

**REFINANCING NEEDS OWNERSHIP PROPERTY AND
ENVIRONMENTAL INFORMATION DISCLOSURE QUALITY
EVIDENCE FROM CHINA LISTED COMPANIES OF HEAVY POLLUTION INDUSTRIES**

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Abstract

This paper explores the environmental information disclosure behavior of listed companies in heavy polluting industries in China, from the perspective of refinancing needs and property rights, and puts forward corresponding suggestions. This study uses data on Chinese A-share listed companies of heavy pollution industries from 2010 to 2015 and examines the relationship between refinancing needs and environmental disclosure quality, as well as the effect of the ownership and the regional factor on the relationship. Method of least square is used for this purpose. The major findings are as follows: 1) environmental disclosure quality gets a positive effect from refinancing needs and ownership and regional marketization significantly affect this relationship; 2) the positive relationship between refinancing needs and the quality of environmental information disclosure is more pronounced in the eastern region than in the western region and more significant of private companies than of state-owned companies.

Keywords: Refinancing needs, environmental disclosure, information disclosure quality, nature of ownership, the degree of marketization

INTRODUCTION

The 19th National Congress of the Communist Party of China proposed to incorporate environmental protection into the process of building ecological civilization in China. This decision means that with economic development, the party and the state have higher expectations for enterprises to fulfill their responsibility of environmental protection. On World Environment Day 2014, our country has put forward a slogan that is “declare war on pollution”, which fully reflects our country’s emphasis on environmental issues.

Corporate social responsibility theory suggests that companies should fulfill their social responsibilities. Corporate is not an independent legal entity, but a combination of various stakeholders. Heavy polluting companies pollute the environment and cause environmental costs during operation. The consequences of pollution should not be borne by the public, but the polluter-companies. Companies should actively to protect the environment and disclose its environmental information to the public. Signal transmission theory suggests that agency problems caused by asymmetric information between managers and owners can be mitigated through information disclosure. Disclosure of environmental information helps companies to establish a corporate image that loves the environment in the presence of investors, government, consumers and other stakeholders. However, scholars have found that Chinese system of social responsibility information disclosure needs to be improved. Many listed companies either do not disclose their social responsibility information, or the quality is lower. The number of companies disclosing environmental information is constantly increasing, however, the quality has not been greatly improved. The reason for this phenomenon is that most companies selectively disclose their information. Specifically, they will select the information that is more positive and difficult to verify and conceal information that may have a negative impact. Only a small percentage of companies disclose their environmental information completely. Therefore, how to improve the quality of environmental information disclosure of listed companies is a major issue for the government and enterprises. The earliest research about environmental information disclosure can be traced back to the 1940s and at that time, scholars started to pay attention to it. In the 1970s, as global environmental pollution became more and more serious, people came to realize the seriousness and urgency of environmental protection. In academia, there have been numbers of scholars specializing in environmental information disclosure issues. In the 1990s, scholars conducted a lot of discussions on content, motivation and influential factors in environmental information disclosure and achieved fruitful achievements. The attention of capital market has a certain degree of impact on the quality of environmental information disclosure of listed companies. When companies need to finance, managers will disclose their financial and non-financial information. The disclosure of

information is helpful to reduce the risk, gain the trust and increase the confidence of investors. In addition, some companies with high equity costs can reduce their cost of equity capital by publishing their social responsibility reports. The researches on the impact of refinancing on the quality of environmental information disclosure recently appeared in our country. If a company proactively performs its social responsibilities, the company is more likely to receive loans and investments from formal financial institutions. In other words, companies with a high degree of social responsibility are more likely to get the trust of formal financial institutions and thus reduce their financing costs. For environment-friendly companies, actively disclosing their environmental protection information can help them enhance their chances of obtaining various preferential treatment from government agencies and enjoying preferential policies.

In 2010, Huanyun Zhai took the Chinese pharmaceutical industry as the research object, and her research conclusion was that under the soft budget constraint, the higher the external financing demands of the manufacturing companies, the more motivated they are to provide high-quality social responsibility information to the public. In summary, some scholars in our country have conclusions that the demand for refinancing is positively related to the disclosure of social responsibility information. However, few scholars have studied the relationship between the refinancing needs and the quality of environmental information disclosure. Few scholars have also carried out research on companies of heavy polluting industries. This paper takes China's listed companies of heavy pollution industries as the research object from 2010 to 2015 and explores the relationship between refinance needs and disclosure of the environmental information quality. Then, the paper also examines the relationship by region and ownership and puts forward some suggestions.

THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

After company went public, investors will judge the investment value of it according to the information published by it. In other words, high-quality information disclosure can help companies successfully refinance. According to the existing literature, refinancing need is one of the motivations for information disclosure. The bank will determine the level of the loan risk to the company based on the information of the its financial status and reputation. As an external agency, a bank can only know the situation of a company through the information disclosed by it and make loan amount, term and interest rate according to the information. As early as 1991, Diamond et al found that if the two companies have the same conditions, the company with the highest quality of disclosure is more likely to have a bank loan. Similarly, in 2007, Kitindi et al found that banks conduct credit evaluations before lending to companies, which is also an important measure for banks to control lending risks. The information provided by companies

play an important role in this process. Specifically, the bank will use this information to judge the company's financial position, profitability and future debt-paying ability. Therefore, the higher the quality of the information disclosed by a company to the public, the more likely it is that it will be given a higher rating in the bank evaluation process and easier to obtain the bank loans. Taking China's special institutional environment into account, Yihe Gao regards the socialist market economy with Chinese characteristics as the environmental variable. He found that a company's information disclosure quality and its new bank loans is significantly positive correlation. This shows that the quality of information disclosure in China's institutional environment has also become a key factor affecting bank credit. The author's explanation is that the asymmetric information existing between companies and banks undermines their trust and cooperation. The disclosure of information can effectively reduce the asymmetry and is conducive to the harmonious development of the relationship between banks and enterprises. The higher the quality of information disclosure of a company, the easier for the bank to understand the real situation of the company and improve the bank's trust in it. Improving the quality of information disclosure, can help enterprises establish corporate image, improve its reputation, and reduce its cost of financing in the capital market. As a result, companies with high demand for refinancing will be more motivated to provide high quality information to the public. Therefore, this paper proposed hypothesis 1: there is a positive association between the quality of information disclosure and the demand of refinancing.

La Potra et al. have found that external institutional environmental factors such as law and degree of marketization also affect management decision-making. The capital structures of different countries are also different because of their different institutional factors. These studies are based on the background of foreign capital markets and there are obvious differences between China's capital market and foreign capital markets. Firstly, our country implements the socialist market economy, that is, the market economy with Chinese characteristics, which is different from the capitalist market economy abroad. Secondly, because of the vast territory of our country and the great disparities in the region's natural resources, the main industries in various regions are also different. Thirdly, due to the different time taken by various localities to implement the reform and opening-up policy, the development in the eastern and western regions is unbalanced. In this situation, whether foreign research conclusions apply to the special circumstances of our country remains to be further discussed. Lijun Xia and Tieqiang Fang took listed companies from 2001-2003 as a sample and classified these companies by two perspectives which are whether the company was controlled by government or not and the degree of the control. First, they classify these listed companies into publicly-controlled and non-government controlled. Then, they further subdivided government-controlled listed companies

into four categories: central government control, provincial government control, municipal government control and county government control. The control level of the county and the municipal are relatively low, while the provincial and central are at a higher level of control. The authors conducted empirical testes on these five types of companies respectively and found that government control at a lower level is not conducive to the growth of the company's value. However, if a region is more market-oriented, such adverse effects will be weakened. At present, China is still in the transitional period of economic development and the characteristic of this period is that there are differences in economic development and institutional environment among various regions. Kai Zhu also confirmed that the degree of government intervention the development of capital markets, the market-oriented process and other institutional factors will affect the managers of business decisions. Min Zhang and Yanxi Li found that the financing decisions made by the managers are influenced by the institutional environment. The reason may be that the development of Chinese capital market is still not perfect. Therefore, corporate finance is easily affected by other factors such as politics. The eastern region is higher than the western region in the level of economic development and marketization in our country. Therefore, in the eastern region, the market can better exert its function of optimizing fund allocation. The disclosure of information can effectively relieve information asymmetry, and the function of fund allocation is more obvious in more marketized areas. The market response to information disclosed was faster in areas with higher marketization than with less marketization. Therefore, the degree of marketization can effectively relieve information asymmetry between listed companies and financial institutions, thus to help companies to obtain loans. Based on the above analysis, this paper proposes hypothesis2:the positive association between refinancing needs and the environmental information disclosure quality is more pronounced in the eastern region than in the western region.

