

A study on the impact of environmental information disclosure on corporate financial performance

Liuxu Wang*

Shanxi university of finance and economy, Taiyuan, China

Abstract: Based on the analysis of relevant enterprise data from 2018 to 2022, this study found that environmental information disclosure has a positive effect on enterprise financial performance, and investor sentiment plays a mediating role in environmental information disclosure on enterprise financial performance, and put forward relevant suggestions on how to improve enterprise financial performance through environmental information disclosure and investor sentiment.

Key words: environmental information disclosure, corporate financial performance, investor sentiment

1. Introduction

The 20th Party Congress report clearly points out that a public and transparent information environment is indispensable in order to improve the fiscal, tax, financial, investment and price policies and standard systems that support green development, and to improve the market-based allocation system of resource and environmental factors. Therefore, in recent years, China has continued to strengthen the implementation of laws and regulations relating to environmental information disclosure. For example, the *Environmental Protection Law of the People's Republic of China* requires environmental information disclosure by the competent department of the people's government for environmental protection and other departments with supervisory and administrative responsibilities for environmental protection, as well as by highly polluting enterprises. The current research shows that the proportion of environmental information disclosure by existing enterprises in China is not high, but there is a trend of gradual improvement (Xiao Shufang, 2004) [1] and there are no prescribed standards for enterprises to disclose environmental information, resulting in a mixed level and quality of information disclosure (Yao Sheng, 2016) [2]. Zong, Ping [3] empirically tested that effective disclosure of environmental information reports can reduce information asymmetry between firms and investors. The existing studies show that environmental information disclosure positively affects firms' economic performance (Fu Yanping, 2022) [4] and financial performance (Yang Chunmin, 2021) [5]. Tian Xing [6] found that signaling effects can act on environmental information disclosure on promoting the financial performance of enterprises. Corporate environmental information disclosure is negatively related to corporate debt costs, which in turn

can improve corporate financial performance (Dong Shidi, 2022) [7]. Corporate environmental information disclosure has a positive effect on investor confidence, and investor confidence affects investor sentiment, which means that high-quality environmental information disclosure promotes higher investor sentiment (Tang, 2011)[8]. And some studies have shown that high investor sentiment will be beneficial to improve corporate business performance in the short term (Gao, Yang, 2022)[9], and also beneficial to increase the wealth of shareholders in targeted and public issues, using stock appreciation as a gain to motivate management to work efficiently, thus improving corporate business performance (Yu, Peng, 2016)[10]. The purpose of this paper is to investigate the impact of environmental information disclosure on corporate financial performance and the pathway of its influence. Therefore, based on the calculation of the environmental information disclosure index of listed companies, the empirical test of investor sentiment indicators and related financial performance indicators, this paper examines the impact of environmental information disclosure on corporate financial performance and then investigates whether corporate investor sentiment plays a mediating role between the two.

2. Literature review

Most of the studies on the impact of environmental information disclosure on the financial performance of enterprises have concluded that environmental information disclosure has a positive impact on the financial performance of enterprises. Yang Chunmin (2021)[11] has argued from the perspective of corporate environmental management strategies that a sound environmental internal control system and a performance

* Corresponding author: 1461683995@qq.com

appraisal system with environmental indicators can improve the level of environmental information disclosure and thus promote the improvement of corporate business performance. In addition, based on the perspective of green governance, Tang Yu [12] (2022) give a relevant analysis that shows that the behavior of companies actively participating in green governance and improving the level of environmental information disclosure can positively affect financial performance. From the perspective of corporate goodwill, Hu Hao (2022)[13] constructs a mediating effect analysis model using the asset valuation excess return method by making a first-order lag on data of industrial industry listed companies in Shanghai and Shenzhen A-shares in the Yangtze River Economic Zone region from 2016 to 2018, and the results show that high-quality environmental information disclosure data enhance the green image and goodwill of enterprises, which in turn promote their financial performance. However, some scholars have obtained the opposite conclusion. Shi Baojuan et al [14] (2022) conducted an empirical study on 478 heavily polluting listed companies from the perspective of the coupling degree of environmental information disclosure and corporate financial performance. From the results of their decoupling test degree, the financial performance of enterprises instead declined as the quality of environmental information disclosure improved, and the relationship between the two showed a negative correlation. Tao Ketao [16] (2020) analyses that corporate environmental information disclosure can weaken business performance based on the perspective of green governance. Some scholars also believe that there is no significant relationship between the two. Sui Fangfang [15] (2012) selected a sample of two hundred A-share listed companies in Shanghai from 2007 to 2008, and the empirical analysis tested that there is no correlation between corporate economic performance and environmental information disclosure. And it can be seen that the existing studies are inconclusive on the impact of environmental information disclosure on the financial performance of companies.

