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Research on the Impact of Liability Insurance of Directors, Supervisors, and Senior Management Personnel on Environmental Information Disclosure

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Abstract

Based on the sample of A-share listed companies in Shanghai and Shenzhen from 2010 to 2021, the empirical study finds that: directors, supervisors, and senior executives' liability insurance is significantly positively related to the level of environmental information disclosure, and this result is still robust after the robustness test; Further analysis reveals that: (1) there is a stronger positive relationship between liability Insurance of directors, supervisors, and senior management personnel under state-owned enterprises and environmental information disclosure; And (2) higher audit quality can promote the impact of directors, supervisors and senior executives' liability insurance on environmental information disclosure levels; In addition, (3) internal incentives will also enhance the positive effect of directors, supervisors and senior executives' liability insurance on the level of environmental information disclosure. The article expands the research on directors, supervisors and senior executives' liability insurance, and provides empirical testing for companies to purchase directors, supervisors and senior executives' liability insurance from the perspective of environmental information disclosure.

Keywords

Information Disclosure; Liability Insurance of Directors; Supervisors and Senior Management Personnel; Corporate Governance.

1. Introduction

With the continuous development of the contemporary market economy, the issue of corporate governance is increasingly attracting people's attention. Among them, the legal responsibility of directors, supervisors, and senior management personnel is particularly important. As a risk management tool, directors, supervisors and senior executives' liability insurance can provide certain protection for enterprises and directors, supervisors and senior executives. It plays an important role in strengthening corporate governance, protecting the interests of directors, supervisors and senior executives, and promoting the stable development of the company. When a company purchases board of directors, supervisors and senior executives' liability insurance, it usually considers its environmental information disclosure situation, so that the insurance company can evaluate its risks and provide corresponding insurance protection. The disclosure of environmental information by a company can increase its transparency, enhance its sense of social responsibility and image. At the same time, if the company fails to fulfill its environmental obligations, it may cause environmental pollution and damage, thereby increasing the risk of the board of directors, supervisors, and senior executives bearing legal responsibility.

The main contributions of this article include: firstly, expanding the research on the economic consequences of directors, supervisors and senior executives' liability insurance. Existing literature is mostly based on research on the risk-taking of enterprises after purchasing directors, supervisors and senior executives' liability insurance (Guoliu Hu and Jun Hu , 2017 [1]; Wen Wen, 2017 [2]), investment efficiency (Guoliu Hu and Shaohua Li, 2014 [3]; Yang Zhao, 2018 [4]), innovation (Conggang Li and Rong Xu, 2019 [5]), and differentiation strategy (Guoliu Hu and Yu Wang, 2019 [6]).This article enriches the relevant literature on the economic consequences of directors, supervisors and senior executives' liability insurance from the perspective of environmental information disclosure; Secondly, research on the influencing factors of environmental information disclosure quality has been expanded. Existing literature has extensively explored the factors that affect the quality of environmental information disclosure, but few have studied its impact on environmental information disclosure from the perspective of directors, supervisors and senior executives' liability insurance. Therefore, this article will enrich the relevant literature on the factors that affect environmental information disclosure; Finally, this article further extends the governance effect of purchasing directors, supervisors and senior executives' liability insurance to the level of corporate governance, in order to provide empirical evidence for enterprises to improve their governance level, enhance their environmental information disclosure level, and achieve high-quality development.

