What Influence the Impact of Underwriters' Reputation on Coupon Rate of Bonds? Evidence from China Interbank Bond Market

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This paper studies the effect of underwriter reputation on coupon rate of bonds in China's inter-bank bond market and how this effect changes according to different credit ratings. This research finds that the improvement of the underwriter reputation can significantly reduce the coupon rate of bonds, and the higher the credit rating of the issuer, the more significant this effect is. This is mainly caused by the lack of junk bond market and the high risk-aversion level of investors in China's market. Further research finds that the effect of the underwriter reputation on the coupon rate of bonds and its significant changes among different credit ratings only appears after the first substantial default cases occurred, and this phenomenon are more significant in short-term bonds comparing with long-term bonds.

Keywords: underwriter reputation, credit rating, coupon rate of bonds

INTRODUCTION

Underwriter of bonds has taken a crucial role in the bond market. As intermediary in bond markets, the underwriter coordinates and enhances the process of bond issuance, and its market influence as well as channel operation capability determine the quality of bond issuance to a certain extent. Moreover, as the important information researcher and provider, the underwriter fulfills the preliminary certified function of bonds, which has a positive effect on clearing up the information asymmetry in the capital market (Booth & Smith, 1986), thereby helping investors choose the appropriate bond products. Therefore, it is generally believed that the higher the reputation of the underwriter has, the more trustworthy the bond is and the lower issuing cost (interest rate) will be held under the same condition. However, China's bond market started late and has a relatively low level of development. In other words, it is uncertain whether the mechanism of underwriter's reputation can be realized. In addition, Chinese bond underwriters are highly subjective when choosing bonds, and to a large extent do not rely on credit ratings. There is no unified recognition of its impact on the issuance cost in previous literatures. In this case, it is valuable to study the influence of the reputation of Chinese underwriters on bond issuance costs.

This article selects China's inter-bank bond market from 2008 to 2018 as the primary research object. China is the second-largest bond market worldwide and has the following special features compared with other bond markets: (1) China's bond market includes inter-bank bond market and exchange market, and they are completely different. For example, non-listed corporate bonds in China are only allowed to be issue in the inter-bank bond market; (2) China's inter-bank bond market requires commercial banks to be the main underwriter, other financial institutions such as investment banks can only assist underwriting; (3) In China's inter-bank bond market, bonds issued by state-owned enterprises account for a high proportion of over 85%; (4) China's bond market is dominated by high-credit-rated bonds with the high degree of market risk aversion, making it difficult for junk bonds to be issued. (5) China's inter-bank bond market has undergone a transition from "rigid redemption" to "breaking rigid redemption", marked by the default event "Chaori Bond" in 2014, and the market has gradually transformed from "no default risk" to normalization. The above characteristics make China's inter-bank bond market unique. Therefore, it is a good sample to study the effect of underwriter reputation on issuance costs under different circumstances.

Firstly, the corresponding influences of the underwriter reputation on bond issue cost (interest rate) under different credit ratings are compared. Secondly, the influence of the underwriter's reputation on the cost of bond issuance as well as the changes of this influence under different credit ratings is analyzed from three perspectives: the perfection of the bond market, the characteristics of the bond itself, and the characteristics of the issuer. The results show that the underwriter's reputation influence on coupon rate of bonds is affected by credit rating. The higher the credit rating, the more significant the effect of the underwriter's reputation; When the credit rating is at level of AA or AA-, there is no significance effect on coupon rate of bonds. This result is diametrically opposed to the conclusion of Fang's (2005) study on the US bond market, who believes that underwriter reputation has a greater effect in junk bond issuance compared to other bonds. Besides, the underwriter's reputation has a significant impact on issuing cost only after the first debt default occurs in china's bond market, and the higher the rating level it is, the more significant effect it will have. The research on long-term and short-term bonds shows that the underwriter reputation will only significantly affect short-term bonds' coupon rates. The higher the credit rating is, the more significant the impact will be, regardless of whether it is a long-term or short-term bond. This effect weakens gradually with the extension of the maturity of the bond. In addition, from the perspective of corporate political background, this study finds that the government background of state-owned enterprises contributes to credit enhancement, and it can be concluded that the effect of underwriters' reputation in state-owned enterprises is weaker than that of private enterprises, especially in high-credit rating enterprises.

The key findings of this paper have implications for both research and practices. First, this paper studies the interaction of underwriter's reputation and bond credit rating, which are the two most important factors that affect coupon rate of bonds. Based on the research, the study finds that bond market in China is scarce of junk debt, and investors are extremely risk-averse. Furthermore, it is concluded that as the credit rating rises, the underwriter's reputation has an increasing impact on coupon rate of bonds. This finding about China's market feature is opposed to the conclusion that Fang (2005) found in the US bond market that underwriter reputation has a more noticeable impact on the junk bond market, reflecting the Chinese market's characteristics. Second, this paper combines China's inter-bank bond market characteristics and considers market maturity, corporate nature, and bond characteristics. It not only greatly improves the comprehensiveness of the research, but also has great value for decision making of enterprises such as selecting bond underwriters and setting coupon rate of bonds.

The remainder of the paper is structured as follows. Chapter 2 presents a review of related literatures and proposes the hypotheses for this study based on prior literatures. Chapter 3 outlines the research methodology about how the samples have been selected, and how data has been collected and analyzed. Chapter 4 presents the results of the research methodology section and then further discusses the results. Finally, Chapter 5 concludes this paper's key findings.

LITERATURE REVIEW AND RESEARCH HYPOTHESIS

The Effect of Underwriter Reputation on Coupon Rate of Bonds With Different Credit Rating

Underwriters play bridge and medium roles in linking issuing enterprises and investors in the security market. It delivers the internal information of issuing enterprises by professional information filtering and screening, to clear up information asymmetry between the issuing enterprises and the investors (Booth and Smith, 1986). Good reputation is the prerequisite for realizing certified functions for underwriters (Chang et al., 2010). The reputation is the guarantee of the quality and an overall measurement of the prior behaviors for underwriter (Michaely and Shaw, 1994). Thus, underwriters with a good reputation may enhance investors' recognition of the authenticity of the issuing enterprise's information, clearing up the adverse selection problems caused by information asymmetry, thus have a positive effect on reducing financing cost.

