide the full sample into these two subsamples according to whether they release a CSR report. As shown in Panel B of Table 1, both the mean and median values of the bond spreads are significantly lower for the CSR disclosure subsample than for the non-disclosure subsample. The bond spreads of a CSR disclosure firm, on average, is 0.71 % lower than that of a non-disclosure firm in the sample. A 0.71 % reduction in bond spreads is equivalent to 10.082 million RMB in annual interest savings (ignoring compounding) on an average bond size of 1.42 billion RMB in our sample. The table also shows that the average bond amount is larger for the CSR disclosure subsample, with a longer maturity compared with that of non-disclosure firms. A bond issued by a CSR disclosure firm is also more likely to contain restrictive covenants. Regarding the control variables, the results in Panel B show that there are pronounced differences in the mean and median values between these two subsamples. The CSR disclosure firms are larger in size, have higher leverage ratios, and are more likely to be audited by Big 4 auditors compared with non-disclosure firms.

For illustration purposes, we plot the average price (bond spreads) and non-price terms of CSR disclosure firms and non-disclosure firms in Fig. 1. We first standardize the price and non-price terms with mean “0” and variance “1” so that they are comparable across firms in the following manner:  $z = \frac{x - \bar{x}}{\sigma_x}$ , where  $z$  is the standardized term of the bond contract,  $x$  is the actual term (non-standardized),  $\bar{x}$  is the average across the sample bonds, and  $\sigma_x$  is the standard deviation of  $x$  across the sample bonds. The top panel of Fig. 1 shows that CSR disclosure firms can issue corporate bonds at lower financing costs compared with the non-disclosure firms. The panel shows quite clearly that bond investors do factor the quality of a firm’s CSR disclosure into the price of a public bond. The bottom panel of Fig. 1 shows various non-price contract terms. Bharath et al. (2011) and Graham et al. (2008) argue that non-price terms generally incorporate the amount, maturity, covenants, and collateral features of the bond. The figure shows that compared with non-disclosure firms, CSR disclosure firms can issue larger corporate bonds with longer maturity and need to post more collateral for their bonds.<sup>15</sup> Interestingly, we find that CSR disclosure firms are more likely to include covenants for their bonds, which contradicts the findings of Hasan et al. (2012) and will be discussed further in the “additional analyses” section. In summary, the foregoing discussion on the price and non-price contract terms and the CSR provides evidence that bond investors factor issuers’ CSR disclosure into the design of bond contracts.

Table 2 provides the Pearson correlations of variables. The key variables of interests in our study are CSR disclosure (*CSR score*) and the costs of corporate bonds (*LogSpread*). The correlation matrix shows that the *CSR score* variable is negatively correlated with *LogSpread*, providing preliminary support for Hypothesis 1. The correlations between *LogSpread* and many bond- and firm-specific variables are highly informative. For example, the costs of corporate bonds are lower in larger SOE firms and in firms whose financial statements are audited by the Big 4. The costs of corporate bonds are high when firms’ operating risk (*LossInc*) is high.

Furthermore, the correlation coefficients among most control variables are generally low, as expected, and the variance inflation factors of all independent variables are far below 10, implying that there is no serious

<sup>15</sup> However, after using regression analysis, we document that CSR disclosure is negatively correlated with the collateral requirement on the bond, which will be discussed later.

**Table 1** Descriptive statistics and univariate testsPanel A: Descriptive statistics of the full sample ( $N = 344$ )

Variable	Mean	SD	Q1	Median	Q3
<i>CSR characteristics</i>					
CSR score	19.47	21.88	0	0	35.50
Overall score	6.34	7.38	0	0	11.25
Content score	9.47	10.72	0	0	17.90
Technical score	3.66	4.20	0	0	6.31
<i>Bond characteristics</i>					
Spread	2.62	0.94	1.83	2.45	3.23
BondAmt	14.20	18.60	5	8	15
Maturity	68.70	22.50	60	60	84
Covenants	0.64	0.90	0	0	2
Put	0.62	0.49	0	1	1
Collateral	0.54	0.50	0	1	1
<i>Firm characteristics</i>					
Size	23.15	1.57	22.04	22.79	24.08
Leverage	51.62	17.12	40.88	52.93	64.07
Tangibility	37.86	19.91	25.62	37.79	49.28
ROA	6.07	4.05	2.99	4.92	8.40
LossInc	0.03	0.10	0	0	0
MB	1.50	0.77	1	1.22	1.63
Growth	23.41	20.37	9.62	21.53	36.74
Big4	0.19	0.39	0	0	0
SOE	0.58	0.49	0	1	1
Accruals	0.06	0.06	0.02	0.05	0.09

Panel B:  $t$  ( $z$ ) tests for the difference in the mean (median) value between CSR disclosure subsample and non-disclosure subsample

Variable	CSR disclosure ( $N = 171$ )		Non-disclosure ( $N = 173$ )		(2) - (1)	
	Mean	Median	Mean	Median	$t$ test	$z$ -test
<i>Bond characteristics</i>						
Spread	2.26	2.10	2.97	2.75	7.55***	7.31***
BondAmt	19.58	12	8.89	7	-5.56***	-6.29***
Maturity	72.60	60	64.86	60	-3.23***	-2.61***
Covenants	0.78	0	0.50	0	-2.94***	-2.93***
Put	0.48	0	0.76	1	5.65***	5.41***
Collateral	0.58	1	0.50	0	-1.52	-1.52
<i>Firm characteristics</i>						
Size	23.91	23.84	22.40	22.20	-10.24***	-8.94***
Leverage	54.71	56.04	48.56	49.94	-3.38***	-3.20***
Tangibility	35.15	36.18	40.52	41.52	2.52**	3.00***
ROA	5.98	4.81	6.17	5.25	0.44	0.81
LossInc	0.04	0	0.03	0	-0.75	-1.29
MB	1.46	1.17	1.54	1.31	0.92	2.68***
Growth	23.37	21.62	23.45	21.44	0.04	0.06
Big4	0.30	0	0.09	0	-5.16***	-4.98***
SOE	0.77	1	0.41	0	-7.29***	-6.79***

**Table 1** continued

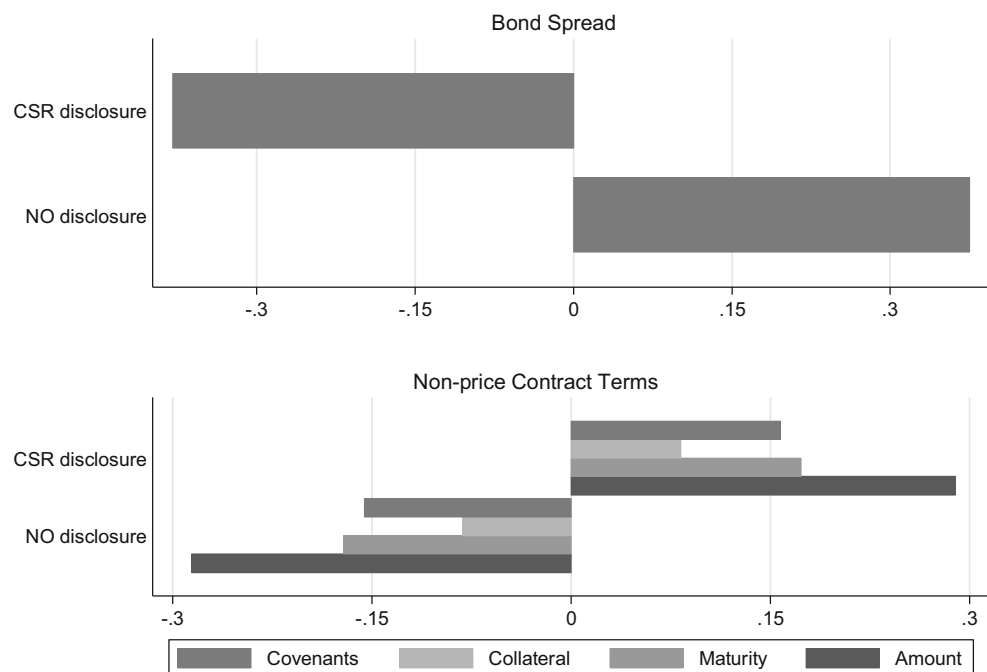
Panel B: *t* (*z*) tests for the difference in the mean (median) value between CSR disclosure subsample and non-disclosure subsample

Variable	CSR disclosure ( <i>N</i> = 171) (1)		Non-disclosure ( <i>N</i> = 173) (2)		(2) – (1)	
	Mean	Median	Mean	Median	<i>t</i> test	<i>z</i> -test
Accruals	0.06	0.05	0.07	0.06	1.66*	1.25

This table reports the results of descriptive analysis and univariate tests. Panel A presents descriptive statistics of firm and bond characteristics for the full sample. Panel B presents subsample descriptive statistics for CSR disclosure firms and non-disclosure firms. CSR disclosure is an indicator variable that equals one if a firm releases a CSR report in year *t* – 1 and 0 otherwise. *T* tests are used to test differences between means. Wilcoxon two-sample tests are used to test differences between medians. The details of definitions and measurements of all the variables are reported in the “Appendix”

Significance at the 10 %, 5 %, and 1 % levels is indicated by \*, \*\*, and \*\*\*, respectively

**Fig. 1** CSR disclosure and bond contract terms. This figure plots average price and non-price contract terms for CSR disclosure firms and non-disclosure firms. All price and non-price contract terms are standardized with mean 0 and variance 1 so that they are comparable across firms, shown in the horizontal axis. The details of definitions and measurements of variables are reported in the “Appendix”



multicollinearity when we include these control variables in our models simultaneously.<sup>16</sup>

**Does CSR Reporting Serves the “Window Dressing” Purpose Surrounding Bond Issuance?<sup>17</sup>**

If bondholders view issuer’s CSR disclosure positively and accordingly ask for a lower premium on the corporate

bond, the issuer could window-dress by improving CSR disclosure quality before and decreasing it after corporate bond initiation. As suggested by Bharath et al. (2008) and Hasan et al. (2014), we investigate whether firm’s CSR disclosure quality has experienced significant changes two or three years prior to bond initiations. To begin with, we examine the change in CSR disclosure status. From Panel A of Table 3, we find that only 8.56 % firms have changed their CSR disclosure status from no disclosure status in year *t* – 2 to disclosure status in year *t* – 1. Approximately 51.4 % firms still do not release CSR reports, whereas 40 % firms continue to release CSR reports. A similar result holds when we examine the change in CSR disclosure status from year *t* – 3 to year *t* – 1. This result indicates that there is a persistence in disclosure status for most firms. Further, to more fully understand how firms manage their CSR disclosure quality before bond issuance,

<sup>16</sup> We offer our many thanks to the referee for his/her valuable suggestion. As suggested, we report variance inflation factors (VIF) in Table 2. Moreover, according to Du et al. (2015), we also employ the condition indices to diagnose the multicollinearity. Non-tabulated results show that the largest intercept-adjusted condition index is far less than 10, suggesting that there is no serious multicollinearity in our empirical models.

