The Relationship of Environmental Information Disclosure and Corporate Performance

―Empirical Research of Chinese Iron&Steel Smelting Firms in A-share Market

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Abstract—**To examine the relationship between environmental information disclosure(EID) and corporate performance in iron& steel smelting industry, we constructed a multiple regression model with SPSS 2.0 and select the accounting statistics of 69 Chinese iron& steel smelting firms from year 2012 to year 2014. The investigation leads to two findings as follows. First, EID is negatively related to corporate performance in iron& steel smelting firms. Then, the negative impact is more significant in state-owned firms compared to non-state-owned firms. The innovation points are mainly the relevance of the correlation between EID and corporate performance in iron& steel smelting industry and the difference between the correlation of that in state-owned firms and non-state-owned firms.**

Keywords—Iron&steel smelting industry; Environmental information disclosure; Corporation performance; The multiple regression model

I. INTRODUCTION

During the latest years, Chinese economy has greatly developed at the cost of severe environment destruction. With numerous pollution emission and energy consumption, enterprises are universally considered to assume the main responsibility of protecting the environment. However, for fear that corporate image will be damaged by the adverse information disclosures; few enterprises are willing to disclosure their environmental information actually. So, to improve the situation of environmental information disclosure in our country, the government has been concentrating on the restriction of enterprises' environmental behavior since the early 21st century. For example, in 2008 SEPA(State Environmental Protection Administration) published the Guidance On Strengthening the Supervision of the Listed Company and Administration of Environmental Protection. While in 2010,Ministry of Environmental Protection released the Handbook of Environmental Information Disclosure of Listed Companies(Opinion Draft).Influenced by the relevant regulations and policies, the number of Chinese listed enterprises which disclosed environmental information is moderately increased from 617 to 747.But compared with the whole amount of listed enterprises, the increasement isn't enough.
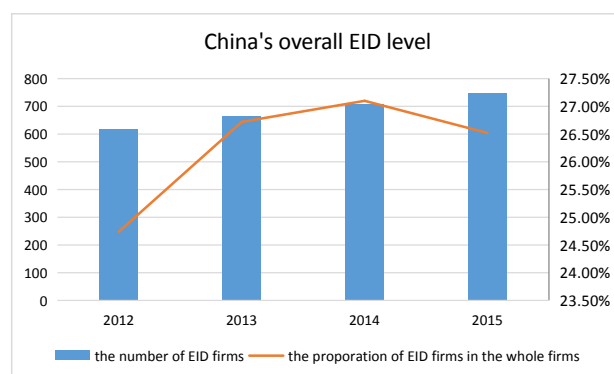

Fig. 1. China's overall EID level

Source: the Evaluation Report of China's Environmental Liability Information Disclosure of Listed Company from 2012 to 2014

As we can see in the Fig. 1, the proportion of EID listed enterprises in the whole listed enterprises was promoted, but was still within 27%. According to the mean score counted in the evaluation report, China's overall level of environmental information disclosure has been enhanced, but there's a big distance for China to reach the EID's level of developed countries. In conclusion, although the compulsive can help to guide and restrict the enterprises' environmental behavior, the main problem of EID hasn't been solved, so there is still a great deal to do.

II. LITERATURE REVIEW

As the foreign industrial economy started early, the environmental protection problem initiated to receive relevant attention in the relatively early time, and foreign scholars have been occupied in the researches on the environmental information disclosure since the last century 40s. Besides, the studies about the relationship between EID and corporate performance made a great achievement. Freedman and Jaggi (1981) analyzed the correlation between EID and corporate performance in enterprises of different sizes from the perspective of the influence factors of environmental information disclosure, and found that in enterprises of different sizes, the EID had different influence on the corporate performance. That is to say, EID of small enterprises had no

influence on the corporate performance, while that of big enterprises had significantly negative influence on the corporate performance [1]. Sharfman(2010) examined the correlation between environmental performance and corporate performance from the perspective of the environmental risk control. The result showed that enterprises' strengthening the environmental risk control could somehow help reduce enterprises' risk of debt and corporate cost, which eventually increases the overall corporate performance [2]. Clarkson (2013) assessed the voluntary disclosure level of American polluting industry with the help of GRI framework, and made the conclusion that EID could help promote the corporate performance. It's convinced that investors' fully mastering the relevant information can help reduce the asymmetric information problems so that corporate capital cost can relatively go down [3].

