ESG Ratings and Bond Covenant Design

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Abstract

This study, based on corporate bonds issued by A-share listed companies in China's Shanghai and Shenzhen Stock Exchanges from 2016 to 2021, aims to explore the impact of a company's ESG (Environmental, Social, and Governance) ratings on the Bond Covenant Index. The results show a positive correlation between the ESG ratings of companies and the design of bond covenant terms at the time of issuance. This result remains robust after tests for robustness and endogeneity. Further analysis indicates that this relationship is more significant in state-owned enterprises and non-polluting industries. The research provides empirical evidence for understanding the impact of ESG ratings on corporate bond covenants.

Keywords

ESG Rating; Corporate Bonds; Contractual Terms.

1. Introduction

ESG (Environmental, Social, and Governance) ratings have become a focus of global attention for investors and companies, widely used to assess the sustainability performance and risks of companies. In a rapidly developing economy like China, ESG ratings are significant for the sustainable development of companies and the decisions of investors. However, the relationship between ESG ratings and the Bond Covenant Index is not yet clear in academia. This paper, based on data from this emerging market, aims to fill the research gap in the relationship between ESG ratings and corporate bond covenants.

There is a close correlation between ESG ratings and corporate bond covenants. Firstly, companies with high ESG ratings often pay more attention to risk management. Bond issuers may establish more protective terms to reduce the risk of bondholders. Secondly, the development of the bond market and the increasing requirements of supervision may also promote the increase in corporate bond covenants, where ESG factors may be included. Lastly, companies with high ESG ratings usually pay more attention to risk management but still face potential ESG risks. Therefore, to protect the interests of bondholders and the successful issuance of bonds, bond covenants may include stricter default terms and remediation mechanisms. For instance, the bond agreement might stipulate that if there is a significant decline in ESG performance or violations by the issuing company, bondholders have the right to demand early bond repayment or initiate related remediation measures.

This paper uses data from 755 corporate bonds issued by A-share listed companies in Shanghai and Shenzhen from 2016 to 2021 to study the impact of ESG ratings on the Bond Covenant Index. The results show that the higher the ESG rating of a company, the higher the Bond Covenant Index. The conclusion still holds after robustness and endogeneity tests. Further analysis reveals that in state-owned enterprises and non-polluting industries, ESG ratings have a more significant impact on the Bond Covenant Index.

The contributions of this paper are primarily reflected as follows: firstly, it expands the research on the economic consequences of ESG ratings. Existing literature not only studies the economic consequences of ESG from the company level (Limkriangkrai et al.,2017; Oh and Park.,2021; Ruan and Liu.,2021), but also examines the impact of ESG ratings on the capital

market (Brounen et al.,2021; Stotz.,2021), and even investigates the influence of ESG ratings on bond primary market issuance pricing. However, there are few studies systematically considering the impact of ESG ratings on the design of bond covenants at the time of issuance. Secondly, it enriches the study of the factors influencing bond covenants. The current literature has explored from the external perspective of companies, such as policies in the macro environment (Qi et al.,2011; Miller and Reisel,2012), climate (Hines and Park,2019), culture (Cao and Xia,2021), as well as capital market participants (Mansi et al.,2021; Zhang and Zhou,2018), supply chain relationships (Liu et al.,2020), etc.; there is also literature based on the governance level at the company level (Pappas et al.,2019), and the quality of information disclosure (Chava et al.,2010; Gong et al.,2018). However, few studies have started from the ESG rating, which is a comprehensive rating indicator based on the company's information in the E, S, and G aspects, to explore its impact on bond covenants. Therefore, this research fills this gap.

2. Literature Review and Hypothesis Development

On the one hand, existing literature has found that ESG ratings significantly impact the bond issuance market. Hachenberg and Schiereck (2018), based on their study of the green bond market, found that compared with traditional bonds, ESG ratings have a significant impact on green bond pricing. High ESG ratings help to improve corporate credit ratings, reduce default risk, and ultimately lower the risk premium at the time of bond issuance (Apergis et al., 2022). Zhang et al. (2023) found that higher ESG ratings could significantly reduce the issue premium of corporate bonds. At the same time, higher ESG ratings can weaken the positive impact of monetary policy uncertainty on the bond issue premium, and this regulatory effect is more significant when the quality of financial information is higher (Zhang et al., 2022). Companies with high ESG ratings have lower operational risks, so the setting of terms will not affect the company's operations after bond issuance. Simultaneously, the term setting also helps protect the interests of bondholders, thus ensuring the successful issuance of bonds.