<sup>17</sup> A referee provides insightful conjecture motivating us to do more descriptive analyses to address this concern in the Chinese corporate bond market.



**Table 2** Pearson correlation matrix

Variables	VIF	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<i>LogSpread</i>	1	1															
<i>CSR score</i>	2	1.87	1														
<i>Size</i>	3	7.94	-0.64	1													
<i>Leverage</i>	4	5.78	-0.18	0.20	1												
<i>Tangibility</i>	5	4.44	0.19	-0.18	-0.44	-0.87	1										
<i>ROA</i>	6	2.10	-0.08	-0.02	-0.15	-0.55	0.43	1									
<i>LossInc</i>	7	1.16	0.19	-0.02	-0.11	0.09	-0.07	-0.17	1								
<i>MB</i>	8	1.75	0.21	-0.11	-0.42	-0.39	0.35	0.41	-0.04	1							
<i>Growth</i>	9	1.24	0.13	0.01	-0.02	0.07	-0.13	0.20	0.14	0.10	1						
<i>Big4</i>	10	1.49	-0.38	0.39	0.52	0.13	-0.15	0.03	-0.12	-0.20	-0.04	1					
<i>SOE</i>	11	1.67	-0.49	0.37	0.47	0.31	-0.27	-0.14	0.04	-0.25	-0.13	0.16	1				
<i>Accruals</i>	12	1.12	0.21	-0.16	-0.18	-0.06	0.01	0.10	-0.03	0.14	0.02	-0.12	-0.08	1			
<i>LogBondAmt</i>	13	3.14	-0.52	0.47	0.79	0.32	-0.28	-0.03	-0.14	-0.29	-0.01	0.42	0.32	-0.16	1		
<i>LogMaturity</i>	14	1.26	-0.12	0.16	0.20	0.12	-0.10	-0.05	0.05	-0.06	0.01	0.02	0.17	0.02	0.16	1	
<i>Put</i>	15	1.73	0.32	-0.33	-0.52	-0.20	0.16	0.07	0.10	0.21	0.05	-0.28	-0.31	0.10	-0.32	0.15	1
<i>Collateral</i>	16	1.37	-0.12	0.08	0.18	0.15	-0.13	-0.14	0.12	-0.12	-0.11	-0.01	0.28	0.06	0.08	0.19	-0.24
<i>Top5</i>	17	1.54	-0.35	0.24	0.43	0.03	-0.04	0.11	-0.07	-0.26	0.02	0.23	0.17	-0.08	0.31	0.12	-0.26
<i>Institutional</i>	18	1.45	-0.31	0.29	0.35	0.13	-0.12	0.04	-0.07	0.11	0.06	0.12	0.20	-0.05	0.25	0.03	-0.19
<i>Market</i>	19	1.29	-0.07	0.04	-0.08	-0.25	0.26	0.20	0.08	0.08	-0.06	0.10	-0.24	-0.08	-0.12	-0.06	0.03
<i>Misconduct</i>	20	1.13	0.26	-0.17	-0.25	-0.16	0.16	0.03	-0.00	0.06	-0.01	-0.15	-0.20	0.02	-0.22	-0.06	0.20
<i>AAA category</i>	21	3.64	-0.66	0.48	0.72	0.28	-0.22	-0.03	-0.12	-0.32	-0.14	0.34	0.45	-0.21	0.56	0.10	-0.44
<i>AA+ category</i>	22	1.58	0.02	-0.06	-0.06	-0.00	-0.08	0.01	-0.01	0.02	0.01	0.01	0.06	0.04	-0.01	-0.02	-0.04
<i>AA- category</i>	23	1.07	0.15	-0.08	-0.12	-0.02	0.05	-0.03	-0.03	0.04	-0.04	-0.05	-0.11	0.05	-0.16	-0.03	0.07
Variables		VIF															
<i>Collateral</i>	16	1.37		1													
<i>Top5</i>	17	1.54		0.16	1												
<i>Institutional</i>	18	1.45		0.08	0.32	1											
<i>Market</i>	19	1.29		-0.08	0.11	0.01	1										
<i>Misconduct</i>	20	1.13		-0.14	-0.11	-0.11	0.03	1									
<i>AAA category</i>	21	3.64		0.27	0.25	0.25	0.05	0.05	0.05	0.05	-0.24	1					
<i>AA+ category</i>	22	1.58		0.05	-0.01	-0.05	-0.15	-0.05	-0.05	-0.05	-0.05	-0.39	1				
<i>AA- category</i>	23	1.07		-0.10	-0.02	0.00	-0.02	0.09	0.09	0.06	0.06	-0.06	-0.06	1			

Correlations that are significant at the 5 % level or less are bold-faced. VIF denotes “variance inflation factors.” Please see “Appendix” for variable definitions

we rank firms with persistent CSR disclosures into quartiles at year  $t - 2$  (year  $t - 3$ ) and year  $t - 1$  according to the CSR disclosure quality and see if the rankings of firms change significantly. In Panel B of Table 3, we find that nearly 98.4 % (91.8 %) firms remain in the same quartile or change by one rank from year  $t - 2$  (year  $t - 3$ ) to year  $t - 1$ . Hence, there is a persistence of CSR disclosure quality for an overwhelming majority CSR disclosure firms, which suggests that quickly improving the CSR disclosure quality before bond issuance is not common. These findings demonstrate that few bond issuers suddenly begin to release CSR reports or significantly increase CSR disclosure quality before bond issuance to “appear” to be ethical and responsible. This gives us confidence that CSR reporting is less likely to serve the “window dressing” purpose.

Moreover, we are also interested in whether firms will stop releasing CSR report or decrease the CSR disclosure quality significantly in the following years after bond issuance since their financing objective has been achieved. From Panel A of Table 3, we can see that 28 firms have changed CSR disclosure status from no disclosure status in year  $t - 2$  to disclosure status in year  $t - 1$ . Therefore, we conduct analysis based on these firms since their CSR reporting is more likely to serve the “window dressing” purpose. From Panel C of Table 3, we find that all firms keep releasing CSR reports after bond issuance, and the CSR information quality is improving. The results of  $t$  tests reveal that CSR disclosure quality in both year  $t + 1$  and year  $t$  is significantly higher than that in year  $t - 1$ . On the whole, foregoing results reveal that firms still increase their CSR disclosure quality even after bond issuance, which indirectly supports the inference that the CSR reporting is less likely to serve the “window dressing” purpose in the corporate bond market of China.

## Results of Empirical Analyses

### CSR Disclosure Quality and the Costs of Corporate Bonds

The baseline OLS regression results on the effect of firms' CSR disclosure on bond spreads are reported in Table 4. In column (1), we simply use the firm and bond characteristics in the regression without controlling for any CSR disclosure variables. We also include year and industry effects as well as bond credit ratings. The baseline group is the AA category.<sup>18</sup> The results show, consistent with intuition, that

<sup>18</sup> In 2007, the CSRC published corporate bond issuance rules that require the bond to be ranked above the investment grade when

larger firms and firms with sound financial performance (*ROA*), higher growth opportunities (*MB*), and lower abnormal accruals (*Accruals*) receive lower costs of corporate bonds. In addition, the yields are lower for bonds issued by SOEs or audited by the Big 4.

Interestingly, the positive (and significant) coefficient for collateral is inconsistent with the notion that this term can be used as a trade-off feature for price terms. This result, however, conforms to the results reported by Berger and Udell (1990) and Bharath et al. (2011), who also find that borrowers that are required to post collateral are also more likely to receive a higher cost of debt. Regarding the *Leverage* variable, the relationship between *Leverage* and debt cost is insignificant, which is inconsistent with most studies (Ge and Kim 2014; Bharath et al. 2008). The most probable reason is that the corporate bond issuance rules published by the CSRC definitely require that the accumulated outstanding balances of companies' corporate bonds do not exceed 40 % of their net asset value after this issuance, which restricts issuers' leverage in a similar interval (Gong et al. 2015). Thus, the coefficient of *Leverage* on the costs of corporate bonds is insignificant.

In columns (2)–(6), we control for firms' CSR disclosure, and the results show that after controlling for various firm and bond characteristics, the magnitude of the coefficient on various proxies for CSR disclosure quality ranges from  $-0.001$  to  $-0.069$  and continues to be statistically significant regardless of the CSR measures used. This result supports the argument of Hypothesis 1 that, all else being equal, bondholders charge lower risk premiums to firms with better CSR information disclosure. Recall from Panel A in Table 1 that the first and third quartiles of *CSR score* are 0 and 35.5, respectively. In column (2), the regression results suggest that the improvement of CSR by moving from the first to the third quartile is associated with an expected change of  $-0.0355$  in *LogSpread*, which denotes a 3.5 % decrease in the bond spread (in excess of the Treasury bond yields).<sup>19</sup> Panel A of Table 1 shows that the mean value of *Spread* is 2.62 %, and the mean bond amount is 1420 million RMB. Thus, on average, the shift in the *CSR score* from the first to the third quartile can save a firm an annual interest cost of 1.302 million RMB

Footnote 18 continued

issued. Thus, our paper only includes bonds with credit rating ranging from AA– to AAA.

<sup>19</sup> The calculation is as follows:  $LogSpread_{CSRscore3rd} - LogSpread_{CSRscore1st} = \log\left(\frac{Spread_{CSRscore3rd}}{Spread_{CSRscore1st}}\right) = -0.001 \times (35.5 - 0) = -0.0355$ . Thus,  $\frac{Spread_{CSRscore3rd}}{Spread_{CSRscore1st}} = e^{-0.0355} = 96.5\%$ . This ratio reflects the effect on the bond spreads when firm's *CSR score* moves from the first to the third quartile, that is, there is a 3.5 % decrease in *Spread*.

