

Bond market information disclosure and industry spillover effect

Xiaochen Zhang and Huifang Yin

Shanghai University of Finance and Economics, Shanghai, China

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Abstract

Purpose – The aim of this paper is to examine the effect of information disclosure by unlisted bond issuers on the stock price informativeness of listed firms in the same industry.

Design/methodology/approach – This paper takes advantage of information disclosure during the bond issuance and examines the spillover effect of unlisted bond issuers' information disclosure on listed firms in the stock market. The sample is composed of A-share firms listed on the Shanghai and Shenzhen stock exchanges from 2007 to 2018. All the data are obtained from the China Stock Market and Accounting Research and WIND databases. The impact of bond market information disclosure on price informativeness of listed firms in the same industry is identified through multivariate regression analyses.

Findings – Empirical results show that price informativeness of listed firms has a significantly positive association with the information disclosure of same-industry unlisted bond issuers. Further analyses show that the above finding is more significant when information disclosure of bond issuers is a more important channel for acquiring industry information (i.e. when industry is more concentrated, when economic uncertainty is high, and when industry information is less transparent) and understanding the industry competitive landscape (i.e. when bond issuers are relatively large, when bond issuers and listed firms have more direct product competition, when bond issuance firms are large-scale state-owned business groups), and when there are more cross-market information intermediaries (i.e. more cross-market institutional investors and more sell-side analysts). This paper indicates that information disclosure of bond issuers has a positive spillover effect on the stock market.

Originality/value – The novelty of the research is that the authors examine industry information spillover from unlisted firms to listed firms leveraging on unlisted firms' information disclosure in bond markets.

Keywords Bond market, Information disclosure, Spillover effect, Price informativeness

Paper type Research paper

1. Introduction

The bond market in China has become the second largest in the world. By the end of 2018, the bond market size of China has reached 85.73 trillion Yuan. Unlike bond issuers in Western countries, bond issuers in China are highly heterogeneous and most of them are not listed in stock markets ("unlisted firms" hereinafter) (Allen, Qian, Shan, & Zhu, 2015). Proceeds of unlisted firms account for 97.8% of overall bond new issuance in 2019 and 84.6% of corporate bonds new issuance in 2019. As an integral part of the national economy, unlisted firms can

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help stock market investors better understand the industry and predict future performance of listed firms in the same industry (Bernard, 2016). Despite so, stock market investors can hardly obtain information of unlisted firms since these firms are not subject to the mandatory disclosure requirements of the stock market. The information disclosure of unlisted firms at the time of bond issuance provides an opportunity for stock investors to understand unlisted firms. Leveraging on this setting, we want to study industry information spillover effect of unlisted firms on listed firms. Specifically, we examine the impact of information disclosure of unlisted firms at the time of the bond issuance on the stock price informativeness of listed firms in the same industry.

Existing research shows that bond market information disclosure can help investors monitor firms effectively in developed countries (Dhaliwal, Hogan, Trezevant, & Wilkins, 2011). However, the capital market in China is still developing, and the regulatory system and information disclosure environment are significantly different from those in developed markets (Allen, Qian, & Qian, 2005). Insufficient information disclosure may increase firms' litigation risk in countries with strong investor protection (Skinner, 1994). However, China's legal environment is relatively weak in investor protection. Even if regulators require firms to make disclosures, firms still may respond with insufficient information disclosure (Piotroski, & Wong, 2013). Therefore, it is important to study the effectiveness of bond market information disclosure in an emerging market like China. In addition, bond market information disclosure attracts attention from regulators and practitioners. The China Securities Regulatory Commission (CSRC) announced the implementation of "registration system" for Chinese corporate bonds in March 2020, that is, the bond market implements a registration system before the stock market does. Information disclosure has become the focus of bond market regulators under the registration system (Yao, & Zhao, 2016). On April 27, 2020, the CSRC Vice-President Li Chao pointed out that information disclosure lies in the core of registration system reform.

Most of the existing literature examines the impact of a bond issuer's information disclosure on its bond issuance behavior and stock market reaction. For example, Zhou, Lin, Li, and Wang (2012) find that information disclosure of bond issuers decreases financing costs. Wu and Wang (2016) find that bond issuers with more disclosure have higher credit ratings. Bittlingmayer and Moser (2014) find that bond-stock market prices are correlated. Guan, Kim, Xin, and Liu (2019) focus on the relationship between corporate bond information disclosure and same-firm stock price crash risk. We argue in this paper that a bond issuer's information disclosure not only affects its own bond price and stock price but may also lead to information spillover to other firms in the stock market.

According to the requirements of the CSRC, bond market issuers are required to disclose a series of documents during the bond issuance, such as the bond prospectus, credit rating reports, etc. Among these, the bond prospectus discloses information about the firm's financial performance, industry environment and debt security. We predict that such information helps stock market investors acquire industry-specific knowledge and evaluate the competitiveness of each firm in the industry, thereby improving stock price informativeness. Using a sample of A-share listed firms on the Shanghai and Shenzhen Stock Exchanges during the period 2007–2018, we find that information disclosure of unlisted bond issuers [1] has a positive and significant association with stock price informativeness of listed firms in the same industry. This finding is more pronounced when information disclosure of unlisted bond issuers serves as a more important channel for acquiring industry information (i.e. when industry is more concentrated, when economic uncertainty is high and when industry information is less transparent) and understanding the industry competitive landscape (i.e. when bond issuers are relatively large, when bond issuers and listed firms have more direct product competition and when bond issuance firms are large-scale state-owned business groups), and when there are

more cross-market information intermediaries (i.e. more cross-market institutional investors and more sell-side analysts). Further analyses show that our main finding is stronger when textual information content of the bond prospectus is higher, corroborating that the improved price informativeness is indeed due to increased disclosure of bond issuers. Additionally, by disaggregating price informativeness into industry-specific and firm-specific, this paper finds that price informativeness is improved through incorporation of both industry-specific and firm-specific information into stock prices.

We examine our research question using China data for the following two reasons. First, unlisted firms are essential in China. According to China's National Bureau of Statistics, China has a total of 383,000 industrial enterprises above designated size by the end of 2020, while the number of A-share listed firms in the same period is only 4,140. Besides, according to the International Statistical Yearbook of China, the ratio of total market capitalization of listed firms to GDP is 48.2% in 2000 and is 71.2% in 2017, which is far lower than the numbers in other countries in the same year. Therefore, understanding the role of unlisted firms in China is critical. However, unlisted firms are not subject to mandatory disclosure requirements of the stock market, and investors have limited knowledge of these firms. Our paper fills this gap. Second, the lack of disclosure is an important issue in countries with weak investor protection (Allen *et al.*, 2005; Piotroski, & Wong, 2013). Since China has become one of the most important emerging economies, examining the externality of bond market information disclosure in China may have meaningful impact on understanding the information environment in an emerging economy.