On the other hand, the design of bond contract terms relates to whether a company's bond issuance is successful (Levy and Shalev, 2017), the cost of bond financing (Deng et al., 2016; Gong et al., 2017), and the duration of bond financing. Therefore, studying bond contract terms is crucial. Studies have found that the foreign background of underwriters can positively affect the design of contract terms (Zhang et al., 2022), and both investors and brokers in charge of bond issuance plans have impacts on the quantity and quality of contracts (Krolikowska and Sierpinska-Sawicz, 2016). Shi and Sun (2015) found that a company's social responsibility score is significantly negatively correlated with the number of contract terms at the time of its bond issuance. Gong et al (2018), through further research on non-price terms, found that companies with high-quality social responsibility information are less likely to be constrained by additional terms, but they will set more restrictive terms. Studies on corporate financing behavior show that when a company recently obtains private loans, the bond issuance spread is lower and the issuance size is larger. However, compared to companies without bank cross-supervision, they design more contract terms to alleviate conflicts between bondholders and bank creditors (Ma et al., 2019).Based on the above, we propose the primary hypothesis:

H0: Ceteris paribus, the higher a company's ESG rating, the more likely it is to design more contract terms to protect bondholders' interests when issuing bonds.

3. Research Design

3.1. Sample Selection and Data Source

To validate the main hypothesis mentioned above, this study selects corporate bonds issued by companies listed on the Shanghai and Shenzhen A-share markets from 2016 to 2021 as the research sample. The sample screening process is as follows: Firstly, since the SynTao Green Finance data (downloaded from Wind database) has disclosed company ESG rating information since 2015, considering the lagging effect of company ESG rating information on the contract term design at the time of company bond issuance, we lag the ESG rating information by one period, so the selected company bond sample period starts from 2016; Secondly, considering the uniqueness of the financial industry, this paper excludes companies in the financial and insurance sectors; Thirdly, this paper excludes samples with floating interest rates for corporate bonds; Finally, ST and *ST class company samples are eliminated. In summary, this study finally obtained 755 corporate bond samples. The dependent variables in the model come from manual collection, the control variable data at the bond level comes from the Wind database, and the control variable at the company level comes from the China Stock Market and Accounting Research(CSMAR) database. All the above data have been manually organized and confirmed.

3.2. Model Design

To test the research hypothesis, this study refers to the research by Chava et al. (2019) and designs the following model for empirical testing.

$$〖Covenants\_Index〗_{(i,t)}=\beta\_0+\beta\_1 〖ESG〗_{(i,t-1)}+\sum Controls+\sum Industry+\sum Year+\varepsilon\_{(i,t)} \quad （1）$$

3.3 Variable Settings

Dependent Variable (Covenants_Index): Corporate bond covenant index. This study draws on the research of Zhang et al (2022) and designs the Covenants_Index based on the classification of various covenant terms. The larger the index, the more covenants are set when the corporate bond is issued, and the higher the protection level for bondholders.

Independent Variable (ESG): Wind's ESG rating. In this study, a discrete variable is set according to the distribution of Wind's ESG rating; where A+ is 10, A is 9, and so on, with D being 1. To rule out certain endogeneity issues, the lagged rating variable is used as the core explanatory variable.

Control Variables: Referring to the existing literature, this study selects control variables from bond features, company characteristics, and external factors, etc. The names and definitions of the control variables are as shown in Table 1.