**Table 3** Summary of changes in CSR disclosure quality

Panel A: Change in CSR disclosure status before bond issuance				
		From $t - 2$ to $t - 1$	From $t - 3$ to $t - 1$	
No disclosure to no disclosure		51.4 [168]	54.7 [122]	
No disclosure to disclosure		8.56 [28]	7.17 [16]	
Disclosure to disclosure		40.0 [131]	38.3 [85]	
Panel B: Persistence of CSR disclosure quality for CSR disclosure firms				
		From $t - 2$ to $t - 1$	From $t - 3$ to $t - 1$	
Stay in the same quartile		68.7 [90]	49.4 [42]	
Change by one rank		29.7 [39]	42.4 [36]	
Change by two rank		0.8 [1]	5.9 [5]	
Change by three rank		0.8 [1]	2.3 [2]	
Panel C: Persistence of CSR disclosure quality for firms firstly releasing CSR reports at year $t - 1$				
Bond-year (year $t$ )	Numbers of bonds	Average CSR score in year $t - 1$	Average CSR score in year $t$	Average CSR score in year $t + 1$
2011	13	27.56	30.80	31.45
2012	13	30.88	32.59	34.68
2013	2	41.22	46.5	unavailable
			$CSR\ score_t - CSR\ score_{t-1} > 0$	$CSR\ score_{t+1} - CSR\ score_{t-1} > 0$
$t$ test			3.887***	3.731***
$(p$ value)			$(p = 0.000)$	$(p = 0.001)$

Numbers shown are percentages. The numbers of firms are in brackets

Significance at the 1 % level is denoted as \*\*\*

( $1420 \times 2.62\% \times 3.5\% = 1.302$ ).<sup>20</sup> Similarly, columns (3)–(5) show that a typical firm can significantly reduce its costs of corporate bonds by improving the overall, content, and technical aspects of its CSR disclosure. In column (6), we also use a CSR dummy to capture the effect of CSR disclosure on the costs of corporate bonds, and the results remain the same.<sup>21</sup>

<sup>20</sup> We ignore any compounding effect here. Thus, the value of 1.302 million is essentially the lower bound of the amount of interest savings that may result from high-quality CSR disclosure.

<sup>21</sup> Prior research finds that non-state-owned CSR initiatives have a higher market valuation (Wang and Li 2015) and financial transparency (Qian et al. 2015) than government-controlled CSR initiators. To check whether the effect of CSR disclosure quality on the costs of corporate bonds is more pronounced when the firm is a non-state-owned (NSOE), we include in our regression models an interaction term of NSOE and a proxy for CSR disclosure quality. Although not reported for brevity, we find that the estimated coefficients of these interaction terms are not statistically significant, suggesting that our results on the relation between CSR disclosure quality and the costs of corporate bonds are insensitive to ownership type.

### Controlling for the Endogeneity Issue

In sum, the OLS regression results support the core argument that we make in this paper. As with any empirical design, these results have to be taken with some caveats. First, there could be additional unmeasured effects that affect both the quality of CSR disclosure quality and the costs of corporate bonds, which may lead to omitted variable bias. Second, the expected cost of debt may affect a firm's choice of CSR disclosure. Although there are various benefits and costs associated with releasing high-quality CSR reports, the cost of debt may not be a primary concern to most firms. However, it is still possible that some firms, e.g., those relying heavily on bond financing, may attach importance to the effect of their CSR disclosure on the cost of debt. Such reverse causality could create a correlation between the regressor and residuals and a bias in the estimated results. Finally, focusing only on the price term ignores the interdependencies, if there are any, between price and non-price debt contract terms. Furthermore, the disclosure quality may simply proxy for some non-price terms in the bond contract. It is possible that disclosure quality is correlated with certain non-price terms in the bond contract, which, in turn, may be correlated with

**Table 4** Quality of CSR disclosure and the costs of corporate bonds: OLS regression

	(1)	(2)	(3)	(4)	(5)	(6)
<i>CSR score</i>		-0.001*** (-2.75)				
<i>Overall score</i>			-0.004** (-2.54)			
<i>Content score</i>				-0.003*** (-3.30)		
<i>Technical score</i>					-0.012*** (-3.05)	
<i>CSR dummy</i>						-0.069* (-1.76)
<i>Size</i>	-0.052* (-1.70)	-0.039 (-1.13)	-0.040 (-1.22)	-0.041 (-1.21)	-0.036 (-1.06)	-0.040 (-1.08)
<i>Leverage</i>	0.001 (0.81)	0.001 (0.39)	0.001 (0.43)	0.001 (0.44)	0.001 (0.27)	0.001 (0.55)
<i>Tangibility</i>	0.001 (1.25)	0.001 (0.90)	0.001 (0.92)	0.001 (0.84)	0.001 (1.02)	0.001 (1.25)
<i>ROA</i>	-0.010*** (-2.73)	-0.011*** (-2.94)	-0.011*** (-2.93)	-0.010*** (-2.97)	-0.011*** (-2.79)	-0.010*** (-2.75)
<i>LossInc</i>	0.186 (1.49)	0.207* (1.69)	0.204* (1.68)	0.201 (1.62)	0.227* (1.79)	0.222** (2.01)
<i>MB</i>	-0.045*** (-4.88)	-0.040*** (-3.60)	-0.040*** (-3.53)	-0.041*** (-4.04)	-0.037*** (-3.20)	-0.039*** (-3.00)
<i>Growth</i>	0.001** (2.55)	0.001** (2.43)	0.001** (2.45)	0.001** (2.54)	0.001* (1.94)	0.001*** (3.02)
<i>Big4</i>	-0.072*** (-2.80)	-0.065** (-2.46)	-0.066** (-2.38)	-0.067** (-2.48)	-0.055*** (-2.81)	-0.071*** (-2.85)
<i>SOE</i>	-0.148** (-2.32)	-0.140** (-2.31)	-0.142** (-2.31)	-0.140** (-2.30)	-0.135** (-2.27)	-0.135** (-2.35)
<i>Accruals</i>	0.526** (2.18)	0.509* (1.88)	0.499* (1.85)	0.509* (1.89)	0.545** (2.14)	0.546** (2.29)
<i>LogBondAmt</i>	0.001 (0.01)	-0.004 (-0.09)	-0.004 (-0.10)	-0.003 (-0.07)	-0.003 (-0.09)	-0.005 (-0.11)
<i>LogMaturity</i>	-0.014 (-0.12)	-0.012 (-0.10)	-0.012 (-0.10)	-0.013 (-0.10)	-0.010 (-0.08)	-0.015 (-0.13)
<i>Put</i>	-0.058 (-1.01)	(-0.92)	-0.057 (-0.93)	-0.055 (-0.91)	-0.058 (-0.96)	-0.059 (-1.01)
<i>Collateral</i>	0.042*** (2.91)	0.037*** (3.00)	0.038*** (2.80)	0.038*** (2.97)	0.034*** (3.12)	0.035*** (3.34)
<i>AAA category</i>	-0.339*** (-21.70)	-0.330*** (-21.82)	-0.330*** (-21.21)	-0.332*** (-23.16)	-0.328*** (-19.59)	-0.332*** (-20.44)
<i>AA+ category</i>	-0.118*** (-3.01)	-0.117*** (-3.32)	-0.117*** (-3.26)	-0.118*** (-3.37)	-0.113*** (-2.94)	-0.115*** (-3.26)
<i>AA- category</i>	0.305*** (4.09)	0.302*** (3.88)	0.302*** (3.89)	0.302*** (3.95)	0.298*** (3.61)	0.293*** (3.54)
<i>Constant</i>	2.466*** (9.45)	2.183*** (6.86)	2.203*** (7.08)	2.233*** (7.63)	2.122*** (6.82)	2.212*** (5.91)
<i>YEAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>IND</i>	Yes	Yes	Yes	Yes	Yes	Yes
Observations	344	344	344	344	344	344
Adjusted R <sup>2</sup>	0.606	0.609	0.609	0.608	0.617	0.611

*T* statistics are reported in parentheses; *t* values are based on two-way, cluster-robust standard errors adjusting for cross-sectional and time-series dependence. See “Appendix” for variable definitions

Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

the bond spreads if the interdependence between price and non-price terms is not properly addressed.

To mitigate the endogeneity caused by omitted correlated variables, we add to the empirical model a number of possibly omitted variables, including CSR performance, cross-listing status, and market volatility that may potentially affect both CSR disclosure quality and the costs of corporate bonds. Ge and Liu (2015) find that CSR performance is negatively related to bond spreads. Brammer and Millington (2008) show that corporate donation is an important dimension of CSR performance and provides a more valid proxy for CSR performance than other single-dimension measures. Thus, we adopt the variable *Donate* used by Ye and Zhang (2011) and Zhang et al. (2014) to proxy for CSR performance. *Donate* is measured as the ratio of corporate charitable donations to sales.<sup>22</sup>

Ge et al. (2012) find that cross-listed firms operate in multiple markets and may be subject to different laws and regulations. In our sample, only two types of enterprises are included. The first only lists in the mainland (Shanghai and Shenzhen stock exchanges), and the second contains firms cross-listed in the mainland and Hong Kong. Porta et al. (1997) indicate that the information disclosure standards of Hong Kong are as high as those in the UK and America. Therefore, those cross-listed firms may face greater pressure to commit to provide complete and comprehensive information. We use *Crosslist*, an indicator variable that equals one when a firm is cross-listed, to denote cross-listed firms. Moreover, Ge and Kim (2014) suggest that bondholders may consider issuer market volatility when pricing bonds. Thus, we take the variable *Volatility* used by Ge and Kim (2014) to proxy for market volatility. *Volatility* is calculated as the standard deviation of daily stock returns one year prior to bond issuance.

Panel A of Table 5 reports the results after including omitted variables. We find that the coefficients on CSR disclosure quality remain significantly negative across the four columns reported in the table. Thus, our finding of a negative relationship between CSR disclosure quality and the costs of corporate bonds is robust to the inclusion of additional controls to mitigate the concern on omitted correlated variables.

Moreover, we also use IV regressions to mitigate endogeneity issues.<sup>23</sup> Here, we adopt a technique

<sup>22</sup> We thank the referee for his/her suggestion that we should simultaneously consider the two dimensions of CSR: CSR disclosure and CSR performance. For example, some firms conduct good CSR activities and report them very clearly. In this situation, CSR disclosure and CSR performance will simultaneously affect the cost of debt. If we omit the CSR performance variable, the effect of CSR disclosure quality on the costs of corporate bonds will be biased.

<sup>23</sup> We acknowledge the referee's comments on the validity of instruments. His/her important comments have encouraged us to invest greater effort in finding valid instruments.

developed by Rigobon (2003), as applied by Lewbel (2012), that exploits the presence of heteroskedasticity in the regression residuals (Eichengreen and Panizza 2016; Denny and Oppedisano 2013; Ivanov et al. 2016). Because this approach is not well known, we first provide a brief intuitive discussion. Assume that we are interested in estimating the following model:

$$y_1 = a_1 + b_1X + cy_2 + \varepsilon_1 \quad (5)$$

$$y_2 = a_2 + b_2X + \varepsilon_2, \quad (6)$$

where  $y_2$  is the endogenous variable and  $X$  is a matrix of exogenous variables. In addition to the standard assumptions that  $\varepsilon_1$  and  $\varepsilon_2$  are uncorrelated with  $X$  and are also uncorrelated with each other (i.e.,  $E(X\varepsilon_1) = E(X\varepsilon_2) = \text{cov}(X, \varepsilon_1\varepsilon_2) = 0$ ), if we add an assumption in the presence of heteroskedasticity (i.e.,  $\text{cov}(X, \varepsilon_2^2) \neq 0$ ), then we can use  $X\varepsilon_2$  as an instrument for  $y_2$ . The reason is that assuming that  $\text{cov}(X, \varepsilon_1\varepsilon_2) = 0$  can guarantee that  $X\varepsilon_2$  is uncorrelated with  $\varepsilon_1$  (the exogeneity condition for valid instruments), whereas the presence of heteroskedasticity ( $\text{cov}(X, \varepsilon_2^2) \neq 0$ ) can guarantee that  $X\varepsilon_2$  is correlated with  $y_2$  (the relevance condition). Fulfilling these two conditions ensures the validity of  $X\varepsilon_2$ .