Chinese government has implemented the socialist economy with Chinese characteristics. Therefore, there are not only state-owned enterprises that control the lifeline of the national economy but also private enterprises that play an important role in raising fiscal revenue and alleviating employment pressure. Funding is an indispensable resource for any business. Whether companies are to maintain the original business or open new business units up need financial support. Particularly, the growing enterprises also need a lot of money to expand reproduction. However, the internal retained funds often can't meet the needs of enterprises, so they must seek external debt (equity) financing. Allen et al found that the reason why the development trend of Chinese private enterprises can be so good under the condition that the market is not perfect is that they have found an informal alternative mechanism based

on social relations and their own reputation. The resources such as funds and land are controlled by the government, so companies better to maintain good relations with the government. Weian Li believes that the private enterprises in our country at present are in transition period from dependence on administrative control to rely on economic governance and the basic characteristic of this period is the dependence of political relations. However, compared with state-owned enterprises, private enterprises do not have state-owned shares that can create natural political connections. Therefore, it is more difficult for private companies to obtain long-term debt financing and tax benefits from the government. Rongrong Li's research suggests that local governments are likely to support state-owned enterprises to go public and give them many conveniences because they want to improve their own political achievements. Private enterprises, on the other hand, find it very difficult to obtain such support from the government. Qingquan Tang believed that due to state-owned enterprises' natural political relations, they are more likely to obtain external investment and government subsidies. Therefore, the purpose of state-owned enterprises to apply for listing of the financing is weak. Private enterprises, on the other hand, lack such natural political advantages and rely more on the stock market, so they have stronger purpose of financing. Foreign scholars also found that the state-owned enterprises can get the government's support, so the possibility of the approval for listing by the government is higher than that of private enterprises. The executives of state-owned enterprises which listed abroad also have higher media attention and more job promotion opportunities.

In summary, China's private enterprises lacks the political support comparable to state-owned enterprises, so they are more motivated to improve the quality of information disclosure and access to investor trust. This paper proposes hypothesis 3: the positive association between refinancing needs and the environmental information disclosure quality is more pronounced in private enterprises than in the state-owned enterprises.

RESEARCH DESIGN

Study samples and data sources

The article selects all A-share listed companies in heavy polluting industries as research samples and the period of 2010-2015, choose their financial reports as the research objects, to verify the research hypothesis above. The determination of heavy polluting industry is mainly based on the *Environmental Information Disclosure Guidelines for Listed Companies* and *Classified Management Directory of Listed Company in Environmental Verification Industry*. The final choice of industries is as follows: Mining; Medicine, biological products industry; Metal, non-metallic manufacturing; Food, beverage industry; Paper, printing industry; Petroleum,

chemical, plastic, plastic industry; Textile, apparel, fur manufacturing and the industry of electricity, gas and water production and supply. The research data required for this paper are from the CSMAR database. The data about the quality of company environmental information disclosure are from Rankings CSR Ratings that scored corporate social responsibility reports. And the company is the authoritative third-party rating agency which rates social responsibility reports of Chinese listed companies. This article excluded non-heavy polluting listed companies, data-missing firms, and ST/PT-listed companies, and finally obtained balanced panel data containing 1002 observations.

The definition of the main variables

(1) Environmental information disclosure quality

At present, there are two ways to evaluate the quality of environmental information disclosure. One is the manual collection of environmental information disclosed in the financial reports, then analysis through the way of content analysis, and finally get the *environmental information disclosure index*. The other one is to get data on environmental responsibility ratings directly from some of the formal social ratings agencies. Since manual collection of data requires a lot of manpower, and this method has a certain subjectivity, this paper uses the second method. The second one has been adopted by many scholars, such as Maoping Liu, Xianjie He, Zhongsheng Zhou and Shaobin Peng have used the data provided by Rankings CSR Ratings. This article uses the content evaluation score (C value) as a measure of the quality of environmental information disclosure, which comes from the *A-share listed company's social responsibility report rating database* of Rankings CSR Ratings and the period is from 2010 to 2015.