Table 1: Definition of Main Variables

Variable Category		Variable Name	Variable Symbol	Variable Definition
Control Variable	Bond Features	Bond scale	BondSize	The natural logarithm of the bond issue size, in yuan.
		Bond term	BondTerm	The bond's term, in years.
		Bond rating	CreditRating	The bond's issuer credit rating includes BBB, A-, A, A+, AA-, AA, AA+, AAA-, AAA, AAA+. If the credit rating reaches the AAA class, CreditRating is set to 1, otherwise 0.
		Interest rate type	RateType	The types of interest rates for the bond include fixed rates and progressive rates. When the bond type is a progressive rate, RateType is set to 1, otherwise 0.
	Company Characteristics	Company size	Assets	Total Corporate Assets (unit: hundred billion yuan)
		Ownership structure	SOE	When the property rights of a company are state-owned, SOE is 1, otherwise 0.
		Tangible Asset Ratio	Tangible	(Total Assets - Intangible Assets - Goodwill) / Total Assets.
		Capital Structure	Leverage	Debt ratio: Total Liabilities / Total Assets.
		Debt-paying Ability	Coverage	Interest Protection Multiple: (Net Profit + Income Tax Expense + Financial Expense) / Financial Expense.
		Sales Growth Rate	GRW	(Sales of the current year - Sales of the previous year) / Sales of the previous year.
		Proportion of Independent Directors	IndDirRat	(Number of independent directors / Total number of board members) * 100%.
		Governance Structure	TopOne	Percentage of shares held by the largest shareholder (%).
	External Factors	Industry of Belonging	Industry	The industry to which the company belongs according to Wind.
		Year of Belonging	Year	The research sample interval of this paper is a total of 16 years from 2007 to 2022.

4. Empirical Results and Test Analysis

4.1. Descriptive Statistics

As shown in Table 2, the mean of the corporate bond covenant index (Covenants_Index) is 0.791, with a standard deviation of 0.190, and the extreme value is 0.750 (1.000-0.250), indicating that there are some differences in the covenant settings of different corporate bonds, but the overall difference is not large, and the corporate bond covenant setting is at a relatively high level. The average ESG rating of listed companies is 5.154, slightly higher than the median of 5.000, and the maximum value is 8.000, which shows that none of the listed companies in the sample have reached the "A+" level in the Wind's ESG rating. The distribution of control variables also well reflects the current situation of bond issuance by listed companies. For example, the mean of the equity nature of listed companies (SOE) is 0.732, and the median is 1.000, indicating that most companies in the sample are state-owned, which is basically in line with the current situation of corporate bond issuance in China.

Table 2: Descriptive Statistics

variable	N	mean	sd	min	p50	max
Covenants_Index	755	0.791	0.190	0.250	0.750	1.000
ESG	755	5.154	1.148	3.000	5.000	8.000
BondSize	755	15.064	11.884	0.500	11.000	127.000
BondTerm	755	4.175	1.730	0.082	4.000	15.000
CreditRating	755	0.783	0.413	0.000	1.000	1.000
Asset	755	3.140	4.301	0.031	1.526	23.970
SOE	755	0.732	0.443	0.000	1.000	1.000
Tangible	755	0.932	0.094	0.362	0.963	1.000
Leverage	755	0.654	0.141	0.106	0.680	0.917
Coverage	755	29.482	258.308	-4.673	4.230	3820.517
GRW	755	0.128	0.265	-0.641	0.108	3.785
IndDirRat	755	39.269	8.121	23.080	36.360	80.000
TopOne	755	41.367	16.226	4.080	43.734	86.347

4.2. Correlation Analysis

Table 3 presents the correlation analysis results of the main variables in this paper. Through analysis, it is found that the ESG rating of the company (ESG) is positively correlated with the bond covenant index (Covenants_Index), which supports the main hypothesis of this paper to a certain extent. The relationship between the control variables and the covenant index is consistent with the conclusions of existing literature. For example, the capital structure of the company (Leverage) is significantly positively correlated with the covenant index, that is, the higher the capital debt ratio, the more terms will be set at the time of bond issuance.