As mentioned above, the role of underwriter's reputation is widespread in equity financing and bond markets. In the equity financing market, Chemmanur and Fulghieri (1994) examined the process of establishing the reputation of underwriters and found that underwriters with higher reputation can significantly reduce the degree of information asymmetry between issuers and investors when issuing new shares. Erhemjamts and Raman (2012) found that high-reputation underwriters are more professional than those who have bad reputation, and they own more capital to invest private information about the company's value. By adopting more stringent criteria to select and evaluate companies that will issue new shares, high-reputation underwriters effectively clear up the information asymmetry. Foreign companies listed in the United States are more likely to hire highly reputable underwriters (Loureiro,2010). The difference between the underwriter's reputation may lead to a significantly different result in reducing information asymmetry (Dong et al., 2011). Carter and Manaster (1990) built a model that included issuers, underwriters, as well as investors, and pointed out that the issuer's company value is less uncertain for securities underwritten by high-reputation underwriters, thus the degree of IPO underpricing is relatively low. When an enterprise uses season new shares through registration, the underwriter's fee is the main reason that drives the enterprise to change the underwriter, instead of the reputation. In contrast, underwriters' reputation is an important consideration when enterprises issue new shares by traditional method (Humphery-Jenneretal.,2018).

In the bond market, Fang (2005) pointed out that underwriters' reputation will affect investors' judgment on the quality of bond-issuing companies. Underwriter with a higher reputation will cherish its goodwill in a highly degree, thus they may stringently screen screening on bond projects they underwrite. Livingston and Miller (2000) believed that investors assume that bonds underwritten by high-reputation underwriters are less risky, therefore require lower coupon rate than similar bonds, which contribute to reducing the issuance cost for bond issuers. Commercial bank underwriters may impact investment banks by the credit relationship with enterprises (Puri,1999). Although good reputation is beneficial for underwriters in financial markets, high reputation may bring some disadvantages as well. Chemmanur and Fulghieri (1994) found that good reputation requires high maintenance costs, and high-reputation underwriters may suffer a certain degree of moral hazard. The research on high-yield bonds proves that high-reputation underwriters increase enterprises' information costs (Andres et al.,2014). In the Chinese stock market, Shao et al. (2013) analyze China's IPO inquiry issuance system, pointing out that underwriters may rise in price in order to maximize the underwriting cost if the underwriting cost is linked to the issuance price, That is to say, the offering price set by the underwriter is high in the quotation of institutional investors, leading to frequent occurrences of "breaking". In addition, Shao et al. (2013) found that the higher the reputation of the underwriters, the fewer the overpricing. Zhang et.al. (2018) examined underwriters' reputation in IPO from the perspective of long-term stock returns, and they found that compared with the underwriters with damaged reputation, the long-term return on stocks underwritten by reputable underwriters is higher, indicating that the underwriters with a good reputation can play a certification role in the process of IPO. Furthermore, Wang and Gao (2017) confirmed that underwriter is vital in the issuance process and pricing bonds in the bond market. However, some studies that research on China's financial market have pointed out the side effects of high-reputation underwriters, which is similar to literature that research on other

countries. In districts with insufficient legal protection for investors, the degree of earnings management of IPO enterprise is positively correlated with the reputation of the underwriters, as high-reputation underwriters can obtain higher economic benefits by indulging or assisting IPO with earnings management (Liu Jianhua et al. ,2017).

Unlike equity financing, the credit rating is one of the essential factors in the bond issuance process. Credit rating reflects enterprises' business conditions as well as the risk of bonds issued, and determines the difficulty of bond issuance as well as issuance cost (coupon rate of bonds). The credit rating is negatively related to the coupon rate of bonds, if the credit rating improves, the bond issuance's coupon rate will drop significantly. However, due to the characteristics of oligopoly in the credit rating market and the situation that issuers have to pay for the rating, there are a large number of conflicts of interest in the process of credit rating, which has led to widespread doubts and controversies about the quality and reliability of credit rating. Through the research of the changes in S&P's market share in the CMBS rating market, Baghai and Becker (2020) believe that enterprises may gain more market share by issuing optimistic rating reports after the reputation has been damaged In China, due to the imperfect bond market, the discrimination ability of bond credit rating is quite weak (Ma and Shi, 2015; Kou et al., 2015). In the past few years, there have been many scandals caused by credit rating errors, such as Shanghai Huaxin International Group rating event and Kadi Ecological Environment Technology Company's rating event. Generally speaking, China's bond market and credit rating have the following characteristics: (1) The overall credit rating is able to reflect the asset-liability ratios, the scale of bond issuance as well as other information of different companies, therefore, the current credit rating system is still of valuable reference (Zhong et al., 2016); (2) Some credit ratings are falsely high, and there are few low-rating bonds. (3) Bond investors are mostly high-risk averse, and they are very cautious about investing in bonds with low credit ratings.

In view of the reality of China's bond market and credit rating, this paper believes that when the credit rating is different, the underwriter reputation has a different effect on bond certification. When the credit rating is low, due to the high-risk aversion of bond investors, credit rating will be the most important factor in decision, that is to say, the difference in the reputation of the underwriters has little effect on the bond issuance cost. Generally, with the gradual increase of credit rating, the risk of bond default is gradually reduced from the perspective of credit rating However, due to the falsely high situation of credit rating in China's financial market, enterprises with a high credit rating account for a large proportion. Therefore, investors will be more likely to pay attention to underwriters' reputation for further screening. The standby commitment system in China's bond market allows underwriters to not only underwrite and recommend bonds, but also be the back-end investor of the bond. Therefore, the underwriter's reputation has a significant impact on the issuing cost. Accordingly, this paper puts forward the following assumptions:

Hypothesis H1: *The impact of the underwriter's reputation on the coupon rate of bonds in China's inter-bank bond market is affected by the credit rating, and the credit rating is positively correlated with the impact of the underwriter's reputation on the coupon rate.*

The Influence of Underwriter Reputation on Coupon Rate of Bonds Under Different Circumstances

Maturity Market vs. Risk-free Market

The "rigid payment" for bank financing products has always been a research hotspot in China's inter-bank bond market. As an unspoken rule, "rigid payment" refers to the product which will be redeemed with principal and interest at maturity, and the bank guarantees that it does not have the risk of default. This result in a almost risk-free bond market.

