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Environmental Information Disclosure, Credit Scale and Credit Cost

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ABSTRACT. *With the development of green finance, environmental information disclosure has an increasing impact on corporate credit. Our research selects the 2014-2018 panel data of 400 A-share listed companies in heavy polluting industries to examine the impact of corporate environmental information disclosure levels on financing costs and credit scale,and further explore the impact of the interactive effect of corporate size and information disclosure level on corporate credit. Research shows that the higher the level of environmental information disclosure of listed companies in the heavy pollution industry, the lower their financing costs and the larger the scale of credit. At the same time, this effect will be enhanced as the scale of the enterprise continues to expand.*

KEYWORDS : *EDI, Heavy pollution enterprise, credit*

I. Introduction

Corporate environmental information disclosure has gradually been put on the agenda of China's environmental governance. Since 2007, the People's Bank of China, the Ministry of Finance, the Environmental Protection Agency, and other departments have jointly issued several documents pointing out that a mandatory environmental information disclosure system for listed companies should be implemented, and commercial banks are required to include corporate environmental behavior information in the assessment scope of loan approval .Then, whether there is a connection between environmental information disclosure and corporate credit behavior is worthy of in-depth study by scholars. Credit behavior first emphasizes the difficulty of credit, that is, financing cost, and secondly emphasizes its credit scale. According to the current research results in this field, it can be concluded that good environmental information disclosure can effectively alleviate the credit financing constraints of enterprises. China is currently in a critical period of transition from an extensive economy to an intensive economy, and the establishment of a mechanism for environmental information disclosure and public opinion evaluation has just started. Whether there is a relationship between the level of environmental information disclosure and the scale of corporate credit and financing costs, In particular, considering the scale of the enterprise to implement relevant research and further exploration in this field is of practical

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significance for optimizing corporate environmental information disclosure and promoting the overall development of green finance.

In exploring the impact of environmental information disclosure index on the scale of corporate credit, scholars generally believe that there is a positive correlation between the two, but some scholars believe that there may be a negative correlation between the two.Granovetter (2011) believes that the active disclosure of environmental information by listed companies sends a positive signal to external investors, so that they can obtain more investment and borrowing. Dhaliwal's (2014) research also found that companies choosing to disclose their environmental information reports can effectively alleviate their financing constraints to obtain more funds. Ni Juan and Kong Lingwen (2016) pointed out that corporate environmental information disclosure plays a major role in bank credit decisions, and companies with better environmental performance can obtain more financing at lower costs. Guan Yamei and Xiao Xue (2019) believe that the disclosure of environmental information in heavily polluting industries can reduce the information asymmetry between borrowers and lenders, and has a significant positive impact on companies' long- and short-term loans. Cai Jianan et al. (2018) found that there is a negative correlation between the corporate environmental information disclosure index and the scale of borrowing through the study of listed companies in the heavily polluting industries on the Shanghai Stock Exchange, and that more environmental information disclosure will increase the risk of corporate environmental risk exposure. It has triggered concerns about business operations by banks and other creditors.

Regarding the impact of environmental information disclosure index on corporate financing costs, previous studies generally believe that high-quality environmental information disclosure can effectively reduce the perception bias of external investors on companies, thereby reducing the financing constraints on companies. However, there are also a few scholars who believe that excessive environmental information disclosure will expose corporate risks and even bring negative effects on corporate financing. Clarkson (2008) believes that the disclosure of corporate environmental information can enable external creditors to make more rational expectations of the company’s future credit risks and operating conditions, effectively reduce its expected risks and ease corporate financing constraints. Schneider (2008) found that companies with poor environmental performance in terms of environmental performance will face strict financing constraints in the capital market through a study of American paper industry companies. Yu Fusheng and Zhang Min (2007) used empirical analysis to conclude that high-quality corporate environmental information disclosure can reduce their financing costs. Li Zhijun and Wang Shanping (2011) found that companies can improve their corporate image through information disclosure, so that they can obtain low-cost financing with higher corporate credit. Xie Hua and Zhu Liping (2018) believe that there is a negative correlation between corporate environmental information disclosure and the cost of debt financing, especially among non-state-owned enterprises.

