# The Impact of Environmental Information Disclosure Quality on Loan Scale for Enterprises in China's Heavy Polluting Industries

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**Abstract.** In view of the importance of environmental accounting to ecological governance, this article attempts to study the economic consequences of environmental information disclosure quality (EID) from the perspective of bank financing. We assume that good environmental information disclosure quality can help companies obtain bank loan, and then test this conjecture through empirical methods. The data of 330 listed companies in China's heavy polluting industries were collected, and then analysed by SPSS for regression. The result shows that EID is positively related to the scale of corporate bank loan, which means the improvement of EID can bring convenience when companies need bank loans. The research clarifies the financial consequences of EID and provides some enlightenment for the improvement of corporate environmental disclosure quality.

# **1** Introduction

With the prevalence of environmental protection concepts, how to balance the relationship between economic development and environmental protection has become a hot topic in academic research. Ecosystems do have economic value, and humans need to find a way to measure it. Discussion on this measurement method has triggered the vigorous development of environmental accounting, and gradually made it separate from social responsibility accounting to become an independent research topic.

However, how to price environmental factors has always been a difficult problem in the environmental accounting filed. For example, it is difficult for us to measure the value of clean water or air. We may only simply say "they are important", but if measured by money, how much are they worth? Furthermore, for different individuals, they may have a wide range of criteria for measuring this issue. Some people may be sensitive, while others are not. Obviously, there are great difficulties in quantifying environmental factors, which makes it difficult to unify environmental information disclosure standards. Due to inadequate mandatory disclosure environmental regulations, corporate information disclosure is generally voluntary. In this situation, the environmental information disclosure quality may vary greatly among different companies. For example, some companies publish environmental report every year, which is the most comprehensive and professional way of disclosing environmental information. The report includes the amount of each pollutant generated by the company every year and their disposal methods, as well as whether the company has complied with environmental protection regulations, etc. Some

companies also hire external agencies to audit the report to enhance information reliability. Whereas some companies just simply mention a little words about environmental information in financial reports. Obviously, there is a gap in disclosure quality between the two kinds of companies.

Considering that information disclosure is a way for companies to communicate with external parties, different information disclosure quality may lead to different consequences. Previous literature confirms that the quality of disclosure does have an impact on some aspects of the company, such as company reputation and market returns [1, 2]. However, few authors have studied the impact of environmental information disclosure on the scale of bank financing. Given that banks are important external stakeholders of enterprises, the environmental information disclosed by enterprises may become an important reference for banks when making loan decisions. Thus it is of great significance to study the relationship between the quality of environmental information disclosure and corporate bank financing.

This article used 330 listed companies in the heavy polluting industries of the Shanghai Stock Exchange in 2017 as samples. Then, we used a multiple regression model to discuss the economic consequence of environmental disclosure quality from the perspective of bank loan. Based on Chinese context, this paper provides meaningful empirical evidence for the economic consequences of environmental information disclosure quality.

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# **2 Experimental Details**

## 2.1. Hypothesis

Decision usefulness theory is one of the basic theories of accounting information objectives, emphasizing that enterprises should provide "useful" information for stakeholders to make correct decisions. With the deterioration of environmental problems and the development of environmental protection concepts, traditional financial information can no longer meet the decision-making needs of stakeholders. It is necessary to make a comprehensive judgment of a company based on social financial information, responsibility, its environmental information, etc. In the "green finance" era, the usefulness of environmental accounting information is becoming increasingly prominent, and the disclosure of corporate environmental accounting information is vital for investors to make reasonable investment decisions.

As an important stakeholder of enterprises, banks will also take environmental factors as an important consideration when providing loans to enterprises. Bank loans to heavy polluting enterprises may face great environmental risks, such as the reputation loss caused by the borrower's bad environmental behavior, or the unfavorable financial consequences caused bv environmental regulations that prevent the company from paying on schedule [3]. However, the environmental risks are often hidden because of inadequate regulations and measurement difficulties, which leads to information barriers between banks and enterprises, and banks tend to be more cautious when lending to heavy polluting enterprises. Therefore, transparent environmental accounting information disclosure alleviate can information asymmetry and reduce the environmental risk of bank loans, which creates favorable conditions for corporate debt financing. Some previous empirical researches also agree with this argument that environmental information disclosure can bring benefits to corporate debt finance [3, 4, 5]. Most of the research is conducted from the perspective of financing costs, and the results show that environmental information disclosure can reduce the interest expense of unit debt. Although there are few studies on debt scale, this study believes that "scale" and "cost" are two major indicators to measure debt financing. This is because loan cost and loan scale are the primary considerations for banks when lending to enterprises, and these two factors are also closely related to the company's environmental risks. It can be speculated that if a company faces high environmental risks, out of prudential considerations, banks will increase loan interest rate to match loan risk, and reduce loan amount to decrease the possibility of bad debts. Since environmental information disclosure can bring benefits to debt financing, it should not only reduce debt costs, but also expand debt scale. Therefore, we propose the hypothesis:

Hypothesis 1. EID is positively related to the scale of corporate bank loans.