In an untabulated analysis, we confirm the presence of heteroskedasticity in model (6) ( $\text{cov}(X, \varepsilon_2^2) \neq 0$ ), which makes us confident in using Lewbel's method. The IV regression results are reported in Panel B of Table 5. The panel shows that all of our CSR disclosure quality variables have negative and statistically significant effects on the costs of corporate bonds.

To some extent, various bond contract terms can be jointly determined. To address the possible joint determination of price and some non-price terms, we adopt three different approaches. First, we follow the suggestion of prior research (Dennis et al. 2000; Ge et al. 2012; Rahaman and Al Zaman 2013) and estimate the costs of corporate bonds in Eq. (1) without including non-price contract terms (*LogBondAmt*, *LogMaturity*, and *Collateral*) as explanatory variables. Panel C of Table 5 shows our estimates from this approach. The panel shows that all CSR disclosure quality variables are statistically significant at the 1% level and that they are also economically significant at a similar magnitude, as discussed in Table 4.

In our second approach, as suggested by Rahaman and Al Zaman (2013), we construct an index of non-price terms (*Maturity*, *Collateral*, and *Covenants*) and examine whether controlling for and interacting this index with CSR disclosure quality variable diminishes the negative effect of CSR disclosure quality on the costs of corporate bonds. We use these three non-price features of a bond because they are the most widely used non-price terms in the literature



**Table 5** CSR disclosure quality and the costs of corporate bonds: control for the endogeneity and the interdependencies between price and non-price terms

	(1)	(2)	(3)	(4)	(5)
Panel A: Regression results controlling for some possibly omitted variables					
<i>CSR score</i>	-0.001** (-2.24)				
<i>Overall score</i>		-0.003* (-1.93)			
<i>Content score</i>			-0.002** (-2.42)		
<i>Technical score</i>				-0.011*** (-2.93)	
<i>CSR dummy</i>					-0.058 (-1.58)
<i>Donate</i>	-0.054 (-0.21)	-0.056 (-0.22)	-0.056 (-0.22)	-0.047 (-0.19)	-0.062 (-0.23)
<i>Crosslist</i>	-0.022 (-0.19)	-0.023 (-0.20)	-0.024 (-0.20)	-0.020 (-0.18)	-0.023 (-0.19)
<i>Volatility</i>	0.021 (0.97)	0.021 (0.97)	0.021 (1.00)	0.021 (1.00)	0.021 (1.00)
Control for					
Firm and bond controls	Yes	Yes	Yes	Yes	Yes
Credit ratings	Yes	Yes	Yes	Yes	Yes
Year and industry dummy	Yes	Yes	Yes	Yes	Yes
Adjusted $R^2$	0.598	0.597	0.597	0.605	0.599
Observations	333	333	333	333	333
Panel B: Instrumental variable regression results					
<i>CSR score</i>	-0.001** (-2.11)				
<i>Overall score</i>		-0.004** (-2.10)			
<i>Content score</i>			-0.003* (-1.80)		
<i>Technical score</i>				-0.017*** (-3.48)	
<i>CSR dummy</i>					-0.121*** (-3.26)
Control for					
Firm and bond controls	Yes	Yes	Yes	Yes	Yes
Credit ratings	Yes	Yes	Yes	Yes	Yes
Year and industry dummy	Yes	Yes	Yes	Yes	Yes
Adjusted $R^2$	0.609	0.609	0.608	0.615	0.607
Observations	344	344	344	344	344
Panel C: Regression with no non-price terms					
<i>CSR score</i>	-0.001*** (-3.09)				
<i>Overall score</i>		-0.004*** (-2.97)			
<i>Content score</i>			-0.003*** (-3.80)		

Table 5 continued

	(1)	(2)	(3)	(4)	(5)
<i>Technical score</i>				-0.013*** (-3.21)	
<i>CSR dummy</i>					-0.072** (-2.01)
Control for					
Firm and bond controls	Yes	Yes	Yes	Yes	Yes
Credit ratings	Yes	Yes	Yes	Yes	Yes
Year and industry dummy	Yes	Yes	Yes	Yes	Yes
Adjusted $R^2$	0.611	0.610	0.610	0.619	0.613
Observations	344	344	344	344	344
Panel D: Regression with non-price term interaction					
<i>CSR score</i>	-0.001*** (-2.83)				
<i>CSR score</i> × <i>PCA</i>	0.001* (1.68)				
<i>Overall score</i>		-0.004*** (-2.62)			
<i>Overall score</i> × <i>PCA</i>		0.002 (1.59)			
<i>Content score</i>			-0.003*** (-3.42)		
<i>Content score</i> × <i>PCA</i>			0.002 (1.38)		
<i>Technical score</i>				-0.012*** (-3.02)	
<i>Technical score</i> × <i>PCA</i>				-0.001 (-0.26)	
<i>CSR dummy</i>					-0.070** (-2.00)
<i>CSR dummy</i> × <i>PCA</i>					0.020 (0.85)
<i>PCA</i>	-0.048** (-2.23)	-0.053** (-2.25)	-0.054** (-2.03)	-0.027 (-1.65)	-0.045* (-1.86)
Control for					
Firm and bond controls	Yes	Yes	Yes	Yes	Yes
Credit ratings	Yes	Yes	Yes	Yes	Yes
Year and industry dummy	Yes	Yes	Yes	Yes	Yes
Adjusted $R^2$	0.613	0.613	0.613	0.620	0.615
Observations	344	344	344	344	344
Panel E: Regression with collateral and maturity instrumented					
<i>CSR score</i>	-0.002** (-2.54)				
<i>Overall score</i>		-0.007** (-2.49)			
<i>Content score</i>			-0.005** (-2.35)		
<i>Technical score</i>				-0.017*** (-3.16)	

**Table 5** continued

	(1)	(2)	(3)	(4)	(5)
<i>CSR dummy</i>					-0.132** (-2.22)
Control for					
Firm and bond controls	Yes	Yes	Yes	Yes	Yes
Credit ratings	Yes	Yes	Yes	Yes	Yes
Year and industry dummy	Yes	Yes	Yes	Yes	Yes
$R^2$	0.396	0.417	0.395	0.269	0.109
Observations	340	340	340	340	340

*T* statistics are reported in parentheses; *t* values are based on two-way, cluster-robust standard errors adjusting for cross-sectional and time-series dependence. The firm and bond characteristics are defined in “Appendix” of the paper

Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

(Bharath et al. 2011; Rahaman and Al Zaman 2013).<sup>24</sup> To construct the non-price term index, we carry out the following: To begin with, we standardize the maturity, collateral, and the number of total covenants of bonds to mean “0” and variance “1” variables so that they are comparable across bonds and firms. Then, we use principal component analysis (PCA) to collect the first and second principal components of these three non-price terms and use these components to formulate our index of non-price terms.<sup>25</sup> Panel D of Table 5 reports the estimates of CSR disclosure quality on the costs of corporate bonds after controlling for the level as well as the interaction of the non-price index. The panel shows that various aspects of CSR disclosure quality still have negative effects on the costs of corporate bonds. Although the non-price index (PCA) is negatively associated with bond spreads, interacting this variable with disclosure quality does not influence the sign and significance of the disclosure quality on the costs of corporate bonds. This finding suggests that the effect of CSR disclosure quality on the costs of corporate bonds is not channeled via the non-price terms of the bond contract.

In our final approach to deal with the interdependence between price and non-price terms, we follow Dennis et al. (2000) and Bharath et al. (2011) and implement a simultaneous equation model incorporating the interdependencies between contract terms. As in Bharath et al. (2011), we estimate the following simultaneous equation model:

<sup>24</sup> In the robustness test, we also use four non-price features (*BondAmt*, *Maturity*, *Collateral*, and *Covenants*) of a bond to construct the non-price term index. The results (not tabulated for brevity) show that the estimated coefficients on the CSR disclosure variables remain statistically negative.

<sup>25</sup> Principal component analysis (PCA) is a variable reduction procedure. It reduces a set of variables to artificial variables (called principal components) by parsing any redundancies among the observed set of variables while preserving most of the variance in the observed variables.

$$LogSpread_{i,t} = \beta_0 + \beta_1 CSR_{i,t-1} + \beta_2 LogMaturity_{i,t} + \beta_3 Collateral_{i,t} + \beta_c Controlvariables + \varepsilon_{i,t}$$

$$Collateral_{i,t} = \beta'_0 + \beta'_1 CSR_{i,t-1} + \beta'_2 LogMaturity_{i,t} + \beta'_c Controlvariables + \varepsilon'_{i,t}$$

$$LogMaturity_{i,t} = \beta''_0 + \beta''_1 CSR_{i,t-1} + \beta''_2 Collateral_{i,t} + \beta''_c Controlvariables + \varepsilon''_{i,t}$$

The variables are defined in “Appendix”. Following Bharath et al. (2011), we assume that maturity and collateral affect each other (bidirectional relationship), whereas spread is only affected by maturity and collateral (unidirectional relationship). Following Bharath et al. (2011) and Rahaman and Al Zaman (2013), we use the average *Spread* of bonds completed over the past six months as an instrument for the observed bond spread. Hart and Moore (1994) indicate that firms would attempt to match their debt maturity to the maturity of real assets. Thus, for the maturity variable, we use asset maturity as our instrument. Following Barclay et al. (2003), we estimate a firm’s asset

$$maturity \text{ as } \left( \frac{CA}{CA + PPE} \times \frac{CA}{COGS} \right) + \left( \frac{PPE}{CA + PPE} \times \frac{PPE}{D\&A} \right),$$

where *CA* is the current assets, *PPE* is the net fixed asset, *COGS* is the cost of goods sold, and *D&A* denotes depreciation and amortization. For the collateral variable, we use a measure of bond concentration as our instrument following Berger and Udell (1990), which is defined as

$$\frac{BondAmt}{ExistingDebt + BondAmt}$$

Panel E of Table 5 reports the results after we construct instruments for maturity and collateral to tackle the interdependencies between spread, maturity, and collateral. The results show that CSR disclosure quality measures still have negative and statistically significant effects on the costs of corporate bonds.