However, this unspoken rule has been gradually broken in recent years. From the perspective of the bond market, the substantial default of "Chaori bond" in 2014 was the first default in the inter-bank bond market, resulting in 2014 the first year of default in the bond market.

This paper takes 2014 as the node to differentiate the maturity of China's bond market: Before 2014, the bond market was an imperfect risk-free market; after 2014, China's bond market has gradually reformed and transformed to a standard and well-established market. There were 5 and 22 default events in the bond

market in 2014 and 2015 respectively, and bond defaults have gradually become the normalization in the bond market. For investors, the default risk of bonds determines the risk of losing their principal, which is their greatest concern; what is more, it is the most crucial reason they pay attention to underwriters' reputation. Before the rigid payment was broken, the vast majority of investors believed that there is no risk of default in the inter-bank bond market so that they do not care about the underwriter's reputation. Therefore, the underwriter's reputation mechanism is quite difficult to be realized. Based on above, the following assumption was proposed:

Hypothesis H2a: *The reputation of underwriters has a significant regulatory effect on coupon rate of bonds only after the bond market is mature with default risk, and the credit rating level is positively correlated with the regulatory effect of the underwriter's reputation on the coupon rate of bonds after the substantial default occurred.*

Long-Term Bond vs. Short-Term Bond

This paper discusses the influence of the underwriter reputation on the uncertainty of the future from the perspective of bond's duration. The longer the bond's duration, the more impossible to forecast the changes of operation condition for enterprises in the future, and the uncertainty will increase. When the bond's duration is long, the probability that the credit rating result when the bond issued deviates from the result will be greater, and the uncertainty of future payment will increase as well (Campbell and Taksler, 2003).

Therefore, this paper assumes that when the underwriter's reputation mechanism cannot be fully realized, the impact of underwriter reputation on short-term bond's coupon rates will be more significant than long-term bonds. In addition, due to the extension of the duration of the bond, the credibility of the credit rating will be reduced relatively. This research believes that with the extension of the bond's duration, the impact of the credit rating on the influence of the underwriter's reputation on the coupon rate will be gradually reduced. Accordingly, this paper proposes the following assumption:

Hypothesis H2b: *Compared with long-term bonds, the effect of underwriter reputation on coupon rate of bonds is more significant in short-term bonds, and the impact of the credit rating on the influence of the underwriter's reputation on the coupon rate is more significant in short-term bonds.*

State-Owned Enterprises vs. Private-Owned Enterprises

Underwriters directly involved in the design and completion of the bond distribution as well as other processes, while the underwriter's reputation indirectly discloses more information about the issuers to the market. From the perspective of the characteristics of issuers, there are significant differences about the political background of issuers in China's inter-bank bond market. State-owned enterprises have access to preferential financing treatment, which is difficult for non-state-owned enterprises to achieve (Han Pengfei and Hu Yiming, 2015). What is more, state-owned enterprises are more likely to be offered bank loans with long loan cycles and low loan costs (LaPortaetal,2002). When a state-owned enterprise gets into financial distress, the government will often support it in finance. This credit discrimination against non-state-owned enterprises due to the nature difference of enterprises is quite common in China's financial system (Li Guangzi and Liu Li, 2009). This discrimination is also widespread in the direct financing market. Compared with state-owned companies, private-owned companies' bond issuance scale is generally smaller, and the coupon rate is higher. To some extent, state-owned enterprises' political background implicitly guarantees the bonds issued by them, and this kind of implicit government guarantee exists significantly in China's bond market for a long time (Wang Bosen et al., 2016). Implicit government guarantee can eliminate creditors' concern about the default risk of state-owned enterprise (Chenetal,2010), as a result, bond investors may not pay attention to credit rating. Compared to private-owned companies, investors usually trust state-owned companies with high credit ratings, and they believe that the default risk of state-owned companies is lower than private-owned companies, thereby their attention to underwriter reputation is weakened. Under this circumstance, the difference of the effect of underwriter reputation of state-owned

companies on the coupon rate of bonds among different credit ratings will be narrowed. Accordingly, this paper proposes the following assumption:

Hypothesis H2c: *The impact of underwriter reputation on the coupon rate of bonds with different credit ratings is significantly smaller in state-owned companies than that in private-owned companies.*

DATA AND RESEARCH DESIGN

Sample and Data

This paper selects the medium-term notes in China's inter-bank bond market from 2009 to 2019 as the research sample. All these bond issuance information, underwriter information, and corporate financial information are collected from Wind database and National Interbank Funding Center (www.chinamoney.com.cn). In order to alleviate the endogenous problems, this paper takes the financial information of the previous fiscal year before the bond was issued. For bonds underwritten by syndicates, this paper only considers the reputation of the main underwriter who serves as bookkeeper. After eliminating the missing data samples and winsorize the explained variables at 1% on two sides, 4864 valid research samples are selected.

Variables

Measurement of Issuance Cost

Bond issuance in China's market is generally by means of coupon rate bidding. Therefore, the coupon rate not only represents the fixed expense of the company for bond financing, but also reflects investors' expected risk and predicted return. This paper takes the coupon rate (Coupon_Rate) as the primary explanatory variable. In the robustness test, this paper takes the bond's interest rate spread as the explained variable. The bond's interest rate spread is calculated based on three interest rates separately, including the treasury bond yields with the same maturity during the same period, the inter-bank overnight lending rate, as well as the inter-bank 7-day lending rate. The results are recorded as CS1, CS2, CS3 respectively.

Measurement of Underwriter Reputation

There are two methods to measure the reputation of underwriters in existing literature: the tombstone announcement method (Carter and Manaster,1990) and the market share method. Since there is no system for scoring underwriters based on the IPO "tombstone announcement" in the Chinese market, the conditions for using the tombstone announcement method to measure underwriters' reputation are temporarily not available. As for the market share method, an underwriter with a larger market share usually has a higher reputation (Megginson and Weiss, 1991). However, high market share does not necessarily represent the high quality of performance, so only taking market share into consideration is not able to fully reflect the actual reputation of the underwriters (Xu Haoping and Luo Wei, 2007).

Some other studies also take the count of IPOs underwriting (Yu Fengyan and Liang Qi, 2017) and the count of underwriting pieces (He Zhigang, Liu Chang and Zhou Quan, 2018) as well as other indicators to measure the reputation of underwriters.