In order to comply with the requirements of sustainable development, our country has also gradually risen to discuss and research about environmental information disclosure in recent years. Tang (2011) analyzed the stock market's reaction to EID with the statistics of EID enterprises and no EID enterprises in Hubei province. The result indicated because investors became more and more rational, they tended to believe those enterprises which didn't disclose their environmental information compared with the EID ones. As a consequence, investors' confidence would decline and corporate stock exchange turnover would correspondingly go down [4]. While Cheng (2013) reached contrary conclusions. In the light of information asymmetry theory, if investors could master enough information, investors' confidence would be evaluated. Apparently the EID can help solve the information asymmetry problem, so investors' confidence could be increased and the corporate value could be accordingly added [5]. However, Zhang (2015) had distinct ideas. He found that enterprises would often choose to disclose those good for its environmental image rather than real and comprehensive information in the premise of voluntary disclosure of environmental information so that enterprises' endeavor to disclose didn't bring about enough good effects for them to offset the subsequent costs and expenses, thus corporate performance didn't have any difference [6].

Above all, although the researches about EID and corporate performance are numerous, the debate for the relationship between EID and corporate performance still doesn't end. Besides, most researches focus on more macroscopic area, like the whole country's effect, while one specific industry's condition is ignored. So the proposed advice often isn't useful enough for one specific industry, especially for iron&steel smelting industry. To examine the relationship between EID and corporate performance, this thesis builds multiple regression models with SPSS 2.0 and selects the accounting statistics of 69 Chinese iron&steel smelting firms from year 2012 to year 2014, hoping that it can help form the related systems of the iron and steel smelting industry.

III. THEORY ANALYSIS AND HYPOTHESIS DEVELOPMENT

According to the research of Plumlee (2009) and Wang (2016), environmentally sensitive enterprises' corporate performance is more sensitive to EID compared with environmentally non-sensitive enterprises' [7, 8]. As ministry of environmental protection defined heavy pollution industry in the Opinion Draft, smelting industry is regarded as heavy pollution industry for its extremely high pollution emission and inconceivable environmental destruction. So we should attach importance to the environmental behavior when assessing the corporate performance. Based on the previous enterprises' administrative practice and traditional environmental theory, enterprises' environmental behavior will have a bad influence on financial interest. First, enterprises' environmental administrative practice requires plenty of investment. Then, the purchase of environmental facilities will increase enterprises' financial burden, like environmental assets depreciation costs and the cost of waste disposal. Finally, the administration expense will also involve some market operation risks. So if enterprises want to build environmental-friendly image by strengthening enterprises' environmental administration, corporate performance will definitely decrease [9]. In addition, because China's environmental information disclosure quality is uneven and the disclosure is lack of comprehensiveness and authenticity, some sharers of relative information are deficient in criteria so that they have to reduce their expectation, and consequently firms' value will also be influenced. Thus, this thesis develops the hypothesis as follows.

H1: EID is negatively related to corporate performance in iron&steel smelting firms.

According to Zhang (2015) and Iwata H (2011), voluntary environmental information disclosure is not significantly related to corporate performance [6, 10]. As a typical example of heavy pollution industry, non-state-owned firms of iron&steel smelting industry are regulated more loosely than state-owned firms, so they have more freedom to decide what they disclose, consequently generating ill-formed and inauthentic disclosures. As a result, investors can't receive enough information to change stereotypes of heavy pollution enterprises, and that somehow reduce the influence which EID has on corporate performance. Then, owing to the strong regulation, state-owned enterprises have great possibilities of being forced to invest more than non-state-owned enterprises. Unfortunately, the coerciveness will incur investors' disfavor, leading to the declined investors' confidence and increased capital cost [11]. Thus, this thesis develops the hypothesis as follows.

H2: The negative impact is more significant for state-owned firms as compared to non-state-owned firms.

IV. RESEARCH METHODOLOGY

A. Sample Selection and Data Sources

To ensure the comparability and continuity of disclosed information, this thesis selects all a-share listed enterprises of iron&steel smelting industry from Shanghai and Shenzhen stock exchange from 2012 to 2014 as initial samples. By excluding ST and *ST enterprises as well as those lack of crucial information, the valid samples remain to be 207, including 44 steel enterprises and 25 smelting enterprises. All the financial data derived from CSMAR database, and the environmental information is manually collected from

corporate annual reports, corporate social responsibility reports and corporate environmental sustainable development reports published in stock exchange website. All the data analysis is done with SPSS 2.0.