2. Literature Review

2.1. The Economic Consequences of Directors, Supervisors and Senior Executives' Liability Insurance

Whether directors, supervisors and senior executives' liability insurance play a positive or negative role in corporate governance has always been a focus of debate in the academic community, and gradually formed two main theories: the risk-taking hypothesis and the external supervision hypothesis. Among them, the risk-taking hypothesis suggests that directors, supervisors and senior executives' liability insurance has an incentive effect on managers' risk-taking by resolving the risk of senior management personnel performing their duties and avoiding the risk of tiptoeing due to concerns about adverse consequences. For example, Guoliu Hu and Jun Hu (2017) [1] found that introducing directors, supervisors and senior executives' liability insurance can help enhance the risk-bearing capacity of enterprises; Zhaohui Hao and Guoliu Hu (2014) [7] found that the introduction of directors, supervisors and senior executives' liability insurance exacerbates managers' mergers and acquisitions in order to obtain private benefits; Li Lai et al. (2019) [8] found that after purchasing directors, supervisors and senior executives' liability insurance, the company engaged in more "short-term loans and long-term investments", which induced more risk decisions for managers and increased the operational risk of the enterprise. Gutierrez (2003) [9], Wei Wang and Yan Li (2002) [10] found that directors, supervisors and senior executives' liability insurance promotes managers' enthusiasm for fulfilling their duties, making them consider projects with high risks and returns, ultimately enhancing the company's value; Chen et al. (2016) [11] found that directors, supervisors and senior executives' liability insurance increased the level of enterprise risk-taking, reduced the quality of company information disclosure, and thus increased the cost of enterprise capital; Weng et al. (2017) [12] found that directors, supervisors and senior executives' liability insurance significantly increases the degree of radicalization of a company's financial reporting policies.

The external supervision hypothesis suggests that the introduction of insurance companies as external supervisors by directors, supervisors and senior executives' liability insurance will encourage managers to continuously improve their corporate governance capabilities. From the perspective of supervisory motivation, insurance companies have the motivation to take various measures through prior risk assessment, in process supervision, and post event efforts to reduce losses, actively playing a supervisory role (Conggang Li et al., 2020 [13]). For example, before applying for insurance, insurance companies conduct a comprehensive investigation of the client company, which serves as a deterrent to managers (Holderness, 1990 [14]) and often requires the client company to appoint sufficient independent directors to reduce risk (O'Sullivan, 1997 [15]); At the same time, insurance companies also participate as independent supervisors in corporate governance, such as constraining managers' misconduct through insurance contract terms (Core, 2000 [16]). Zhigang Zheng et al. (2011) [17] found that the establishment of directors, supervisors and senior executives' liability insurance clauses in the articles of association helps to limit the opportunism behavior of managers and reduce agency costs. Conggang Li et al. (2020) [13] found that directors, supervisors and senior executives' liability insurance can significantly increase executive compensation and performance sensitivity. Rongli Yuan et al. (2018) [18], Conggang Li, and Rong Xu (2020) [19] all found that directors, supervisors and senior executives' liability insurance play a positive external governance role in suppressing company violations.

2.2. The Influencing Factors of Environmental Information Disclosure

Based on agency theory, improving the quality of information disclosure can alleviate information asymmetry, effectively reduce agency costs, and a good level of corporate governance can promote enterprises to improve their environmental information disclosure system. Yongjun Tang et al. (2021) [20] believe that internal control can transform external environmental pressure into specific internal governance measures, and high-level internal control enables more truthful and reliable disclosure of environmental information, fully leveraging the "adhesive" effect. The size of management power has a significant impact on the implementation of environmental information disclosure policies. When there are conflicts with stakeholders, managers tend to disclose environmental information (Rong Huang and Xiaofan Peng, 2021 [21]). Feng Wang et al. (2020) [22] argue that executives may view environmental information disclosure as a tool for earnings management, and that different characteristics such as political background, salary, and scale of executives have varying impacts on environmental information disclosure and true earnings management. Enterprises with good environmental performance tend to disclose more environmental information and transmit positive environmental information. Stakeholders are willing to pay for the "green premium", which allows enterprises to obtain excess returns. Hongjun Wu (2014) [23] concluded that companies with strong environmental management capabilities and good environmental performance will disclose more detailed and verifiable environmental information. However, not all companies with excellent environmental performance have a high-quality level of environmental information disclosure, as it incurs a series of direct or indirect costs. Environmental information disclosure is only carried out when the benefits of disclosing environmental information outweigh the costs. Jun Lv (2012) [24] found that companies with a poor environmental performance increase their environmental information disclosure behavior in order to alleviate external pressures such as government and media, as well as concerns from stakeholders such as investors about their operating conditions.