This research considers various indicators, through the factor analysis of each underwriting amount, the market share of underwriting, and the count of underwriting cases, extracting its common factor as the proxy variable $f1$of underwriter reputation. In addition, in the robustness test, this paper only uses the medium-term note market data for the similar factor analysis as above to extract the underwriter reputation proxy variable $f2$, which is confined to the medium-term note market.

Rating Information

In the regression analysis and the robustness test, this paper uses the credit rating of the issuer F_Rating and the credit rating of the bond issued B_rating to represent the credit rating level. According to the practice studied by He and Jin (2010), when the rating is AAA, the value of the credit rating variable is 4;

when the rating is AA+ and AA, the value is 3 and 2 respectively; when the rating is AA- or below, the value is 1.

Control Variables

In addition to the above variables, this research adds a series of variables reflecting the characteristics of bonds, enterprises and underwriters as control variables in the regression analysis. Table 1 lists all the variables included in the models, providing their description and measurement.

TABLE 1
DEFINITION OF CONTROL VARIABLES

Name of Variables	Variable Description
Duration	The duration of the bonds
B_size	The natural logarithm of the bond issuance amount
Option	A dummy variable which equals 1 if the company has the early redemption right, otherwise 0
SOE	A dummy variable which equals 1 if the bond issuer is a state-owned enterprise, otherwise 0
BIG4	A dummy variable which equals 1 if the audit agency of the issuance is the big 4 accountancy firms, otherwise 0
List	A dummy variable which equals 1 if the company is listed, otherwise 0
F_size	The natural logarithm of the total asset value of the issuance company in the year before the bond is issued.
Growth	The operating income growth rate of the issuance company in the year before the bond is issued
ROA	The return on total assets of the issuance company in the year before the bond is issued
Leverage	The leverage of the issuance company in the year before the bond is issued
Age	The difference between the year the company issued bonds and the year of company was established
CR	The current ratio of the issuance company in the year before the bond is issued

Regression Model

In order to test the hypothesis H1, this paper designs the regression model 1, in which f1 is the underwriter's reputation variable, F_Rating is the bond issuer's rating variable, and the explained variable is the $Coupon\_Rate_i$. The specific regression model is as follow:

$$Coupon\_Rate_i = \beta_1 F\_Rating_i * f1_i + \beta_2 F\_Rating_i + \beta_3 f1_i + \sum_4^n \beta_n \, Control_i + \mathrm{FE} + \varepsilon_i \quad (1)$$

In Eq. (1), FE represents the fixed effects model of years. If the H1 holds, both the cross-multiplication term's regression coefficient β_1 and the underwriter reputation's regression coefficient β_3should be significantly negative.

For all hypotheses in H2, the paper not only separates the sample data in different situations for the Model 1, but also introduce adjust variables, such as Duration and SOE into the regression model to investigate the influence of these factors on the research results. The regression model 2 is shown as follows:

$$\begin{aligned} Coupon\_Rate_i = {} & \beta_1 Adjust\_Variables_i * F\_Rating_i * f1_i + \beta_2 F\_Rating_i * f1_i + \beta_3 F\_Rating_i \\ & + \beta_4 f1_i + \beta_5 Adjust\_Variables_i * F\_Rating_i + \beta_6 Adjust\_Variables_i * f1_i \\ & + \sum_7^n \beta_n \, Control_i + \mathrm{FE} + \varepsilon_i \end{aligned} \quad (2)$$

where $Adjust\_Variables_i$ is represents the adjust factors such as Duration and SOE.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 the descriptive statistical results of variables in this paper and the correlation coefficients of core variables.

TABLE 2
DESCRIPTIVE STATISTICS AND CORRELATIONAL ANALYSIS

Panel A： Descriptive analysis

	N	Mean	Median	SD	Min	Max
Coupon_Rate	4864	5.547	5.480	1.097	3.250	8.200
CS1	4864	2.234	2.081	0.950	0.338	5.482
CS2	4864	3.093	3.020	1.108	-2.136	7.029
CS3	4864	2.602	2.519	1.086	-2.385	6.022
f1	4864	-0.0112	-0.237	0.986	-1.587	2.546
f2	4864	0.0194	0.0222	1.015	-1.671	2.186
F_Rating	4864	2.997	3	0.893	1	4
B_Rating	4864	3.061	3	0.880	1	4
B_Size	4864	2.204	2.303	0.778	0.405	4.522
Duration	4864	4.087	3	1.326	2	10
Option	4864	0.376	0	0.484	0	1
List	4864	0.145	0	0.352	0	1
Growth	4864	0.199	0.122	0.360	-0.446	2.085
Age	4864	16.47	16	7.773	2	38
SOE	4864	0.866	1	0.341	0	1
BIG4	4864	0.0711	0	0.257	0	1
ROA	4864	4.023	3.282	3.245	-0.554	18.62
F_Size	4864	10.88	10.74	1.287	8.222	13.89
Leverage	4864	62.30	63.98	13.35	25.63	86.39
CR	4864	1.823	1.225	1.719	0.222	9.966

Panel B： correlational analysis of core variables

	Coupon_Rate	f1	F_Rating	B_Rating	Duration	SOE
Coupon_Rate	1					
f1	-0.215***	1				
F_Rating	-0.505***	0.205***	1			
B_Rating	-0.516***	0.206***	0.918***	1		
Duration	0.025*	-0.159***	0.079***	0.075***	1	
SOE	-0.283***	-0.0120	0.252***	0.264***	0.197***	1

From the Panel A in Table 2, the average coupon rate of the medium-term notes $Coupon\_Rate_i$ involved in the study is 5.547%, the average issuance spread based on the treasury bond yields with the same maturity during the same period is 2.234%, while the average issuance spread based on the inter-bank overnight lending rate, as well as the inter-bank 7-day lending rate is 3.093% and 2.602%, respectively. All these results are basically consistent with the real situation of China's bond market. In terms of underwriter market reputation, f1 and f2 are standardized underwriter's total market reputation variable and medium-term note market reputation variable respectively. The overall distribution of these two variables is very similar, indicating that both variables are able to reflect the underwriter's reputation. The mean values and

median value of F_Rating as well as B_Rating are 3, indicating that China's bond rating is generally high, with AAA and AA+ as the majority. The mean values, minimum value, maximum value and median value for the bond maturity Duration are 4.087, 2, 10, and 3 respectively, which indicates that the bonds studied in this paper are mainly medium-term bonds with a maturity of 2 to 5 years, which are the essential financial sources to support enterprises' medium-long term development strategy.