Our study contributes to the literature in the following ways. First, our paper complements existing literature on information disclosure in the bond market. While prior research mainly focuses on the impact of bond information disclosure on its own debt issuance behavior and stock market reaction (Zhou *et al.*, 2012; Bittlingmayer, & Moser, 2014; Wu, & Wang, 2016), our study instead examines the effect on the information environment of other firms in the stock market. Second, we add to the literature that examines the consequences of unlisted firm information disclosure (e.g. Badertscher, Shroff, & White, 2013; Bernard, 2016). Despite their importance in the Chinese economy, previous studies pay little attention to the unlisted firms. This paper enriches the research on how unlisted firm information affects behavior of listed firms' investors in the Chinese capital market. Third, this paper extends the literature on industry spillover effects. Prior research examines industry spillover effects in the stock market (e.g. Durnev, & Mangen, 2009; Beatty, Liao, & Yu, 2013). Our study adds to this line of literature by showing that industry information can also spill over from the bond market to stock market. Our paper also has important policy implications. During the "14th Five-Year Plan", the CSRC identifies "promoting the innovative development of the bond market" and "increasing the proportion of direct financing" as the regulatory focuses. This paper not only provides a theoretical basis for regulatory authorities to regulate the bond market information disclosure system efficiently but also helps stock market investors use bond market information disclosure to identify specific information of listed firms, thereby improving market efficiency.

2. Literature review and research hypotheses

2.1 Stock price synchronicity

Market information, industry-level information and firm-specific information can influence the volatility of stock prices (Roll, 1988). Morck, Yeung, and Yu (2000) propose the concept of price informativeness, which is defined as the degree to which industry, and firm-specific information is reflected in stock prices. When stock price fluctuations are mostly driven by

firm-specific information and industry information, the synchronicity between stock prices and market factors decreases, and price informativeness increase (Durnev, Morck, Yeung, & Zarowin, 2003). Bris, Goetzmann and Zhu (2007) use R^2 from the regression of contemporaneous and lagged individual stock returns on market returns to measure price synchronicity of individual stocks. High stock price synchronicity has a negative impact on the firm's decision-making, such as decreasing the CEO turnover to performance sensitivity (Defond and Hung, 2004), a firm's investment efficiency (Bennett, Stulz, & Wang, 2020) and capital allocation efficiency (Wurgler, 2000).

Morck *et al.* (2000) find that price synchronicity in emerging countries like China is relatively higher than that in developed capital markets. Previous studies document drivers of high synchronicity such as the perspective of "Guanxi"-based trades, institutional investor herding effect, investor psychological deviation and government behavior (Li, Ye, & He, 2011; Xu, Hong, Wu, & Xu, 2011; Xu, Yu, & Yi, 2013; Chen, & Yao, 2018). Another string of literature focuses on how to reduce high price synchronicity in China. Institutional investor holdings, media reports, internet communication, social responsibility report disclosure, supplier information environment and margin trading are all negatively related to stock price synchronicity (Wang, Liu, & Wu, 2009; Huang, & Guo, 2014; Wang, Yu, & An, 2014; Li, & Wang, 2016; Tan, Kan, & Cui, 2016; Chen, & Liu, 2018).

In summary, the existing studies mainly focus on the reasons of high price synchronicity in China and how the information environment of listed firms reduces price synchronicity. Few studies discuss the impact of unlisted firms' bond market information disclosure on price synchronicity of listed firms in the same industry. This paper focuses on this cross-market information spillover effect.

2.2 Bond market information disclosure

Bond market information disclosure can improve the information environment in the bond market (Wang, & Shi, 2014). One string of literature focuses on whether information disclosure of bond issuers provides useful information. Shi and Jiang (2013) show that information disclosed by bond issuers contains useful information for investors. Specifically, bond issuers with higher information quality have lower financing costs and higher bond ratings. Fang, Shi and Zhang (2013) find that bond market information disclosure can reduce agency costs and increase firm value. Another string of literature focuses on whether investors incorporate information disclosed by bond issuers into their investment decisions. Akerlof (1970) argues that external stakeholders can enhance their understanding of internal information after information disclosure of the firm. Chen and Li (2014) show that both investors and credit rating agencies pay attention to information disclosure quality in a Chinese setting. Wei and Zhou (2016) find that bond investors' trading behavior is related to firms' unexpected earnings, indicating that bond investors trade on information disclosed by bond issuers.

Bond market information can also influence the stock market. Even-Tov (2017) shows that bond prices after earnings announcements have predictive effects on stock returns, and this impact is more pronounced when the proportion of institutional investors is relatively low and bond liquidity is relatively high. Bittlingmayer and Moser (2014) find that the stock price decreases by 1.42% after an abnormal price decline of a firm's most liquid bond, indicating that bond market information is transferred to the stock market. De Franco, Vasvari and Wittenberg-Moerman (2009) argue that institutional investors in the bond market facilitate information dissemination from the bond market to stock market, due to their strong information discovery and interpretation abilities.

Previous studies mainly focus on the impact of bond market information disclosure on price informativeness of the same firm. However, we take another perspective and examine

the information spillover effect of bond market information disclosure on price informativeness of same-industry listed firms in the stock market.

2.3 Theoretical analysis and research hypothesis

Firms' information disclosure can supplement the information of same-industry firms. [Lang and Lundholm \(1996\)](#) show that a firm's earnings contain information that can affect same-industry firms' stock returns, indicating that information of same-industry firms is value-relevant. [Badertscher et al. \(2013\)](#) find that information disclosure by unlisted firms can reduce industry uncertainty and benefit same-industry listed firms' investors. The proportion of listed firms in an industry is negatively correlated with the industry's uncertainty and is positively related to investment efficiency of same-industry unlisted firms.

This paper aims to examine the spillover effect of information disclosure by unlisted bond issuers on stock price informativeness of listed firms in the same industry. We argue that unlisted firms' information disclosure during bond issuance provides incremental information to investors of listed firms. Investors' understanding of the industry is not comprehensive if they only pay attention to information disclosure of listed firms. Understanding unlisted firms can also contribute to knowledge of the whole industry. For example, investors can verify a firm's industry prospect reported in MD&A through financial information disclosed by unlisted peer firms. In addition, unlisted firms disclose information that is not disclosed in the stock market, including debt guarantee, repayment plans, use of proceeds, etc. We argue that bond market disclosure can help stock market investors acquire information on industry prospects and competitive landscape within the industry.

First, unlisted firm information disclosure enables investors of same-industry listed firms to obtain industry common knowledge. Firms in the same industry are affected by similar macro-economic factors and industry policies. One possible reason for across-firm information transfer is that a firm's revenues convey industry-wide common information, which can also affect other firms in the industry ([Foster, 1981](#)). [Durnev and Mangen \(2009\)](#) find that a firm's financial restatements contain information about industry demand in the future and influence investment decisions of same-industry firms, indicating that a firm's information disclosure contains industry-level information. [Kim, Lacina and Park \(2008\)](#) show that positive information transfer within the industry is caused by industry common information. [Lang and Lundholm \(1996\)](#) find a positive relationship between a firm's stock return and same-industry firms' earnings when industry prospects are unclear. This implies that a same-industry firm's disclosure provides information about industry average value in the future. An unlisted bond issuer's prospectus contains information on industry operations, industry policies, industry prospects, etc. Such information reduces investors' forecasting uncertainty and enables investors to have a better grasp of the industry ([Bonsall, Bozanic, & Fischer, 2013](#)). When more industry information is incorporated into stock prices, stock price synchronicity declines ([Durnev et al., 2003](#)).