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In the existing literature, previous scholars mainly used empirical analysis and case analysis to conduct research on a certain type of industry or a certain region of the company, in order to analyze the relationship between corporate environmental information disclosure and its credit status. Generally speaking, the larger the scale of the company, the more external pressure and internal ability to disclose higher-quality environmental information. The scale of listed companies and its environmental performance information disclosure have a positive effect (He Limei, 2010), so for listed companies of different sizes, Environmental information disclosure has different effects on corporate debt financing costs and credit scale.However, there are not many research on the impact of environmental information disclosure of listed companies in heavy pollution industries on credit behavior based on the perspective of enterprise scale, and a unified conclusion has not yet been formed.

Our research selects 400 sample data sources from 16 heavy polluting industries announced by the Shanghai Stock Exchange to explore the effect of the environmental information disclosure index on its credit scale and financing costs, and adds the interaction item between the enterprise scale and the environmental information disclosure index for further exploration. This proposes to improve the relevant environmental information disclosure laws and mechanisms so that they can play a positive role.

This study contributes to the literature in several ways.First, the introduction of the interaction variable between the scale of the enterprise and the environmental information disclosure index into the regression analysis is a useful supplement to the related topics of the impact of the environmental information disclosure index on the credit status of enterprises; Second, the sample selection is comprehensive and targeted. Compared with other industries, heavy pollution industries have a greater impact on the environment. Therefore, we selects 400 sample data from 16 heavy pollution industries for empirical analysis, this reduces the high heteroscedasticity caused by industry differences and reduces the probability of distortion of the regression results.

The paper proceeds as follows. Section 2 discusses related research and formulates hypotheses. Section 3 discusses the data and research design. Section 4 then reports the empirical findings. The final section concludes the paper.

2. Hypotheses development

Predecessor literature usually carried out research on the level of corporate environmental information disclosure based on signaling theory and legality theory. Signal transmission theory believes that modern enterprises based on the principal-agent system separates external investment owners and internal management managers, which leads to the problem of information asymmetry. Generally, the annual reports published by companies only disclose part of the company's information, so external stakeholders cannot fully grasp the internal

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operating conditions and overall picture of the company, which can easily induce moral hazard and adverse selection (Wu Qian, 2018).

In order to eliminate the problem of information asymmetry as much as possible, companies with high environmental quality will choose to actively disclose their environmental information, create a positive corporate image, and send positive signals to the outside world. On this basis, companies with average or poor environmental performance will actively disclose valuable environmental information in order to highlight their own efforts and eliminate investors' distrust of corporate development. Active disclosure of environmental information can not only encourage enterprises to continuously increase investment in environmental protection, but also establish a positive image of the enterprise, increase the overall surplus, and cultivate the value of intangible assets, thereby reducing investors' expectations of future risks and return on capital. Ultimately, companies can expand the scale of credit and reduce financing costs (Chang Kai, 2015). It can be inferred that the level of corporate environmental information disclosure is positively correlated with its credit scale and negatively correlated with its financing cost. Based on the above analysis, we propose:

H1: The higher the level of environmental information disclosure of listed companies in heavy pollution industries, the lower their financing costs and the larger the scale of credit.

The theory of legitimacy holds that legitimacy is obtained when an organization's behavior conforms to social values and is satisfactory or understandable. The legitimacy of the organization can not only make organizational behavior and social behavior consistent, but also win the credibility of the organization, gain the trust of various stakeholders, and obtain more resources for organizational development (Yao Haibo, 2019).In order to obtain more key resources, the senior managers of the organization need to adjust the organization's actions to conform to social values to gain legitimacy, and ultimately gain the support of stakeholders. Large-scale companies are also more concerned by stakeholders due to their greater social influence. Kansal (2014), Elena (2014), and D'Amico (2016) and others have examined samples of companies from different countries , it is proposed that larger enterprises are facing greater external pressure to require enterprises to follow and disclose social values and norms to obtain corresponding resources.Lu and Abeysekera (2014) demonstrated through empirical research that the quality of environmental information disclosure of large-scale companies is higher than that of small and medium-sized companies. Zhao Xuan (2015) also reached the same conclusion through research on samples of listed companies in heavily polluting industries. . Based on the above analysis, higher environmental information disclosure quality can break the information barriers inside and outside the company to a greater extent, and can bring greater excess disclosure benefits to the company, thereby alleviating debt financing constraints than small-scale companies. Therefore, the relationship between environmental information disclosure and debt status may be closer. From this we propose:

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H2: As the scale of enterprises continues to expand, the higher the level of environmental information disclosure, the lower the cost of debt financing, but the larger the scale of credit.