In summary, the results presented in all four panels of Table 5 suggest that the negative relationship between



CSR disclosure quality and the costs of corporate bonds is robust to the endogeneity of CSR disclosure quality as well as to the interdependencies between the price and non-price terms in the bond contract.<sup>26,27</sup>

### CSR Disclosure Quality, Corporate Governance, and the Costs of Corporate Bonds

Hypothesis 2 predicts that compared with strong governance firms, firms with weak corporate governance have more information risk and thus are expected to experience a greater decrease in the costs of corporate bonds after firms release more CSR information. Table 6 presents the regression results. The coefficients of the interaction terms *CSR disclosure quality* × *Top5* and *CSR disclosure quality* × *Institutional* are both positive and significant at the 1 % level in the columns (1)–(5).<sup>28</sup> This finding suggests that the effect of CSR disclosure quality on bond spreads is more pronounced in firms with weak corporate governance than in those with strong corporate governance, which is consistent with Hypothesis 2.

<sup>26</sup> According to Shen and Chang (2009), the classification of samples between CSR disclosure firms versus non-disclosure firms may not be a random process and is endogenously determined. Thus, we employ a propensity score matching (PSM) following Rosenbaum and Rubin (1983) to correct for the sample's self-selection bias for a robustness check. The results (not tabulated for brevity) show that the estimated coefficient on the CSR disclosure variable (*CSR dummy*) remains statistically significant and qualitatively unaltered after adopting four matching specifications (Kernel matching, Nearest neighbor matching, Radius matching, and AIM matching).

<sup>27</sup> We thank the referee for his/her suggestion that we should use change model to mitigate the endogeneity issue. Since our sample observations are bond-years, the firm's CSR disclosure data for a given year can be matched with multiple corporate bonds. Thus, when regressing the changes in the costs of corporate bonds on the changes in CSR disclosure quality, we may need to use two corporate bonds initiated in different years by the same firm. The untabulated results show that only fifteen firms satisfy the requirements. Even though the coefficient on  $\Delta$  *Overall score* is negative and significant at the 10 % level ( $-0.025$  with  $t = -1.85$ ), due to the small sample size, we cannot draw a robust conclusion after using change model. Further, among the fifteen firms, we only find that one firm (stock code: 600655) makes the first-time CSR disclosure before the secondary bond issuance but after the first bond issuance. The descriptive analysis (untabulated) indicates that after releasing CSR report, the spreads of the subsequent bond offering decreases. Even so, we cannot draw any conclusion based on a particular case. We thank the referee again who reminds us of this limitation.

<sup>28</sup> We thank the referee for his/her suggestion that we had better include both governance variables and their interaction terms in the regression.

### CSR Disclosure Quality, Institutional Environment, and the Costs of Corporate Bonds

The results reported in Table 7 show that *CSR disclosure quality* is negatively associated with the costs of corporate bonds; the coefficients of the interaction term *CSR disclosure quality* × *Market* are positive and significant in most columns, except for column (3).<sup>29</sup> The abovementioned findings thus support Hypothesis 3, that is, the negative relationship between CSR information disclosure and the costs of corporate bonds is stronger in regions with a weak institutional environment.<sup>30</sup>

### CSR Disclosure Quality, Corporate Misconduct, and the Costs of Corporate Bonds

As shown in Table 8, the coefficients on various proxies for CSR are negative and significant at the 1 % level, and the magnitude of the coefficients on the interaction term ranges from 0.003 to 0.130. This result supports the argument of Hypothesis 4 that, all else being equal, bond investors will be less willing to rely on CSR information after the firm has engaged in misconduct. Williams and Barrett (2000)'s study is the most relevant to H4. The authors find that corporate violations negatively affect corporate reputations but that the extent of the effect is reduced through corporate giving. However, they focus on firms' donation, whereas our variable is firms' CSR disclosure quality. To directly test whether our results are consistent with those of Williams and Barrett (2000), we simultaneously include *Donate* and the interaction term of *Donate* and *Misconduct*. In an untabulated analysis, we find that H4 is still supported, but both coefficients of *Donate* and *Donate* × *Misconduct* are insignificant. This result indicates that a firm's donation cannot mitigate the adverse

<sup>29</sup> Even though the coefficients of interaction terms are marginal, the effect of institutional environment on the relation of CSR disclosure quality and the costs of corporate bonds is statistically significant, except for column (3). If we replace *LogSpread* with *Spread* as a dependent variable, the coefficients on the interaction terms are 0.001, 0.004, 0.001, 0.008, and 0.058, respectively. Those coefficients are statistically significant except for the coefficient of *Content score* × *Market*. Thus, our regression results are still robust.

<sup>30</sup> From another perspective, the result is similar to that in Table 6. Xia and Fang (2005) indicate that compared with other corporate governance mechanisms, such as ownership structure, independent directors, independent auditors, market for executives and mergers, and acquisitions market, the institutional environment is a more inherent governance mechanism. Thus, we draw a consistent conclusion that CSR disclosure is more valuable not only under weak corporate governance firms but also in a weak institutional environment.

**Table 6** CSR disclosure quality and the costs of corporate bonds: effect of corporate governance

	(1)	(2)	(3)	(4)	(5)
<i>CSR score</i>	-0.005*** (-5.06)				
<i>Overall score</i>		-0.014*** (-4.01)			
<i>Content score</i>			-0.010*** (-5.19)		
<i>Technical score</i>				-0.031*** (-5.03)	
<i>CSR dummy</i>					-0.229*** (-6.35)
<i>CSR disclosure quality × Top5</i>	0.001*** (4.13)	0.002*** (3.52)	0.001*** (5.67)	0.005*** (3.62)	0.035*** (4.65)
<i>CSR disclosure quality × Institutional</i>	0.001*** (3.64)	0.000*** (3.25)	0.001*** (3.53)	0.001** (2.25)	0.002*** (2.97)
<i>Top5</i>	-0.013 (-1.19)	-0.011 (-0.95)	-0.012 (-1.10)	-0.017** (-2.20)	-0.014 (-1.37)
<i>Institutional</i>	-0.002** (-2.48)	-0.002** (-2.58)	-0.002** (-2.39)	-0.002** (-2.10)	-0.002*** (-2.69)
<i>Size</i>	-0.031 (-0.68)	-0.032 (-0.72)	-0.033 (-0.76)	-0.023 (-0.49)	-0.028 (-0.57)
<i>Leverage</i>	0.001 (0.10)	0.001 (0.09)	0.001 (0.12)	0.001 (0.18)	0.001 (0.17)
<i>Tangibility</i>	0.001 (0.51)	0.001 (0.50)	0.001 (0.40)	0.001 (1.30)	0.001 (1.05)
<i>ROA</i>	-0.010* (-1.83)	-0.010* (-1.78)	-0.010* (-1.83)	-0.011* (-1.95)	-0.010* (-1.93)
<i>LossInc</i>	0.199* (1.83)	0.198* (1.83)	0.193* (1.77)	0.211* (1.75)	0.202* (1.96)
<i>MB</i>	-0.025 (-1.22)	-0.024 (-1.15)	-0.026 (-1.32)	-0.025 (-1.16)	-0.025 (-1.23)
<i>Growth</i>	0.001** (2.12)	0.001** (2.13)	0.001** (2.24)	0.001 (1.58)	0.001** (2.32)
<i>Big4</i>	-0.081*** (-4.03)	-0.085*** (-3.96)	-0.083*** (-3.83)	-0.068*** (-5.47)	-0.086*** (-3.69)
<i>SOE</i>	-0.131*** (-2.75)	-0.132*** (-2.78)	-0.131*** (-2.75)	-0.131** (-2.53)	-0.127*** (-2.77)
<i>Accruals</i>	0.609** (2.03)	0.581* (1.95)	0.615** (2.07)	0.650** (2.23)	0.642*** (2.62)
<i>LogBondAmt</i>	-0.006 (-0.12)	-0.005 (-0.11)	-0.006 (-0.12)	-0.011 (-0.21)	-0.007 (-0.14)
<i>LogMaturity</i>	-0.018 (-0.15)	-0.018 (-0.15)	-0.020 (-0.16)	-0.013 (-0.11)	-0.019 (-0.17)
<i>Put</i>	-0.052 (-0.77)	-0.053 (-0.77)	-0.051 (-0.75)	-0.053 (-0.82)	-0.050 (-0.77)
<i>Collateral</i>	0.045** (2.35)	0.046** (2.33)	0.046** (2.23)	0.042** (2.51)	0.045*** (2.92)
<i>AAA category</i>	-0.314*** (-23.73)	-0.315*** (-24.16)	-0.316*** (-24.09)	-0.318*** (-28.21)	-0.331*** (-27.97)

**Table 6** continued

	(1)	(2)	(3)	(4)	(5)
AA+ category	-0.121*** (-3.74)	-0.121*** (-3.65)	-0.122*** (-3.75)	-0.121*** (-3.43)	-0.125*** (-3.71)
AA- category	0.325*** (3.33)	0.324*** (3.30)	0.325*** (3.36)	0.330*** (3.51)	0.325*** (3.13)
Constant	2.073*** (3.19)	2.084*** (3.09)	2.133*** (3.65)	1.889*** (2.75)	2.026*** (2.77)
YEAR	Yes	Yes	Yes	Yes	Yes
IND	Yes	Yes	Yes	Yes	Yes
Observations	340	340	340	340	340
Adjusted R <sup>2</sup>	0.618	0.616	0.616	0.625	0.620

*T* statistics are reported in parentheses; *t* values are based on two-way, cluster-robust standard errors adjusting for cross-sectional and time-series dependence. See “Appendix” for variable definitions

Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

effect of the firm’s misconduct activities on the costs of corporate bonds in China.<sup>31</sup>

In an unreported analysis, we study whether the identity of the party that reveals the misconduct differentially affects the relationship between CSR and the costs of corporate bonds. Misconduct detected by outside parties such as the CSRC and the stock exchange may signal that a firm’s internal monitoring failed not only to prevent but also to disclose misconduct. Conversely, detection and revelation by the firm provides some indication of relatively strong internal governance (Graham et al. 2008), which may mitigate the adverse signal regarding the firm’s credibility and reputation.