Second, information disclosure of unlisted bond issuers can increase investors' understanding of same-industry firms' competitiveness within the industry. First, information disclosure of competitors in the same industry can help a firm predict its future market share. When a firm reports that its sales and revenue increase, it might suggest that the market shares of same-industry competitors would reduce. Therefore, this report conveys negative information for same-industry firms ([Foster, 1981](#)). [Lang and Lundholm \(1996\)](#) find that a firm's stock return is negatively associated with same-industry firms' earnings in industries with an unclear competition pattern. Their results show that a firm's earnings announcements provide incremental information about the firm's competitiveness in the industry. Similarly, [Bernard \(2016\)](#) finds that a listed firm's market share grows after Germany requires unlisted competitors to disclose financial data. Besides, information

disclosure of these unlisted firms also increases their bankruptcy probability. Following the same logic, we argue that unlisted bond issuers' disclosure also helps listed firms evaluate their competitiveness in the industry and make corporate decisions to distinguish from competitors. When these decisions and information are released, more firm-specific information is incorporated into stock prices.

On the basis of the above discussion, we propose the following hypothesis:

H1. Information disclosure of bond issuers can improve the stock price informativeness for same-industry listed firms.

However, our research question is not without tension. Information disclosure of bond issuers may have limited impact on stock price informativeness of same-industry firms. On the one hand, information from unlisted bond issuers may be just a "noisy" version of same-industry listed firms' information. In this case, if unlisted bond issuers disclose earnings before a same-industry listed firm does, bond market information disclosure can affect a firm's stock returns. However, if unlisted bond issuers disclose earnings after a same-industry listed firm does, the impact of bond market information disclosure is limited, because it does not bring any additional information. Following the same rationale, [Frost \(1995\)](#) investigates information transfer three days before and after earnings announcements between the announced firm and other firms in the same industry. She finds that only 4 of the 22 industries have information transfer. [Pownall and Waymire \(1989\)](#) examine abnormal returns on the day of and one day before annual earnings announcement. They find that a firm's information disclosure has a significant impact on same-industry firms' stock prices if these same-industry firms do not disclose performance forecasts. However, when these same-industry firms have already issued earnings forecasts, the disclosure has no significant impact. This finding suggests that a firm's disclosure can be partly substituted by that of same-industry firms. Therefore, unlisted bond issuers' information disclosure may have limited influence on price informativeness of same-industry listed firms if their disclosures are already sufficient.

3. Research design

3.1 Data and sample

Our initial sample includes A-share firms listed on the Shanghai and Shenzhen stock exchanges from 2007 to 2018. We obtain data from the China Stock Market and Accounting Research (CSMAR) and WIND databases. To ensure accuracy, we drop the following observations (1) firms in the financial industry; (2) special treatment (ST and *ST) firms; (3) firm-year observations with a listing age less than one year; (4) firm-year observations with trading days less than 30 weeks in the year; (5) observations with missing data of control variables. The final sample has 18,063 firm-year observations. We also winsorize continuous variables at the 1 and 99% levels to mitigate effect of outliers.

3.2 Variable definition

3.2.1 Stock price synchronicity (Synch). Following [Durnev et al. \(2003\)](#), we use Model (1) to estimate R^2 of individual stock prices, and we further use Model (2) to log transform R^2 . We obtain $Synch_i$, which is stock price synchronicity.

$$Ret_{i,t} = \alpha_0 + \alpha_1 \times Market_t + \alpha_2 \times Market_{t-1} + \varepsilon_{i,t} \quad (1)$$

$$Synch_i = Ln\left(\frac{R_i^2}{1 - R_i^2}\right). \quad (2)$$

where $Ret_{i,t}$ is firm i 's stock return on the t th trading day; $Market_t$ is market return on the t th trading day; $Market_{t-1}$ is market return on the $(t-1)$ th trading day; R_i^2 is the coefficient of determination of Model (1).

3.2.2 Unlisted bond issuers' information disclosure in each industry (PeerDebtIssue). $PeerDebtIssue_{i,t}$ measures unlisted bond issuers' information disclosure in each industry. Following [Badertscher et al. \(2013\)](#), we use the number of unlisted firms that issue bonds in an industry in each year divided by the number of listed firms in this industry to measure $PeerDebtIssue_{i,t}$ [2].

3.2.3 Defining a firm's industry. The industry classification data of listed firms and unlisted bond issuers are obtained from the WIND database. We classify the industries of listed and unlisted firms according to the CSRC's industry classification guidelines (2012 edition). Specifically, we use the first two-digit industry code for the manufacturing industry and use the first one-digit industry code for other industries.

3.2.4 Control variables. Following prior literature ([Hou, & Ye, 2008](#); [Hutton, Marcus, & Tehranian, 2009](#); [Chen, & Yao, 2018](#)), we include a set of control variables in the regression. The variable definitions are described in [Table A1](#).

3.3 Regression model

We use the following model to test H1:

$$Synch_{i,t} = \beta_0 + \beta_1 PeerDebtIssue_{i,t} + \beta_2 Size_{i,t} + \beta_3 Turnover_{i,t} + \beta_4 BMRatio_{i,t} + \beta_5 ROE_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 Separation_{i,t} + \beta_8 lnSize_{i,t} + \beta_9 EarnVol_{i,t} + \beta_{10} Policy_{i,t} + \beta_{11} Opaque_{i,t} + Firm\ Fixed\ Effect + Year\ Fixed\ Effect + \epsilon_{i,t} \quad (3)$$

To mitigate the concern that our results are driven by listed firms' own disclosures or macroeconomic conditions, we include firm-fixed effect and year-fixed effect in the model.

3.4 Descriptive statistics

[Table 1](#) reports the descriptive statistics of all variables. The descriptive statistics show that the mean value of $Synch$ is -0.614 , and the standard deviation is 0.741 . The mean value of $PeerDebtIssue$ is 0.830 , indicating a significant number of unlisted bond issuers. As for control variables, the average logarithm of total assets ($Size$) is 22.166 . The mean value of $Turnover$ is

Variable	N	Mean	Sd	p25	p50	p75
<i>Synch</i>	18,063	-0.614	0.741	-1.098	-0.579	-0.086
<i>PeerDebtIssue</i>	18,063	0.830	1.745	0.203	0.314	0.503
<i>Size</i>	18,063	22.166	1.281	21.226	21.985	22.916
<i>Turnover</i>	18,063	3.764	2.618	1.814	3.067	5.034
<i>BMRatio</i>	18,063	0.628	0.234	0.449	0.632	0.807
<i>ROE</i>	18,063	0.089	0.063	0.042	0.077	0.120
<i>Leverage</i>	18,063	0.428	0.202	0.266	0.426	0.586
<i>Separation</i>	18,063	5.147	7.799	0.000	0.000	9.245
<i>lnSize</i>	18,063	30.937	1.147	30.166	30.819	32.031
<i>EarnVol</i>	18,063	2.017	4.550	0.203	0.542	1.597
<i>Policy</i>	18,063	0.580	0.494	0.000	1.000	1.000
<i>Opaque</i>	18,063	0.061	0.066	0.018	0.041	0.078

Table 1.
Descriptive statistics

Note(s): This table reports summary statistics of variables included in our main regressions. Variables are defined in [Table A1](#)

3.764. Further, our sample firms have an average book-to-market ratio of 62.8%, and an average ROE of 0.089. The average total debt-to-asset ratio of our sample firms is 0.428. The mean value of *Separation* and *INSIZE* is 5.147 and 30.937, respectively. The average earnings volatility (*EarnVol*) is 2.017. Besides, 58.0% of firms belong to the “Five-Year Plan” supported-industries. Finally, the mean value of *Opaque* is 0.061.