3.Research methology

3. 1 Sample Selection and Data Sources

We select companies listed on the Shanghai Stock Exchange from 2014 to 2018 that are listed on the A-shares and belong to heavy polluting industries. According to the defined standards, heavy polluting industries include 16 categories such as mining and electrolytic aluminum. At the same time, we selected heavy polluting industries as follows: first, we removed samples that lacked listed financial data and information disclosure since 2014; secondly, we removed samples of financial abnormalities such as ST; and finally, we removed samples of companies with incorrect data logic. After the above three levels of in-depth screening, the final collection of effective sample data of 400 heavily polluting listed companies. Subsequently, we collected and compiled the environmental disclosure data of each sample company from 2014 to 2018.

In the empirical research, considering that the level of environmental information disclosure will have a certain lag effect on the credit behavior of heavily polluting enterprises, that is, the impact of debt financing costs and credit scale, and considering that the selection of effective samples may cause endogenous problems,therefore, we have processed the independent variables in a lagging period, using panel data from 2014 to 2018.

3.2 Variable definitions

1)Explained variable

We study the impact of environmental information disclosure levels on the credit behavior of listed companies. Corporate credit behavior includes credit costs and credit scale. First, the research focuses on financing costs. In this article, debt financing costs are quantified. The credit scale is measured by three indicators: total bank borrowings, short-term bank borrowings and long-term bank borrowings.

Regarding the debt financing cost (DEBT), we refer to the quantitative methods of Yang Qiulin (2019) and Zhao Fangyi (2020), and use the net financial expenses to requantify the proportion of the company's total liabilities at the end of the period. Among them, net financial expenses include current interest expenses, handling fee expenses and other financial expense items in the company's balance sheet.

For the total amount of corporate bank loans (LOAN), we draw on the quantitative method of Song Quanyun et al. (2017) and use the sum of short-term bank borrowings and long-term bank borrowings to measure the total amount of

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loans obtained by companies in a certain period of time. Among them, long-term bank loans (LLOAN) are expressed as long-term loans at the end of the period, and short-term bank loans (SLOAN) are expressed as short-term loans at the end of the period, which are standardized and brought into the model during regression.

2) Explanatory variables

In this paper, corporate environmental disclosure information is defined as eleven parts. In the EDI information disclosure system, if a listed company does not describe the problem, it will be assigned a value of 0, a qualitative description will be assigned a value of 1, and a quantitative description will be assigned a value of 2. In this paper, in the calculation of the assignment, scores are scored and totaled according to the above assignment rules. After obtaining the total score for information disclosure, the environmental information disclosure level of the i-th listed company is finally obtained, which is derived from the total score of the evaluation results of various specific EDI standards.Therefore, listed companies with better environmental information disclosure levels have higher EDI scores.

In order to ensure that important variables are not omitted in the model, we refer to relevant literature to determine some indicators that affect corporate financing costs and credit scale, including profitability, industry, and year, and use them as control variables for this study. At the same time, the variable table of this research is designed, and the specific variable definitions are shown in Table 1.