3. Theoretical Analysis and Hypothesis

3.1 Environmental Information Disclosure and Corporate Financial Performance

Increased disclosure of environmental information reduces the cost of financing for companies and thus improves corporate performance. On the one hand, the improved quality of environmental information disclosure by firms increases investors' knowledge of internal company information, raising investors' expectations of the stock, and thus the lower the cost of equity financing (Ye, Chengang, 2015). The reduced cost of equity financing increases the profitability of the business, resulting in improved financial performance. On the other hand, in terms of relevant national policies, the higher the quality of corporate environmental information disclosure, the lower the cost of debt for enterprises (Yao Lei, 2016). In summary, improving the quality of corporate

environmental information disclosure reduces corporate equity financing costs and debt financing costs thereby reducing corporate costs and improving corporate financial performance. Therefore, the following hypotheses are proposed.

H1: Environmental information disclosure has a positive effect on corporate financial performance.

3.2 The mediating effect of investor sentiment in environmental information disclosure and corporate financial performance

There is a paucity of relevant studies that use investor sentiment as a mediating variable in the path of the impact of environmental information disclosure on corporate financial performance. Most of the available literature has concluded that environmental information disclosure has a positive impact on financial performance. Zhang Xiaoyang (2021) found that companies transmit signals to investors through information disclosure, and investors understand the business conditions of companies based on favourable information, which in turn stimulates investors' sentiment. And special information disclosure can influence investors' judgment and sway investors' sentiment (Zhang Benzhaio, 2016), so environmental information disclosure can have an impact on investors' sentiment. From the perspective of enterprise resource allocation, investors' irrational emotions will lead to inefficient investment in enterprises (Bai Xuelian, 2022). The higher the individual investors' emotions, the more overconfident the management, thus inhibiting the efficiency of resource allocation, reducing the return on investment of enterprises and reducing the financial performance of enterprises. From the perspective of enterprise commercial credit supply, when investor sentiment is high, enterprise investors and managers will increase their investment intentions, while low investor sentiment will have a significant inhibitory effect on enterprise operation (Yuan Ling, 2022), which will have a negative impact on financial performance. From the perspective of the financialization of corporate investment, investors' emotional fluctuations will make investors' management decisions too radical, which will increase the business risk of the enterprise. Although investors know that it will bring adverse effects to the enterprise, under the influence of peer effect, where investors' emotions magnify the financialization of the enterprise, the enterprise will follow the market to make financialization behavior (Wang Bao, 2023). According to the research of Cao Zhipeng (2022), it is found that corporate financialization will increase corporate financial risk and have a negative effect on corporate financial performance. Therefore, the following assumptions are made:

H2: Investor sentiment plays a mediating role when environmental information disclosure plays a role in corporate financial performance.

4. Research design

4.1 Data sources and variables defined

This paper selects enterprises from 2018 to 2022 as the sample and treats the data as follows: (1) Excluding cross-listed enterprises, as the format and content of environmental information disclosure differs among enterprises in different capital markets; (2) Excluding listed companies with ST (special treatment), *ST (*special treatment) and PT (special transfer) during the study period, as this sample of business anomalies may have a biased impact on the analysis of the results; (3) Excluding companies with incomplete financial data and those listed for less than three years during the study period, as incomplete data undermine the validity of the results; (4) Excluding financial companies such as banks and insurance companies, as these companies have special characteristics in terms of business and financial data. Other required investor sentiment was taken from financial databases such as CSMAR. In order to reduce the impact of extreme values on the error of the empirical results, the data of each indicator were Winsorize shrunken according to 1% and 99% quantile respectively. The sample value of the final data is 8,130 after the data have been matched accordingly.