4. Regressions results

4.1 The association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms

Table 2 shows the association between information disclosure of unlisted bond issuers and stock price informativeness of same-industry listed firms. Column (1) only includes *PeerDebtIssue* as well as firm-fixed effect and year-fixed effect. Column (2) shows the regression result after further including control variables. The regression results show that *PeerDebtIssue* is negative and statistically significant at the 1% level. This indicates that information disclosure of bond issuers improves stock price informativeness of same-industry listed firms, supporting our H1.

4.2 The association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms: mechanism analyses

We argue that the association between unlisted firms’ information disclosure in the bond market and price informativeness of same-industry listed firms is realized through the following two channels: by helping stock market investors acquire incremental industry-wide information and by promoting investors’ understanding of industry competitive landscape. In addition, cross-market information intermediaries play a vital role in facilitating information transfer. In this section, we conduct mechanism analyses on the above channels.

Variable	(1) <i>Synch</i>	(2) <i>Synch</i>
<i>PeerDebtIssue</i>	-0.017*** (-2.96)	-0.027*** (-4.70)
<i>Size</i>		-0.058*** (-3.66)
<i>Turnover</i>		-0.051*** (-20.42)
<i>BMRatio</i>		0.906*** (21.30)
<i>ROE</i>		-0.115 (-1.20)
<i>Leverage</i>		-0.062 (-1.19)
<i>Separation</i>		-0.002 (-1.39)
<i>InSize</i>		-0.002 (-0.23)
<i>EarnVol</i>		-0.011*** (-7.20)
<i>Policy</i>		0.019 (1.04)
<i>Opaque</i>		-0.397*** (-6.45)
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
Observations	18,063	18,063
Adjusted R^2	0.575	0.626

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms. The dependent variable is stock price synchronicity. The *t*-statistics in parentheses are robust *t*-values. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 2.
The association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms

4.2.1 *Mechanism analyses of industry-wide information.* 4.2.1.1 Industry monopoly. Foster (1981) argues that firm disclosure contains industry-level information. Joh and Lee (1992) believe that a firm's sales information is a type of industry information in a monopolistic industry, since all firms in the industry are affected in the same way in front of a shock in demand. They find that investors' demand for industry-specific information is positively related to industry monopoly power. Therefore, we expect that cross-market information spillover effect is stronger when industry monopoly power is higher. We use the Lerner index to measure overall monopoly power in the industry [3]. Following Gaspar and Massa (2006), we use the following model to calculate the Lerner index of individual stocks:

$$L_{i,t} = Sales_i / \sum_i^n Sales_i \left(\frac{Profit_{i,t} - Finance_{i,t}}{Sales_{i,t}} \right) \quad (4)$$

where i denotes firm, t denotes year, *Profit* is operating profit, *Finance* represents financial costs, *Sales* is the total sales revenue and n is the number of listed firms and unlisted bond issuers in the industry in a given year. A higher number of Lerner index indicates that the industry is more monopolistic. If the Lerner index is greater than the median of the sample in the year, *Lerner* takes the value of 1; otherwise, *Lerner* equals 0. The results in Table 3 show that the effect of unlisted bond issuers' information disclosure on listed firms' price informativeness is more significant when the industry has higher monopoly power.

4.2.1.2 Macroeconomic uncertainty. Firms face greater uncertainty when the macroeconomic environment is more uncertain and when industry prospects are more unpredictable (Pandit, Wasley, & Zach, 2011). When the industry has relatively uncertain prospects, information disclosed by same-industry bond issuers is more helpful for investors to predict industry prospects (Rao, & Xu, 2017). Thus, we predict that the positive relationship between bond market information spillover and price informativeness of same-industry listed firms is more significant when macroeconomic uncertainty is higher. Following Rao and Xu (2017), we use the economic policy uncertainty index in China to measure macroeconomic uncertainty. The index is developed by Baker, Bloom, and Davis (2016). To convert the original monthly data into yearly data, we follow Meng and Shi (2017) and take the average of monthly numbers in each year and divide it by 100. We divide our sample into subsamples with above- and below-median macroeconomic uncertainty. The results in Columns (3) and (4) of Table 3 show that our main finding is more significant in high macroeconomic uncertainty periods.

4.2.1.3 Industry information transparency. Investors could acquire more industry information when the information environment is more transparent. When information transparency in the industry is high, information disclosure of unlisted bond issuers may only bring limited additional information to the industry. Conversely, when industry information is less transparent, information disclosure of unlisted bond issuers can mitigate information asymmetry and help same-industry investors understand industry-specific information. Therefore, this paper predicts that our main finding is stronger when industry information is less transparent. Following Dechow, Sloan and Sweeney (1995), we use the modified Jones model to estimate the discretionary accruals and take the absolute value to measure information transparency. Accrual-based earnings management is positively associated with information opacity (Hutton *et al.*, 2009). If discretionary accruals of the industry to which firm i belongs are less than the median of all industries, then *Trans* takes the value of 1; otherwise, *Trans* equals 0. The results in Columns (5) and (6) of Table 3 show that the positive relationship between information disclosure of unlisted bond issuers and price informativeness of same-industry listed firms is more significant for firms with low information transparency, in line with our expectation.

Variable	(1) <i>Lerner</i> = 1 <i>Synch</i>	(2) <i>Lerner</i> = 0 <i>Synch</i>	(3) <i>MacroUn</i> = 1 <i>Synch</i>	(4) <i>MacroUn</i> = 0 <i>Synch</i>	(5) <i>Trans</i> = 1 <i>Synch</i>	(6) <i>Trans</i> = 0 <i>Synch</i>
<i>PeerDebtIssue</i>	-0.068*** (-5.52)	-0.008 (-1.11)	-0.013* (-1.96)	-0.002 (-0.26)	-0.014 (-1.53)	-0.043*** (-5.01)
<i>Size</i>	-0.078*** (-2.97)	-0.045** (-2.08)	-0.075*** (-3.83)	-0.045* (-1.91)	-0.080*** (-3.47)	-0.044* (-1.85)
<i>Turnover</i>	-0.059*** (-14.24)	-0.048*** (-14.87)	-0.064*** (-20.06)	-0.033*** (-8.47)	-0.065*** (-18.29)	-0.043*** (-10.07)
<i>BMRatio</i>	0.954*** (13.76)	0.898*** (16.18)	0.770*** (14.18)	1.148*** (19.99)	0.901*** (15.52)	1.008*** (14.10)
<i>ROE</i>	0.116 (0.72)	-0.194 (-1.63)	-0.088 (-0.70)	-0.049 (-0.36)	0.065 (0.45)	-0.218 (-1.42)
<i>Leverage</i>	-0.200** (-2.29)	-0.018 (-0.26)	0.021 (0.30)	-0.330*** (-4.24)	-0.021 (-0.29)	-0.108 (-1.24)
<i>Separation</i>	0.001 (0.51)	-0.003* (-1.73)	-0.002 (-1.10)	-0.001 (-0.36)	-0.003** (-2.05)	-0.000 (-0.06)
<i>InSize</i>	0.015 (0.51)	0.023* (1.69)	0.015 (1.11)	-0.003 (-0.21)	0.025 (1.16)	-0.033** (-2.44)
<i>EarnVol</i>	-0.010*** (-4.92)	-0.012*** (-5.19)	-0.008*** (-4.30)	-0.011*** (-4.23)	-0.009*** (-4.13)	-0.017*** (-6.84)
<i>Policy</i>	0.035 (1.25)	-0.096*** (-3.35)	-0.006 (-0.26)	0.013 (0.55)	-0.031 (-1.18)	0.087*** (2.81)
<i>Opaque</i>	-0.396*** (-4.26)	-0.400*** (-4.93)	-0.423*** (-4.22)	-0.399*** (-4.62)		
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,000	9,905	10,559	7,504	10,209	6,859
Adjusted <i>R</i> ²	0.628	0.636	0.656	0.497	0.590	0.639

