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Impact of Environmental Information Disclosure on Certified Public Accountant Audit of Chinese Listed Companies in the Energy Industry

Dawei Xue¹, Jiashan Wang¹, Zhiwei Zhu²

¹Institute of Petroleum Economics and Management, Northeast Petroleum University, Daqing 163318, China

²Department of Management, University of Louisiana at Lafayette, Lafayette, LA 70504, USA

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Abstract

This paper sets up an individual fixed-effect model. Taking environmental information disclosure index and independent report as an alternative to environmental information disclosure, this paper studies the impact of environmental information disclosure on Certified Public Accountants' audit fees and audit opinions. The results show that the environmental information disclosure level of the Chinese listed companies in the energy industry is positively correlated with the audit fees of CPA, and negatively correlated with the issuance of non-standard audit opinions, but whether the disclosure of independent reports has no significant impact on audit fees.

Keywords: environmental information disclosure, audit opinion, audit cost

AMS 2010 codes: K1358

1 Introduction

The rapid development of the economy has brought great pressure to the environment. In recent years, environmental problems happen frequently [1]. There are incidents such as the international Gulf of Mexico crude oil leakage accidents. The Ministry of environmental protection issued in 2010 "Guide to Environmental Information Disclosure of Chinese listed companies" (hereinafter referred to as the "guide"), clear requirements of thermal power, coal, petrochemical and other industries 16 Regular disclosure of environmental information, petroleum, natural gas, coal, electricity and other energy industry is Chinese pillar industry, but also easy to cause environmental pollution of heavy polluting industries at present, the stakeholders more and more environmental problems of the energy industry invested a great deal of attention [2]. The twenty-first century is a new century that advocates low-carbon energy-saving and green environmental protection. The goal of enterprises is not only limited to the maximization of economic benefits but also to protect the environment and fulfill social responsibilities. While in developing the economy, enterprises should also maintain the balance of the ecosystem and take the road of sustainable development to maximize its value and achieve a new goal of the

development. Therefore, it is of great significance to study the impact of environmental information disclosure of listed energy companies on the audit of certified public accountants. Theoretically, it broadens the research on the impact factors of audit opinions and audit fees and promotes the development of interdisciplinary subjects. In practice, it not only helps enterprises to choose the degree of environmental information disclosure but also promotes the development of certified public accountants' environmental audit. At the same time, there are two research purposes for analyzing the impact of environmental information disclosure on audit opinions and audit costs. On the one hand, it can provide a certain theoretical reference for enterprises to increase the emphasis on environmental information disclosure and how to disclose environmental information to the outside world; on the other hand, it can also pave the way for certified public accountants to carry out the environmental audit.

2 Literature Review

In the study of the motivation of environmental information disclosure, Fraser and Brown put forward the "stakeholder responsibility and critical theory," which explains the inevitable relation between social responsibility and environmental accounting. They think enterprises should shoulder the fiduciary responsibility to society, social stakeholders for enterprise environmental information disclosure to ensure that their legitimate rights and interests [3]. In terms of the mode of environmental information disclosure, Friedman and Miles believe that the disclosure mode of environmental information is mainly qualitative, and the information disclosure between enterprises is not comparable [4]. Regarding the determinants of environmental information disclosure, Richardson and Welker found that there was a positive correlation between social disclosure and cost of equity capital; environmental information disclosure will bring some economic consequences, which may affect the stock investors outside stakeholder's benefit company [5]. Tuwaijri et al. selected the waste recycling rate in the TRI database as an indicator of environmental performance and studied the relationship between environmental information disclosure, and environmental performance and economic performance, which proved the positive correlation between environmental information disclosure and the two [6]. Blacconiere and others have found that the disclosure of environmental information helps to improve the value of the enterprise [7]. In terms of audit opinion research, Warfield et al. (1995) believed that the corporate governance structure is an important factor influencing the audit opinion issued by certified public accountants. A good internal governance structure can send a strong signal to certified public accountants, prove that the company has a low risk of illegal activities, and reduce the risk of receiving non-standard audit opinions. Goh and Li (2011) found that internal governance structure defects will directly affect the company's sustainable operation issues. Eventually, the certified public accountants will issue non-standard audit opinions. In terms of audit costs research, according to the study of Simunic's classic paradigm, the main factors that affect the audit fees of certified public accountants are audit cost, audit risk, and the normal profit portion obtained by accounting firms. Among them, there is a positive correlation between audit risk and audit fees, and the positive impact of client size and audit fees is the most significant. Nikkinen (2005) pointed out that there is a significant positive correlation between corporate operating risk, financial risk, and certified public accountants' audit fees. Hogan and Wilkins (2008) and Hoitash (2008) studied the relationship between internal control deficiencies and audit fees from the perspective of audit risk. The results show that audit fees increase with the severity of internal control deficiencies.