To examine the potential difference in the effects of promulgator party on the relation between CSR disclosure quality and bond spreads, we create two dummy variables, *Company* and *Outside*. *Company* is equal to one if the misconduct is detected by the company itself, and *Outside* is equal to one if the misconduct is detected by outside parties, such as the CSRC or the Shanghai and Shenzhen stock exchanges. These dummies are interacted with *CSR disclosure quality*. The results (available upon request) show that all interaction terms between *CSR disclosure quality* and promulgator dummies are significantly positive, implying that the value of CSR disclosure decreases after misconduct regardless of who promulgates the news. Furthermore, we find that the coefficient of interaction terms is higher for cases promulgated by outside parties than for cases promulgated for the company itself regardless of the CSR disclosure quality variables used, and their

differences are statistically significantly if the *Overall score*, *Content score*, and *CSR dummy* are employed to measure the CSR disclosure quality.<sup>32</sup> To summarize, we find that misconduct promulgated by outside parties might be a stronger negative signal than misconduct promulgated by the company.

## Additional Analyses

### Mediation Effect of Credit Ratings<sup>33</sup>

Credit rating is one of the most important pricing factors of corporate bonds. The rating agencies evaluate the quality of bonds by collecting financial and non-financial information. Attig et al. (2013) posit that credit rating agencies collect and process CSR-related information in assessing a firm’s creditworthiness. Jiraporn et al. (2014) also find that more socially responsible firms enjoy more favorable credit ratings. However, we cannot tell if bond investors concern other CSR information beyond the information which has been incorporated into the credit ratings. If the credit ratings already contain all information that investors need, then the importance of CSR disclosure to bond investors is quite limited since people do not need to read and analyze the CSR reports by themselves. In this condition, it is quite necessary to investigate the incremental effect of CSR disclosures on the costs of corporate bonds beyond the credit ratings.

We conduct path analysis to explore this issue. As introduced by Bhattacharya et al. (2012), the path analysis

<sup>31</sup> We acknowledge the referee’s valuable suggestion regarding the comparison between our finding and that of Williams and Barrett (2000).

<sup>32</sup> If *CSR score* and *Technical score* are used to measure CSR disclosure quality, we do not find that their differences are statistically significant.

<sup>33</sup> We greatly acknowledge the referee’s constructive suggestion which is very helpful to improve our research.

**Table 7** CSR disclosure quality and the costs of corporate bonds: effect of institutional environment

	(1)	(2)	(3)	(4)	(5)
<i>CSR score</i>	-0.005** (-2.59)				
<i>Overall score</i>		-0.013** (-2.29)			
<i>Content score</i>			-0.005 (-1.48)		
<i>Technical score</i>				-0.037*** (-9.21)	
<i>CSR dummy</i>					-0.240** (-2.34)
<i>CSR disclosure quality × Market</i>	0.001*** (2.60)	0.001** (2.20)	0.001 (0.78)	0.003*** (8.84)	0.020** (2.57)
<i>Market</i>	-0.023*** (-3.45)	-0.022*** (-3.27)	-0.019* (-1.67)	-0.029*** (-5.06)	-0.027*** (-5.77)
<i>Size</i>	-0.040 (-1.30)	-0.040 (-1.35)	-0.041 (-1.26)	-0.043 (-1.63)	-0.040 (-1.27)
<i>Leverage</i>	0.001 (0.52)	0.001 (0.55)	0.001 (0.45)	0.001 (0.59)	0.001 (0.62)
<i>Tangibility</i>	0.001 (1.36)	0.001 (1.34)	0.001 (0.86)	0.001** (2.01)	0.001 (1.55)
<i>ROA</i>	-0.009*** (-3.10)	-0.009*** (-3.18)	-0.009*** (-3.27)	-0.010*** (-2.98)	-0.009*** (-2.71)
<i>LossInc</i>	0.150 (1.29)	0.152 (1.32)	0.145 (1.30)	0.158 (1.27)	0.165 (1.57)
<i>MB</i>	-0.046*** (-4.79)	-0.047*** (-5.13)	-0.046*** (-5.37)	-0.041*** (-3.55)	-0.044*** (-3.86)
<i>Growth</i>	0.001*** (2.83)	0.001*** (2.76)	0.001*** (2.86)	0.001* (1.87)	0.001*** (3.15)
<i>Big4</i>	-0.063** (-2.53)	-0.065** (-2.34)	-0.060** (-2.38)	-0.042*** (-8.40)	-0.064** (-2.42)
<i>SOE</i>	-0.153*** (-2.95)	-0.155*** (-2.94)	-0.155*** (-2.95)	-0.148*** (-2.69)	-0.148*** (-3.01)
<i>Accruals</i>	0.520** (2.39)	0.509** (2.32)	0.505** (2.22)	0.574*** (3.13)	0.541*** (3.02)
<i>LogBondAmt</i>	-0.015 (-0.43)	-0.016 (-0.44)	-0.013 (-0.39)	-0.014 (-0.41)	-0.016 (-0.43)
<i>LogMaturity</i>	0.002 (0.02)	0.001 (0.01)	0.001 (0.01)	0.010 (0.09)	0.002 (0.02)
<i>Put</i>	-0.056 (-0.99)	-0.056 (-0.97)	-0.054 (-0.94)	-0.065 (-1.18)	-0.060 (-1.16)
<i>Collateral</i>	0.031*** (3.12)	0.032*** (2.91)	0.034*** (2.93)	0.029*** (2.83)	0.028*** (4.31)
<i>AAA category</i>	-0.316*** (-19.03)	-0.317*** (-18.43)	-0.322*** (-27.36)	-0.315*** (-16.58)	-0.320*** (-17.86)
<i>AA+ category</i>	-0.115*** (-3.03)	-0.115*** (-3.03)	-0.119*** (-3.64)	-0.107** (-2.47)	-0.115*** (-2.97)
<i>AA- category</i>	0.323*** (4.11)	0.322*** (4.09)	0.318*** (3.81)	0.325*** (4.01)	0.320*** (3.92)

**Table 7** continued

	(1)	(2)	(3)	(4)	(5)
<i>Constant</i>	2.310*** (6.78)	2.315*** (6.95)	2.311*** (6.28)	2.369*** (7.78)	2.344*** (6.32)
<i>YEAR</i>	Yes	Yes	Yes	Yes	Yes
<i>IND</i>	Yes	Yes	Yes	Yes	Yes
Observations	341	341	341	341	341
Adjusted $R^2$	0.614	0.613	0.611	0.629	0.617

*T* statistics are reported in parentheses; *t* values are based on two-way, cluster-robust standard errors adjusting for cross-sectional and time-series dependence. See “Appendix” for variable definitions

Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

decomposes the correlation between the causal variable (CSR disclosure quality in this paper) and the outcome variable (costs of corporate bonds in this paper) into direct and indirect paths. Here we consider *Credit ratings* as the mediator. The question we concern is the existence and relative importance of the direct and indirect paths between CSR disclosure quality and the costs of corporate bonds. Table 9 presents the results of our path analysis. The  $p[\text{CSR}, \text{Costs of Bonds}]$  is the direct path coefficient. The  $p[\text{CSR}, \text{Credit ratings}]$  and  $p[\text{Credit ratings}, \text{Costs of Bonds}]$  are the path coefficients between CSR information quality and credit ratings and between credit ratings and costs of corporate bonds, respectively. Across all our five measures of CSR disclosure quality, we find that all direct and mediated paths are highly significant. Sobel and Goodman (I, II) mediation statistics confirm the strong mediation effect of *Credit ratings*. The results further show that about 66 % of the correlation between *CSR score* and costs of corporate bonds is attributable to a direct path, but only approximately 34 % is attributable to the indirect path through *Credit ratings*. The results are similar if we use other variables to denote CSR disclosure quality. Therefore, the *Credit ratings* is a partial mediator and this finding indicates that CSR disclosure can provide incremental information beyond the credit ratings.

### CSR Disclosure Quality and the Non-price Bond Contract Terms

To gain a comprehensive understanding on the role of CSR disclosure in the corporate bond market, in this section, we focus on non-price contract terms, i.e., maturity, collateral, and covenants, which are the most widely used non-price terms in the literature (Bharath et al. 2011; Graham et al. 2008). Consistent with Rahaman and Al Zaman (2013), we do not include bond spreads in any of our regression of non-price terms on the CSR disclosure quality for two reasons: First, including the spread in the regression of non-price term on CSR disclosure quality will lead to

endogeneity problems. Second, the typical process of bond issuance suggests that the coupon rate is determined after all other non-price terms have been settled.

Table 10 reports our regression estimates.<sup>34</sup> Panel A shows the effects of various measures of CSR disclosure quality on bond maturity. The dependent variable in the regression is the natural logarithm of bond maturity measured in number of months. Generally, we would expect a positive association between CSR disclosure quality and bond maturity because firms with more information disclosure are able to significantly reduce the amount of information asymmetry, and, as a result, bondholders are willing to purchase a bond with longer maturity. The results show that, except for *CSR dummy*, all CSR disclosure quality variables are positively related to maturity. Although economically meaningful, the coefficients, except for *Technical score*, in the regression are not statistically significant, which suggests that there is no systematic difference in bond maturity between firms with more CSR disclosure and firms with less or no CSR disclosure. The results also show the following relationships between the control variables and bond maturity: Firm size and bond maturity are positively related, owing to that lower-risk firms tend to secure larger and longer maturity bonds. Bond maturity is greater for SOE firms and is positively correlated with the likelihood of the bond being secured. Bonds with a put option are associated with a longer maturity; this could be due to the fact that a put option offers bondholders the right to force the issuer to pay back the principal before maturity; therefore,

<sup>34</sup> In an unreported analysis, we also examine the relation between the proxies for CSR disclosure quality and bond amount. The dependent variable in the regression is the natural logarithm of bond offering amount measured in RMB hundred million. An unreported regression shows that there is no significant association between CSR disclosure quality and bond amount.