4.2 Description of variables

4.2.1 Variable interpretation: Environmental Disclosure Index (ED)

Based on Xu Lin, Lin Siyi and Qian Shufang's (2021) scoring method for environmental information disclosure, the enterprise's environmental information disclosure is evaluated from the perspective of concept, action and management system. The detailed scoring rules are shown in Table 1 below. The maximum score of each indicator sum ($\sum ED_i$) is 7 points.

Table 1. Environmental Information Disclosure Index score indicators

Category	Index	Content	score
Environmental protection concept	ED_i	Disclosure of the company's environmental protection concept	No relevant information disclosure : 0 point; Relevant information disclosure : 1 point.
Environmental protection action	ED_i	Environmental education and training of the company	
	ED_i	Environmental protection special action	
	ED_i	Environmental honor or reward	
Environmental protection	ED_i	Company's environmental	

management system		management system
	ED_i	Emergency mechanism of environmental events
	ED_i	Emergency mechanism of environmental events
	ED_i	Threesimultaneous system

4.2.2 Explained variables: corporate financial performance

According to the research methods of Xiong Mingning and Wang Tao (2020), corporate financial performance is mainly reflected in corporate earnings. This paper selects Return on Equity (ROE) to measure corporate financial performance.

4.2.3 Intermediate variable: investor sentiment

Referring to Yi, Zhigao et al. (2009), the study uses the China Investor Sentiment Index (CICSI) published by the National Development Institute of Peking University as a measure of investor sentiment. Also, refer to the A-share market investor sentiment index (ISI) constructed by Wei Xingji et al. (2014) as a measure of investor sentiment in the robustness test.

4.2.4 Control variable

Given the current research on firms, the choice of firm size (Size) refers to the classification of firm size by different criteria according to industry characteristics. The presence or absence of state-owned enterprises (SOE) was selected as one of the control variables, as there are significant differences between state-owned and privately owned enterprises in terms of operations. The years 2018-20122 were selected. Management shareholding (Mshare) is an important factor that influences the decision of the firm. Institutional investor shareholding (INST) is the shares held by professional investment institutions in the firm. Lev is a factor that measures the profitability of a company. The largest shareholder in a company often has the power to make decisions, and the percentage of shares held by the first largest shareholder (Top1) influences the business performance of the company. Cashflow is an important measure of a firm's ability to offset its liabilities. The above six control variables were selected for the subsequent empirical analysis. The definition and description of each variable are given in Table 2 below.

Table 2. Definition and description of each variable

Variable type	Variable name	Variable symbol	Variable description
Explained variable	Rate of Return on Common Stockholders' Equity	ROE	Net profit/owner's equity
Explanatory variable	Environmental information disclosure index	ED	The quality score of the company's environmental information disclosure is obtained by summing up the scores.
		CISCI	Excluding the values of investor sentiment influenced by macro factors
mediator variable	Investor sentiment	ISI	
Control variable	Scale	Size	Natural logarithm of total operating income
	Asset-liability ratio	Lev	Total liabilities at the end of year/total assets
	The shareholding ratio of the largest shareholder	Top1	Number of shares held by the largest shareholder / Total number of shares
	Is it a state-owned enterprise?	SOE	State-controlled enterprises take the value of 1, others 0
	Proportion of institutional investors' shareholding	INST	Total number of shares held by institutional investors / outstanding share capital
	Management shareholding ratio	Mshare	Management shareholding

			data/total share capital
	industry	Industry	SFC 2012 Industry Classification, manufacturing industry takes two codes, other industries use broad categories
	YEAR	Year	2018-2022

4.3 Model design

In response to research hypothesis H1, model (1) was constructed to test the positive effect of environmental information disclosure on corporate financial performance.

Where: i and t are firm i and year t respectively; α is a constant term; β_1 is used to estimate the effect of the independent variable on the dependent variable ($ROE_{i,t}/CISCI_{i,t}$) in each model; $\sum Control_{i,t}$ is each control variable in the model; $\varepsilon_{i,t}$ is a random disturbance term.

Mediating effect analysis is an important step in testing whether a variable is a mediating variable in a given path and to what extent it plays a mediating role. In this paper, the following model is constructed using a stepwise regression analysis test to demonstrate the mediating effect of investor sentiment in the relationship between environmental information disclosure and business performance, based on the applicable conditions of each variable and the research hypothesis H2 (Wen Zhonglin et al., 2005).

