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Can ESG Performance Mitigate Credit Risk?

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Abstract: With the development and improvement of the banking and financial systems, people are increasingly concerned about the impact of non-financial factors on corporate performance and long-term value. Using a sample of Chinese A-shared listed commercial banks operating from 2013 to 2022, this study investigate the association between environment, social and government (ESG) combined scores and bank credit risk. By conducting descriptive tests, autocorrelation tests and mixed regression analysis,we find that a bank's ESG performance is negatively associated with its credit risk. In addition, we took a closer look at banks' good performance on the environmental and governance pillars of ESG ratings and found that these two pillars can reduce credit risk more effectively than the social pillars. Our research provides new ideas for risk management and bank governance, helping banks to incorporate ESG scores into their daily management and risk monitoring, enabling banks to prevent risks more effectively and take effective measures.

Keywords: ESG, credit risk, commercial bank

1. Introduction

In recent years, people's attention to environment, society and governance has increased rapidly. The banking industry is also paying more and more attention to credit risk and is committed to applying ESG evaluation system to risk management. The United Nations first proposed the concept of ESG in 2004. In China, the Shanghai and Shenzhen stock exchanges already required listed companies to provide social responsibility reports in 2006. The China Securities Regulatory Commission (CSRC) issued guidance on strengthening the social responsibility of listed companies in 2008 and again issued the Guiding Opinions on Listed Companies' Fulfillment of Social Responsibilities in 2013. In 2016, CSRC required all listed companies to disclose environmental information in their annual reports. Nowadays, China's ESG standards are becoming more and more comprehensive, and enterprises' ESG practices are becoming richer.

In this paper, we mainly study whether ESG performance can be applied to risk management to alleviate bank credit risk, hoping to provide new ideas for bank governance.To solve the above problems, it is necessary to clarify the relationship between ESG score and credit risk. First, we introduce ESG-related data, ROA, leverage ratio, bank size, non-performing debt, and loan growth rate. Second, we performed a descriptive analysis, auto-correlation analysis on these data, exploring the relationship between ESG and credit risk. Finally, we conducted a robustness test to investigate whether the impact of ESG changes on credit risk is reliable.

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There are many innovations in this paper. First of all, it enriches ESG literature related to the banking industry. Secondly, this paper will increase the attention of ESG to a certain extent and provide a new idea for credit risk management.

The structure of this article is as follows. Section 2 carries out literature review. Section 3, we put forward relevant hypotheses. Section 4 describes variables, sample and methodology applied. Section 5, we have summarized the full text and give some advice.

2. Literature review

This section mainly reviews ESG and risk-related literature, which is mainly divided into three pillars, credit risk, bank loan and so on.

Although ESG performance is closely related to financial institution distress [1], there are still limited articles considering the relevance of the three pillars of ESG [2] and bank credit risk[3], in particular a large number of literatures have studied the relationship between ESG scores and bank risk[4].

Most of the previous literature on credit risk has studied the consequences of risks, mainly focusing on fintech [5], machine learning [6], macroeconomics [7], risk comparison [8], regional financial distress [9], climate [10] and other perspectives [11].

Based on the existing literature, we know that ESG score and credit risk are negatively correlated, indicating that good ESG performance can reduce the volatility of earnings and cash flow, and the risk mitigation effect is related to the enterprise life cycle [3].

By analyzing the relationship between ESG performance and bank loans, it is crucial to incorporate ESG scores into the loan evaluation system [12] and adjust them according to different industries which can effectively screen non-performing loans and reduce credit risks [13].

3. Hypothesis development

With the increasing disclosure of ESG by major banks, banks also pay more attention to ESG scores. ESG score combines the three aspects of environment, society and governance, and can comprehensively analyze the credit risk status of banks. At the same time, banks with high ESG scores will pay more attention to the risk status of companies, in order to extend loans to companies with excellent environmental, social and governance aspects. As a result, those firms are more likely to repay their loans on time. ased on the above analysis, we speculate that:

Hypothesis 1: Credit risk is negatively correlated with banks' ESG performance.