Table 3: Correlation Analysis

	Covenants_Index	ESG	BondSize	BondTerm	CreRat	Asset	SOE	Tangible	Leverage	Coverage	GRW	IndDirRat	TopOne
Covenants_Index	1.000												
ESG	0.046	1.000											
BondSize	-0.042	0.076**	1.000										
BondTerm	0.002	-0.085**	0.102***	1.000									
CreditRating	-0.021	0.121***	0.269***	0.128***	1.000								
Asset	0.075**	-0.107***	0.257***	0.162***	0.305***	1.000							
SOE	-0.043	0.125***	0.201***	0.135***	0.371***	0.248***	1.000						
Tangible	-0.011	-0.027	0.015	0.046	0.066*	0.108***	-0.05	1.000					
Leverage	0.098***	-0.150***	0.031	0.045	0.163***	0.336***	0.085**	0.320***	1.000				
Coverage	0.064*	-0.114***	0.031	0.035	-0.117***	-0.033	-0.111**	0.044	0.022	1.000			
GRW	0.046	-0.117***	-0.034	-0.076**	-0.02	-0.025	-0.095**	-0.049	0.148***	0.073*	1.000		
IndDirRat	0.163***	0.032	-0.01	-0.055	0.012	0.137***	0.087**	0.042	0.127***	-0.021	0.012	1.000	
TopOne	0.044	0.032	0.180***	0.049	0.203***	0.235***	0.414***	-0.106***	0.059	0.067*	-0.033	0.052	1.000

4.3. Baseline Regression Result Analysis

Table 4 reports the regression results of model (1). The results in column (1) are the univariate regression results when only controlling for industry and year. The results show that the coefficient of ESG is significantly 0.020, significant at the 1% level, which to a certain extent validates the hypothesis H0 of this paper. Further, this paper also adds control variables at the bond level, and the regression results are listed in column (2). The results show that the coefficient of ESG is 0.038 and is significant at the 1% level. Finally, adding control variables at the company level, the results in column (3) show that the ESG rating of listed companies (ESG) significantly positively affects the corporate bond covenant index at the 1% significance level. That is, the higher the ESG rating of listed companies, the more terms companies tend to set when issuing bonds in order to reduce the risk of bondholders and ensure successful bond issuance. So far, the results of this paper point out hypothesis H0.

Table 4: Main Effect Regression Results

	(1)	(2)	(3)	(4)
	Covenants_Index	Covenants_Index	Covenants_Index	Covenants_Index
ESG	0.020***	0.024***	0.026***	0.026*
	(2.73)	(3.35)	(3.47)	(1.95)
BondSize		-0.000	-0.000	-0.000
		(-0.44)	(-0.72)	(-0.68)
BondTerm		-0.002	-0.004	-0.004
		(-0.47)	(-0.86)	(-0.57)
CreditRating		-0.041*	-0.060***	-0.060*
		(-1.90)	(-2.66)	(-1.76)
Asset			0.011***	0.011
			(4.11)	(1.56)
SOE			-0.005	-0.005
			(-0.22)	(-0.10)
Tangible			-0.007	-0.007
			(-0.06)	(-0.04)
Leverage			-0.121	-0.121
			(-1.19)	(-0.81)
Coverage			0.000***	0.000**
			(3.53)	(2.29)
GRW			0.021	0.021
			(0.76)	(0.58)
IndDirRat			0.002*	0.002
			(1.89)	(1.28)
TopOne			0.001*	0.001
			(1.90)	(0.88)
BondType	NO	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
Constant	0.806***	0.738***	0.690***	0.690***
	(12.07)	(8.22)	(4.81)	(3.42)
N	755	755	755	755
adj.R2	0.194	0.216	0.244	0.244

4.4. Robustness Test

4.4.1. Replacement of Core Variables

On one hand, the dependent variable is replaced. First, this paper uses Covenants_IndexA (Zhang et al.,2022) to replace Covenants_Index in model (1) and remodels model (1). The regression results are shown in column (1) of Table 5 Panel A. The coefficient of Rating_ST is significantly 0.029 and is significant at the 1% level, which further verifies hypothesis H1a of this paper. Second, this paper uses Covenants_Num (the algebraic sum of all types of terms set at the time of bond issuance) to measure the corporate bond covenant index, remodels model (1), and lists the results in column (2). The regression results show that the coefficient of Rating_ST is significantly positively correlated. On the other hand, the explanatory variables are replaced. This paper selects Huazheng ESG rating (Rating_HZ) to replace the explanatory variable and restates model (1). The regression results are shown in column (3) of Table 5 Panel A. The coefficient of Rating_HZ is significantly positive, which once again verifies the main hypothesis of this paper.