In the first step, models (1) and (2) were constructed to test the positive effect of environmental information disclosure on the financial performance of firms.

$$ROE_{i,t} = \alpha + \beta_1 ED_{i,t} + \sum Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

The specific explanations have been set out above and will not be repeated.

In a second step, a model (2) was constructed for the study of the impact of environmental disclosure on investor sentiment.

$$CISCI_{i,t} = \alpha + \beta_2 ED_{i,t} + \sum Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where: i and t are firm i and year t respectively; α is the constant term to be estimated; refers to the effect of the mediating variable ($CISCI_{i,t}$) on the dependent variable ($ROE_{i,t}$); $\sum Control_{i,t}$ is each control variable in the model; $\varepsilon_{i,t}$ is the random disturbance term.

In the third step, Model (3) is constructed to demonstrate the impact of investor sentiment on firm performance.

$$ROE_{i,t} = \alpha + \beta_3 ED_{i,t} + \beta_4 CISCI_{i,t} + \sum Control_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where: i and t are years i and t of the firm respectively; α is the constant term to be estimated; β_3 refers to the effect of the explanatory variable on the explanatory variable

$(ED_{i,t}/ROE_{i,t})$, β_4 refers to the effect of the mediating variable ($CICSI_{i,t}$) in the mechanism of action of the explanatory variable on the explanatory variable, $\sum Control_{i,t}$ is each control variable in the model; $\varepsilon_{i,t}$ is the random disturbance term.

5. Experimental results and analysis

5.1 Descriptive statistics and correlation coefficient tests

From the descriptive statistics in Table 3 below, we can see that the mean value of ROE is 0.05, the standard deviation of ROE is 0.25, the standard deviation is small, and the difference between the maximum and minimum values is not obvious, which shows that the financial performance of most enterprises is good and there is not much difference between the financial performance of various industries. The mean value of ED is 2.11, with a large standard deviation, and the maximum value is 7, with a large difference from the minimum value of 0. This shows that there is a large gap between the current degree of environmental information disclosure by enterprises in China, and the information disclosure behaviour of each enterprise is uneven.

Table 3. Descriptive statistics results

Variable Name	Mean	Standard Deviation	Min	Max	p25	p50	p75
ROE	0.0500	0.250	-6.850	1.280	0.0300	0.0700	0.1200
ED	2.110	1.930	0	7	0	2	3
Size	22.61	1.440	20.19	26.72	21.54	22.38	23.48
Lev	0.410	0.200	0.0600	0.870	0.250	0.400	0.560
Cashflow	0.0700	0.0600	-0.130	0.270	0.0300	0.0600	0.100
SOE	0.360	0.480	0	1	0	0	1
Top1	0.340	0.150	0.0900	0.750	0.220	0.310	0.430
INST	0.410	0.250	0	0.890	0.200	0.430	0.620
Mshare	0.130	0.190	0	0.670	0	0.0100	0.240
Year	2020	0	2020	2020	2020	2020	2020

5.2 Correlation coefficient test

Firstly, the results of the correlation coefficient test in Table 4 show that the value of the relationship between each test variable is within 0.5, and the value of 1/VIF is less than 1 from the results of the multicollinearity test in

Table 5, which shows that there is no significant multicollinearity problem in the above model setting.

Table 4. Correlation coefficient test results

ROE	ED	Size	Lev	Cashflow	SOE	Top1	INST
ROE	1						
ED	0.097** *	1					
Size	0.036** *	0.437** *	1				
Lev	-0.372** *	0.142** *	0.472** *	1			
Cashflow	0.373** *	0.137** *	0.070** *	-0.162** *	1		
SOE	-0.021*	0.245** *	0.385** *	0.222** *	-0.024**	1	
Top1	0.160** *	0.143** *	0.188** *	0.021**	0.108** *	0.250** *	1
INST	0.057** *	0.267** *	0.503** *	0.207** *	0.092** *	0.419** *	0.350** *
Mshare	0.093** *	-0.100** *	-0.183** *	-0.115** *	0.073** *	-0.241** *	-0.033** *
Year	0.078** *	0.094** *	0.078** *	-0.024**	0.109** *	0.047** *	-0.00200
industry	-0.107** *	-0.201** *	0.085** *	0.115** *	-0.099** *	0.094** *	-0.00600

Note: ***, ** and * indicate significant at the 1%, 5% and 10% levels respectively.