Since twenty-first Century, the disclosure of environmental audit into China, China had the awareness and understanding of environmental information disclosure, is the first by Liu Dazhu, Wang Benqiang et al. Studied the reason of government environmental audit in China, and the concept of environmental audit defines Chinese situation, discusses the development of government environmental audit based on the road [8]. Li Xia and others put forward the theory of circular economy, which explains the motivation and the enthusiasm of corporate environmental information disclosure [9]. In terms of the mode of environmental information disclosure, Xu Jialin and Cai Chuanli believe that enterprises should independently disclose environmental reports, mainly through environmental pollution reports, environmental performance reports, environmental profit statements, environmental balance sheets, and other environmental information disclosure. In terms of influencing factors

of environmental information disclosure, Tang Yali, Chen Zili and others analyze the influencing factors of environmental information disclosure by empirical analysis. The results show that asset size and corporate performance of Chinese listed companies are positively correlated with the environmental information disclosure index [10, 11].

Through the combing and analysis of literatures can be found, the foreign research on environmental information disclosure of domestic early, domestic research results mainly in the theoretical research of environmental audit, a small amount of empirical research on the influencing factors of environmental information disclosure analysis, even a small amount of research results related to environmental information audit methods, but in general, operability is not strong and the lack of in-depth study, research on the CPA audit of the more less, in comparison, foreign research on environmental audit, whether in a theoretical research or empirical research in China are mature, therefore, for environmental information disclosure has theoretical and practical significance for the research on CPA audit effect. This will open a new world for the environment of social audit and will also guide the CPA audit.

3 Empirical analysis

3.1 Research hypothesis

According to the research of Simunic classic paradigm, the factors that affect the audit fees of CPA include audit cost factors, audit risk factors, and normal profits obtained by CPA firms [12, 13]. As early as 2006, the Ministry of Finance has issued relevant auditing standards to regulate CPA's consideration of environmental matters of audited units in financial statements auditing. From the perspective of audit risk theory, the environmental problems may lead to serious financial consequences and affect the audit risk of CPAs. Affected by the complexity of environmental information audits, accounting firms may consume more human and material resources, and certified public accountants will maintain professional suspicion and obtain more audit evidence to reduce inspection risks. Therefore, the audit of financial statements considering environmental information may increase the audit fees. Based on the "deep pocket" theory, CPAs play the role of risk bearers and guarantors. In an unpredictable external environment, once a company experiences financial crisis or bankruptcy, creditors and investors will be held accountable by CPAs. Generally, accounting firms and CPAs will bear a certain amount of damage. Therefore, this risk is often taken into account when making audit pricing, which affects the audit fees decision to a certain extent. In the process of an audit of environmental information disclosure, CPA will invest more resources to verify the disclosed environmental information, which is bound to increase audit costs and improve audit risk, resulting in increased audit fees. Therefore, two hypotheses are put forward.

Hypothesis 1: The environmental information disclosure index of the Chinese listed companies in the energy industry is positively related to the audit cost of CPA.

Hypothesis 2: The disclosure of independent reports from the Chinese listed companies in the energy industry is significantly positively related to the audit fees of CPA.

The influence factors of CPA audit opinion are as follows. On the one hand, it depends on whether the CPA has sufficient competence to determine whether the overall financial statements are free from material misstatements due to error or fraud, and on the other hand it also depends on whether the CPA can maintain the independence of the audit process, the audit objective, and published opinions. The improvement of the quality of environmental information disclosure can send a signal to the society of green development of enterprises, attract potential investors, and benefit the long-term development of enterprises. The improvement of the quality of environmental information disclosure can also promote friendly relations between various stakeholders and reduce the risk of corporate litigation. These may affect the audit risk of CPAs. From the above analysis, it can be seen that corporate risk affects the audit risk of CPAs, and the disclosure of environmental information by companies will reduce the corporate risk to a certain extent, which will affect the assessment of audit risk. When the level of corporate environmental information is low, the risk of corporate operations and litigation

increases, and the audit risk also increases accordingly, which may increase the risk of obtaining non-standard audit opinions. Environmental auditing involves multidisciplinary and multi-field cross integration. Therefore, CPA faces many challenges in the recognition and measurement of environmental information. However, at present, relevant guidelines are issued in China. There is no specific standard for an audit of financial statements under environmental information. CPAs mainly rely on professional judgment to send standard audit opinions, and therefore they should be more cautious about issuing audit opinions. Hence, hypothesis three and hypothesis four are proposed.