Banks with higher environmental scores are more likely to provide loans to environmentally friendly and low-carbon companies. The company adheres to the concept of environmental protection, uses recyclable materials, adopts environmental protection technology and reduces energy consumption and carbon dioxide emissions, which will be easier to achieve sustainable development and achieve the purpose of long-term operation.As a result, these firms are less prone to default. Based on the above analysis, we speculate that:

Hypothesis 2: Credit risk is negatively correlated with the environmental score of bank ESG.

The social evaluation of the company can help the company gain more recognition and support.The company provides more employment benefits and social security so that employees can have greater motivation to work.In addition, the company has the courage to assume social responsibility and actively participate in public undertakings, which can effectively improve the social recognition of the enterprise.Therefore, the company may have a good reputation and stable income, which is more likely to maintain a good relationship with the bank and repay the loan.Based on the above analysis, we speculate that:

Hypothesis 3: Credit risk is negatively correlated with the social score of bank ESG.

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Banks with high governance scores should have good corporate governance. The interests of shareholders and management should be consistent and trust each other, so it will reduce the possibility of principal-agent problems. The Bank shall employ professional auditors and disclose its financial reports openly and transparently. This can provide more effective information for investors to make decisions and improve China's capital market. Banks and firms should match each other, so banks with high governance scores should provide lending services to banks with high governance scores.Crises are also a test of bank governance. Banks and enterprises should have sufficient capacity, capital and personnel to deal with major crises and provide a set of crisis solutions in a timely, accurate and perfect manner. In this way, banks and companies can maintain healthy and stable relationships and deliver loans on time. Based on the above analysis, we speculate that:

Hypothesis 4: Credit risk is negatively correlated with the governance score of bank ESG.

4. Sample and methodology

4.1. Sample and data

To study the relationship between ESG performance and credit risk, this paper selects the unbalanced panel data of China's A-share listed banks from 2013 to 2022 as the research object. The annual financial data of the sampled banks are all from the information of all A-share listed commercial banks in the CSMAR database and Huazheng ESG Index comes from WIND database. We eliminated banks with too small a sample size, incomplete financial data, and outliers. Our final sample contains 215 observations of 36 A-share listed commercial banks from 2013 to 2022. This paper winalises the main contained data by 1% at both ends to avoid the influence of outliers.

4.2. Methodology

In order to investigate the relationship between bank credit risk and ESG score, we use the following mixed effect model regression analysis at the bank level:

$$CREDIT\_RISK_{i,t} = \alpha_0 + \beta_1 ESG_{i,t} + \beta_2 ESG\_E_{i,t} + \beta_3 ESG\_S_{i,t} + \beta_4 ESG\_G_{i,t} + \beta_5 SIZE_{i,t} + B_6 ROA_{i,t} + \beta_7 LEV_{i,t} + \beta_8 NPL_{i,t} + \beta_9 LOAN\_GROWTH_{i,t} + \varepsilon_{i,t} \quad (1)$$

The pooled regression effects mitigate the impact of the presence of random differences across individuals, and both individual and time fixed effects are considered. $\varepsilon_{i,t}$ is a dummy variable and α_0 is a bank-specific fixed effect that can be used to account for characteristics of commercial banks that do not change over time.

4.3. Baseline results

Table 2 reports descriptive statistics. The mean value of credit risk (CREDIT_RISK) is 0.911. This means that credit risk accounts for a large proportion of risk-weighted assets, so credit risk has a profound impact on bank risk management. The mean value of the ESG composite score (ESG) is 79.74, where the environmental (ESG_E), social (ESG_S) and governance (ESG_G)scores are 70.73, 76.87 and 85.96, respectively. The natural logarithm of total assets(SIZE) is 28.7 on average. And the averages of ROA and NPL of sampled banks are respectively 1.3% and 1.4%.

The autocorrelation analysis is presented in Table 3. The correlation coefficients are significant at less than 5% in absolute value, indicating that there is very weak correlation between the explanatory variables. Therefore, there is no multicollinearity problem in our data.