(2) Demand of refinancing

Scholars often use the funding deficit to measure the refinancing needs of enterprises. The sum of funds used by enterprises for various projects is often much higher than the stock of internal funds and the difference is the funding deficit which is usually filled by external capital markets. Reference Shyam-Sunder and Myers calculation method and the funding deficit (def) is calculated as follows:

$$\text{def} = (\text{dividend payments} + \text{capital expenditure} + \text{net increase in working capital} - \text{operating cash flows after interest and taxes}) / \text{total assets at the end of the period}$$

(3) Control variables

With reference to the study of Hongtao Shen and Siqin Yang, this article selects the variables of enterprise size, enterprise growth, business performance, property rights, debt level and

regional variables as the control variables. The dependent variables explanatory variables and control variables used in this paper are listed in the table 1 as follows as well as the specific calculation of these variables.

Table 1: Definition and calculation of main variables

variable sign	variable name	definition and calculation of variables
Def	funding gap	(dividend payments+ capital expenditure+ net increase in working capital- operating cash flows after interest and taxes)/ total assets at the end of the period
Edi	the quality of environmental information disclosure	data from the corporate social responsibility report published by CSR Ratings.
Size	enterprise size	the natural logarithm of the total assets at the end of the period
Q	tobin q	data from the CSMAR database
Roe	business performance	net profit after tax/ shareholders' equity at the end of the year
Debt	liabilities level	total liabilities at the end of the year/total assets at the end of the year
Zone	Area	1 for the eastern region; 0 for the non-eastern region
State	nature of property	1 for the private-owned enterprises; 0 for the state-owned enterprises

Analytical Approach

The empirical analysis of this paper is divided into two steps:

The first step is to test whether there is a significant positive relationship between the quality of company's environmental information disclosure (edi) and refinancing needs (def) empirically.

The second step is to divided samples into four groups according to the four standards of eastern、western、state-owned and private. And then regress in these four groups respectively. Regression coefficients obtained are compared to examine the impact of regional differences and property rights on the relationship between environmental disclosures quality and refinancing needs.

The model of this paper is designed as follows:

$$edi = \alpha + B \times def + \gamma \times \text{control variables} + \varepsilon$$

ANALYSIS AND RESULTS

Descriptive statistics of main variables

The annual distribution of the index of environmental information disclosure of sample companies in the period from 2010 to 2015 is shown in Table 2. The industrial distribution of the index of environmental information disclosure is shown in Table 3. The descriptive statistics of the main variables in this article are shown in Table 4.

Table 2: the annual distribution of the score of the quality of environmental information disclosure

year	n	edi	edi≤10		10<edi≤20		20<edi	
		mean	N	%	n	%	n	%
2010	167	18.60	22	13.17%	97	58.08%	48	28.74%
2011	167	15.94	38	22.75%	99	59.28%	30	17.96%
2012	167	17.76	6	3.59%	122	73.05%	39	23.35%
2013	167	17.82	3	1.80%	118	70.66%	46	27.54%
2014	167	17.99	5	2.99%	116	69.46%	46	27.54%
2015	167	18.62	3	1.80%	111	66.47%	53	31.74%
total	1002	17.79	77	7.68%	663	66.17%	262	26.15%

Table 3: the industry distribution of the quality of environmental information disclosure score

Industry	N	edi	edi≤10		10<edi≤20		20<edi	
		mean	n	%	n	%	n	%
Mining	108	23.38	0	0	47	43.52%	61	56.48%
medicine, biology	138	18.22	9	6.52%	87	63.04%	42	30.43%
metal, nonmetal	246	18.10	11	4.47%	171	69.51%	64	26.02%
food and drink	84	17.71	6	7.14%	55	65.48%	23	27.38%
oil, plastic	210	16.48	32	15.24%	135	64.29%	43	20.48%
textile, garment	60	14.32	8	13.33%	50	83.33%	2	3.33%
electricity, gas	114	16.78	6	5.26%	82	71.93%	26	22.81%
papermaking, printing	42	13.90	5	11.90%	37	88.10%	0	0
total	1002	17.36	77	7.68%	664	66.27%	261	26.05%