Hypothesis 3: The environmental information disclosure index of the Chinese listed companies in the energy industry is significantly negatively related to the non-standard audit opinion published by CPA.

Hypothesis 4: The disclosure of independent reports from the Chinese listed companies in the energy industry is significantly negatively related to the non-standard audit opinion published by CPA.

3.2 Data sources

In this paper, 2012–2016 years of Shanghai and Shenzhen two energy industry Chinese listed companies as research samples, the energy industry mainly for oil, coal, electricity and other traditional energy industries, excluding data missing samples, the final sample number of 460. The sample data were derived from the the A shares of the Chinese listed companies in Shanghai and Shenzhen stock markets. The annual financial reports retrieved from the samples are derived from the huge tide information network. The basic financial data are derived from the Taiwa database, the CCER database, the environmental information disclosure index, and the disclosure of independent reports through the review of the annual report, the social responsibility report, and the environment Reports, reports on sustainable development, and so on are manually processed; the data processing tools are mainly evIEWS8.0, stata12.0, and excel.

3.3 Research variable

3.3.1 Interpreted variable

This paper mainly studies the impact of environmental information disclosure on the CPA audit of the Chinese listed companies in the energy industry, so the explanatory variables are financial report, audit fees and audit opinions. The audit fee is expressed in AF, and the audit opinion is expressed in OP, which is divided into two categories, such as the standard audit opinion and the non-standard audit opinion.

3.3.2 Explanatory variable

Environmental Protection Bureau in 2010 issued a “guide” based on the requirements of the heavy pollution industry’s regular disclosure of environmental information and independent environmental report, but according to the statistical data of the Chinese listed companies, the results are not satisfactory. Therefore, it is necessary to study the relationship between “disclosure independent report” and “audit opinion of certified public accountants and audit fees.” This paper uses the “environmental information disclosure index” and “whether to disclose independent reports” as an alternative to the level of environmental information disclosure.

The environmental information disclosure index is mainly based on eight environmental information required by the guide, which are as follows. The occurrence of major environmental problems, the environmental impact assessment, the implementation of the “three simultaneous” system, the discharge of the pollutants, the handling and disposal of the general industrial solid waste and hazardous waste according to law, and the total amount, the completion of emission reduction tasks, the payment of sewage charges according to law, the implementation of cleaner production, and the establishment and operation of the environmental risk management system. If the quantitative disclosure is 2 points, the qualitative disclosure is 1 point, and the 0 points are not disclosed, the environmental information disclosure index of Sample Firms is 16 points. If an independent report is disclosed, an independent environmental report, a social responsibility report, and a category of reports in the sustainable development report are recorded as 1 point or 0 point.

Table 1 Variable summary table

	Variable name	Identification	Variable meaning
Interpreted variable	Audit fees	lnAF	Natural logarithm of audit fees
	Audit opinion	OP	The non-standard audit opinion is 1, and the standard audit opinion is 0.
Explanatory variable	Whether an independent report is disclosed	IR	The independent report was 1, otherwise 0
	Environmental information disclosure index	EDI	The guide requires the disclosure of 8 environmental information points
control variable	Internal controls	lnICI	The natural logarithm of the de Bo control index in this year
	Asset liability ratio	LEV	Total liabilities/year-end assets at the end of the year
	Net interest rate	ROE	Net profit/net assets
	Accounts receivable/total assets	Receivable	Accounts receivable/total assets
	Turnover rate of mobile assets	CAT	Average balance of operating income/current assets
	Asset scale	lnAS	Natural logarithm of total assets
	Site of a listed company	lnGDP	The natural logarithm of the GDP in the site of the listed company

3.3.3 Control variable

In the selection of control variables, this paper uses a content analysis method to study and summarize the existing results of scholars' influence on audit opinion and audit fees. Scholars have done a lot of research on the influencing factors of audit opinions. After summing up, they found that the factors mainly focused on financial characteristics and company characteristics. The final control variables are shown in Table 1.