#### 2.2. Data

We selected 2017 data of listed companies in heavy polluting industries on the Shanghai Stock Exchange as the research sample. There are two reasons for sample selection. Firstly, the Shanghai Stock Exchange "Guidelines for Environmental promulgated the Information Disclosure of Listed Companies" in 2008, which is a special guideline for environmental information disclosure, but the Shenzhen Stock Exchange has no similar regulations. Due to different regulatory pressures, the environmental disclosure quality of listed companies on the Shanghai stock market is generally higher than that of Shenzhen. Secondly, when discussing environmental disclosure, it is also a common practice to use companies in heavy polluting industries as the research object because their environmental information disclosure is relatively sufficient. Considering the sufficiency and availability of data, we identified the research samples of this paper.

In order to avoid the impact of abnormal data, we deleted the data of ST and \*ST companies, companies with outliers, and companies that were listed for the first time in 2017. After the sample selection, we obtained a total of 330 eligible companies samples from 16 different heavy polluting industries.

Considering the sufficiency and reliability of the data, selected five periodic reports containing we environmental information to calculate the EID index. These periodic reports are environmental report, sustainable development report, social responsibility report, annual financial report and environmental, social and governance report. In addition to financial reports, the other four reports are disclosed voluntarily. These reports can be queried from the Shanghai Stock Exchange website or the company's official website. The other data in the model below comes from the CSMAR database, and the data analysis software used in this article is SPSS. The scroing system is based on the author's article published in IOP Conference Series: Earth and Environmental Science in 2020 [6], and the specific caculation method is shown in the table below. The content analysis method is used in the table to calculate EID. Content analysis method include hermeneutic content analysis and empirical content analysis, and most research uses the latter. The operation process of empirical content analysis is to divide the text content into specific categories, calculate the frequency of each type of content element, and describe obvious content characteristics. Compared with other methods, the content analysis method has the advantages of high flexibility, strong operability, low cost, and low difficulty in obtaining EID data, so this method is widely used in the field of environmental information disclosure in recent years.

 Table 1. The scoring system of EID.

Monetary information	2 points for each disclosure
Non-monetary information	2 points for quantitative disclosure and 1 point for qualitative disclosure.

Voluntary report	2 points for disclosure in environmental report, 1 point for disclosure in other voluntary reports.			
Whether the information in voluntary report is audited	1 point for audited and 0 point for non-audited.			
Other information not included in the system	2 points for quantitative information and 1 point for qualitative information.			

#### 2.3. Model

Hypothesis 1 aims to examine the impact of EID on bank financing, so the dependent variable is the bank loan size and the independent variable is EID. The calculation method of EID has been introduced in the previous section. The bank loan of an enterprise usually includes two parts: long-term loan and short-term loan. In this paper, the sum of the two is taken as the overall size of the enterprise bank loan. The total value of the loans is too large, and taking the logarithm is a common data processing method. However, some companies do not have bank loans, so it may be inappropriate to directly log the total amount of loans. Therefore, this article adopted the following formula to calculate the bank loan scale.

#### *The size of bank loans (Loan)* = $LOG_{10}$

#### $(short-term \ borrowing + long-term \ borrowing + 1)$ (1)

With reference to previous research and practical experience [4, 7], we identified seven control variables for the model. The variables are equity concentration (Top5), development ability (Growth), financial leverage (Leverage), profitability (Profit), company age (Age), company size (Size), and cash strength (Cash), which are closely related to the scale of corporate bank financing. Concretely speaking, in a company with a concentrated

share of equity, the majority shareholders have a greater degree of intervention in corporate financing decisions, which may have a greater impact on corporate debt financing size. Development ability, financial leverage, profitability, company size and cash strength will affect the company's solvency, and the company's age may affect the trust relationship between the company and the bank. As for the measurement method of control variables, equity concentration is the sum of the top five shareholders' shareholding ratio; development ability is the growth rate of total assets; financial leverage is represented by equity multiplier; profitability is measured by operating net interest rate; company age is the difference between 2017 and the company's establishment year; company size is expressed by the number of employees; cash strength is the ratio of net cash flow to total assets.