Table 4: descriptive statistics of main variables

variable	mean	standard deviation	Minimum	1% quantiles	50% quantiles	99% quantiles	Maximum
edi	17.71	5.68	6.56	8.81	16.50	35.81	39.59
def	-0.19	0.15	-0.36	-0.28	-0.04	0.66	0.93
size	23.02	1.56	18.76	20.21	22.82	27.75	28.51
roe	0.06	0.25	-5.30	20.21	22.82	27.75	0.85
debt	0.47	0.20	0.01	-0.48	0.08	0.33	0.95
q	2.10	1.60	0.70	0.82	1.65	7.30	30.67

We can find that the average value of the quality of environmental information disclosure score is on the rise from table 2 which means that the quality in our country is getting higher and higher. Specifically, the percentage of companies with a score of 10-20 points increased from 58.08% to 64.47% and with a score of 20 points or more increased from 17.96% to 31.74%. And the percentage of companies that scored less than 10 points dropped from 13.17% to 1.08%. Table 3 shows that the extractive industry has the highest average scores, while the average scores of other industries are below 20 points. The number of the metal, non-metallic manufacturing and petroleum, chemical, plastic industry enterprises accounted for more than half of the total number of samples, but their average scores are low which shows that government departments should focus on the environmental protection of these two types of enterprises. The lowest score is the paper printing industry and textile , garment industry, far below the average which means that two types of industries that lower the quality of information disclosure in Chinese companies are the paper printing industry and the textile、 garment industry. Table 4 shows that the average value of edi is 17.71 and the standard deviation is 5.68, indicating that there is a great difference in the quality of environmental information disclosure among Chinese companies.

Inferential Statistics

The regression coefficient of refinancing demand (def) is positive, indicating that the higher the refinancing demand, the higher the quality of corporate environmental information disclosure with other factors controlled from the column called “whole samples” from table 5. And the regression result of refinancing demand is significant at the 5 per cent confidence level. The result obtained supports the hypothesis 1 in this article, showing that firms do indeed disclose environmental information for refinancing. Comparing the eastern region list with the western region list in table 5, we can find that the regression coefficient of the refinancing demand (def)

in the eastern region is 2.163 and is significant at the 5 per cent confidence level, while the regression coefficient in the western region is not significant. This shows that the positive correlation between corporate refinancing demand (def) and environmental information disclosure quality is more significant in the eastern region which supports the hypothesis 2 in this article. The more developed the market, the more sensitive the market response to information disclosure and better reduce the information asymmetry between companies and external investors, so companies have easier access to external financing. At last, comparing the list of private companies and state-owned companies in table 5, we can find that the regression coefficient of financing demand (def) in private companies is 1.672 and is significant at the 5 per cent confidence level. While the regression coefficient of refinancing demand (def) in the state-owned companies is 2.286 and is significant at the 10 per cent confidence level. This shows that the positive correlation between the refinancing demand (def) and the corporate environmental information disclosure quality is more significant in private companies which supports the hypothesis 3 in this paper. Comparing with state-owned companies, private companies will turn to high-quality information disclosure to attract investors' attention because they take the same political relations with state-owned companies.

Table 5: empirical result of the model

Edi											
variable	whole samples		eastern region		western region		private companies		state-owned companies		
	coefficient	T	coefficient	T	coefficient	T	coefficient	T	coefficient	T	
constant	-15.674 ^{***}	-2.02	-24.392 ^{***}	-2.43	-5.191	-0.38	-35.957 ^{***}	-3.52	10.042	0.75	
Def	1.541 ^{**}	2.22	2.163 ^{**}	2.56	0.344	0.26	1.672 ^{**}	2.05	2.286 [*]	1.82	
Size	1.457 ^{***}	4.29	1.803 ^{***}	4.10	1.036 [*]	1.73	2.339 ^{**}	5.13	0.355	0.62	
Roe	-0.496	-1.16	-0.079	-0.14	-1.215	-1.8	2.069	1.04	-0.467	-0.96	
Debt	-0.018	-0.75	1.912	1.04	-4.437	-2.13	-0.943	-0.50	0.248	0.12	
Q	0.188 ^{**}	2.43	0.136	1.55	0.243	1.29	0.13	1.36	0.046	0.25	
Year	controlled		controlled		controlled		controlled		controlled		
industry	controlled		controlled		controlled		controlled		controlled		
Observations	1002		630		372		426		576		
R-Squared (%)	28.62%		31.75%		33.68%		28.50%		30.60%		