The correlation coefficient matrix in Panel B shows that the bond coupon rate is significantly negatively correlated with the credit rating variables and underwriter reputation variables. It also has a significant negative correlation with state-owned enterprise and has a weak positive correlation with the bond's duration. In addition, the correlation coefficient between F_Rating and B_Rating is 0.918, indicating that these two variables are highly consistent in measuring the credit rating of bond-issuing enterprises, thus proving that they both can reflect the credit rating of bond-issuing enterprises.

To better illustrate the implication of this study, the existing circumstances of falsely high bond rating are analyzed, and whether the underwriter reputation mechanism can be fully realized from the perspective of bond default cases is discussed. Table 3 shows the number of default cases under different ratings. There are 42 actual default bonds in the sample, of which 1 bond is AAA rating, 14 bonds are AA+ rating, and 27 bonds are AA rating. In general, bond ratings will be declined while the number of default cases increases. However, there is no actual bond default in the credit rating AA-. This possibly because of the limited samples, but it also shows that China's credit rating and the mechanism of underwriters' reputation cannot truly and effectively evaluate bond issuers. Furthermore, the actual defaults in AAA and AA+ bonds accounted for about 36% of the total default cases, indicating that the behavior of the credit rating agencies in the Chinese bond market needs to be standardized and their professional ability needs to be improved. The sixth column of Table 3 shows the average underwriter reputation of common bonds and actual defaulted bonds. The T-test results shown in the seventh column show that the two groups have significant differences. On average, the reputation of underwriters of defaulted bonds is significantly lower than that of common bonds. The interactive effect of the underwriter and rating agency is still vague and worth discussing.

TABLE 3
THE MUMBER OF DEFAULT CASES UNDER DIFFERENT CREDIT RATINGS

	AAA	AA+	AA	AA-	Total	Mean F1	T-Value
Normal	1786	1401	1494	141	4822	-0.006	3.042^{***}
Default	1	14	27	0	42	-0.471	

Test Hypothesis H1

To verify the hypothesis H1, we use the sample data to process the multiple linear regression model 1. Table 4 shows the results of the linear regression analysis. The first four columns are the regression results of the bond data under the four different credit ratings. The columns (5) and (6) are the regression results of all samples with and without considering the multiplication of credit rating and underwriter reputation $F\_Rating_i * f1_i$.

TABLE 4
UNDERWRITER REPUTATION H1

	***Coupon_Rate* as dependent variable**					
Variables	(1) AAA	(2) AA+	(3) AA	(4) AA- or lower	(5) All	(6) All
$F\_Rating * f1$	×	×	×	×	×	-0.082^{***} (-6.21)
F_Rating	×	×	×	×	-0.522^{***} (-24.44)	-0.541^{***} (-25.33)
$f1$	-0.088^{***} (-5.46)	-0.063^{**} (-2.57)	-0.030 (-1.09)	0.119 (0.84)	-0.055^{***} (-4.35)	-0.038^{***} (-2.78)
List	-0.086^{*} (-5.46)	-0.123 (-1.60)	-0.109^{*} (-1.76)	0.448^{***} (2.35)	-0.067^{**} (-1.97)	-0.061^{*} (-2.78)
Duration	0.050^{***} (4.17)	-0.021 (-1.13)	0.075^{***} (3.48)	0.194^{**} (2.38)	0.037^{***} (4.02)	0.035^{***} (3.76)
Option	0.484^{***} (14.45)	0.364^{***} (7.59)	0.217^{***} (3.51)	0.196 (0.74)	0.424^{***} (16.18)	0.426^{***} (16.27)
BIG4	-0.090^{*} (-1.82)	-0.272^{***} (-2.97)	-0.095 (-0.83)	0.111 (0.20)	-0.180^{***} (-4.36)	-0.162^{***} (-3.97)
SOE	-0.375^{***} (-3.41)	-0.685^{***} (-8.24)	-0.682^{***} (-11.38)	-0.438^{**} (-2.23)	-0.642^{***} (-15.01)	-0.628^{***} (-14.81)
B_Size	-0.029 (-1.21)	-0.090^{**} (-2.32)	-0.117^{**} (-2.54)	-0.077 (-0.40)	-0.068^{***} (-3.39)	-0.072^{***} (-3.56)
Age	-0.008^{***} (-4.00)	0.002 (0.72)	-0.009^{***} (-2.77)	-0.009 (-0.94)	-0.004^{***} (-2.90)	-0.004^{***} (-2.75)
F_Size	-0.089^{***} (-4.73)	0.239^{***} (6.11)	0.181^{***} (4.35)	-0.187 (-0.97)	0.023 (1.39)	0.033^{**} (2.06)
ROA	-0.007 (-1.19)	-0.019^{**} (-2.44)	0.007 (1.00)	0.036^{*} (-2.44)	-0.009^{**} (-2.10)	-0.009^{**} (-2.10)
Growth	-0.119^{**} (-2.51)	0.032 (0.61)	-0.145^{***} (-2.36)	-0.145 (-0.47)	-0.064^{**} (-2.05)	-0.070^{**} (-2.25)
Leverage	0.012^{***} (7.80)	0.001 (0.31)	0.002 (1.13)	0.008 (1.10)	0.007^{***} (6.51)	0.006^{***} (6.25)
CR	-0.029 (-1.48)	-0.027^{*} (-1.67)	-0.019 (-1.37)	0.125 (1.59)	0.007 (0.80)	0.006 (0.61)
Constant	4.567^{***} (18.19)	3.122^{***} (7.82)	3.434^{***} (7.81)	6.923^{***} (4.15)	4.664^{***} (26.14)	4.561^{***} (25.60)
Year	control	control	control	control	control	control
Industry	control	control	control	control	control	control
R^2	0.548	0.408	0.365	0.616	0.541	0.545
N	1788	1415	1521	139	4864	4864

Notes: *, **and *** indicate that the coefficients are significant at the statistical level of 10%, 5% and 1%, respectively. The t values in brackets are calculated based on the heteroskedasticity-robust standard error.