Table 5. Multi-collinearity test results

Variable	VIF	1/VIF
Size	1.97	0.506559
INST	1.50	0.665600
Lev	1.38	0.725714
ED	1.36	0.733478
SOE	1.31	0.762741
Mshare	1.12	0.892477
industry	1.10	0.905307
Cashflow	1.10	0.907757
Year	1.02	0.975624

5.3 Regression analysis

Table 6. Regression analysis results

Variables	(1)	(2)	(3)
	ROE	CICSI	ROE
ED	0.003***(2.991)	-2.21e-17***(-0.536)	0.003***(2.991)
CICSI			0.001***(3.745)
Size	0.028***(12.469)	3.11e-16***(4.051)	0.028***(12.469)
Lev	-0.278***(-15.571)	-8.70e-16***(-2.061)	-0.278***(-15.571)
Cashflow	0.639***(18.193)	8.16e-15***(7.268)	0.639***(18.193)
SOE	0.006(1.527)	-2.20e-16(-1.186)	0.006(1.527)
Top1	0.103***(9.413)	-2.09e-15***(-4.212)	0.103***(9.413)
INST	0.030***(3.522)	2.33e-16(0.629)	0.030***(3.522)
Mshare	0.102***(10.409)	-2.81e-15***(-7.338)	0.102***(10.409)
_cons	-0.569***(-12.150)	0.295***(8.541e+13)	-0.572***(-12.202)
Industry	Control	Control	Control
Year	Control	Control	Control
N	8130	8130	8130
adj.R ²	0.241	0.241	0.241

Note: ***, **, * denote significant at the 1%, 5% and 10% levels respectively, with t-values in brackets.

Firstly, in the main test of environmental information disclosure on corporate financial performance, the results of the test of the impact of environmental information disclosure on return on total assets are shown in Table 6. The (1) in Table 6 lists the regression results when return on net assets (ROE) is used as the explanatory variable and environmental information disclosure index (ED) is used as the explanatory variable. From Table 4, it can be obtained that the environmental information disclosure index (ED) is significantly positive at the regression coefficient at the 1% level, indicating that corporate environmental information disclosure has a significant positive impact on corporate financial performance, validating hypothesis H1.

Secondly, in the regression tests for Models 2 and 3, columns (2) and (3) in Table 6 show the results of the regressions with Return on Equity (ROE) as the explanatory variable and Environmental Disclosure Index (ED) as the explanatory variable, and with Investor Sentiment (CICSI) as the control variable in order to test the mediating effect of investor sentiment. The regression results support hypothesis H2, in which the ED is significantly positive at the 1% level and the coefficients of each key variable are significantly positive according to the three-step regression test, indicating that high and low investor sentiment play a mediating role in the system of environmental information disclosure on corporate financial performance.

Combined with the above empirical results, it can be obtained that the research hypotheses of this paper are all valid, proving that environmental information disclosure has a positive effect on the financial performance of enterprises, and the path can be divided into direct path and indirect path. The direct path shows that enterprises can enhance the protection of the environment and get high quality environmental information disclosure can improve the net asset income of enterprises and promote the financial performance of enterprises. The indirect path suggests that in the external environmental information disclosure, it improves investors' understanding of the internal aspects of the company, thus attracting more investors, influencing their sentiment and indirectly improving the financial performance of the company.

6. Robustness test

In order to ensure the stability of the above test results, this paper replaces the test indicator of the mediating variable as investor sentiment (ISI) for robustness testing. From the data in Table 7, it can be concluded that the sign and significance of the explanatory variable ED, the explanatory variable ROE and the mediating variable ISI do not change significantly, and the empirical test results are in line with expectations that environmental information disclosure has a positive effect on corporate financial performance, and investor sentiment continues to play a mediating effect in this mechanism of action.