4.4.2. Company-Level Clustering Adjustment

In order to mitigate the potential heteroscedasticity problem in this paper, a company-level clustering adjustment is carried out based on robust standard error regression. The regression results are shown in column (4) of Table 5 Panel A. The coefficient of Rating_ST is consistent with the previous text (column (3) of Table 4) and is still significant at the 1% level.

4.5. Endogeneity Test - Instrumental Variable Method

Due to the potential endogeneity problems caused by mutual causality and omitted variables, this paper first uses the instrumental variable method for endogeneity treatment. Based on the ideas of Lin et al (2012) and Yang et al (2021), this paper uses the industry annual average ESG rating excluding itself as the instrumental variable (Rating_AVR) for the ESG rating of listed companies to perform 2SLS regression on model (1). The results are listed in columns (5) and (6) of Table 5 Panel B. It can be found that the coefficient of Rating_Pre is 0.027 and is significant at the 5% confidence level. When the endogeneity problem is effectively alleviated, the main effect is still robust.

Table 5: Robustness and Endogeneity Test

	PanelA:Robustness Test				PanelB:Endogeneity Test	
	(1)	(2)	(3)	（4）	（5）	（6）
	Covenants_IndexA	Covenants_Num	Covenants_Index	Covenants_Index	First Rating_ST	Second Covenants_Index
Rating_ST	0.029***	0.218**		0.026*		
	(4.09)	(2.12)		(1.95)		
Rating_HZ			0.037***			
			(4.59)			
Rating_AVR					0.742***	
					(18.67)	
Rating_Pre						0.027**
						(2.06)
BondSize	-0.001	-0.018	-0.001*	-0.000	0.005*	-0.001
	(-1.50)	(-1.63)	(-1.86)	(-0.68)	(1.66)	(-1.63)
BondTerm	0.001	-0.097	-0.006	-0.004	-0.024	0.003
	(0.16)	(-1.25)	(-1.19)	(-0.57)	(-1.12)	(0.64)
CreditRating	-0.001	-0.226	-0.039*	-0.060*	0.061	-0.002
	(-0.06)	(-0.72)	(-1.87)	(-1.76)	(0.69)	(-0.09)
Asset	0.008***	0.080*	0.001	0.011	-0.027***	0.003
	(2.81)	(1.90)	(0.34)	(1.56)	(-3.62)	(1.14)
SOE	0.003	-0.104	-0.019	-0.005	0.201**	-0.028
	(0.12)	(-0.31)	(-0.81)	(-0.10)	(2.35)	(-1.40)
Tangible	-0.433***	-5.083***	-0.079	-0.007	0.603	-0.170**
	(-3.83)	(-3.13)	(-0.83)	(-0.04)	(1.36)	(-2.28)
Leverage	-0.085	-0.674	-0.056	-0.121	-0.223	0.081
	(-1.07)	(-0.61)	(-0.68)	(-0.81)	(-0.76)	(1.24)
Coverage	0.000***	0.001***	0.000**	0.000**	-0.000***	0.000***
	(5.48)	(3.29)	(2.45)	(2.29)	(-6.42)	(3.26)
GRW	0.020	0.239	0.052*	0.021	-0.201*	0.022
	(0.68)	(0.50)	(1.71)	(0.58)	(-1.87)	(0.79)
IndDirRat	0.000	0.015	0.001	0.002	0.005	0.002**

	(0.32)	(1.22)	(0.73)	(1.28)	(1.37)	(2.51)
TopOne	-0.000	-0.005	0.001	0.001	0.006**	0.001*
	(-0.68)	(-0.57)	(1.59)	(0.88)	(2.18)	(1.73)
BondType	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Constant	0.701***	10.633***	0.674***	0.690***	0.796*	0.692***
	(5.46)	(5.77)	(6.13)	(3.42)	(1.70)	(6.92)
N	755	755	755	755	755	755
adj.R2	0.209	0.286	0.191	0.244	0.422	0.079

5. Further Analysis

5.1. Heterogeneity Analysis Based on Equity Nature

Compared with non-state-owned enterprises, state-owned enterprises have a guarantee effect and can obtain financing preferentially (Chen et al.,2019), and they have a positive signal effect in the capital market. Based on this, we divided the samples into state-owned (SOE=1) and non-state-owned (SOE=0) samples according to the property rights nature (SOE) in Table 1 company characteristics, and then remodeled model (1) respectively. The regression results are shown in columns (1) and (2) of Table 6. The coefficients of Rating_ST are 0.033 and -0.031 respectively, but only the coefficient of Rating_ST in the state-owned enterprise sample is significant.