2.3. Literature Review

In summary, directors, supervisors, and senior executives' liability insurance can provide certain protection, promote the effectiveness and standardized management of corporate governance, enhance the company's credibility and image, and thus enhance the company's competitiveness. At the same time, environmental information disclosure can promote environmental management and regulation of enterprises, improve transparency and sustainability of enterprises, increase investor trust and investment, reduce capital costs and financing difficulties of enterprises, and thus promote sustainable development of enterprises. The influencing factors of environmental information disclosure in existing literature mainly focus on internal governance structure and external regulatory environment, and there is no in-depth exploration of the impact mechanism of directors, supervisors, and senior executives' liability insurance on environmental information disclosure.

3. Theoretical Analysis and Hypothesis Formulation

When a company purchases board of directors, supervisors, and senior executives' liability insurance, it usually considers its environmental information disclosure situation, so that the insurance company can evaluate its risks and provide corresponding insurance protection. On the one hand, as a rational economic person, insurance companies conduct thorough investigations and evaluations of the basic situation of the enterprise and its directors and executives before the signing of insurance contracts, and continuously monitor and evaluate enterprise risks through professional risk control techniques during the execution of insurance contracts (Core, 2000 [16]), and strictly evaluate and review the behavior of directors and executives (Gillan and Panasian, 2015 [25]) play an external supervisory role. On the other hand, directors, supervisors, and senior executives' liability insurance play an important role in strengthening corporate governance, protecting the interests of directors, supervisors, and senior executives, and promoting the stable development of the company. Specifically, it can provide certain protection for directors, supervisors, and senior executives, reduce their risk taking, reduce their uncertainty and pressure in company decision-making, and thereby increase their confidence and independence in company decision-making. At the same time, in the context of the development of a green economy, directors, supervisors, and senior executives' liability insurance can promote transparency and standardized management of companies, strengthen supervision and constraints on the behavior of directors, supervisors, and high officials, improve the quality of environmental information disclosure, further improve the company's financial and market performance, and thereby increase investors' investment confidence.

Companies that purchase directors, supervisors, and senior executives' liability insurance usually have a high level of governance, which means that these companies have relatively sound supervision and constraint mechanisms for directors and supervisors, and pay more attention to risk management. Higher quality environmental information disclosure can reduce environmental risks and costs for enterprises, improve their environmental reputation and market competitiveness, and thereby enhance their profitability and value. Based on this, this article proposes the following research hypotheses:

H0: Under the same other conditions, directors, supervisors, and senior executives' liability insurance is conducive to improving the level of environmental information disclosure.

4. Research Design

4.1. Sample Selection and Data Sources

This article selects data samples from A-share listed companies in Shanghai and Shenzhen from 2010 to 2021, using the CSMAR database, Wind database, and manual collection and organization. The data is removed according to the following procedure:

(1) Excluding financial and insurance listed companies;

(2) Exclude observations with missing or abnormal data during the sample period;

(3) Excluding ST and * ST listed companies during the sample period.

4.2. Variable Definition and Model Construction

4.2.1. Explained Variable

The explained variable of this article is the level of environmental information disclosure (EID), see Table 1.