Table 4 carries out the regression analysis on the combined ESG score and the three pillars of ESG: environment, society and governance, and investigates the associated factors between credit risk and

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ESG score. Columns 1 is the combined ESG score, which is Columns 2 through 3 show the pooled regression results for bank credit risk on each ESG pillar, respectively. Both the environmental pillar and the governance pillar are negatively related to the credit risk of banks, indicating that both environmental and governance factors are able to reduce the probability of credit risk. But social pillars do not necessarily mitigate banks' credit risk.

Table 1: Variable definitions.

Variable	Description	Source
Dependent variable		
CREDIT_RISK	Risk weighted assets related to credit risk / total risk weighted assets	CSMAR
Independent variables		
ESG	A comprehensive evaluation index used to measure the performance of enterprises in the three aspects of environment, society and corporate governance。	Wind
ESG_E	The part of an ESG indicator that describes the environment separately	Wind
ESG_S	The part of an ESG indicator that describes the social separately	Wind
ESG_G	The part of an ESG indicator that describes the governance separately	Wind
Control variables		
SIZE	Natural logarithm of total bank assets	CSMAR
ROA	Net profit /total assets	CSMAR
LEV	Equity capital/total assets in the balance sheet	CSMAR
NPL	Non-performing loans/total loan balance	CSMAR
LOAN_GROWTH	The growth rate of outstanding loans of a bank or financial institution over a certain period of time.	CSMAR

Table 2: Descriptive statistics.

Variable	N	Mean	S.D.	Min	Max
CREDIT_RISK	215	0.911	0.033	0.730	0.950
ESG	215	79.740	3.794	65.300	87.300
ESG_E	215	70.730	6.191	56.300	89.430
ESG_S	215	76.870	5.600	60.590	89.490
ESG_G	215	85.960	6.113	56.450	96.070
SIZE	215	28.700	1.515	25.480	31.310
ROA	215	0.013	0.064	0.005	0.940
LEV	215	0.065	0.009	0.043	0.087
NPL	215	0.014	0.003	0.008	0.024
LOAN_GROWTH	215	0.002	0.001	0.002	0.004

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Table 3: Autocorrelation Analysis.

	CREDIT_RISK	ESG	ESG_E	ESG_S	ESG_G	SIZE	ROA	LEV	NPL	LOAN_GROWTH
CREDIT_RISK	1.000									
ESG	-0.031	1.000								
ESG_E	-0.009	0.417***	1.000							
ESG_S	0.035	0.578***	0.124*	1.000						
ESG_G	-0.063	0.779***	0.018	0.073	1.000					
SIZE	-0.025	0.015	0.352***	-0.293***	0.041	1.000				
ROA	0.007	0.050	-0.045	0.038	0.066	-0.008	1.000			
LEV	-0.018	-0.202***	0.129*	-0.265***	-0.164**	0.261***	-0.129*	1.000		
NPL	0.069	-0.288***	0.076	-0.307***	-0.215***	0.304***	0.027	0.162**	1.000	
LOAN_GROWTH	-0.021	0.024	-0.366***	0.217***	0.069	-0.511***	-0.009	-0.383***	-0.345***	1.000

***、**、* representing significant levels of 1%, 5%, and 10% respectively.

Table 4: Regression analysis

Variables	CREDIT_RISK(3)	CREDIT_RISK(4)	CREDIT_RISK(5)	CREDIT_RISK(6)
ESG	-0.000			
	(-0.20)			
ESG_E		-0.000		
		(-0.05)		
ESG_S			0.000	
			(0.66)	
ESG_G				-0.000
				(-0.70)
SIZE	-0.001	-0.001	-0.001	-0.001
	(-0.70)	(-0.70)	(-0.60)	(-0.62)
ROA	0.000	0.000	-0.000	0.002
	(0.01)	(0.00)	(-0.01)	(0.04)
LEV	-0.122	-0.111	-0.074	-0.140
	(-0.42)	(-0.38)	(-0.25)	(0.48)
NPL	0.775	0.822	0.945	0.702
	(0.95)	(1.06)	(1.19)	(0.88)
LOAN_GROWTH	-1.767	-1.737	-0.610	-1.664
	(-0.42)	(-0.40)	(-0.38)	(-0.40)
Constant	0.958***	0.948***	0.914***	0.969***
	(12.19)	(15.77)	-12.160	(14.99)
Observations	215	215	215	215
R-squared	0.008	0.008	0.010	0.010