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms conditional on the importance of industry-wide information. The dependent variable is stock price synchronicity. The *t*-statistics in parentheses are robust *t*-values. *, **, and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 3.
The association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms: the mechanism analyses of industry-wide information

4.2.2 *Mechanism analyses of firms' competitive landscape.* Impact of unlisted bond issuer's information disclosure on price informativeness of same-industry listed firms is also realized by promoting investors' understanding of industry competitive landscape. In this section, we conduct the following three cross-sectional analyses to test this mechanism.

4.2.2.1 The importance of bond issuers in the industry. The importance of bond issuers in the industry affects investors' understanding of industry competitive landscape. When unlisted firms are major players in the industry competition, their information disclosure is more useful for stock market investors to understand industry competitive landscape. Similarly, [Shroff, Verdi and Yost \(2017\)](#) find that a firm's cost of capital is affected more significantly when its peer firms that disclose information are market leaders. Therefore, we expect that cross-market information spillover effect is more significant when bond issuers are relatively important in the industry.

We use an unlisted firm's relative size as a proxy for the importance of bond issuers. It is measured as the average total assets of unlisted bond issuers divided by the average total assets of listed firms in the industry. We split our sample by the median of relative size. Columns (1) and (2) of [Table 4](#) report the regression results. Results show that bond market information disclosure has a larger impact on price informativeness of same-industry listed firms when unlisted bond issuers are relatively important in the industry.

4.2.2.2 The operation similarity between bond issuers and listed firms. Next, we explore how operation similarity between bond issuers and listed firms moderates the relationship between bond market information disclosure and stock price informativeness of same-industry listed firms. High operation similarity indicates direct product competition between bond issuers and listed firms. We argue that the positive relationship between information disclosure of bond issuers and price informativeness of same-industry listed firms is more significant when operation similarity between bond issuers and listed firms is high, since the information disclosed by unlisted bond issuers is more relevant with the listed firm.

[MacKay and Phillips \(2005\)](#) and [Haushalter, Klasa, and Maxwell \(2007\)](#) use natural hedge (*NH*) to measure the operation similarity among firms. Following their studies, we use *NH* to measure operation similarity between unlisted bond issuers and listed firms. We calculate *NH* using the following formula:

$$NH = \frac{\left| (K/L)_{f,j,t} - \text{median}_{g,j,t} (K/L) \right|}{\text{range} \left\{ \left| (K/L)_{f,j,t} - \text{median}_{g,j,t} (K/L) \right| \forall f \in j, t \right\}} \quad (5)$$

where K/L is capital-labor ratio, f denotes listed firm, g denotes bond issuer, j denotes for the industry and t denotes for year. Higher *NH* represents lower operation similarity between bond issuer and listed firm. We divide our sample into two subgroups according to the similarity between bond issuers and listed firms. Columns (3) and (4) of [Table 4](#) report regression results. Results show that the positive relationship between bond issuer's information disclosure price informativeness of same-industry listed firms is more significant when the operation similarity between bond issuer and listed firm is higher.

4.2.2.3 Large-scale state-owned business groups. We then explore whether bond issuers are large-scale state-owned groups moderate the effect of bond market information disclosure on price informativeness of listed firms. We expect that bond market information disclosure has a more significant impact on price informativeness of same-industry listed firms when bond issuers are large state-owned groups since large-scale state-owned groups play a critical role in the industry and have a relatively high influence on the industry competition. Besides, large state-owned groups generally have more related transactions, and their internal operations are more complicated. The pyramid ownership structure within business group

Variable	(1) <i>RSize</i> = 1 <i>Synch</i>	(2) <i>RSize</i> = 0 <i>Synch</i>	(3) <i>OpSimil</i> = 1 <i>Synch</i>	(4) <i>OpSimil</i> = 0 <i>Synch</i>	(5) <i>BigGroup</i> = 1 <i>Synch</i>	(6) <i>BigGroup</i> = 0 <i>Synch</i>
<i>PeerDebtIssue</i>	-0.065*** (-3.58)	-0.024*** (-3.32)	-0.075*** (-5.32)	-0.019*** (-2.59)	-0.028** (-2.50)	-0.007 (-1.05)
<i>Size</i>	-0.069*** (-2.40)	-0.085*** (-4.11)	-0.045** (-2.16)	-0.066*** (-2.44)	-0.130*** (-5.10)	-0.031 (-1.38)
<i>Turnover</i>	-0.069*** (-15.93)	-0.049*** (-15.48)	-0.047*** (-13.56)	-0.065*** (-16.91)	-0.068*** (-18.03)	-0.046*** (-12.96)
<i>BMRatio</i>	1.035*** (14.63)	0.986*** (19.02)	0.943*** (16.83)	0.827*** (12.53)	0.961*** (15.10)	0.897*** (15.47)
<i>ROE</i>	0.031 (0.16)	-0.086 (-0.73)	-0.068 (-0.52)	-0.177 (-1.19)	0.151 (0.91)	-0.140 (-1.14)
<i>Leverage</i>	0.054 (0.56)	-0.130* (-1.90)	-0.194*** (-2.82)	0.046 (0.55)	0.134 (1.60)	-0.221*** (-2.93)
<i>Separation</i>	-0.004 (-1.64)	0.000 (0.06)	0.000 (0.18)	-0.003 (-1.29)	-0.003 (-1.54)	0.001 (0.52)
<i>InSize</i>	0.038* (1.85)	0.005 (0.31)	-0.007 (-0.47)	0.005 (0.31)	0.000 (0.01)	0.005 (0.36)
<i>EarnVol</i>	-0.011*** (-3.97)	-0.012*** (-5.69)	-0.009*** (-3.81)	-0.012*** (-5.27)	-0.009*** (-3.51)	-0.011*** (-4.89)
<i>Policy</i>	-0.126*** (-3.39)	0.059*** (2.44)	0.027 (1.11)	-0.004 (-0.12)	-0.140*** (-3.92)	0.048** (2.16)
<i>Opaque</i>	-0.235** (-2.01)	-0.423*** (-5.41)	-0.398*** (-4.71)	-0.400*** (-3.80)	-0.542*** (-4.58)	-0.345*** (-4.49)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,465	11,581	8,945	8,960	8,546	9,517
Adjusted <i>R</i> ²	0.670	0.633	0.662	0.622	0.660	0.579