Table 7. Robustness test results

variable	(1)	(2)	(3)
	ROE	ISI	ROE
ED	0.003***(2.991)	-5.19e-16***(-32.384)	0.003***(2.991)
ISI			0.011***(3.745)
_cons	-0.569***(-12.150)	0.267***(1.343e+14)	-0.572***(-12.202)
industry	control	control	control
Year	control	control	control
N	8130	8130	8130
adj.R ²	0.241	1.000	0.241

7. Conclusions and recommendations

China is currently in the stage of economic growth and development, and it is becoming a problem that most companies need to solve in order to get high-quality environmental information disclosure and improve their financial performance. In this paper, the role of environmental information disclosure on the financial performance of enterprises and the mediating effect played by investor sentiment are studied by selecting enterprises from 2018-2022 as the research sample. The study shows that: (1) environmental information disclosure has a positive impact on corporate financial performance, and high-quality environmental information disclosure by companies externally as well as internally

can in turn improve corporate financial performance. (2) investor sentiment plays a stable mediating role in the mechanism of the effect of environmental information disclosure on corporate financial performance, as detailed environmental information disclosure by companies can attract the attention of external investors, and the quality of environmental information disclosure improves the positive sentiment of investors, which in turn promotes the improvement of corporate financial performance.

The findings of this paper offer new ways for companies and investors to jointly promote their financial performance and corporate development: (1) Companies should improve their environmental information disclosure systems, etc., consciously undertake their obligations to social and environmental protection, and build competitive advantages in the same industry by improving the quality of environmental information disclosure. (2) Investors should receive high quality environmental information disclosure, grasp their own emotions, understand the risks of the enterprise, make correct and reasonable investment behaviour towards the enterprise, and obtain higher investment returns.

References

1. Xiao Shufang, Hu Wei. Research on Environmental Information Disclosure of Listed Companies in China [J]. *Journal of Beijing Institute of Technology (Social Science Edition)*, 2004 (05): 69-88.
2. Yao Sheng, Yang Jie, Liang Haotian. Geographical location, spatial heterogeneity of environmental regulation and selective disclosure of environmental information [J]. *Management Review*, 2016,28 (6): 192-204
3. Zong Ping, Yan Wang, Yang Ting, Tang Jian. Analysis of the impact of environmental information reports in heavily polluting industries on information asymmetry, [J]. *Accounting and Corporate Governance*, 2017 (07): 50-51.
4. Fu Yanping, Xiao Daqiao. Study on the impact of corporate environmental information disclosure on corporate performance [J]. *Modern Marketing (last issue)*, 2022 (08): 88-90
5. Yang Chunmin. Study on the impact of environmental information disclosure on enterprise performance [J]. *Contemporary Accounting*, 2021, (13): 100-102
6. Tian Xinjia, Zhang Guangmei. Environmental information disclosure, environmental regulation and business performance [J]. *Friends of Accounting*, 2020, (06): 43-49
7. Dong Shidi, Huang Ning. Environmental information disclosure quality, institutional pressure and corporate debt cost [J]. *China Market*, 2022 (30): 8-10.
8. Tang Guoping, Li Longhui. Environmental information disclosure, investor confidence and company value-empirical evidence from listed companies in Hubei Province [J]. *Journal of Zhongnan University of Economics and Law*, 2011, (06): 70-77
9. Levin, Xinyang, Wei Xiye, He Yinning. Investor sentiment and real business performance [J]. *Modern Business*, 2022 (05): 83-86
10. Yu Peng, Li Fenfang. Investor sentiment, the type of company issuance, and the wealth effect of shareholders [J]. *Accounting Newsletter*, 2016(09): 94-97
11. Yang Chunmin. Study on the impact of environmental information disclosure on enterprise performance [J]. *Contemporary Accounting*, 2021 (13): 100-102
12. Tang Yi, Lu Yiheng. Overview of the relationship between corporate environmental information disclosure and financial performance [J]. *China Management Informatization*, 2022,25 (09): 47-49.
13. Hu Hao, Zhong Mei. Environmental information disclosure, goodwill and enterprise performance [J]. *Cooperative Economy and Technology*, 2022 (17): 76-69
14. Shi Baojuan, Zhou Sitong, Zhang Lihua. An empirical study on the coupling and decoupling of environmental information disclosure quality and financial performance-based on the data of listed companies in heavily polluting industries [J]. *Economics and Management*, 2022,36 (06): 50-56
15. Sui Fangfang. The relationship between environmental information disclosure and economic performance of listed companies [J]. *Accounting Newsletter*, 2012 (15): 53-55