Table 1. Environmental information disclosure indicator system

<table>
<tr><th>Indicator type</th><th>Disclosure type</th><th>Disclosure items</th><th>Scoring criteria</th></tr>
<tr><td rowspan="19">Non-monetary environmental information disclosure</td><td rowspan="3">Environmental information disclosure carrier</td><td>Annual report of listed companies</td><td rowspan="31">Quantitative disclosure: 2 points
Qualitative disclosure: 1 point
Undisclosed:0 point</td></tr>
<tr><td>Social responsibility report</td></tr>
<tr><td>Environmental report</td></tr>
<tr><td rowspan="8">Environmental management disclosure</td><td>Environmental protection concept</td></tr>
<tr><td>Environmental goals</td></tr>
<tr><td>Environmental management system</td></tr>
<tr><td>Environmental education and training</td></tr>
<tr><td>Special action on environmental protection</td></tr>
<tr><td>Emergency mechanism for environmental matters</td></tr>
<tr><td>Environmental honors or rewards</td></tr>
<tr><td>The "three simultaneities" system</td></tr>
<tr><td rowspan="7">Environmental regulation and certification disclosure</td><td>Key pollution monitoring units</td></tr>
<tr><td>Pollutant discharge meets standards</td></tr>
<tr><td>Sudden environmental accidents</td></tr>
<tr><td>Environmental violations</td></tr>
<tr><td>Environmental petition cases</td></tr>
<tr><td>Has it passed ISO14001 certification</td></tr>
<tr><td>Has it passed ISO9001 certification</td></tr>
<tr><td rowspan="12">Monetary Environmental Information Disclosure</td><td rowspan="6">Environmental liability disclosure</td><td>Effluent discharge</td></tr>
<tr><td>COD emissions</td></tr>
<tr><td>SO2 emissions</td></tr>
<tr><td>CO2 emissions</td></tr>
<tr><td>Smoke and dust emissions</td></tr>
<tr><td>Industrial solid waste generation</td></tr>
<tr><td rowspan="6">Environmental performance and governance disclosure</td><td>Situation of waste gas emission reduction and control</td></tr>
<tr><td>Wastewater emission reduction and treatment situation</td></tr>
<tr><td>Dust and smoke control situation</td></tr>
<tr><td>Solid waste utilization and disposal situation</td></tr>
<tr><td>Control of noise, light pollution, radiation, etc</td></tr>
<tr><td>Implementation of clean production</td></tr>
</table>

At present, the measurement of the level of environmental information disclosure (EID) is mainly based on the project scoring method. Select the rating data of environmental liabilities,

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environmental management, environmental performance and governance, disclosure carriers, regulatory certification status, and other related items of listed companies in the CSMAR database, and conduct multidimensional and comprehensive measurements of the adequacy, significance, and reliability of the company's environmental information disclosure quality. Therefore, this article refers to the content scoring method of existing research (Wanjing Wang et al., 2021 [26]), and aggregates each score to measure the quality of environmental information disclosure of listed companies. The higher the total score, the more comprehensive and detailed the environmental information disclosure content is, and the more standardized the disclosure method is.

4.2.2. Explanatory Variable

This article refers to the research by Xiaole Li et al. (2023) [27], where Insurance is the proxy variable for directors, supervisors, and senior executives' liability insurance. If a listed company purchases directors, supervisors, and senior executives' liability insurance, it will be recorded as 1, and vice versa as 0.

4.2.3. Control Variables

Table 2. Definition and Description of control variables

Variable type	Name of variables	Symbol of variables	Definition of variables
Control variables	Profitability	ROA	Net profit/total asset balance
	Leverage	Lev	Total liabilities /total assets
	Enterprise size	Size	Total assets at the end of the period (in billions)
	Property nature	SOE	The value for state-owned enterprises is 1, otherwise it is 0
	Ownership concentration	Topten	Shareholding ratio of top ten shareholders (%)
	Industry attributes	Ind	The value for heavily polluting industries is 1, otherwise it is 0
	Duality	Dual	When two positions are combined, the value is 1, otherwise it is 0
Externalities	Industry	Industry	Wind Industry
	Year	Year	2010-2021

4.2.4. Modeling

To test the main hypothesis of this article, we refer to the research of Li Lai et al. (2019) [8], Brochet F et al. (2019) [28], and Xiaole Li et al. (2023) [27] to establish the following model for empirical testing:

$$\mathrm{EID}_{i,t} = \beta_0 + \beta_1 \mathrm{Insure}_{i,t} + \sum \beta_j \mathrm{Control}_{i,t} + \sum \mathrm{Industry} + \sum \mathrm{Year} + \varepsilon_{i,t} \quad (1)$$

5. Empirical Research and Analysis

5.1. Descriptive Statistics

Table 3 provides descriptive statistics on the main variables in this article. Firstly, the average EID is 8.254, slightly higher than the median of 6.000, indicating that the environmental information disclosure level of listed companies is relatively high, with a maximum value of 37.000. Secondly, it can be seen that the mean of Insure is 0.080, the median is 0, and the standard deviation is 0.271, indicating that there are still many companies with an insufficient willingness to purchase directors, supervisors, and senior executives' liability insurance (with

ISSN: 2688-9323

a minimum value of 0.000). The distribution of other variables also reflects the current status of environmental information disclosure of listed companies.