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms conditional on the information of competitive landscape. The dependent variable is stock price synchronicity. The *t*-statistics in parentheses are robust *t*-values. *, **, and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 4.
The association
between information
disclosure of unlisted
bond issuers and the
stock price
informativeness of
same-industry listed
firms: The mechanism
analyses of firms'
competitive landscape

allows controlling shareholder to control subsidiaries with relatively low ownership and obtain private benefits from minority shareholders (La Porta, Lopez-de-Silanes, & Shleifer, 1999; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000; Bae, Kang, & Kim, 2002; Bertrand, Mehta, & Mullainathan, 2002; Baek, Kang, & Lee, 2006; Claessens, Fan, & Lang, 2006), and they may disclose information selectively to conceal this behavior from external shareholders (Fan, & Wong, 2005; Kim, & Yi, 2006). Therefore, investors have little knowledge of these large state-owned business groups. Bond market information disclosure of large state-owned groups can enhance investors' understanding of these firms. Therefore, we expect the effect of information disclosure on the improvement of price informativeness of listed firms is more pronounced when the bond issuers are large-scale state-owned firms.

We split our sample by the value of *BigGroup*, which takes the value of 1 if the number of central government-owned firms issuing bond in a certain industry divided by the number of all bond issuers in that industry in year t is greater than the median of all industries, and 0 otherwise. Results are reported in Columns (5) and (6) of Table 4. Results show that coefficient of *BigGroup* is negative and significant in Column (5), while it is not significant in Column (6), indicating that bond market information disclosure has a more significant impact on the price informativeness of same-industry listed firms when bond issuers are large state-owned groups.

Overall, results in Table 4 suggest that bond market information disclosure reduces price synchronicity of same-industry listed firms by enhancing investors' understanding of competitive landscape. Additionally, the above results alleviate the endogenous concern to a certain extent, that is, a series of unobservable industry factors are related to the bond issuance and drive the observed association between bond issuance and price informativeness of listed firms. Through the above three cross-sectional tests, we find that firm-level heterogeneities have different effects on the reduction of listed firms' price synchronicity. If some industry characteristics explains our results, then we should observe similar relationship between bond market information disclosure and price synchronicity of listed firms regardless of the bond issuers' heterogeneity.

4.2.3 Mechanism analyses of intermediaries. This section analyzes how information intermediaries moderate the relationship between bond market information disclosure and price informativeness of listed firms. Institutional investors and analysts are important information intermediaries in capital market. First, institutional investors have more information channels and stronger information analysis capabilities. As the "informed investors" in market (Grossman, & Stiglitz, 1980), they can incorporate idiosyncratic information into stock price through trading. When unlisted firms disclose information in the bond market, institutional investors who both hold stocks and bonds have stronger incentives to collect and analyze relevant bond information than institutional investors who only hold stocks. Thus, we predict that bond market information spillover effect is more significant when there are more cross-market institutional investors. Second, sell-side analysts play an important role in information dissemination in capital market. Prior literature finds that information collection activities by analysts can increase information content of stock prices, thereby enhancing capital market efficiency (Schutte, & Unlu, 2009). When there are more sell-side analysts following listed firm, analysts are more motivated to provide incremental information that is different from other analysts and are more likely to pay attention to unlisted bond issuers in the same industry, which in turn increases information content contained in stock price. Therefore, we predict that the information spillover effect is more significant when there are more sell-side analysts.

Results in Table 5 show that information spillover effect is more significant when there are more cross-market institutional investors and when there are more sell-side analysts.

5. Robustness tests

5.1 Endogenous concern

The endogeneity of our paper comes from the fact that some unobservable characteristics may affect bond issuance and stock price synchronicity at the same time. We further use the instrumental variable approach to alleviate the endogeneity concern [4].

We identify the following two variables, namely *IndDefault* (whether same-industry bond defaulted in previous year) and *BondScale* (average bond issuance adjusted scale in the industry) as instrument variables.

IndDefault takes the value of 1 if number of bond defaults in an industry in previous year is greater than 0, otherwise it equals 0. It is likely to be related to *PeerDebtIssue* but unrelated to *Synch*. Underwriters, credit rating agencies and other entities are more cautious in risk control if same-industry bond defaulted in previous year (Ma, & Shi, 2016) and thereby reduce bond issuance amount. But bond default does not affect the amount of information contained in stock price of an individual firm.

Second, following Xia (2014), we also employ *BondScale* (average bond issuance adjusted scale in the industry) as an instrumental variable. This variable is associated with *PeerDebtIssue* and should not associated with stock price synchronicity of same-industry listed firms. Specifically, *BondScale* takes the value of 1 if average bond issuance size deflated by industry size is greater than the median of all industries in the year and equals 0 otherwise.

The empirical results of instrumental variables are shown in Table 6. The Cragg-Donald Wald F Statistic is 500.23, indicating that there is no weak instrumental variable problem. The coefficient of *IndDefault* in Column (1) is significantly negative, indicating that same-industry bond defaults in previous year reduce *PeerDebtIssue*. And the coefficient of *BondScale* is significantly positive, indicating that industry's average demand for bond market financing is positively related to *PeerDebtIssue*. In Column (2), we find that the coefficient on the instrumental value of *PeerDebtIssue* (*Pre_PeerDebtIssue*) is negative and significant, suggesting that information disclosure of bond issuers improves price informativeness of same-industry listed firms after considering endogenous concern.

Variable	(1) <i>Inst</i> = 1 <i>Synch</i>	(2) <i>Inst</i> = 0 <i>Synch</i>	(3) <i>Analyst</i> = 1 <i>Synch</i>	(4) <i>Analyst</i> = 0 <i>Synch</i>
<i>PeerDebtIssue</i>	-0.034*** (-3.79)	-0.014 (-0.90)	-0.037*** (-3.71)	-0.010 (-1.50)
<i>Size</i>	0.067** (2.11)	-0.176*** (-5.10)	0.178*** (6.11)	-0.203*** (-9.69)
<i>Turnover</i>	-0.055*** (-12.32)	-0.056*** (-12.98)	-0.035*** (-8.25)	-0.068*** (-20.63)
<i>BMRatio</i>	0.760*** (10.48)	1.056*** (13.62)	0.776*** (12.11)	1.065*** (17.80)
<i>ROE</i>	0.069 (0.41)	0.001 (0.00)	-0.172 (-1.20)	0.226 (1.61)
<i>Leverage</i>	-0.209** (-2.19)	0.198* (1.96)	-0.442*** (-5.13)	0.135* (1.90)
<i>Separation</i>	-0.003 (-1.28)	-0.000 (-0.17)	-0.002 (-0.93)	-0.000 (-0.30)
<i>InSize</i>	-0.046 (-1.60)	-0.004 (-0.23)	0.002 (0.08)	-0.016 (-1.16)
<i>EarnVol</i>	-0.010*** (-4.80)	-0.011*** (-3.09)	-0.012*** (-6.21)	-0.011*** (-4.02)
<i>Policy</i>	-0.018 (-0.55)	0.058* (1.93)	0.009 (0.33)	0.038 (1.51)
<i>Opaque</i>	-0.539*** (-4.72)	-0.302*** (-2.80)	-0.486*** (-4.70)	-0.295*** (-3.63)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	8,368	6,591	8,664	9,399
Adjusted <i>R</i> ²	0.673	0.606	0.637	0.648