Table 1.Design of research variables

Variable type	Variable name	Variable definitions
Explained variable	DEBT	(Interest expenses + handling fee expenses + other financial expenses) / total liabilities
	LOAN	Standardized total borrowings
	LLOAN	Standardized long-term borrowing
	SLOAN	Standardized short-term borrowing
Explanatory variables	EDI	Comprehensive score of corporate environmental behavior
	Size	The natural logarithm of the company's total assets
Control variable	EPS	Earnings per share
	LEV	Year-end book total liabilities/year-end book total assets
	TAT	Operating income/total assets
	TANG	Net fixed assets/total assets
	Supervisor	Number of supervisors
	INDIR	Number of Board of Directors
	TOP1	Proportion of the first shareholder
	EBITR	EBIT/Interest Expense
	Nature	Value 1 for state-owned enterprises and 0 for non-state-owned enterprises
	MTB	Total asset market value/book value
	year	Control different years
	IND	Control different industries

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3.3 Research model design

We study the impact of environmental information disclosure of listed companies in the heavy pollution industry on their credit behavior. First, we study the impact on corporate financing costs and construct a multiple regression model:

$$\mathrm{DEBT}_{i,t+1} = \beta_0 + \beta_1 \mathrm{EDI}_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t} \quad (1)$$

Second, we study the impact of listed companies' environmental information disclosure on their credit scale, and construct the following regression model:

$$\mathrm{LOAN}_{i,t+1} = \beta_0 + \beta_1 EDI_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$\mathrm{LLOAN}_{i,t+1} = \beta_0 + \beta_1 EDI_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$\mathrm{SLOAN}_{i,t+1} = \beta_0 + \beta_1 EDI_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t} \quad (4)$$

Among them: β_0 is the constant term, ε is the random error term in the model, β is the regression parameter, X refers to the control variable in the model, and t is time.

4. Empircial analysis and results

4.1 Descriptive analysis

In the empirical stage, we first use Eviews10.0 to perform descriptive statistics on the variables appearing in the model. The results are shown in Table 2.

We performed descriptive statistics on the dependent variables and found that the mean value of debt financing costs of listed companies in heavy pollution industries was equal to its median, indicating that the overall distribution of debt financing costs of companies in heavy pollution industries in the sample was balanced. However, the maximum and minimum values of corporate total bank loans after standardized processing are -0.299 and 16.983, the maximum and minimum values of long-term bank loans (LLOAN) are -0.217 and 18.784, and the maximum and minimum values of short-term bank loans (SLOAN) are -0.393 and 18.772.From the above data, it is not difficult to find that there is a problem of extremely large differences in corporate borrowings.

Through the above descriptive statistical analysis, the average value of the Environmental Information Disclosure Index (EDI) is 6.964, the median is 7, and the full score of this environmental information is 17 points, indicating that half of the sample companies' EDI levels are lower than those of the same industry. On average, the level of environmental information disclosure is generally low, and

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through range analysis, it is not difficult to find that there is a large gap between high-disclosure companies and low-disclosure companies, with a maximum difference of up to 17 points.

Table 2. Results of descriptive statistical analysis of variables

variable	sample	Mean	median	Standard deviation	Minimum	Max
DEBT	400	0.030	0.030	0.020	0	0.513
Size	400	22.919	22.773	1.3877	19.475	28.519
LOAN	400	-7.06E-06	-0.251	1.000	-0.299	16.983
LLOAN	400	4.86E-06	-0.207	1.000	-0.217	18.784
SLOAN	400	1.16E-07	-0.302	1.000	-0.393	18.772
EDI	400	6.964	7.000	4.036	0.000	17.000
EPS	400	0.310	0.220	0.773	-14.540	5.630
LEV	400	0.482	0.478	0.205	0.045	1.645
TAT	400	0.677	0.579	0.444	0.017	3.824
TANG	400	0.356	0.346	0.170	0.000	0.863
Supervisor	400	3.975	3.000	1.346	1.000	11.000
INDIR	400	0.372	0.353	0.053	0.231	0.800
TOP1	400	36.980	35.055	15.371	3.622	89.093
EBITR	400	18.914	2.960	11.690	-10.429	33.000
Nature	400	0.550	1.000	0.498	0.000	1.000
MTB	400	1.527	1.083	1.406	0.076	14.352

In addition, the distribution of corporate profitability, financial leverage ratio, operating capacity, mortgage capacity and corporate governance capacity in the sample is relatively balanced. The average value of equity concentration and interest guarantee multiples both exceed the median, indicating that the future development of the company is facing internal difficulties and needs to focus on managing internal problems.