By analyzing the results in columns (5) and (6) of Table 4, this paper finds that the regression coefficient of underwriter reputation f1 is significantly negative in both models, and the result is significant at the 99% confidence interval. It shows that a high underwriter's reputation can indeed reduce the coupon rate at the time of bond issuance. After introducing the cross-term $F\_Rating * f1$ (column 6), the regression coefficient of the term $F\_Rating * f1$ is also significantly negative. The coefficient indicates that for each

increase in the credit rating, the coupon rate of the bond will fall by an additional 0.082% for each unit of increase in the underwriter's reputation. That is to say, the higher the credit rating, the greater the influence of the underwriter's reputation on the coupon rate of bonds, which supports the hypothesis H1. In addition, by comparing the results of columns (1) to (4), this paper finds that the regression coefficient of $f1$ is the largest and most significant when the corporate credit rating is AAA, and the coefficient value and the degree of significance decline with the credit rating goes down. In contrast, when the corporate credit rating is AA- or below, the regression coefficient of $f1$ is positive. These show that with the gradual decline of the credit rating of bond-issuing enterprises, the influence of underwriter reputation on the coupon rate of bond issuance gradually weakens. For enterprises with a credit rating AA or below, the impact of underwriter reputation even disappears completely. This result is consistent with the regression coefficient result of the cross term in column (6), which further supports the hypothesis H1.

For other control variables, this paper investigates that most of the $Duration$ coefficients of the bond term are significantly positive, indicating that the longer the duration of the bond, the higher the coupon rate of the bond; the coefficient SOE is generally negative, indicating that under the same conditions as credit rating and underwriter's reputation, the coupon rate of bonds issued by state-owned enterprises is lower. In addition, when the enterprise has the right to redeem the bond in advance, the coupon rate of the bond increases significantly. The other variables, such as the age of the enterprise and bond issuance scale, have strong negative correlations with the bond`s coupon rate. These results are consistent with intuition.

Test Hypothesis H2

Regression Results of H2a

To study the impact of level of market maturity on the underwriters` reputation influence in the bond market, this research divides the sample into two periods that before and after the first actual default event, and re-conduct the multiple linear regression analysis of Model 1. The first default event which breaks down the rigid payment in the Chinese bond market occurred in 2014. After that, massive default events emerged. Thus, we use 2014 as the dividing line and regard samples before 2014 as an immature market environment while samples after 2014 as a gradually mature market environment. Table 5 shows the result of this regression analysis.

TABLE 5
BEFORE AND AFTER THE BREAKDOWN OF RIGID PAYMENT

Variables	$Coupon\_Rate$ as dependent variable			
	After 2014		Before 2014	
	(1)	(2)	(3)	(4)
$F\_Rating * f1$	×	-0.047^{***} (-2.91)	×	0.012 (0.26)
F_Rating	-0.625^{***} (-21.66)	-0.617^{***} (-21.42)	-0.438^{***} (-12.00)	-0.429^{***} (-8.76)
$f1$	-0.059^{***} (-4.38)	-0.048^{***} (-3.21)	0.007 (0.16)	0.008 (0.21)
Controls	Yes	Yes	Yes	Yes
Constant	5.284^{***} (25.17)	5.250^{***} (24.95)	3.534^{***} (11.22)	3.541^{***} (11.20)
Year	control	control	control	control
Industry	control	control	control	control
R^2	0.522	0.524	0.619	0.620
N	3106	3106	1074	1074

Notes: *, **and *** indicate that the coefficients are significant at the statistical level of 10%, 5% and 1%, respectively. The t values in brackets are calculated based on the heteroskedasticity-robust standard error.

The results in Table 5 show that for the inter-bank bond markets before 2014, regardless of whether the cross-term $F\_Rating * f1$ is considered or not, the cross-term and the term $f1$ are not significant in both models. The impact of underwriters' reputation was emerged after China's bond market broke the rigid payment in 2014. In column 2, the regression coefficient of $f1$ and $F\_Rating * f1$ are 0.048 and -0.047 respectively, and both are significant in the 99% confidence interval. This result shows that with the bond market gradually matures, the information research and certification function of underwriter reputation are able to play its due role. The higher the reputation of the underwriter, the lower the coupon rate of the bond issued. Moreover, the higher the bond credit rating, the stronger the underwriter's reputation effect on the coupon rate of the bond, which realizes the two-factor authentication. In other words, the conclusion of the study on the sample after the default event is consistent with the hypothesis H1, while the sample before the default event is not. Therefore, the study supports the hypothesis of H2a.

Regression Results of H2b

To study the different effects of underwriter's reputation in long-term and short-term bonds, this paper used two methods to conduct research: one is to classify bonds with a maturity of 2 years or 3 years as short-term bonds and those with a maturity of not less than 4 years as long-term bonds. Those two types of samples are introduced into the multiple linear regression model 1 for comparison. The other method is to introduce the bond's duration variable $Duration$ into the regression model and process the multiple linear regression model 2. Table 6 shows the results of the above regression.

TABLE 6
LONG-TERM AND SHORT-TERM BONDS

Variables	$Coupon\_Rate$ as dependent variable				
	$Duration \leq 3$		$Duration > 4$		All
	(1)	(2)	(3)	(4)	(5)
$Duration * F\_Rating * f1$	×	×	×	×	0.056^{**} (2.08)
$F\_Rating * f1$	×	-0.093^{***} (-5.21)	×	-0.053^{***} (-2.58)	-0.063^{***} (-3.07)
F_Rating	-0.581^{***} (-18.02)	-0.594^{***} (-18.69)	-0.496^{***} (-17.72)	-0.515^{***} (-17.72)	-0.508^{***} (-20.15)
$f1$	-0.073^{***} (-4.22)	-0.055^{***} (-2.96)	-0.024 (-1.35)	-0.009 (-0.47)	-0.063^{***} (-3.25)
$Duration$	×	×	×	×	-0.081^{***} (-3.25)
$Duration * f1$	×	×	×	×	0.038 (1.55)
$Duration * F\_Rating$	×	×	×	×	-0.057^{**} (-2.16)
Controls	Yes	Yes	Yes	Yes	Yes
Constant	3.984^{***} (15.97)	4.515^{***} (17.53)	4.460^{***} (20.78)	5.015^{***} (21.26)	4.714^{***} (26.62)
Year	control	control	control	control	control
Industry	control	control	control	control	control
R^2	0.562	0.567	0.562	0.564	0.546
N	2480	2480	2384	2384	4864

Notes: *, **and *** indicate that the coefficients are significant at the statistical level of 10%, 5% and 1%, respectively. The t values in brackets are calculated based on the heteroskedasticity-robust standard error.