3.3.4 The establishment of the model

Based on the definition and measurement of variables, we establish the impact model of environmental information disclosure on audit opinion and audit fees. The multiple regression models are as follows:

Model 1: Multiple regression model of the impact of environmental information disclosure on audit costs

$$\ln AF = \beta_1 + \beta_2 EDI_{it} + \beta_3 \ln ICI_{it} + \beta_4 IR_{it} + \beta_5 LEV_{it} + \beta_6 ROE_{it} + \beta_7 \ln AS_{it} + \beta_8 Receivable_{it} + \beta_9 \ln GDP_{it} + \beta_{10} OP_{it} + \delta_{it} \quad (1)$$

Model 2: Multiple regression model of the impact of environmental information disclosure on the audit opinion

$$OP = \alpha_1 + \alpha_2 EDI_{it} + \alpha_3 IR_{it} + \alpha_4 LEV_{it} + \alpha_5 ROE_{it} + \alpha_6 CAT_{it} + \alpha_7 \ln AS_{it} + \delta_{it} \quad (2)$$

Among them, *I* is the section unit of each energy industry, *t* is time, α_i and β_i are regression equation parameters, and δ_{it} is a random error term.

3.3.5 Sample description

In this paper, the variables of model 1 and model two are descriptive statistics. As shown in Table 2, the maximum audit cost is 17.93, the minimum value is 11.92 and the mean value is 14.2393. Because the mean comparison is close to the minimum value, the majority of audit fees can be lower for the sample enterprises. The maximum value of audit opinion is 1, the minimum value is 0, the mean value is 0.0256, and the mean value

Table 2 Descriptive statistics of variables

	Maximum	Minimum	Mean	Std. Dev.
lnAF	11.92	17.93	14.2383	1.01210
OP	0.00	1.00	0.0256	0.15823
EDI	0.00	16.00	4.9829	4.13422
IR	0.00	1.00	0.4423	0.49719
lnICI	0.00	6.89	6.4050	0.74605
LEV	0.02	1.56	0.5631	0.18172
ROE	-1.54	0.98	0.0634	0.12431
lnAS	20.23	28.51	23.4460	1.60545
Receivable	0.00	0.40	0.0517	0.04902
lnGDP	0.68	2.47	1.6219	0.40569
CAT	0.06	19.87	2.3136	1.83478

Table 3 Unit Root test for panel data

Variable	Levin, Lin & Chu t*test	ADF test	PP test	Stationarity
lnAF	0.0000	0.0000	0.0000	Stable
OP	Virtual variable			Stable
IR	Virtual variable			Stable
EDI	0.0000	0.0003	0.0001	Stable
lnAS	0.0132	0.4896	0.0050	Stable
Receivable	0.0000	0.0004	0.0000	Stable
ROE	0.0000	0.0000	0.0000	Stable
lnICI	0.0000	0.0001	0.0001	Stable
lnGDP	0.0000	0.2079	0.0000	Stable
LEV	0.0000	0.0009	0.0000	Stable
CAT	0.0000	0.0008	0.0000	Stable

is closer to the minimum value, so most of the sample enterprises have obtained the standard audit opinion. The maximum value of the environmental information disclosure index is 16, the minimum value is 0, the mean value is 4.9829, indicating that the overall disclosure level of the sample enterprises is moderate and the standard deviation is 4.1342, indicating that the environmental information disclosure level of the Chinese listed companies in the energy industry has a great difference.

3.3.6 Unit root test for panel data

Because panel data reflect two-dimensional information of time and section, there may be unit-roots. To prevent false regression or pseudo regression, we need to test the stationarity of data. Different from the time series, the unit root test of the panel data is to use the cross-section of all panel variables as a whole to carry out the unit root test. When the original sequence is not stable, the first order lag or two order lag of the unit root can be selected, that is, continue to check the first or the two order differences of the data until the data is stable. To ensure the accuracy of test results, this paper uses Levin for panel data unit root test, Lin& Chu t* test, ADF test, and PP-Fisher test, if they are 5% of the most important level denied the existence of the unit root hypothesis, the sequence can be considered to be a stationary sequence, and on the contrary, it is an unstable sequence. The results are shown in Table 3.