Table 3. Descriptive statistics

Variable	N	Mean	Min	Median	Max	SD
EID	18479.000	8.254	1.000	6.000	37.000	6.812
Insure	18479.000	0.080	0.000	0.000	1.000	0.271
ROA	18479.000	0.038	-1.856	0.037	0.590	0.073
Lev	18479.000	0.427	0.007	0.419	1.698	0.203
Size	18479.000	17.255	0.054	4.037	2733.190	72.411
SOE	18479.000	0.419	0.000	0.000	1.000	0.493
Topten	18479.000	58.689	3.588	59.467	101.160	14.971
Ind	18479.000	0.299	0.000	0.000	1.000	0.458
Dual	18479.000	0.256	0.000	0.000	1.000	0.436

5.2. Correlation Analysis

Table 4 presents the correlation analysis between the main variables in this article. The results indicate that there is a significant positive correlation between directors, supervisors, and senior executives' liability insurance and environmental information disclosure, which verifies the rationality of the main hypothesis in this article. In addition, the correlation between other variables is also in line with expectations, such as the positive relationship between company size and environmental information disclosure, and the higher level of environmental information in state-owned enterprises (SOE).

Table 4. Correlation analysis

	EID	Insure	ROA	Lev	Size	SOE	Topten	Ind	Dual
EID	1.000								
Insure	0.211***	1.000							
ROA	0.044***	-0.010	1.000						
Lev	0.147***	0.127***	-0.305***	1.000					
Size	0.206***	0.212***	-0.007	0.212***	1.000				
SOE	0.185***	0.184***	-0.068***	0.312***	0.168***	1.000			
Topten	0.102***	0.110***	0.185***	-0.072***	0.160***	-0.015**	1.000		
Ind	0.274***	0.010	-0.003	0.059***	0.012*	0.085***	0.007	1.000	
Dual	-0.100***	-0.079***	0.020***	-0.131***	-0.054***	-0.313***	0.025***	-0.070***	1.000

5.3. Main Effect Regression Analysis

Table 5 reports the regression results of Eq. (1). The results in column (1) show that when only industry and annual fixed effects are included, directors, supervisors, and senior executives' liability insurance has a significant positive impact on environmental information disclosure. After adding other control variables in Table 2 for regression, the results are shown in column (2),the Insure coefficient is 2.736, which is significant at the 1% level, indicating that under given conditions, the company's purchase of directors, supervisors, and senior executives' liability insurance will improve the level of environmental information disclosure, At this point, the main assumption of this article, H0, has been preliminarily verified.

ISSN: 2688-9323

Table 5. Main regression

	(1)	(2)
	EID	EID
Insure	4.335***	2.736***
	(21.17)	(13.86)
ROA		5.569***
		(8.37)
Lev		3.850***
		(15.51)
Size		0.012***
		(8.99)
SOE		1.748***
		(16.50)
Topten		0.030***
		(9.60)
Ind		2.458***
		(15.93)
Dual		-0.520***
		(-5.22)
Industry	Controlled	Controlled
Year	Controlled	Controlled
constant	6.979***	-1.564***
	(24.02)	(-3.92)
N	18479	18479
adj. R2	0.215	0.286

Note: The values in parentheses represent T-statistics: * * *, * *, and * represent significant values at the 1%, 5%, and 10% levels, respectively

5.4. Robust Test

5.4.1. Cluster Adjustment

To alleviate the possible heteroscedasticity problem, we conducted cluster adjustment regression on the enterprise level based on Eq. (1). The results are as shown in column (1) of Table 6. The Insurance coefficient is equal to the main effect regression coefficient (column (2) of Table 5) and is significantly positively correlated at the level of 1%, indicating that after the heteroscedasticity problem may exist in the mitigation model, the directors, supervisors, and senior executives' liability insurance still has a significant positive impact on environmental information disclosure, again supporting the main hypothesis H0 of this paper.