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms conditional on information intermediary. The dependent variable is stock price synchronicity. The *t*-statistics in parentheses are robust *t*-values. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 5.
The association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms: the mechanism analyses of intermediaries

Variable	(1) <i>PeerDebtIssue</i>	(2) <i>Synch</i>
<i>IndDefault</i>	-0.287*** (-9.85)	
<i>BondScale</i>	0.002*** (28.57)	
<i>Pre_PeerDebtIssue</i>		-0.116*** (-7.06)
<i>Size</i>	-0.015 (-0.68)	-0.057*** (-4.97)
<i>Turnover</i>	-0.001 (-0.22)	-0.051*** (-23.18)
<i>BMRatio</i>	0.455*** (7.11)	0.953*** (27.74)
<i>ROE</i>	0.688*** (4.32)	-0.044 (-0.53)
<i>Leverage</i>	0.086 (1.04)	-0.055 (-1.28)
<i>Separation</i>	0.004** (2.06)	-0.001 (-1.28)
<i>InSize</i>	-0.054*** (-2.77)	-0.007 (-0.70)
<i>EarnVol</i>	-0.012*** (-4.90)	-0.012*** (-8.90)
<i>Polcy</i>	0.059** (2.09)	0.015 (1.03)
<i>Opaque</i>	0.372*** (3.18)	-0.371*** (-6.10)
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
Observations	17,551	17,551
Cragg-Donald Wald <i>F</i> statistic		500.23***

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms. We implement two-stage instrumental variable approach in this table. The dependent variable is *PeerDebtIssue* in Column (1) and its stock price synchronicity in Column (2). The *t*-statistics in parentheses are robust *t*-values. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 6.
Endogenous analyses:
instrumental variables

5.2 Alternative measures

In this section, we examine the robustness of our results using the following alternative independent variables: number of unlisted bond issuers in the industry divided by the sum of number of listed firms and number of unlisted bond issuers in the same industry (*PeerDebtIssue2*); bond proceeds raised by unlisted bond issuers divided by total market value of stocks in the same industry (*PeerDebtIssue3*); and bond proceeds raised by unlisted bond issuers divided by circulated market value of stocks in the same industry (*PeerDebtIssue4*). Results reported in Columns (1)–(3) of Table 7 show that coefficients on these alternative measures of independent variable remain significantly negative at the 1% level.

5.3 Subsample of the initial bond issuance in each year

We then use a subsample of initial bond issuance in each year to ensure the robustness of our results. Information disclosure during initial bond issuance in each year contains more novel information. We expect information disclosure during initial bond issuance is more useful for investors of same-industry listed firms. Column (4) of Table 7 reports the regression results. The results show that the coefficient of *PeerDebtIssue-Initial* is negative and significant at the 1% level. The magnitude of the coefficient is larger than that reported in Table 1. Therefore, our main results are robust using the subsample of initial bond issuance to measure unlisted bond issuers' information disclosure.

5.4 Subsample of bond issuance in the first half year

To better depict the lead-lag relation between information disclosure and price synchronicity, we capture the bond issuance period from January to June and calculate stock price synchronicity using data from July to December. The regression results are reported in Column

Variable	(1) <i>Synch</i>	(2) <i>Synch</i>	(3) <i>Synch</i>	(4) <i>Synch</i>	(5) <i>SynchFH</i>
<i>PeerDebtIssue2</i>	-0.350*** (-7.14)	-0.252*** (-4.51)	-0.177*** (-4.25)	-2.224** (-2.02)	-0.086*** (-5.18)
<i>PeerDebtIssue3</i>					-0.032* (-1.69)
<i>PeerDebtIssue4</i>					-0.019*** (-6.16)
<i>PeerDebtIssue-Initial</i>					1.086*** (22.08)
<i>PeerDebtIssue-FH</i>					0.423*** (3.69)
<i>Size</i>	-0.058*** (-3.70)	-0.057*** (-3.63)	-0.058*** (-3.63)	-0.079*** (-4.70)	-0.163** (-2.51)
<i>Turnover</i>	-0.052*** (-20.66)	-0.051*** (-20.49)	-0.051*** (-20.48)	-0.057*** (-21.61)	-0.002 (-1.21)
<i>BMRatio</i>	0.904*** (21.08)	0.893*** (21.01)	0.892*** (20.97)	0.908*** (20.14)	-0.009 (-0.68)
<i>ROE</i>	-0.112 (-1.17)	-0.126 (-1.32)	-0.126 (-1.31)	-0.075 (-0.73)	-0.002 (-1.21)
<i>Leverage</i>	-0.062 (-1.18)	-0.054 (-1.03)	-0.055 (-1.05)	-0.044 (-0.79)	-0.002 (-1.21)
<i>Separation</i>	-0.002 (-1.26)	-0.002 (-1.46)	-0.002 (-1.47)	-0.002 (-1.21)	-0.009 (-0.68)
<i>InSize</i>	-0.012 (-1.17)	-0.004 (-0.41)	-0.005 (-0.50)	-0.002 (-0.13)	-0.013*** (-6.68)
<i>EarnVol</i>	-0.011*** (-7.03)	-0.011*** (-7.03)	-0.011*** (-7.01)	-0.010*** (-6.41)	-0.025 (-1.15)
<i>Policy</i>	0.012 (0.68)	0.025 (1.34)	0.025 (1.34)	-0.014 (-0.67)	-0.314*** (-4.04)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	18,063	18,063	18,063	15,860	18,063
Adjusted R^2	0.627	0.625	0.625	0.632	0.574

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms. The dependent variable is stock price synchronicity. The t -statistics in parentheses are robust t -values. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 7.
Robust analyses

(5) of Table 7. The coefficient of *PeerDebtIssue-FH* is significantly negative at the 1% level, indicating that price synchronicity improves after bond issuers' information disclosure.

6. Further analyses

6.1 Textual analysis

The above analyses show that bond market information disclosure increases stock price informativeness of same-industry listed firms by promoting investors' understanding of industry information and firm-specific information. However, the independent variable in the main regression only measures the number of bond issuers in each industry. To measure heterogeneity of information content in unlisted bond issuers' disclosure, we extract textual information from bond issuance prospectuses.

Among the various issuance documents, the bond prospectus is the most critical one. While prior literature has closely studied the financial information contained in the prospectus, research on textual information contained in bond prospectuses is limited. We argue that bond information disclosure is an important channel for acquiring industry and firm information. If our statement holds, we should observe a positive relationship between the amount of textual information contained in bond prospectuses and price informativeness of same-industry listed firms.