B. Variable Definition and Model Construction

The dependent variable is corporate performance, which is a measurable indicator whether the enterprises are in good financial condition and have the sustainable development capacity [7]. Currently, Tobin's Q is universally popular among the scholars because it can reflect the corporate operating situation more truly and objectively. The bigger Tobin's Q is, the better the company's growth prospect will be, which will enhance investors' willingness to invest this enterprise [12]. Therefore, we select Tobin's Q as the proxy variable of corporate performance.

The independent variable is the level of EID. To reflect enterprises' environmental behavior directly, we use the proxy variable EDI, which means the index of the environmental information disclosure level. By using the content analysis method and index method, this thesis constructs the EDI index = the sum of the scores of each item divided by the maximum score of each item, and the most ideal score value of the denominator is 16 points. According to the Disclosure Guidelines of SHFE and MeP as well as current research experience, this article does the independent variable assignment according to the different disclosure content as shown in table 1.

TABLE I.　　EDI ASSIGNMENT TABLE

No.	Information disclosure items	Scoring
1	Environmental planning and related description	Qualitative description 1, otherwise 0
2	Environmental cost input	Quantitative description 2, qualitative description 1, otherwise 0
3	Environmental expenditure	Quantitative description 2, qualitative description 1, otherwise 0
4	"Three wastes" emissions	Quantitative description 2, qualitative description 1, otherwise 0
5	Energy conservation and emissions reduction	Quantitative description 2, qualitative description 1, otherwise 0
6	Disclosure of the carrier	Independent report 2, annual reports and important items 1, otherwise 0
7	Environmental subsidies and tax breaks	Quantitative description 2, qualitative description 1, otherwise 0
8	Environmental rewards and punishment	Qualitative description 1, otherwise 0
9	Environmental risk	Qualitative description 1, otherwise 0
10	major pollution incident	Qualitative description 1, otherwise 0

a. Environmental cost input includes investment and development of environmental protection technology and construction of environmental protection facility, environmental expenditure includes enterprise environment cost and water fees, such as sewage charges, green fees, bank fees, resource compensation fees.

b.

TABLE II.　　DEFINITION OF VARIABLES

Variables category	Variables	Code	Definition
The dependent variable	Corporate performance	QV	Market value divided by total assets at the end of the year
The independent variable	The level of EID	EDI	EDI=the sum of the scores of each item divided by the maximum score of each item
The control variables	Financial leverage	LEV	Asset-liability ratio
	Size of corporate	SIZE	Natural logarithm of total assets
	Profitability	ROA	Return on assets
	Ownership property	QWNER	State-owned corporate 1, otherwise 0
	Ownership concentration	OC5	The total proportion of the top five shareholders

Referring to the domestic and foreign literature, the control variables adopts some variables which can influence the dependent variable and the independent variables. Firstly, some variables representing enterprises' financial characteristic are included, namely size of corporate (SIZE), profitability (ROA), financial leverage (LEV). In addition, ownership property (OWNER) and ownership concentration (OC5) are considered in terms of corporate governance. We can see all variables in table 2. Based on the research methodology, this thesis establishes the following model. β_0 inside the equation represents the constant item, and ε is the random interference.

$$QV = \beta_0 + \beta_1 EDI + \beta_2 LEV + \beta_3 SIZE + \beta_4 ROA + \beta_5 OWNER + \beta_6 OC5 + \varepsilon$$

V. Empirical Analysis

A. Descriptive Statistics

In the table 3, we can see the EID situation of iron&steel smelting industry from 2012 to 2014. In terms of the mean value, the EID situation was promoted from 2012 to 2013 with a little drop in 2014 and the mean value was obviously higher than the China's overall EID level, so the EID level of this industry was fairly fine. But regarding the big standard deviation, the intensity of the industry's EID level still needs improving.

In the table 4, we can see overall financial conditions of iron&steel smelting industry from 2012 to 2014. In terms of the mean value, the financial performance significantly decreased from 2012 to 2013 with a little increase in 2014, perhaps because the "new normal" contributed to the economy slowdown. But regarding the declining standard deviation, the level of economic development gap within iron and steel smelting enterprises is narrowing.

TABLE III.　　DESCRIPTIVE STATISTICS OF DEPENDENT VARIABLE

Year	N	Min	Max	Mean	Std
2012	69	0.25	0.94	0.5025	0.1817
2013	69	0.25	0.94	0.5460	0.2024
2014	69	0.13	0.88	0.5351	0.1839

c. N is the sample size, Min is the minimum value, Max is the maximum value, Std is the standard deviation.