ISSN: 2688-9323

5.4.2. Group Regression

Due to the adjustment of accounting standards in China in 2018, we divided the sample into two groups before and after 2018, and conducted regression analysis separately. The results are shown in the (2) and (3) columns of Table 6, with the Insure coefficients of 2.570 and 2.738, respectively. The difference between the two groups of coefficients is not significant, and both groups of coefficients are significant at the 1% level. That is to say, in both cases, the quality of environmental information disclosure will be significantly affected by the directors, supervisors and senior executives' liability insurance. Based on this, the main hypothesis of this article has been further validated.

5.4.3. PSM

Table 6. Robust test

	(1)	(2)	(3)	(4)
	EID	EID	EID	EID
Insure	2.736***	2.570***	2.738***	2.642***
	(6.66)	(9.45)	(9.51)	(10.77)
ROA	5.569***	7.294***	3.808***	4.604**
	(6.01)	(7.23)	(4.58)	(2.48)
Lev	3.850***	3.391***	4.597***	5.662***
	(7.90)	(11.28)	(10.65)	(7.74)
Size	0.012***	0.021***	0.008***	0.007***
	(4.95)	(7.60)	(7.70)	(9.60)
SOE	1.748***	1.889***	1.517***	1.798***
	(7.28)	(14.58)	(8.36)	(5.82)
Topten	0.030***	0.022***	0.037***	0.077***
	(4.61)	(5.85)	(6.82)	(9.30)
Ind	2.458***	2.291***	2.825***	2.563***
	(7.37)	(12.65)	(9.99)	(5.50)
Dual	-0.520***	-0.395***	-0.709***	0.357
	(-2.83)	(-3.28)	(-4.18)	(0.96)
Industry	Controlled	Controlled	Controlled	Controlled
Year	Controlled	Controlled	Controlled	Controlled
constant	-1.564**	-1.056**	1.920***	-4.264***
	(-2.03)	(-2.30)	(3.02)	(-3.75)
N	18479	11562	6917	2944
adj. R2	0.286	0.233	0.319	0.386

Note: The values in parentheses represent T-statistics: * * *, * *, and * represent significant values at the 1%, 5%, and 10% levels, respectively

This article studies the impact of directors, supervisors and senior executives' liability insurance on environmental information disclosure, and we use propensity score matching

(PSM) to alleviate certain endogeneity issues. Specifically, this article will use the sample of purchasing directors, supervisors and senior executives' liability insurance as the processing group, and vice versa as the control group. The control variables in Table 2 will be selected as the covariates, while the Industry and Year are fixed. The 1:1 nearest neighbor matching method will be used to match the scores of individuals. The final matching samples and regression results are shown in column (4) of Table 6. The results show that after the endogeneity of the model has been alleviated, the directors, supervisors and senior executives' liability insurance still significantly and positively affects the quality of environmental information disclosure.

5.5. Further Analysis

5.5.1. Control Hierarchy

This article further divides the company sample into state-owned enterprises and non-state-owned enterprises. When SOE is 1, it is a state-owned enterprise, otherwise it is a non-state-owned enterprise; And multiply SOE with Insure to obtain the variable Insure_ SOE, later Insure_ SOE was added to Eq. (1) for regression, and the results are shown in column (1) of Table 7, and Insure_ SOE coefficient is 1.053, which is significant at the 1% level. The above results indicate that the positive effect of directors, supervisors and senior executives' liability insurance on environmental information disclosure is stronger in state-owned enterprises, reflecting the advantages of overseas enterprises themselves, which leads to a more significant implementation effect.