4.2 Results of multivariate analysis

Before the multiple regression analysis, we used SPSS25.0 to complete the correlation test of the independent variables. The test results showed that the KMO value was 0.492, and the significance level of Bartlett's sphericity test was greater than 10%, indicating that the correlation of the independent variables in the model that accepted the null hypothesis was not significant. They are suitable for subsequent multiple linear regression.

The regression analysis in the research of this paper is mainly done with the statistical software Eviews10.0, and the regression results are shown in Table 3.

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Table 3. The impact of environmental information disclosure on corporate financing costs and credit scale

VARIABLES	DEBT	LOAN	LLOAN	SLOAN
EDI	-0.266**	0.039***	0.056***	0.036***
	(-2.232)	(5.105)	(4.949)	(4.866)
EPS	-0.0015*	0.177***	0.173***	0.246***
	(-1.916)	(3.927)	(2.724)	(5.537)
LEV	0.016***	4.207***	3.364***	3.766***
	(6.108)	(23.002)	(10.941)	(20.813)
TAT	0.002**	0.014	-0.577***	0.145**
	(2.107)	(0.187)	(-4.354)	(2.095)
TANG	0.016***	0.287	0.565*	-0.182
	(5.120)	(1.310)	(1.699)	(-0.860)
Supervisor	0.053	0.120***	0.081**	0.109***
	(0.855)	(5.015)	(2.373)	(4.728)
INDIR	-0.009	1.443***	2.261***	1.554***
	(-1.128)	(2.647)	(2.685)	(2.980)
TOP1	-0.576*	0.012***	0.013***	0.008***
	(-1.747)	(5.062)	(4.176)	(3.845)
EBITR	-0.449	-0.234***	-0.151***	-0.002***
	(-0.090)	(-7.221)	(-3.553)	(-8.866)
Nature	-0.002**	-0.355***	-0.033	-0.252***
	(-2.134)	(-4.963)	(-0.297)	(-3.626)
MTB	0.001***	-0.554***	-0.542***	-0.497***
	(3.083)	(-20.283)	(-10.211)	(-18.719)
constant	0.028***	17.809***	17.060***	17.652***
	(4.396)	(40.338)	(23.905)	(41.943)
Year	control	control	control	control
IND	control	control	control	control
Observations	400	400	400	400
AdjustedR-squared	0.297	0.258	0.254	0.209
R-squared	0.317	0.394	0.334	0.306
F-statistic	8.721	15.083	15.574	10.609
Prob（F-statistic）	0.000	0.000	0.000	0.000

[a] T-statistics are reported and ***, **, and * denote two-tailed signifificance at the 1%, 5%, and 10% levels, respectively.

Table 3 reflects the regression results of the model (1). It is not difficult to find from the table that the adjusted R^2 of the model is 0.297, indicating that the overall fitting effect of the model is ideal. At the same time, the level of environmental information disclosure (EDI) of heavily polluting companies and their debt financing costs (DEBT) are significantly negatively correlated at the 5% level, with a marginal effect of -0.266, indicating that the level of corporate environmental information disclosure has a negative impact on external financing costs. That is, the

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higher the degree of adequate disclosure of environmental information by heavily polluting companies, the lower their debt financing costs will be.

Among the control variables in the model, the coefficient of company profitability (EPS) is negative, passing the 10% significance test. The company's financial leverage (LEV), mortgage capacity (TANG) and market-to-book ratio (MTB) are significantly positively correlated at the level of 1%, indicating that the debt-to-asset ratio has a positive impact on corporate debt financing costs, which is in line with expectations. Equity concentration (TOP1), nature of equity (Nature) and debt financing cost are significantly negatively correlated at the levels of 10% and 5%,indicating that the higher the concentration of company equity, the stronger the nature of state-owned enterprises, and the lower the cost of corporate debt financing .