Notes: *, **, *** indicates significance at the 10%, 5% and 1% confidence level (two-tailed test)

Robustness test

In the existing research, there are other ways to calculate the funding deficit. With the purpose of testing the stability of the previous conclusion, this paper uses another method to calculate a company's funding deficit. The new formula is:

$$\text{def2} = (\text{At} - \text{At-1}) - \text{ROEt} / (1 - \text{ROEt})$$

Where, "A" represents the scale of assets, "ROE" represents the return on net assets and "t" represents the year. We use the new funding deficit variable instead of the refinancing demand above and then return to get the regression results in the table below. Table 6 and table 5 are basically the same conclusions, which shows that the results above are more reliable and stable.

Table 6 : empirical result of def2

Edi										
Variable	whole samples		eastern region		western region		private companies		state-owned companies	
	coefficient	T	coefficient	T	coefficient	T	coefficient	T	coefficient	T
constant	28.580***	3.59	17.391*	1.73	49.38***	3.56	20.264*	1.95	32.59**	2.47
def2	0.972**	2.06	0.979*	1.82	0.95	0.84	0.931*	1.73	1.378	1.27
Size	-0.522	-1.49	0.042*	0.10	-1.552**	-2.5	-0.191	-0.42	-0.678	-1.19
Roe	0.223	0.50	-0.517*	-0.79	0.494	0.68	0.896	0.42	0.368	0.72
Debt	1.622	1.18	-1.139	-0.62	5.951***	2.87	0.812	0.43	2.575	1.28
Q	0.186**	2.02	0.208	1.90	0.099	0.52	0.142	1.29	0.245	1.36
Year	controlled		controlled		controlled		controlled		controlled	
Industry	controlled		controlled		controlled		controlled		controlled	
Observations	1002		630		372		426		576	
R-Squared (%)	25.62%		35.75%		28.80%		20.80%		32.60%	

CONCLUSIONS

This paper examines whether there is a significant correlation between the refinancing demand and environmental disclosure quality. Empirical results show:

- (1) The results of the list of the whole sample show that there is a significant positive correlation between refinancing demand and the quality of corporate environmental disclosure.

- (2) This paper regresses the regional sample groups and finds that the positive correlation between the demand of refinancing of a company and the quality of environmental information disclosure in the eastern region is significantly higher than that of company in the western region.
- (3) The regression of ownership sample groups shows that the positive correlation between the demand of refinancing of private enterprises and the quality of environmental information disclosure is more significant than the state-owned enterprises.

Therefore, this paper draws the following conclusion:

Firstly, capital market motivation can be a good explanation for the environmental information disclosure behavior of A-share listed companies in Chinese heavy polluting industries. Information asymmetry often exists between inside and outside the company. With the purpose of winning the trust of external investors and reduce external pressure, managers will choose to disclose relevant information to the public.

Secondly, the ultimate controller of state-owned companies is the government. State-owned companies have natural political connections, so state-owned companies have more access to external financing and government subsidies. However, private companies appear to be far more disadvantaged in this respect. Private companies do not have the same strong political relations as state-owned companies. Therefore, private companies are more active in disclosing environmental information than state-owned companies to gain the trust and investment from outside investors.

Thirdly, improving the quality of environmental information disclosure in Chinese companies overall, the most important thing is to speed up the building of a socialist market economy. The market reaction of corporate information disclosure is shorter and external investors may get higher quality of information in the more market-oriented areas. In areas where the marketization process is low, the quality of information obtained by external investors is lower due to the longer response time of the information. Under such circumstances, a company is unmotivated to disclose information, because the amount and quality of information have little effect on the company.

Lastly, this paper only studies companies in heavily polluting industries. In the future, the research objects can be extended to other industries.

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