A multiple regression model was used to explore the impact of EID and other control variables on corporate bank loan size, and the equation is as follows:

$$Loan = \beta_0 + \beta_1 EID + \beta_2 Top5 + \beta_3 Growth + \beta_4 Leverage + \beta_5 Profit + \beta_6 Age + \beta_7 Size + \beta_8 Cash + \varepsilon$$
(2)

#### 2.4. Result

#### 2.4.1 Descriptive statistics and correlation analysis

The descriptive statistical results of the data in the model are shown in Table 2. The values of Loan vary greatly, indicating the data has a certain randomness. The correlation test shows the maximum correlation coefficient is 0.421 and does not exceed 0.5, which can be seen that there is no serious endogenous problem between the variables.

	Loan	EID	Top5	Growth	Leverage	Profit	Age	Size	Cash
Loan	1								
EID	0.421	1							
Top5	0.017	0.109	1						
Growth	-0.014	-0.043	0.007	1					
Leverage	0.133	0.101	-0.007	-0.064	1				
Profit	-0.230	-0.108	0.112	0.182	-0.122	1			
Age	-0.020	-0.115	-0.210	-0.136	0.090	-0.037	1		
Size	0.170	0.168	0.297	-0.027	0.001	-0.050	-0.062	1	
Cash	0.027	0.055	0.069	0.227	-0.040	0.183	-0.040	0.011	1
Observations	330	330	330	330	330	330	330	330	330
Max	11.461	29.000	0.978	2.318	46.619	0.966	36.000	49.430	0.346
Min	0.000	0.000	0.132	-0.366	-17.054	-0.280	8.000	0.002	-0.299
Mean	7.599	11.903	0.549	0.111	2.332	0.091	19.736	1.069	0.010
S.D.	3.469	6.230	0.158	0.206	3.566	0.118	4.202	3.795	0.079

Table 2. Descriptive statistics and correlation test.

#### 2.4.2 Multiple regression result

The regression results of the equation are shown in Table 3. The correlation coefficient between EID and the size of bank loans is greater than 0, and the significance coefficient is 0, which means the two variables are significantly positively correlated at the 1% level and Hypothesis 1 is supported. The empirical results show that the good quality of environmental accounting information disclosure has a positive effect on enterprises' access to bank loans. Standardized, complete and reliable environmental information can effectively alleviate the problem of information asymmetry between enterprises and banks, and enhance the attractiveness of enterprises in bank loan decisions.

Financial leverage and profitability in the control variables are not in line with the expected direction, and the two may not be the main consideration factors in bank lending decisions. The positive correlation between the equity multiplier and the bank loan scale is not significant, and the value of the correlation coefficient is very small. It cannot be inferred from the data results that higher financial leverage is conducive to corporate loan financing. The profit level is significantly negatively correlated with the size of bank loans, which may be due to the fact that the profit amount cannot represent the profit quality, and it does not match the company's true debt repayment ability.

	β	Sig.				
EID	0.212	0.000				
Тор5	-0.775	0.506				
Growth	0.639	0.462				
Leverage	0.072	0.141				
Profit	-5.386	0.000				
Age	0.013	0.750				
Size	0.099	0.037				
Cash	1.538	0.493				
Constant	5.360	0.000				
F-value	11.998					
Adjusted R <sup>2</sup>	0.211					

Table 3. Regression result.

## 3 Discussion and conclusion

Using data from companies in China's heavy pollution industries, we verified the impact of EID on bank financing. The result shows that EID is significantly positively correlated with the size of corporate bank loans. The adequate and appropriate environmental accounting information disclosure of heavy polluting enterprises can effectively alleviate the information asymmetry problem between enterprises and banks, and provide favorable conditions for enterprises when they need bank loans.

One of the realistic contributions of this article may lie in prompting the polluting enterprises to improve their environmental disclosure performance. We have verified the positive effect of environmental information disclosure on corporate bank financing. For heavy polluting enterprises, increasing the transparency of environmental information will facilitate their access to bank loans.

This article also has the following shortcomings. Firstly, the method of manually collecting data is too time-consuming and laborious, and we only selected cross-sectional data for research, which may have some defects compared with panel data. In addition, the economic consequences factors of EID aren't only bank loans. More financial variables need to be further studied.

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