The second column of Table 3 is the regression result of model (2). According to the results, the adjusted R2 of the model is 0.258, indicating that the overall fit of the equation is good, and the corporate environmental information disclosure level (EDI) and total borrowing amount (LOAN) is significantly positively correlated at the 1% level, with a marginal effect of 0.039, indicating that the level of disclosure of information related to environmental behavior of heavily polluting companies has a positive impact on the credit line of the company. The reason is that listed companies conduct timely and comprehensive corporate environmental information Disclosure will alleviate the problem of information asymmetry between borrowers and lenders, reduce banks' perception of corporate adverse selection, and help companies increase their loan quotas in a timely and effective manner. Hypothesis 1 has been verified.

The last two columns of Table 3 are the regression results of model (3) and model (4). According to the table, it can be seen that the disclosure level of corporate environmental information has a positive impact on both its long-term borrowing (LLOAN) and short-term borrowing (SLOAN). Both regression results passed the significance test at the 1% level. It is not difficult to conclude from this that the environmental disclosure level of listed companies in heavy pollution industries will not only affect the total bank loans, but also have a significant impact on both long-term and short-term bank loans.

4. 3 Robustness test

We use the method of replacing important explanatory variables to test the robustness. This indicator replacement refers to the method of Jiang Yan (2009), replacing the indicator of debt financing cost with the ratio of financial expenses to total liabilities at the end of the period. At the same time, referring to the method of Guan Yamei et al. (2019), the scale of corporate credit and long-term and short-term bank borrowings are replaced by the total increase in bank borrowings, and the model regression still uses the ordinary least squares method.Finally, through the robustness test of the model, we found that the level of environmental information disclosure and the corporate debt financing cost (DEBT2) were significantly

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negative at the 5% level, while the total corporate credit (LOAN2) was significantly positively correlated at the 1% level, and was significantly correlated with the long-term Bank borrowings (LLOAN2) and short-term bank borrowings (SLOAN2). This conclusion is basically consistent with the above results, indicating that the model results are robust.

For the replacement of important explanatory variables of EDI, we refer to the method of Guan Yamei et al. (2019) and replace them with dummy variables. The EDI of a company is higher than or equal to the mean value of 1, and lower than the mean value of 0.Then multiple linear regression was performed on the above model.In the end, the test results found that the environmental information disclosure index (EDI) and debt financing cost (DEBT) are significantly negatively correlated at the level of 5%, and this indicator is positively correlated with total bank loans (LOAN), long-term bank loans (LLOAN) and short-term bank loans (SLOAN) and passed the significance test at the 1% level.The regression results are basically consistent with the above tests, indicating that there is a significant positive relationship between the level of information disclosure in heavy pollution industries and the scale of credit. The results are stable.

4. 4 Interactive analysis

With the continuous development of China's stock market, for listed companies of different scales of development, the level of information disclosure has different effects on their financing costs and credit scale. Therefore, we further analyze the impact of the level of information disclosure on financing costs and credit scale under different enterprise sizes.

We refer to He Limei et al. (2010) to quantify the scale of the company with the natural logarithm of the company. We added the asset scale of the 400 listed companies collected to the model, and at the same time added the interaction item between the scale of the company and the level of environmental information disclosure.It is used to analyze the impact of environmental information disclosure level on debt financing costs and credit scale under different corporate sizes of listed companies.

According to the observation interaction items in Table 4, it can be seen that for debt financing costs, the higher the level of environmental information disclosure for companies with a larger scale listed in A shares, the lower the debt financing costs. The partial effect of the interaction term is significant at the 5% level. Regarding the scale of credit, whether it is the total amount of credit or the short-term and long-term credit amount, the larger the A-share listed companies, the higher the level of environmental information disclosure,then the larger the credit scale. The partial effects of the interaction term are all significantly positive above the 5% level. Therefore, the regression results show that the higher the level of environmental information disclosure of listed companies with larger scales, the lower the future debt financing costs will be, but the larger the scale of credit will be, which proves Hypothesis 2.