Following Loughran and McDonald (2014), we use a bond prospectus' length (*InfoContent*) to measure textual information contained in bond prospectuses. To eliminate the influence of pictures and fonts on file size, we convert bond prospectuses from PDF format to TXT format. Specifically, we use the following formula to compute *InfoContent*:

$$InfoContent = \frac{\sum_{i=1}^n Text}{m} \quad (6)$$

where *Text* is file size of each bond prospectus in TXT format, *n* is the total number of unlisted firms issuing bonds in the industry in the year, *m* is the total number of all listed firms in the industry. Results reported in Table 8 show that textual information contained in

Variable	(1) <i>Synch</i>
<i>InfoContent</i>	-0.127*** (-6.48)
<i>Size</i>	-0.073*** (-4.18)
<i>Turnover</i>	-0.056*** (-21.41)
<i>BMRatio</i>	0.926*** (20.18)
<i>ROE</i>	-0.047 (-0.44)
<i>Lev</i>	0.035 (0.61)
<i>Separation</i>	-0.002 (-1.55)
<i>InSize</i>	-0.017 (-1.33)
<i>EarnVol</i>	-0.011*** (-7.03)
<i>Policy</i>	0.021 (1.06)
<i>Opaque</i>	-0.397*** (-5.98)
Firm fixed effect	Yes
Year fixed effect	Yes
Observations	16,642
Adjusted <i>R</i> ²	0.618

Table 8. Textual information contained in bond prospectuses and price informativeness of same-industry listed firms

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms. The dependent variable is stock price synchronicity. The independent variable is constructed by using textual information in bond issuance prospectus. The *t*-statistics in parentheses are robust *t*-values. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

bond prospectuses is positively related to the stock price informativeness of same-industry listed firms, which is in line with our expectations. This result further corroborates our argument that the improvement in price informativeness is indeed from increased disclosure of bond issuers.

6.2 Disaggregating price informativeness into industry-specific and firm-specific components

In this section, we disaggregate price informativeness into industry-specific and firm-specific components and examine their associations with bond issuers' information disclosure.

Following [Piotroski and Roulstone \(2004\)](#), we use the difference in R^2 between Model (7) and Model (8) (i.e. *IndInfo*) to measure industry-specific information contained in stock prices. *FirmInfo* (difference between 1 and R^2 in model (7)) measures firm-specific information contained in stock prices. [Table 9](#) reports the regression results. The dependent variable in Column (1) is *IndInfo*, and dependent variable in Column (2) is *FirmInfo*. Coefficient of *PeerDebtIssue* is significantly positive, indicating that listed firms' price informativeness is improved through incorporation of both industry-specific and firm-specific information into stock prices.

$$Ret_{i,t} = \alpha_0 + \alpha_1 \times Market_t + \alpha_2 \times Market_{t-1} + \alpha_3 \times Industry_t + \alpha_4 \times Industry_{t-1} + \varepsilon_{i,t} \quad (7)$$

$$Ret_{i,t} = \alpha_0 + \alpha_1 \times Market_t + \alpha_2 \times Market_{t-1} + \varepsilon_{i,t} \quad (8)$$

7. Conclusions

This paper uses A-share listed firms on the Shanghai and Shenzhen stock exchanges during the period 2007–2018 to investigate the impact of information disclosed by bond issuers on stock price informativeness of same-industry listed firms. The above impact is more pronounced when information disclosure of bond issuers is a more important channel for

Variable	(1) <i>IndInfo</i>	(2) <i>FirmInfo</i>
<i>PeerDebtIssue</i>	0.003** (2.52)	0.003** (2.39)
<i>Size</i>	0.003* (1.68)	0.008** (2.28)
<i>Turnover</i>	0.002*** (7.74)	0.009*** (15.49)
<i>BMRatio</i>	-0.022*** (-5.29)	-0.161*** (-17.74)
<i>ROE</i>	0.035*** (3.87)	-0.002 (-0.11)
<i>Leverage</i>	-0.006 (-1.32)	0.025** (2.26)
<i>Separation</i>	-0.000 (-1.02)	0.000 (1.56)
<i>InSize</i>	-0.002 (-1.35)	0.003 (1.08)
<i>EarnVol</i>	0.000 (1.60)	0.002*** (4.99)
<i>Policy</i>	0.006*** (2.87)	-0.008** (-2.06)
<i>Opaque</i>	-0.017** (-2.52)	0.094*** (6.79)
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
Observations	18,063	18,063
Adjusted R^2	0.218	0.554

Note(s): This table reports the association between information disclosure of unlisted bond issuers and the stock price informativeness of same-industry listed firms. The dependent variable is industry-specific component of price informativeness in Column (1), and is firm-specific component of price informativeness in Column (2). The t -statistics in parentheses are robust t -values. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 9.
Disaggregating price informativeness into industry-specific and firm-specific components

acquiring industry information (i.e. when the industry is more concentrated, when economic uncertainty is high, and when industry information is less transparent) and for understanding industry competitive landscape (i.e. when bond issuers are relatively large, when bond issuers and listed firms have more direct product competition and when bond issuance firms are large-scale, state-owned business groups), and when there are more cross-market information intermediaries (i.e. more cross-market institutional investors and more sell-side analysts). Further analyses show that our main finding is stronger when the textual information content of bond prospectuses is higher, corroborating that the improved price informativeness is indeed from increased disclosure of bond issuers. Additionally, by disaggregating price informativeness into industry-specific and firm-specific, this paper finds that price informativeness is improved through incorporation of both industry-specific and firm-specific information into stock prices. Our results remain unchanged after a series of robustness tests.

The CSRC announced the implementation of “registration system” for Chinese corporate bonds in March 2020, that is, the bond market implements a registration system before the stock market does. The implementation of registration system further removes hurdles of bond issuance and facilitates bond issuance process. Information disclosure has become the focus of bond market regulators under the registration system. By examining the impact of bond market information disclosure on stock price informativeness of same-industry listed firms, this paper provides evidence on the importance of bond market information disclosure and could serve as theoretical guidance for improving information disclosure regime in bond markets in China.

Notes

1. We focus on unlisted bond issuers, since their disclosure is more novel to listed firm investors.
2. Due to the lack of data on total number of firms in each industry, we use the number of listed firms in each industry instead to conduct the calculation.
3. In addition, we employ the HHI index as another monopoly power indicator and our results remain qualitatively similar.
4. As we discussed in [Section 4.2.2](#), our cross-sectional analyses results on the heterogeneity of bond issuers also mitigate this endogeneity concern to some extent.

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Variable	Definition
<i>Synch</i>	A measure of stock price synchronicity. Log-transformed R^2 from the regression of a stock's daily return on both contemporaneous and lagged market return
<i>PeerDebtIssue</i>	Number of unlisted bond issuers divided by number of listed firms in each industry
<i>Size</i>	Logarithm of a firm's total assets at the end of the year
<i>Turnover</i>	A firm's yearly average turnover divided by 100
<i>BMRatio</i>	A firm's book-to-market ratio
<i>ROE</i>	A firm's return on equity
<i>Leverage</i>	A firm's total debt-to-asset ratio
<i>Separation</i>	Percentage difference between control rights and ownership
<i>lnSize</i>	Natural logarithm of total assets of all the firms in the industry
<i>EarnVol</i>	Standard deviation of quarterly adjusted net income in three years, where adjusted net income is calculated by the difference between net income and the industry average
<i>Policy</i>	Equals one if the firm belongs to an industry supported by "Five Year Plan", and equals zero otherwise
<i>Opaque</i>	The absolute value of discretionary accruals estimated by the modified Jones model

Table A1.
Variable definitions

Corresponding author

Huifang Yin can be contacted at: yin.huifang@mail.shufe.edu.cn