TABLE IV. DESCRIPTIVE STATISTICS OF INDEPENDENT VARIABLE

Year	N	Min	Max	Mean	Std
2012	69	0.81	15.61	1.9655	2.1689
2013	69	0.70	4.03	1.3299	0.5770
2014	69	0.84	2.84	1.3476	0.4378

B. Correlation Analysis

Prior to the regression analysis of the model, the thesis runs a correlation test for all the variables to investigate the problem of multicolinearity and to find out its potential impact on the regression results. In statistical analysis, if the correlation coefficient between the independent variables is less than 0.50, it won't be problematic for the regression results, which ensures the multiple regression models is of the statistical significance. The correlation coefficient matrix is shown in table 5.

C. Regression Analysis

Table 6 presents the results of regression analysis, verifying the impact of EID on the economic performance. From the regression results of full sample, it can be seen that the regression coefficient of environmental information disclosure index is -0.884 and statistically significant (lower than 1% significant level). This explains that the environmental information disclosure has significant negative impact on business performance, in line with our first hypothesis. From

the regression results of group sample, the regression coefficient of EDI in state-owned enterprise group is -0.854 and statistically significant (lower than 1% significant level), while that of EDI in non-state-owned enterprise group is not statistically significant (higher than 1% significant level). This indicates that the negative impact is more significant in state-owned firms, compared to non-state-owned firm, in line with our second hypothesis.

VI. CONCLUSION AND SUGGESTIONS

The thesis uses data of the listed iron&steel smelting firms from 2012 to 2014 to demonstrate the relationship between corporation performance and EID and reaches the following conclusions.

First, China's overall level of EID proves to be promising and has the rising trend currently, but the diversity and fluctuation still need improvement. Then, the environmental information disclosure of iron& steel smelting industry, to some extent, has negative impact on corporate performance. Finally, owing to the voluntary disclosure, non-state-owned enterprises of iron&steel smelting industry show no correlation, while the negative correlation is proved in state-owned enterprises of iron&steel smelting industry since governments impose more pressure on these firms, but such commitments may not be the choice of other shareholders and that contradiction really discourages investors.

TABLE V. CORRELATION COEFFICIENT MATRIX

	QV	EDI	LEV	SIZE	OWNER	ROA	CR5
QV	1						
EDI	-0.357**	1					
LEV	-0.121	0.524**	1				
SIZE	-0.491**	0.475**	0.415**	1			
OWNER	-0.272**	0.159*	0.227**	0.424**	1		
ROA	0.163*	0.096	-0.102	-0.151*	-0.129	1	
CR5	-0.359**	-0.063	-0.287**	0.252**	0.194**	-0.020	1

d. * * indicates significant at 1% levels; * indicates significant at 5%.

TABLE VI. CORRELATION COEFFICIENT MATRIX

	T sample		SOE		NSOE	
	Coefficient	*Sig*	*Coefficient*	*Sig*	*Coefficient*	*Sig*
(constant)	2.547	0.000	2.079	0.000	4.476	0.000
EDI	-0.884	0.000	-0.854	0.000	-0.764	0.127
LEV	0.004	0.001	0.005	0.000	0.002	0.651
SIZE	-0.113	0.000	-0.090	0.000	-0.260	0.007
ROA	0.014	0.005	0.020	0.001	0.012	0.191
CR5	-0.470	0.004	-0.394	0.005	-0.532	0.251
OWNER	-0.057	0.321				
R2_adj	0.413		0.518		0.304	
F value	25.187		31.717		6.415	
Sig	0.000		0.000		0.000	

e. T sample is the total sample,SOE is sample of state-owned enterprises,NSOE id sample of non-state-owned enterprises.

For improvement to occur, there are a number of recommendations to be addressed. As we know, government plays the most powerful role in raising the China's EID level. So, some compulsory policy and regulation should timely be initiated to complete the relevant system and strengthen the government supervision of environmental accounting so that the enterprises committing violations can be disciplined and the disclosure can be ensured to be normative [13]. When it comes to the enterprises, some environmental publicity campaigns should be organized to enhance the environmental awareness of employees, helping the implementation of environmental regulations and the optimization of environmental standards realize. Furthermore, corporate culture as soft power is supposed to comprise the environmental concept to advance the environmental technology. Finally, legalization is also a critical route to improve the EID level, for example, it's quite necessary to include environmental accounting and supervision in the Accounting Law and employ third party audit in an attempt to avoid enterprises' "green-washing" behavior and ensure the disclosure objective and true.

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