5.5.2. Audit Quality

Next, we regress whether the enterprise hires auditors from the four major international accounting firms, setting the dummy variable Big4. If the auditor hired by the enterprise comes from the four major international accounting firms, the value is 1, otherwise it is 0; And multiply Big4 by Insure to obtain the variable Insure_Big4, insert Big4, Insure_Big4 added to Eq. (1), and the regression results are shown in column (2) of Table 7, the Insure_Big4 coefficient is 2.024, which is significant at the 1% level. From this, it can be seen that the positive effects brought by companies hiring auditors from the four major international firms are more significant.

5.5.3. Internal Incentives

Finally, we consider the impact of internal incentives on information disclosure, which means that after alleviating the agency problem, the management team, based on the company's interests, improves the level of environmental information disclosure, thereby enhancing the company's social image. Therefore, we set the dummy variable GJ based on whether the enterprise conducts equity incentives. If the enterprise conducts internal incentives, the value is 1, otherwise it is 0; And multiply GJ by Insure to obtain the variable Insure_GJ, restate Eq. (1) again, and the results are shown in column (3) of Table 7, Insure_ GJ coefficient is 0.855 and significant at the 1% level. From this, it can be seen that internal incentives within enterprises will promote the positive impact of directors, supervisors, and senior executives' liability insurance on environmental information disclosure.

Table 7. Further analysis

	(1)	(2)	(3)
	EID	EID	EID
Insure	2.438***	1.833***	2.653***
	(8.14)	(9.48)	(8.78)
Insure_SOE	1.053***		

	(2.96)		
SOE	1.823***	1.785***	2.038***
	(17.49)	(17.77)	(18.66)
Insure_Big4		2.024***	
		(5.20)	
Big4		3.024***	
		(13.62)	
Insure_GJ			0.855**
			(2.22)
GJ			0.607***
			(5.31)
ROA	5.969***	5.480***	5.840***
	(9.44)	(8.75)	(8.56)
Lev	4.553***	4.182***	4.540***
	(18.68)	(17.29)	(18.63)
Size	0.001	0.002	0.001
	(0.66)	(0.91)	(0.35)
Topten	0.037***	0.028***	0.040***
	(12.41)	(9.30)	(13.03)
Ind	2.481***	2.477***	2.502***
	(16.37)	(16.52)	(16.06)
Dual	-0.525***	-0.518***	-0.531***
	(-5.06)	(-5.04)	(-5.28)
Industry	Controlled	Controlled	Controlled
Year	Controlled	Controlled	Controlled
constant	-2.232***	-1.677***	-2.847***
	(-5.48)	(-4.15)	(-6.91)
N	18479	18479	18479
adj. R2	0.273	0.289	0.275

Note: The values in parentheses represent T-statistics: * * *, * *, and * represent significant values at the 1%, 5%, and 10% levels, respectively

6. Conclusion

In the emerging market of China, studying the economic impact of environmental information disclosure quality has profound significance. Therefore, based on the A-share listed companies in Shanghai and Shenzhen from 2010 to 2021 as research samples, we explore whether the purchase of directors, supervisors, and senior executives' liability insurance by enterprises has a significant impact on environmental information disclosure.The research results show that the purchase of directors, supervisors and senior executives' liability insurance will improve the level of environmental information disclosure. After the robustness test, the two still have a significant positive correlation after alleviating the heteroscedasticity and endogeneity problems. Further research has found that compared to non-state-owned enterprises, state-owned enterprises have a greater positive effect on environmental information disclosure through directors, supervisors, and senior executives' liability insurance, and both audit quality and internal incentives will expand the positive impact of directors, supervisors, and senior executives' liability insurance on environmental information disclosure.

The above conclusions have the following implications for environmental information disclosure: Firstly, the content and time limit of enterprise environmental information disclosure should be quickly implemented, and the supervision, management, and penalties for enterprises should be implemented in the new management measures, in order to further accelerate the governance effect of information disclosure. Secondly, linking internal and external supervision mechanisms to further enhance the sustainability of ensuring the quality of information disclosure under good internal governance.

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