***、**、* representing significant levels of 1%, 5%, and 10% respectively.

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5. Results and discussion

5.1. Robustness testing

We test robustness by substituting the explained variables. Provision coverage, loan provision ratio and overdue loan ratio were respectively used as alternative explained variables to conduct robustness tests and draw conclusions as shown in Table 5.

Table 5: Robustness testing

Variables	CREDIT_RISK(1)	Pvcra(2)	Lpvra(3)	Overdue _Rate(4)
ESG	0.0129	0.230	-0.00119	0.00343
	(0.0158)	(0.281)	(0.00288)	(0.0408)
ESG_E	-0.0028	-0.0576	0.000181	-0.00133
	(0.0033)	(0.0592)	(0.000607)	(0.00860)
ESG_S	-0.0039	-0.0686	0.000397	3.09e-05
	(0.0052)	(0.0921)	(0.000945)	(0.0134)
ESG_G	-0.0062	-0.125	0.000366	-0.00262
	(0.0072)	(0.128)	(0.00132)	(0.0186)
SIZE	-0.0010	-0.0673**	-0.00095***	0.00306
	(0.0019)	(0.0341)	(0.00035)	(0.00495)
ROA	0.0013	-0.327	-0.00356	-0.0135
	(0.0368)	(0.653)	(0.0067)	(0.0948)
LEV	-0.107	6.475	0.12**	-0.396
	(0.298)	(5.291)	(0.0543)	(0.768)
NPL	1.008	-254.9***	-0.579***	9.505***
	(0.852)	(15.13)	(0.155)	(2.198)
LOAN_GROWTH	-1.330	183.0**	1.532**	10.08
	(4.391)	(78.01)	(0.801)	(11.33)
Constant	0.933***	9.083***	0.0778***	-0.129
	(0.0825)	(1.465)	(0.015)	(0.213)
N	215	215	215	215
R-squared	0.016	0.707	0.246	0.113

Robustness testing:***、**、* representing significant levels of 1%, 5%, and 10% respectively.

5.2. Heteroscedasticity testing

The article is tested for heterogeneity, and the P-value is less than 0.05 through White test, so there is heteroscedasticity. We can use OLS and robust standard error methods to solve the heteroscedasticity problem.

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Table 6: Heteroscedasticity testing

Variables	CREDIT_RISK(1)
ESG	0.013
	(1.025)
ESG_E	-0.003
	(-1.088)
ESG_S	-0.004
	(-0.934)
ESG_G	-0.006
	(-1.082)
SIZE	-0.001
	(-0.581)
ROA	0.001
	(0.146)
LEV	-0.107
	(-0.344)
NPL	1.008
	(1.191)
LOAN_GROWTH	-1.330
	(-0.236)
Constant	0.933***
	(13.312)
N	215
R-squared	0.016
F test	0.721
Ajusted R-squared	-0.0272
F	70.686

***、**、* representing significant levels of 1%, 5%, and 10% respectively.

6. Conclusion

Using the data of 36 Chinese listed banks from 2013 to 2022, we find that ESG composite scores are negatively correlated with bank credit risk. ESG scores can reduce the absorption of assets related to credit risk by commercial banks and decrease the probability of non-performing loans. We have made a certain contribution to the risk management of banks, and the research direction is basically consistent with the development trend of China's banking industry.Our results can help us understand the development of credit risk and mitigate it.In addition, the environmental and governance risks in ESG scores are related to credit risks, which play a certain role in mitigating risks. But social factors play a small role in the overall risk.

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