**Table 8** CSR disclosure quality and the costs of corporate bonds: effect of corporate misconduct

	(1)	(2)	(3)	(4)	(5)
<i>CSR score</i>	-0.002*** (-4.92)				
<i>Overall score</i>		-0.005*** (-4.46)			
<i>Content score</i>			-0.003*** (-6.01)		
<i>Technical score</i>				-0.014*** (-5.46)	
<i>CSR dummy</i>					-0.087*** (-2.92)
<i>CSR disclosure quality × Misconduct</i>	0.003*** (3.00)	0.010*** (2.74)	0.007*** (2.65)	0.024*** (5.53)	0.130*** (5.60)
<i>Misconduct</i>	0.056*** (2.82)	0.060*** (3.00)	0.059** (2.49)	0.045*** (3.41)	0.054*** (3.05)
<i>Size</i>	-0.037 (-1.08)	-0.038 (-1.16)	-0.039 (-1.16)	-0.034 (-1.05)	-0.038 (-1.07)
<i>Leverage</i>	-0.001 (-0.09)	-0.001 (-0.06)	-0.001 (-0.06)	-0.001 (-0.17)	0.001 (0.04)
<i>Tangibility</i>	0.001 (0.03)	0.001 (0.03)	0.001 (0.01)	0.001 (0.09)	0.001 (0.20)
<i>ROA</i>	-0.010*** (-3.13)	-0.010*** (-3.10)	-0.010*** (-3.12)	-0.011*** (-3.03)	-0.010*** (-3.00)
<i>LossInc</i>	0.202** (2.44)	0.195** (2.49)	0.200** (2.27)	0.220*** (2.65)	0.232*** (2.90)
<i>MB</i>	-0.036*** (-3.97)	-0.036*** (-3.85)	-0.038*** (-4.60)	-0.034*** (-3.45)	-0.035*** (-3.18)
<i>Growth</i>	0.001*** (2.82)	0.001*** (3.32)	0.001*** (2.96)	0.001 (1.58)	0.001*** (3.45)
<i>Big4</i>	-0.059** (-2.23)	-0.061** (-2.18)	-0.062** (-2.23)	-0.047** (-2.49)	-0.066*** (-2.75)
<i>SOE</i>	-0.134** (-2.25)	-0.136** (-2.26)	-0.134** (-2.23)	-0.128** (-2.17)	-0.127** (-2.22)
<i>Accruals</i>	0.551* (1.73)	0.543* (1.72)	0.547* (1.75)	0.589* (1.90)	0.596** (2.05)
<i>LogBondAmt</i>	0.001 (0.02)	0.001 (0.02)	0.001 (0.03)	0.002 (0.04)	-0.001 (-0.02)
<i>LogMaturity</i>	-0.007 (-0.06)	-0.006 (-0.06)	-0.008 (-0.07)	-0.005 (-0.04)	-0.010 (-0.09)
<i>Put</i>	-0.065 (-1.12)	-0.065 (-1.13)	-0.063 (-1.10)	-0.069 (-1.18)	-0.069 (-1.26)
<i>Collateral</i>	0.040** (2.33)	0.040** (2.26)	0.040** (2.35)	0.036** (2.13)	0.036** (2.17)
<i>AAA category</i>	-0.318*** (-28.46)	-0.318*** (-27.42)	-0.320*** (-29.81)	-0.318*** (-27.18)	-0.318*** (-28.49)
<i>AA+ category</i>	-0.120*** (-3.30)	-0.119*** (-3.23)	-0.120*** (-3.35)	-0.118*** (-3.00)	-0.117*** (-3.41)
<i>AA- category</i>	0.313*** (4.82)	0.311*** (4.87)	0.313*** (4.84)	0.313*** (4.57)	0.301*** (4.33)

**Table 8** continued

	(1)	(2)	(3)	(4)	(5)
<i>Constant</i>	2.103*** (6.94)	2.119*** (7.02)	2.159*** (7.71)	2.072*** (7.07)	2.148*** (5.94)
<i>YEAR</i>	Yes	Yes	Yes	Yes	Yes
<i>IND</i>	Yes	Yes	Yes	Yes	Yes
Observations	344	344	344	344	344
Adjusted $R^2$	0.617	0.616	0.615	0.627	0.619

*T* statistics are reported in parentheses; *t* values are based on two-way, cluster-robust standard errors adjusting for cross-sectional and time-series dependence. See “Appendix” for variable definitions

Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

**Table 9** Path analysis with credit ratings as a mediator

	<i>CSR score</i>		<i>Overall score</i>		<i>Content score</i>		<i>Technical score</i>		<i>CSR dummy</i>	
	Coefficient	<i>t</i> value	Coefficient	<i>t</i> value	Coefficient	<i>t</i> value	Coefficient	<i>t</i> value	Coefficient	<i>t</i> value
Direct Path										
<i>p</i> [ <i>CSR, Costs of Bonds</i> ]	-0.0020***	-2.94	-0.0061***	-2.85	-0.0040***	-2.69	-0.0140***	-3.74	-0.0853***	-2.89
<i>percentage</i>	65.80 %		64.36 %		63.98 %		75.29 %		70.07 %	
Mediated Path										
<i>p</i> [ <i>CSR, Credit ratings</i> ]	0.0057***	3.73	0.0182***	3.87	0.0120***	3.70	0.02489***	2.92	0.1935***	2.91
<i>p</i> [ <i>Credit ratings, Costs of Bonds</i> ]	-0.1850***	-7.45	-0.1849***	-7.43	-0.1864***	-7.50	-0.1852***	-7.58	-0.1885***	-7.65
Total mediated path	-0.0011***	-3.34	-0.0034***	-3.43	-0.0022***	-3.30	-0.0046***	-2.83	-0.0364***	-2.72
<i>percentage</i>	34.20 %		35.64 %		36.02 %		24.71 %		29.93 %	
<i>Sobel statistics</i>	-3.337 ( <i>p</i> = 0.00)		-3.435 ( <i>p</i> = 0.00)		-3.303 ( <i>p</i> = 0.00)		-2.728 ( <i>p</i> = 0.01)		-2.723 ( <i>p</i> = 0.01)	
<i>Goodman I statistics</i>	-3.313 ( <i>p</i> = 0.00)		-3.411 ( <i>p</i> = 0.00)		-3.280 ( <i>p</i> = 0.00)		-2.707 ( <i>p</i> = 0.01)		-2.703 ( <i>p</i> = 0.01)	
<i>Goodman II statistics</i>	-3.361 ( <i>p</i> = 0.00)		-3.459 ( <i>p</i> = 0.00)		-3.327 ( <i>p</i> = 0.00)		-2.748 ( <i>p</i> = 0.01)		-2.743 ( <i>p</i> = 0.01)	

*p* indicates the path coefficients. Except for credit rating dummies, all control variables are included in the regressions of direct path and mediated path

Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

bondholders are willing to purchase a bond with longer maturity.<sup>35</sup>

Panel B of Table 10 presents the regression results estimating the effect of CSR disclosure quality on the likelihood of using security for the bond. The dependent variable is a dummy variable that is equal to one if the bond is secured and zero otherwise. The regression is estimated using a Probit model. The results show that CSR disclosure is negatively related to the collateral requirement of the bond in columns (6)–(10) regardless of the CSR disclosure measures used. This finding suggests that high-quality CSR disclosure firms are subject to fewer

security requirements, implying yet another advantage of information disclosure. The estimated effects of other control variables on the likelihood of a bond being secured are quite plausible; they indicate that a higher growth and profitable firm with fewer tangible assets has a lower probability of having a secured bond. Bond maturity is positively correlated with the likelihood of a bond being secured because longer maturity implies that bondholders need to bear higher default risk and thus the requirement for collateral increases.

Panel C of Table 10 presents the regression results concerning the determinants of covenant intensity.<sup>36</sup>

<sup>35</sup> We do not report the coefficients of other firm- and bond-specific characteristics in Table 10 for the sake of the brevity of analysis. These results are available upon request from the authors.

<sup>36</sup> In the bond prospectus, they also include event-related covenants and accounting-related covenants. However, event-related covenants are often written loosely by lawyers, using boilerplate language. They

**Table 10** CSR disclosure quality and the non-price contract terms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	A. OLS: <i>LogMaturity</i>					B. Probit: <i>Collateral</i>				
<i>CSR score</i>	0.001 (0.60)					-0.008** (-2.56)				
<i>Overall score</i>		0.001 (0.43)					-0.024*** (-2.74)			
<i>Content score</i>			0.001 (0.47)					-0.017** (-2.56)		
<i>Technical score</i>				0.003* (1.95)					-0.043*** (-2.61)	
<i>CSR dummy</i>					-0.009 (-0.61)					-0.326* (-1.75)
Observations	344	344	344	344	344	336	336	336	336	336
	C. Poisson: <i>total covenants</i>					D. OLS: <i>total covenants</i>				
<i>CSR score</i>	0.005*** (3.09)					0.004*** (2.60)				
<i>Overall score</i>		0.013** (2.44)					0.009** (2.25)			
<i>Content score</i>			0.011** (2.12)					0.007* (1.96)		
<i>Technical score</i>				0.045*** (4.96)					0.031*** (4.61)	
<i>CSR dummy</i>					0.195*** (3.98)					0.128*** (3.14)
Observations	344	344	344	344	344	344	344	344	344	344
Firm and bond controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Credit rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*T* statistics are reported in parentheses; *t* values are based on two-way, cluster-robust standard errors adjusting for cross-sectional and time-series dependence. See “Appendix” for variable definitions  
 Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

Following Gong et al. (2015), we measure the dependent variable, covenant intensity, by counting the total number of financing-related and asset-sale covenants included in the bond prospectus.<sup>37</sup> Thus, the dependent variable in Panel C is the total number of covenants associated with a

bond. Because the number of covenants is a positive integer, we estimate the equation using a Poisson regression. In Panel D, we also use OLS procedure to investigate the association between CSR disclosure quality and covenants. The estimated coefficient of proxies for CSR disclosure is significantly positive at the conventional level, suggesting that high-quality CSR disclosure firms are subject to more covenant restrictions than their low-quality CSR disclosure counterparts.

This finding contradicts the prior literature, which consistently concludes that covenants are used more frequently in worse information environments, such as in firms with financial restatements (Graham et al. 2008), modified audit opinions (Chen et al. 2016), and less predictable earnings (Hasan et al. 2012), as well as for non-IFRS adopters (Kim et al. 2011). Shi and Sun (2015) and Ge and Liu (2015) provide evidence that better CSR performance faces few

Footnote 36 continued

are designed to protect bondholders upon default by increasing the recovery amount and decreasing the possible losses, which usually serve a minor role in settling the coming default. For accounting-related covenants, these covenants are seldom used in public bond contracts because only 3.09 % of bond contracts include them (Gong et al., 2015). Therefore, we only consider financing-related and asset-sale covenants in this study.

<sup>37</sup> Financing-related covenants are restrictions on guarantees of indebtedness of other parties and obligations secured by pledge on property of the company. Asset-sale covenants usually specify that the firm should not sell any assets except for those required for normal business activities.

covenant restrictions. The likely reason for our finding is that firms providing more covenants in a bond transmit a strong signal to the public that the bond is riskless and investors can better supervise the bond through various covenants. Firms with more CSR disclosure are usually well-governed firms (El-Gazzar 1998), and they are more likely to transmit a good signal to investors. Therefore, the positive relation between CSR disclosure quality and covenants is plausible.

### Investors' Reactions to Different Quality of CSR Reporting

Following the literature on CSR reporting in China (Wang and Li 2015; Marquis and Qian 2013), we also measure CSR reporting quality using ratings for CSR reports from Rankins CSR Ratings (RKS). The RKS rating consists of nineteen categories: AAA, AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC, CC, and C, with AAA indicating the highest quality and C the lowest.