5.2. Heterogeneity Analysis Based on Corporate Industry

Furthermore, this paper groups the full sample according to whether the company's industry is a polluting industry. The grouping results are shown in columns (3) and (4) of Table 6. The coefficients of Rating_ST are 0.011 and 0.045 respectively, but only the coefficient of Rating_ST in the non-polluting industry sample is significant.

Table 6: Further Analysis

	(1) Covenants_Index	(2) Covenants_Index	(3) Covenants_Index	(4) Covenants_Index
	SOE		Pollution industry	
	Yes	NO	Yes	NO
Rating_ST	0.033**	-0.031	0.011	0.045**
	(2.36)	(-1.05)	(0.84)	(2.45)
BondSize	-0.001*	0.001	-0.001	0.000
	(-1.92)	(0.86)	(-1.12)	(0.33)
BondTerm	-0.007	0.014	-0.004	0.003
	(-0.95)	(0.87)	(-0.36)	(0.51)
CreditRating	-0.130***	-0.038	-0.055	-0.074*
	(-2.92)	(-0.81)	(-0.89)	(-1.84)
Asset	0.014*	-0.008	-0.015	0.011*
	(1.92)	(-0.26)	(-0.44)	(1.70)
SOE			0.120	-0.045
			(1.49)	(-0.72)
Tangible	-0.068	-0.864	0.273	-0.250
	(-0.31)	(-1.29)	(0.76)	(-1.40)
Leverage	-0.192	-0.191	-0.156	0.023
	(-1.17)	(-0.58)	(-0.64)	(0.12)

Coverage	-0.000	0.000	0.000	0.000*
	(-0.84)	(0.96)	(0.65)	(1.68)
GRW	0.069	-0.168***	0.065	0.010
	(1.30)	(-3.40)	(1.02)	(0.25)
IndDirRat	0.002	-0.001	0.001	0.002
	(1.25)	(-0.09)	(0.24)	(1.39)
TopOne	0.002	0.002	0.002	0.001
	(0.86)	(0.80)	(0.65)	(0.74)
BondType	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
Constant	0.806***	2.024***	0.496	0.252
	(3.31)	(2.88)	(1.40)	(1.40)
N	553	202	243	489
adj.R2	0.315	0.339	0.274	0.247

6. Conclusion

This study is based on the corporate bond data issued by 755 Shanghai and Shenzhen A-share listed companies in China, and explores the impact of ESG ratings on the bond covenant index. Through robustness testing and endogeneity testing of the data, we have drawn the following conclusions:

Firstly, there is a significant positive correlation between ESG ratings and the corporate bond covenant index. Companies with high ESG ratings tend to set more protective clauses to protect the rights and interests of bondholders. This is consistent with previous studies and theoretical views, supporting the positive correlation between ESG ratings and bond covenants.

Secondly, further analysis found that this relationship is more significant in state-owned enterprises and non-polluting industries. State-owned enterprises are often subject to more regulatory requirements and social responsibility pressure in the process of bond issuance, and therefore tend to add more protective measures in the covenant terms. Companies in non-polluting industries pay more attention to sustainable development and ESG factors and tend to set more contract terms related to the environment and social responsibility.

In conclusion, the results of this study support the positive correlation between ESG ratings and the bond covenant index, and further point out that this relationship is more significant in state-owned enterprises and non-polluting industries. This provides empirical evidence on the impact of ESG ratings on corporate bond covenants for investors, bond issuers, and regulators, and provides a useful reference for the sustainable development and standardization of the bond market. However, due to the data limitations and method selection of this study, further research is still needed to explore the differences among different industries, markets, and countries for a more comprehensive and in-depth understanding.

Acknowledgements

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