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Table 4. The impact of enterprise scale and environmental information disclosure level on debt financing costs and credit scale

VARIABLES	DEBT	LOAN	LLOAN	SLOAN
EDI	-0.004**	0.045**	0.043**	0.062**
	(-2.105)	(1.992)	(2.001)	(1.991)
SIZE	-0.002***	0.943***	1.098***	0.899***
	(-2.890)	(23.178)	(17.119)	(22.491)
EDI*SIZE	-0.001**	0.002***	0.001**	0.002***
	(-1.999)	(2.564)	(1.997)	(2.597)
EPS	-0.002**	-0.130***	-0.159***	0.002
	(-2.304)	(-3.657)	(-2.954)	(0.062)
LEV	0.021***	3.241***	2.493***	2.876***
	(7.360)	(22.477)	(9.732)	(19.801)
TAT	0.002**	0.190***	-0.428***	0.295***
	(2.224)	(3.458)	(-4.066)	(5.509)
TANG	0.018	0.588***	1.097***	0.131
	(5.670)	(3.478)	(4.008)	(0.790)
Supervisor	0.000***	0.018	-0.024	0.018
	(1.140)	(0.943)	(-0.846)	(0.974)
INDIR	-0.009	0.409	0.554	0.649
	(-1.072)	(0.965)	(0.788)	(1.574)
TOP1	0.000	-0.003	-0.002	-0.004***
	(-1.160)	(-1.573)	(-0.782)	(-2.642)
EBITR	-0.001	-0.001***	-0.000***	-0.003***
	(-0.990)	(-10.218)	(-5.032)	(-13.322)
Nature	-0.002**	-0.412**	-0.041	-0.320***
	(-2.052)	(-7.467)	(-0.450)	(-5.866)
MTB	0.001	-0.149***	0.018	-0.119***
	(1.141)	(-6.122)	(0.363)	(-4.964)
constant	0.069***	-2.323**	-7.114	-1.353
	(3.922)	(-2.453)	(-4.688)	(-1.453)
Year	control	control	control	control
IND	control	control	control	control
Observations	400	400	400	400
AdjustedR-squared	0.201	0.394	0.294	0.257
R-squared	0.302	0.498	0.301	0.261
F-statistic	9.148	17.573	13.970	14.649
Prob（F-statistic）	0.000	0.000	0.000	0.000

[a] T-statistics are reported and ***, **, and * denote two-tailed signifificance at the 1%, 5%, and 10% levels, respectively.

5. Conclusion and suggestion

We select A-share listed companies in the heavy polluting industries announced by the Shanghai Stock Exchange from 2014 to 2018 as the research objects, and

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conduct empirical analysis on the environmental information disclosure level, debt financing cost and corporate credit scale of each sample company to explore the impact of environmental information disclosure level on corporate credit behavior.

The research results found that: (1) The higher the level of environmental information disclosure of listed companies in heavy pollution industries, the lower their financing costs. By actively publicizing their environmental information, companies can effectively alleviate debtor credit constraints and reduce creditors' risks, thereby reducing corporate financing cost. (2) The higher the level of environmental information disclosure of listed companies in heavy pollution industries, the larger their credit scale. This behavior has a significant positive impact on their long- and short-term credit scale. (3) Through the interactive analysis of the environmental information disclosure level of listed companies and the scale of enterprises, it is finally concluded that as the scale of enterprises continues to expand, the higher the level of environmental information disclosure of listed companies in the heavy pollution industry, the lower the debt financing cost, but the scale of credit Bigger.

Accordingly, we make the following recommendations:

First, introduce a third-party assessment agency to conduct environmental "green assessment" on enterprises. At present, the environmental information of Chinese enterprises relies on the active disclosure of the enterprises themselves, which makes the disclosed information have a certain degree of subjectivity and selectivity. External stakeholders also have doubts about the information disclosed by the enterprises, so professional assessment agencies are urgently needed. Use professional knowledge to conducts a "green assessment" of the company and forms a corporate environmental information report, which not only enables stakeholders to have a deeper understanding of the company's "green attributes" and environmental behaviors, but also encourages companies to improve their own environmental performance to improve its green rating.

Second, creditors such as banks should attach importance to the green and sustainable behavior of enterprises in lending activities. In the future process of corporate lending, banks should also pay more attention to corporate "green performance" in addition to financial performance, actively require companies to produce corresponding environmental information reports and other materials, and strictly enforce compliance with "high pollution and high energy consumption" companies.Sharing information with third-party assessment agencies, providing credit and convenience for companies with strong "green attributes", promoting the transformation of traditional heavy-polluting companies and the vigorous development of new "green companies".