To examine whether higher-quality CSR disclosure reports have more positive investor responses, we classify CSR reports into three groups: (1) High-quality CSR reports if a report is rated as all "A" categories (AAA, AA, and A); (2) Low-quality CSR reports if a report is rated as all "B" categories (BBB, BB, and B) and CCC category<sup>38</sup>; and (3) No CSR rating, which is the baseline group and refers to the firms that do not release a CSR report. Column (1) of Table 11 reports the results. The coefficient on *High-quality CSR disclosure* is significantly negative. A test of the null hypothesis that *High-quality CSR disclosure* equals *Low-quality CSR disclosure* is rejected, indicating that firms releasing high-quality CSR reports earn significantly lower-cost corporate bonds than non-disclosure firms and firms releasing low-quality CSR reports. The coefficient on *Low-quality CSR disclosure* is negative, but it is not statistically significant, demonstrating that there is no significant difference in the costs of corporate bonds between non-disclosure firms and firms releasing low-quality CSR reports.

### Investors' Reactions to Voluntary and Mandatory CSR Disclosure

Our main tests show that firms releasing more CSR information have lower costs of corporate bonds than firms that do not disclose CSR information, suggesting that CSR reports are able to convey positive signals to public investors. Our sample includes firms that are required to

**Table 11** Effect of CSR disclosure quality and CSR disclosure mandate on the costs of corporate bonds

	(1)	(2)
<i>High-quality CSR disclosure</i>	-0.149*** (-17.20)	
<i>Low-quality CSR disclosure</i>	-0.065 (-1.50)	
<i>Mandatory</i>		-0.073 (-1.43)
<i>Voluntary</i>		-0.064* (-1.79)
<i>Size</i>	-0.035 (-0.94)	-0.039 (-1.05)
<i>Leverage</i>	0.001 (0.48)	0.001 (0.51)
<i>Tangibility</i>	0.001 (1.15)	0.001 (1.06)
<i>ROA</i>	-0.010*** (-2.81)	-0.010*** (-2.88)
<i>LossInc</i>	0.226** (2.10)	0.222** (2.00)
<i>MB</i>	-0.038*** (-3.16)	-0.039*** (-2.98)
<i>Growth</i>	0.001*** (2.83)	0.001** (2.13)
<i>Big4</i>	-0.063* (-1.84)	-0.070*** (-3.82)
<i>SOE</i>	-0.141*** (-2.60)	-0.135** (-2.23)
<i>Accruals</i>	0.503** (2.37)	0.551*** (2.58)
<i>LogBondAmt</i>	-0.002 (-0.04)	-0.004 (-0.10)
<i>LogMaturity</i>	-0.009 (-0.07)	-0.016 (-0.13)
<i>Put</i>	-0.058 (-0.96)	-0.059 (-1.07)
<i>Collateral</i>	0.038*** (5.11)	0.035*** (3.41)
<i>AAA category</i>	-0.334*** (-18.01)	-0.331*** (-17.95)
<i>AA+ category</i>	-0.120*** (-3.21)	-0.116*** (-3.40)
<i>AA- category</i>	0.306*** (3.39)	0.294*** (3.71)
<i>Constant</i>	2.072*** (7.14)	2.207*** (5.79)
<i>YEAR</i>	Yes	Yes
<i>IND</i>	Yes	Yes
Observations	344	344

<sup>38</sup> In our sample, the lowest quality rating for the CSR disclosure is CCC.

**Table 11** continued

	(1)	(2)
Adjusted $R^2$	0.612	0.610

$T$  statistics are reported in parentheses;  $t$  values are based on two-way, cluster-robust standard errors adjusting for cross-sectional and time-series dependence. See “Appendix” for variable definitions

Significance at the 1 % level is denoted as \*\*\*, 5 % level as \*\*, and 10 % level as \*

disclose their CSR reports and firms that voluntarily disclose their CSR reports. Wang and Li (2015) consider that investors might perceive mandatory CSR disclosure as simply carrying out regulatory CSR obligations. Therefore, the signaling effect of CSR reports may not be applicable to mandatory CSR disclosure.

To examine whether mandatory CSR disclosure is valuable in the corporate bond market, we include the variables *Mandatory* and *Voluntary*, where *Mandatory* is a dummy variable equal to one if the firm is required to disclose their CSR reports; *Voluntary* is a dummy variable equal to one if the firm is voluntary to disclose their CSR reports. The baseline group represents non-disclosure firms. The results reported in column (2) of Table 11 indicate that bond investors regard mandatory CSR disclosure as a minor valuable. The coefficient of *Mandatory* is negative, but it is not significant at conventional levels, demonstrating that there is no significant difference in investors’ valuation between firms with mandatory CSR disclosure and non-disclosure. The coefficient on *Voluntary* is  $-0.064$ , and the coefficient is significant at the 10 % level. Compared with non-disclosure firms, bondholders perceive firms with voluntary CSR disclosure as well governed and less likely to cause asymmetric information problems and thus charge lower risk premiums.

### Further Robustness Checks

Although not tabulated for brevity, we also conduct the following robustness checks:

- (1) As previously noted in the Table 2, *LogSpread* and *Size*, *CSR score* and *Size*, *LogBondAmt* and *Size* are all highly correlated ( $-0.64$ ,  $0.62$ , and  $0.79$ , respectively). To address this issue, we remove the *Size* variable, and the conclusions are the same as those presented before.<sup>39</sup>
- (2) Bonds can also be declared for different uses such as project construction, debt repayment, takeover,

working capital, etc. Because bonds with different purposes are associated with different risks, they may be priced differently. We conduct estimations that include the purpose of dummy variables and the results are qualitatively similar to the main specification.

- (3) Our sample contains firms that have multiple bond issues in the same year. As suggested by Ge and Kim (2014), we treat a firm’s multiple bond issues in the same year as a portfolio and calculate the weighted average bond yield spread for those firms, using the relative offering amounts as the weights. This aggregation process reduces the sample size significantly. We repeat the regression analyses using the new sample, and our results are still robust.
- (4) In the main tests, we use a series of dummy variables to control for credit ratings. As a robustness check, we instead use an ordered variable, with 4 for an AAA rating; 3 for AA+; 2 for AA; and 1 for AA-. Our inference on the CSR disclosure quality variables remains unaltered.

### Conclusion

The concept of taking social responsibility is prevalent and accepted by management practices around the globe. Prior studies find that the costs of equity and bank loans decrease with an increase in the quality of CSR disclosure. In this paper, we investigate the influence of CSR information disclosure on the costs of corporate bonds using data of CSR reports disclosed in China. The empirical results show that for firms with a higher quality of CSR information disclosure, their financing costs are lower. The results are generally robust after controlling for the endogeneity of CSR disclosure quality and the interdependencies between price and non-price terms in the bond contract.

In addition, we find that the effect of CSR information quality on bond spreads is not homogeneous. The negative influence of CSR information disclosure on the costs of corporate bonds is stronger for firms that have weak corporate governance and are located in regions with a weak institutional environment. This finding implies substitute effects between CSR information disclosure and corporate governance on the reduction of costs of corporate bonds. Furthermore, compared with non-misconduct firms, misconduct firms experience more information problems, and their information credibility (including CSR information) diminishes sharply. Thus, the negative relation between CSR information disclosure and the costs of corporate bonds is less pronounced in firms that are found to have committed misconduct.

<sup>39</sup> We acknowledge the referee’s comments on the high correlations among several variables.

In additional analyses, we find that CSR disclosure can provide other information which is not captured by the credit ratings and this incremental information will lower the costs of corporate bonds. Moreover, CSR information disclosure affects non-price bond terms as well. Firms with a higher quality of CSR information are less likely to be subject to collateral terms, but they tend to include more restrictive covenants. Additional analyses also demonstrate that high-quality CSR disclosure firms have lower costs of corporate bonds than low-quality CSR disclosure firms and non-disclosure firms. Bond investors regard mandatory CSR disclosure as simply carrying out regulatory CSR obligations.

Hence, the signaling effect of mandatory CSR disclosure is much weaker than that of voluntary CSR disclosure.

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## Appendix

See Table 12.

**Table 12** Variable definitions

Variables	Descriptions
<i>Overall score</i>	The overall evaluation score released by RKS
<i>Content score</i>	The content evaluation score released by RKS
<i>Technical score</i>	The technical evaluation score released by RKS
<i>CSR score</i>	Sum of <i>Overall</i> , <i>Content</i> , and <i>Technical</i> score, released by RKS
<i>CSR dummy</i>	An indicator variable that equals one if issuers release a CSR report, and zero otherwise
<i>Size</i>	Firm Size, measured as natural logarithm of total assets
<i>Leverage</i>	Firm's financial leverage ratio, calculated as the total debt divided by total assets
<i>Tangibility</i>	Measured as tangible assets divided by total assets
<i>ROA</i>	Firm's return-on-assets ratio, calculated as net income divided by total assets
<i>LossInc</i>	Loss incidence, measured as the proportion of income losses over the past eight quarters
<i>MB</i>	Market-to-book ratio, measured as the market value divided by the book value of equity
<i>Growth</i>	Sales growth, measured as ending sales revenue divided by one-year lagged sales revenue
<i>Big4</i>	An indicator variable that equals one if firm's auditor is one of the Big 4, and zero otherwise
<i>SOE</i>	An indicator variable that equals one if the firm is an state-owned enterprise, and zero otherwise
<i>Accruals</i>	Unsigned abnormal accruals computed as the absolute residual using the methodology in Dechow and Dichev (2002)
<i>Donate</i>	Measured as the ratio of corporate charitable donations to sales revenue
<i>Crosslist</i>	An indicator variable that equals one if the firm is cross-listed, and zero otherwise
<i>Volatility</i>	Calculated as the standard deviation of daily stock returns one year prior to bond issuance
<i>Spread</i>	Following Reisel (2014), we measure bond spread as corporate bond yields at the issuance date minus Treasury bond yields of comparable maturity
<i>LogSpread</i>	Natural logarithm of <i>Spread</i>
<i>BondAmt</i>	The amount of bond offering (measured in hundred millions of RMB)
<i>LogBondAmt</i>	Natural logarithm of <i>BondAmt</i>
<i>Maturity</i>	The maturity of corporate bonds in month
<i>LogMaturity</i>	Natural logarithm of <i>Maturity</i>
<i>Covenants</i>	The number of financing-related and asset-sale covenants in a bond contract
<i>Collateral</i>	An indicator variable that equals one if bond is secured with collateral, and zero otherwise
<i>Put</i>	An indicator variable that equals one if a new bond issue has a put option, and zero otherwise
<i>Credit ratings</i>	Defined as an ordered variable, with 4 for an AAA rating; 3 for AA+; 2 for AA; and 1 for AA-

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