Comparing the results of columns 1-2 with those in columns 3-4, this paper concludes that from that for relatively short-term bonds with a maturity of 2 or 3 years, $f1$ have a significant negative regression coefficient; and for long-term bonds with maturity not less than 4 years, the regression coefficients of $f1$ are not significant. This result shows that the improvement of underwriters' reputation can only significantly reduce the coupon rate of bonds with a shorter duration but has no significant effect on long-term bonds. In addition, by comparing columns (2) and (4), this research finds that although the regression coefficients of $F\_Rating * f1$ are significantly negative, the absolute value of the coefficient (0.093) and the significance of this item (t=-5.21) in short-term bonds are significantly higher than those in long-term bonds (- 0.053;t=-2.58). It indicates that the effect of different credit ratings on the reputation of underwriters in short-term bonds is more significant than that in long-term bonds. Besides, in column (5), the coefficient of $Duration * F\_Rating * f1$ is significantly positive, which is opposite to the negative coefficient of $F\_Rating * f1$. It shows that with the extension of the duration of bonds, the influence of different credit ratings on the underwriters` reputation effect is gradually weakened. To sum up, the study supports the hypothesis H2b.

Regression Results of H2c

To study the difference caused by enterprises' political background, the dummy variable SOE to reflect whether a company is state-owned or private company was introduced. Table 7 shows the results of this regression analysis.

TABLE 7
SOE AND PRIVATE ENTERPRISE

	Coupon_Rate as dependent variable				
Variables	$SOE = 1$		$SOE = 0$		All
	AAA and AA+	AA or lower	AAA and AA+	AA or lower	
	(1)	(2)	(3)	(4)	(5)
$SOE * f1 * F\_Rating$	×	×	×	×	0.160*** (3.39)
$F\_Rating * f1$	×	×	×	×	-0.212*** (-4.70)
F_Rating	×	×	×	×	-0.593*** (-12.36)
$f1$	-0.074*** (-5.05)	-0.051 (-1.58)	-0.116** (-1.99)	-0.063 (-1.11)	-0.003 (-0.08)
SOE	×	×	×	×	-0.633*** (-12.78)
$SOE * f1$	×	×	×	×	-0.057 (-1.34)
$SOE * F\_Rating$	×	×	×	×	0.063 (1.30)
Controls	Yes	Yes	Yes	Yes	Yes
Constant	5.157*** (28.63)	4.621*** (10.17)	6.110*** (5.36)	4.970*** (4.89)	4.572*** (25.55)
Year	control	control	control	control	control
Industry	control	control	control	control	control
R^2	0.476	0.317	0.494	0.494	0.547
N	2,930	1,283	272	379	4864

Notes: *, **and *** indicate that the coefficients are significant at the statistical level of 10%, 5% and 1%, respectively. The t values in brackets are calculated based on the heteroskedasticity-robust standard error.

Firstly, the bond ratings are divided into high rating groups (AAA and AA+) and low rating groups (AA and AA-). Comparing the estimated coefficient of $f1$ in columns (1) to (4), this paper finds that no matter the enterprises is state-owned or private-owned, the influence of underwriters is much more significant in high bond rating groups. This result is consistent with the result of hypothesis H1. Besides, comparing the differences of estimated coefficient in columns (1) and (2) and columns (3) and (4) respectively, this paper finds that the difference of the coefficient of $f1$ of SOE group between high and low credit ratings is small, and this is mainly caused by the absolute value of the $f1$ coefficient of SOE group under high credit ratings is much lower than that of private-owned companies' group. This shows that, for companies with high credit ratings, investors are more likely to trust SOE and believe that state-owned companies are highly reliable. In this case, compared with high-rating private companies, it is not very necessary for SOE to use the underwriter reputation to further distinguish. In column (5), the estimated coefficient of $SOE * f1 * F\_Rating$ is 0.160, which is significant under the 99% confidence interval. Since the estimated coefficient of $f1 * F\_Rating$ is negative, the opposite signs of this two variables shows that the difference of the effect of underwriter reputation on interest rate of SOE bond issuance among different credit ratings is significantly smaller than that of private companies, and this is consistent with the result from columns (1) to (4). In addition, the estimated coefficient of SOE in column (5) is -0.633, which indicates that having a state-owned background has a very significant effect on reducing bond issuance cost. In summary, the results in Table 7 support the hypothesis H2c.

Robustness Test

To test the reliability of the above research conclusions, a series of robustness tests are processed in this paper. First of all, for the three core research objects of this paper, including the coupon rate of bonds, the reputation of the underwriters, and the credit rating, the other measurements that are different from those in Model 1 are introduced to study according to the description in the research design part. Table 8 shows the results of multiple linear regression model 1 using $CS1$、$CS2$ and $CS3$ (the bond spread calculated based on the treasury bond yield, the inter-bank overnight lending rate, and the inter-bank 7-day lending rate) as explanatory variables respectively. From Table 8, the coefficients of $F\_Rating * f1$ and $f1$ in each column of regression results are negative, and these regression coefficients are significant in the 99% confidence interval. The results after replacing the explained variables are utterly consistent with the above conclusions.

TABLE 8
ROBUSTNESS CHECK (USING SPREADS AS DEPENDENT VARIABLE)

Variables	$CS1$ as dependent variable		$CS2$ as dependent variable		$CS3$ as dependent variable	
	(1)	(2)	(3)	(4)	(5)	(6)
$f1 \times Firm\_Rating$	×	−0.077***	×	−0.072***	×	−0.075***
		(-6.05)		(-5.12)		(-5.34)
$Firm\_Rating$	−0.510***	−0.529***	−0.504***	−0.521***	−0.501***	−0.519***
	(-26.23)	(-27.05)	(-18.26)	(-19.01)	(-18.83)	(-19.65)
$f1$	−0.052***	−0.036***	−0.054***	−0.039***	−0.054***	−0.038***
	(-4.24)	(-2.73)	(-4.01)	(-2.70)	(-4.10)	(-2.72)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.360***	2.264***	3.763***	3.673***	3.517***	3.424***
	(14.60)	(14.05)	(17.75)	(17.38)	(17.16)	(16.76)
Year	control	control	control	control	control	control
Industry	control	control	control	control	control	control
R^2	0.479	0.483	0.425	0.428	0.431	0.434
N	4864	4864	4864	4864	4864	4864

Notes: *, **and *** indicate that the coefficients are significant at the statistical level of 10%, 5% and 1%, respectively. The t values in brackets are calculated based on the heteroskedasticity-robust standard error.