3.3.7 Selection of regression model and regression analysis

3.3.7.1 Panel data estimation

According to whether the constant term and the coefficient vector are constants, the panel data model can be divided into three types: mixed regression model, individual fixed-effect model, and the random effect model. In the panel data multivariate regression analysis, the most important thing is to choose the suitable model and the test model to reach the best conclusion, which conforms with reality. Mixed regression model assumes “intercept” and the “explanatory variable coefficient” is the same for all members of the individual section, which assumes that the members’ section has no individual effect and no structural change; the solid effect model and the random effect model are variable intercept models, assuming that the interface of different members have different intercepts. But the “random variable” of the random effect model has nothing to do with each “explanatory variable.” To determine which model a panel data belongs to, we first use the covariance analysis to conduct the Fisher test to determine whether the mixed selection regression model or the individual fixed-effect model. The F statistics expression is as follows:

$$F = \frac{(SSE_{\sigma} - SSE_{\omega}) / (N - 1)}{SSE_{\omega} / (NT - N - K)} \sim F_{\alpha}(N - 1)(NT - N - K) \quad (3)$$

Among them, the SSE sigma represents the constraint model, which is the sum of the residuals of the mixed regression model, and the SSE Omega represents the unconstrained model, which is the sum of the residuals of the individual fixed-effect model. The unconstrained model has more than N-1 estimated parameters than the constrained model. If the value of the calculated F statistics is greater than the set significant level of critical value, then the original hypothesis is rejected, and the selection of the individual fixed effect model is more appropriate. If it is less than the critical value, the mixed data model is more suitable. According to the estimation of the results of panel data, the F statistics of model one and model two are all larger than the critical value.

3.3.7.2 Hausman Test

First, the individual fixed effect model was selected by the PP test. Second, a random effect model was established, and the individual fixed effect model or random effect model was established by the Hausman test. The original hypothesis of the Hausman test was that the individual fixed effect was independent of the regression variable. If the test results show that the original hypothesis is accepted, the random effect model should be used, and on the other hand, the individual fixed-effect model is used. The results of model one and model two are mentioned in table 4 and table 5.

The results of the Hausman test show that all the test statistics are less than 5%. It is proved that on the level of importance of 5%, all the models one refuse the original hypothesis, that is, the model of individual fixed effect should be established in the model of audit fees and audit opinion.

3.3.7.3 Regression analysis

Through the F test and Hausman test, the rational regression model was determined, and the individual fixed effect model was established. The regression analysis of model one and model two was carried out as mentioned in table 6 and table 7.

From the regression analysis of the individual fixed effect model of table 6, we can see that the index of environmental information disclosure and the regression coefficient of the independent report are positive. At the level of 5%, the impact of the environmental information disclosure index on CPA audit cost is significant (P-value is less than 0.05). Significantly, the environmental information disclosure index increased by 1.4883% and the audit cost increased by 1%. In the control variables, the asset-liability ratio and the asset scale had a

Table 4 The Hausman test of the first model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnAF	0.214996	0.074391	2.890083	0.0042
IR	0.078676	0.012515	6.286496	0.0000
EDI	0.375081	0.032331	11.601180	0.0000
AS	1.274527	0.824980	1.544918	0.1236
Receivable	-0.066970	0.040803	-1.641311	0.1020
ROE	0.009643	0.023033	0.418649	0.6758
CR	0.063361	0.063778	0.993458	0.3214
BIG10	0.033850	0.082914	0.408255	0.6834
OP	-0.012769	0.155756	-0.081981	0.9347
Indr	-0.114389	0.093267	-1.226469	0.2211
C	4.978372	0.741695	6.712159	0.0000
Weighted Statistics				
R-squared		0.613107	Mean dependent var	3.504279
Adjusted R-squared		0.597994	S.D. dependent var	0.482715
S.E. of regression		0.195848	Sum squared resid	9.819240
F-statistic		40.568190	Durbin-Watson stat	1.280906
Prob(F-statistic)		0.0000		
Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	Prob.
Cross-section random	28.022086		28.022086	0.0009

significant impact on the audit costs. R square =0.8577 shows that the model has a good fitting degree, and the DW value is =1.6317, indicating that there is no autocorrelation in the model, and the significant probability =0 of the F value indicates that the overall regression effect of the equation is significant.