Third, the government should issue corresponding laws and regulations to unify the disclosure of corporate environmental information. The government should take into account the actual development of various industries, establish and improve corresponding laws and regulations as soon as possible, and establish a standardized and unified system for corporate environmental information disclosure. Clarify disclosure requirements and standards, and guide companies to publish independent

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environmental information reports to reduce information asymmetry and promote the continuous development of green finance.

References

[1]Dhaliwal,D.S.,O.Z.Li,A.Tsang,and Y.G.Yang.Voluntary Nonfinancial Disclosure and the Cost of Equity CapitalLThe Initiation of Corporate Social Responsibility Reporting[J]. The Accounting Review,2011,86(1),59-100.

[2]D'Amico E., Coluccia D., Fontana S., et al. Factors influencing corporate environmental disclosure[J]. Business Strategy and the Environment, 2016(25): 178-192.

[3]Lu Ying-Jun, Abeysekera I. Stakeholders' power, corporate characteristics, and social and environmental disclosure: Evidence from China[J]. Journal of Cleaner Production, 2014,64: 426-436.

[4]Ni Juan, Kong Lingwen. Environmental Information Disclosure, Bank Credit Decisions and Debt Financing Costs——Empirical Evidence from China's Shanghai and Shenzhen A-share listed companies in heavily polluting industries[J]. Economic Review, 2016(01):147 -156+160.

[5] Guan Yamei, Xiao Xue. Research on the Impact of Environmental Information Disclosure on Debt Financing Costs and Enterprise Credit Scale [J]. Chinese Certified Public Accountant, 2019(09): 47-54.

[6]He Limei, Hou Tao. An Empirical Study on Environmental Performance Information Disclosure and Its Influencing Factors——Empirical Evidence from Social Responsibility Reports of Listed Companies in China [J]. China Population·Resources and Environment, 2010,20(08):99- 104.

[7]Wu Qian. The impact of environmental information disclosure on corporate debt financing[D]. Central China Normal University, 2018.

[8]Chang Kai. The impact of environmental information disclosure on financial performance: an empirical analysis based on cross-sectional data of China's heavy polluting industries[J]. Collected Essays on Finance and Economics, 2015(01):71-77.

[9] Zhao Xuan, Zhang Lieke, Zheng Kaikai. An Empirical Study on the Performance of Corporate Environmental Responsibility Information Disclosure System and Its Influencing Factors[J]. Journal of Southwest University (Social Science Edition), 2015, 41(03): 64-74+190.

[10] Yao Haibo. Research on the impact of directors' professional background and enterprise scale on the quality of corporate environmental information disclosure [D]. Northwest University, 2019.

[11] Tian Xinjia, Zhang Guangmei. Environmental Information Disclosure, Environmental Regulation and Business Performance [J]. Friends of Accounting, 2020 (06): 43-49.

[12] Zhao Fangyi. Internal control, audit quality and debt financing cost [J]. Taxation, 2020, 14 (01): 166-167.

[13] Yang Qiulin, Liu Wei, Hua Wenying. Environmental regulations, internal control and debt financing costs [J/OL]. Finance and accounting news: 1-5

ISSN 2616-5902 Vol. 2, Issue 5: 37-51, DOI: 10.25236/AJBM.2020.020505

[2020-03-19]. https://doi-org-s.vpn2.njau.edu.cn/10.16144/j.cnki.issn1002-8072.20191119.001.

[14]Chen Jiawei. A review of research on environmental information disclosure of green bonds[J]. Strait Science and Technology and Industry, 2019 (06): 65-66.

[15] Song Quanyun, Wu Yu, Yin Zhichao. Research on Household Credit Behavior from the Perspective of Financial Knowledge [J]. Financial Research, 2017 (06): 95-110.

[16] Jiang Yan. Cost of Equity, Cost of Debt and Corporate Governance: A Study on the Differences of Impact [J]. Management World. 2009 (11)