Table 9 shows the results of the multiple regression model 1 using the underwriter reputation obtained from the medium-term note market data $f2$ as the proxy variable of the underwriter's reputation and the debt rating B_Rating as the proxy variable of the credit rating. It can be seen from Table 9 that in both cases, the regression coefficients of underwriters' reputation terms and cross-multiplication terms are significantly negative, which is completely consistent with the conclusion obtained in Table 4.

TABLE 9
ROBUSTNESS CHECK (CHANGING INDEPENDENT VARIABLES)

Variables	$Coupon\_Rate$ as dependent variable			
	Using $f2$ to replace $f1$		Using B_Rating to replace F_Rating	
	(1)	(2)	(3)	(4)
$F\_Rating * f2$	×	-0.079^{***} (-6.05)	×	×
F_Rating	-0.523^{***} (-24.45)	-0.539^{***} (-25.25)	×	×
$f2$	-0.046^{***} (-3.77)	-0.039^{***} (-3.12)	×	×
$B\_Rating * f1$	×	×	×	-0.073^{***} (-5.42)
B_Rating	×	×	-0.504^{***} (-24.80)	-0.520^{***} (-25.25)
$f1$	×	×	-0.051^{***} (-3.96)	-0.035^{**} (-2.56)
Controls	Yes	Yes	Yes	Yes
Constant	4.690^{***} (26.33)	4.603^{***} (25.75)	5.051^{***} (28.63)	4.983^{***} (28.22)
Year	control	control	control	control
Industry	control	control	control	control
R^2	0.540	0.544	0.546	0.549
N	4864	4864	4864	4864

Notes: *, **and *** indicate that the coefficients are significant at the statistical level of 10%, 5% and 1%, respectively. The t values in brackets are calculated based on the heteroskedasticity-robust standard error.

In addition, from the perspective of the industry, there are 961, 854 and 946 bond-issuing enterprises from the manufacturing, construction and comprehensive categories respectively, which together exceed more than half of the total sample amount. One of these industries' characteristics is that they often have vital centralized large financing needs, which are different from those in other industries because of their own development needs. This paper therefore excludes the data of manufacturing, construction, and comprehensive enterprises and conduct a regression analysis model 1 (Table 10). The regression results show that after excluding the data of these three industries, the regression coefficients of $F\_Rating * f1$ and $f1$ are both significantly negative, and the conclusions of the study remain unchanged. The results of table 8, 9 and 10 show that the conclusions of this paper are robust.

TABLE 10
ROBUSTNESS CHECK (REMOVE SAMPLES FROM SPECIFIC INDUSTRIES)

Variables	$Coupon\_Rate$ as dependent variable	
	(1)	(2)
$F\_Rating * f1$	×	-0.061^{***}
		(-3.10)
F_Rating	-0.474^{***}	-0.484^{***}
	(-15.14)	(-15.49)
$f1$	-0.065^{***}	-0.046^{**}
	(-3.30)	(-2.01)
Controls	Yes	Yes
Constant	5.185^{***}	5.141^{***}
	(20.24)	(20.09)
Year	control	control
Industry	control	control
R^2	0.548	0.724
N	2103	2103

Notes: *, **and *** indicate that the coefficients are significant at the statistical level of 10%, 5% and 1%, respectively. The t values in brackets are calculated based on the heteroskedasticity-robust standard error.

CONCLUSIONS

By studying the 2-year and 5-year medium-term notes of all non-financial enterprises in China's inter-bank bond market, this paper has three outstanding findings. First, the effect of underwriter reputation on interest rate of bonds under different credit ratings is investigated. This paper finds that the impact of the underwriter's reputation on the issuance rate of China's inter-bank bond market is affected by the credit rating. The higher the credit rating is, the more significant the negative effect of underwriter reputation on issuance rate will be. If the credit rating is low, the underwriter reputation has no significant effect on the issuance rate. The above results show that as an external intermediary, the effect of underwriters is relatively limited compared with internal credit rating. In addition, the results of this paper are contrary to the conclusion which study the bond market in US, reflecting the significant differences between the two markets in terms of bond type composition and investor behavior. Secondly, this paper compares the impact of underwriter reputation on the interest rate of bonds before and after substantive default events in the market. The results show that the underwriter reputation significantly affects the issuing interest rate only after 2014 when the substantive default events occurred, at the same time, the marketization in China's bond market is gradually realized. After that, the higher the credit rating is, the more significant the effect of underwriter reputation on issuance rate will be. Finally, this paper studies the difference of this impacts under different circumstances respectively, including the duration of bonds (long-term and short-term bonds), and the characteristics of issuers (state-owned enterprises and private enterprises).From the perspective of risk and duration of bonds, the underwriter's reputation will only affect short-term bonds' interest rates with low risk while there is no significant effect on long-term bonds with high risk. The two-factor authentication of underwriter and credit rating effects both long-term and short-term bonds, but it is more significant in short-term bonds. From the perspective of characteristics of issuers, the, underwriter reputation can significantly reduce bond costs for those bonds which have high credit ratings for both state-owned enterprises and private enterprises. In addition, due to the strong credit background of state-owned enterprises, the impact of reputation of underwriters is weakened. The above research results are consistent with common senses and supports the research logic of the current literature (Campbell and Taksler, 2003；Chen et al., 2010）.

This paper aims at the particularity of China's bond market, in which most investors are highly risk-

aversion and show very negative attitude toward high-risk bonds and junk bonds. With this kind of particularity, the effect of underwriter reputation on coupon rate of bonds is significantly different according to the credit ratings of bonds. The results systematically explain the dynamic changes of the influence of underwriter reputation and credit rating on coupon rate, which have implications for both research and practice.

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