From the regression analysis of the individual fixed effect model of table 7, we can see that the index of disclosure of environmental information and the regression coefficient of whether the independent report is disclosed is negative, and it conforms with the hypothesis. At the level of importance of 5%, the impact of both on the audit opinion of CPA is significant (P-value is less than 0.05), and the environmental information disclosure index is reduced by 0.8358.%, the probability of CPAs to publish non-standard audit opinions increased by 1%, the degree of independent disclosure of environmental reports was reduced by 6.5059%, and the probability of CPAs for non-standard audit opinions increased by 1%; in the control variables, the asset-liability ratio had a significant impact on the audit opinion and showed a significant positive correlation. Significant negative correlation. R square =0.6628 shows that the model has a good fitting degree, and the DW value is =1.8655, indicating that there is no autocorrelation in the model, and the significant probability =0 of the F value indicates that the overall regression effect of the equation is significant.

3.3.8 Cointegration test of the EG two-step method

To judge whether the sequence of panel data has a long-term stable relationship, it is necessary to have a cointegration test. In this paper, the EG two-step method is used for the cointegration test of panel data, and the unit root test is done by regression panel residuals. If the residual sequence is stable, the model is the

Table 5 The Hausman test of second models

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDI	-0.007839	0.002926	-2.678837	0.0077
IR	-0.018763	0.022368	-0.838815	0.4020
LEV	0.136951	0.054196	2.526977	0.0118
ROE	-0.071547	0.058366	-1.225846	0.2209
CAT	-0.004694	0.004759	-0.98647	0.3244
lnAS	0.001107	0.008603	0.128687	0.8977
C	-0.01479	0.189842	-0.077909	0.9379
R-squared		0.056599	Mean dependent var	0.012072
Adjusted R-squared		0.044104	S.D. dependent var	0.122638
S.E. of regression		0.119903	Sum squared resid	6.512677
F-statistic		4.529591	Durbin-Watson stat	1.476338
Prob(F-statistic)		0.000179		
		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		14.446729	6	0.0250

cointegration equation of the variable. On the other hand, the model is not a cointegration equation, that is, there is no long-term stable relationship. The test results are shown in Table 8, and the P-value is less than 0.05. The variables of the model are cointegration equations.

4 Research Conclusions

(1) The impact of environmental disclosure index on audit fees.

The results show that the environmental information disclosure index of the Chinese listed companies in the energy industry has a positive and significant impact on audit fees, thus validating the hypothesis. That is, if the audit customer's disclosure of environmental information is higher, the CPA will spend more resources to verify the information disclosed, and the CPAs should give more professional judgment to avoid the audit risk when they confirm the environmental information. To reduce the risk of inspection, the accounting firm will consume more human and material resources to reduce the risk of inspection. CPA will maintain professional doubt, obtain more audit evidence, and increase the audit cost.

(2) Whether disclosure of independent reports affects audit fees?

The results show that there is a positive correlation between the disclosure of independent reports and audit costs in the energy industry, but the disclosure of independent reports has no significant impact on audit costs and is contrary to the hypothesis. It shows that for environmental audit matters, it is the details of environmental information disclosure, not the carrier. Even if the carrier of environmental information is an independent report, it has little influence on the audit fees.

(3) The impact of environmental disclosure index on non-standard audit opinions.

The results show that the environmental disclosure index of the Chinese listed companies in the energy industry is negatively and significantly influenced by the publication of non-standard audit opinions, thus validates

Table 6 The individual fixed effect model of the first model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDI	0.014883	0.007007	2.123877	0.0344
IR	0.038175	0.063217	-0.603871	0.5463
lnICI	-0.022225	0.012788	-1.738054	0.0831
LEV	-0.346644	0.164509	-2.107147	0.0358
ROE	-0.149108	0.119737	-1.245295	0.2138
lnAS	0.351762	0.036519	9.632408	0.0000
Receivable	-0.286922	0.585266	-0.490242	0.6243
lnGDP	0.166957	0.131356	1.271028	0.2045
OP	0.029439	0.105057	0.280222	0.7795
C	6.020103	0.806983	7.460013	0.0000
R-squared		0.857692	Mean dependent var	14.22741
Adjusted R-squared		0.845907	S.D. dependent var	1.013858
S.E. of regression		0.235802	Akaike info criterion	0.139579
Sum squared resid		19.96135	Schwarz criterion	1.046652
Log-likelihood		68.8969	Hannan-Quinn criteria	0.496765
F-statistic		81.26382	Durbin-Watson stat	1.63175
Prob(F-statistic)		0.0000		

the hypothesis. The relationship between enterprise and society is interdependent and interdependent. The improvement of the quality of environmental information disclosure can transmit the signal of green development to the enterprise, attract potential investors, benefit the long-term development of the enterprise, promote the friendly relations among the stakeholders and reduce the risk of enterprise litigation. When auditing customers' detailed and independent disclosure of environmental information, the credibility of Certified Public Accountants is increased. On the contrary, when audit clients have a low level of environmental information disclosure, they will cause professional suspicion of CPAs and make them more prudent to publish audit opinions.

(4) Whether disclosure of independent reports affects non-standard audit opinions.

The results show that the disclosure of independent reports by the Chinese listed companies in the energy industry is negative and significant, which confirms the hypothesis. Similar to hypothesis three, the disclosure of independent environmental information reports reflects the importance of enterprises to environmental protection and social responsibility performance, to a certain extent, to reflect the state of corporate governance, and to help CPAs to publish standard audit opinions.

5 Policy suggestion

In the “guide” issued by the Ministry of Environmental Protection, the Chinese listed companies in the heavy pollution industry regularly disclose environmental information and independent environmental reports, but the results of the implementation are poor. On the one hand, according to the analysis results of environmental information disclosure to the CPA audit, it not only guides CPA audit but also provides help for enterprises

Table 7 Individual fixed effect model of second models

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDI	-0.008358	0.003426	-2.439621	0.0152
IR	-0.065059	0.030845	-2.109258	0.0356
LEV	0.252573	0.077228	3.270495	0.0012
ROE	-0.016008	0.062562	-0.255879	0.7982
CAT	-0.009965	0.006305	-1.580567	0.1149
lnAS	-0.02748	0.016934	-1.622767	0.1055
C	0.621527	0.39773	1.562688	0.1190
R-squared		0.662835	Mean dependent var	0.026087
Adjusted R-squared		0.545694	S.D. dependent var	0.159567
S.E. of regression		0.118801	Akaike info criterion	-1.236234
Sum squared resid		5.109125	Schwarz criterion	-0.356103
Log likelihood		382.3339	Hannan-Quinn criter.	-0.889657
F-statistic		4.804775	Durbin-Watson stat	1.865558
Prob(F-statistic)		0.0000		

Table 8 Cointegration test

Augmented Dickey-Fuller test statistic	t-statistic	Prob.*
The first model	-20.66770	0.0000
The second model	-16.42007	0.0000

to disclose environmental information. On the other hand, environmental problems are serious, environmental pollution incidents are frequent, and therefore it is necessary to have an environmental audit in China. It is still in the initial stage, mainly dominated by government audits. The conclusions of this study are the foreshadowing of broadening the audit subjects and promoting the development of environmental auditing. This paper puts forward specific suggestions from three aspects, such as enterprises, accounting firms, and the state.

For the enterprise, on the one hand, full disclosure of environmental information is conducive to obtaining a standard audit opinion and improving the trust degree of the report users, not only to deepen the trust of the investors on the Chinese listed companies but also to attract potential investors to obtain sufficient funds to directly affect the development of the enterprise; on the other hand, it is detailed. Detailed disclosure of environmental information will enable CPA to invest more resources in the audit process, and assume higher audit risks, thereby increasing the audit fees. The enterprise is engaged in the production and operation activities for profit. Therefore, the enterprise should weigh the advantages and disadvantages to the degree of environmental information disclosure. The environmental information that the state is forced to disclose should be accurate and timely, and the environmental information that the State encourages disclosure or other non-compulsory disclosure can be selected according to the actual situation. Optional disclosure.

For accounting firms, members of the audit team should be arranged reasonably. Environmental audit is a comprehensive and interdisciplinary subject of environmental science, audit, and economics, but it is not a simple addition of various disciplines, audit methods are not uniform, the audit system is not sound, and of course, there is no organization or group to carry out related training at present, so the environmental audit personnel are extremely lacking. The training of environmental auditors can not be done in one day. Therefore, first of all, the accountants should arrange the auditors reasonably. When necessary, the specialists should be used in the environmental field to help the certified public accountants to obtain adequate and appropriate audit evidence. Secondly, with the serious environmental pollution and the increasing environmental governance, China is increasingly responsible for environmental governance. To pay attention to the training of environmental audit personnel is imminent, and the training of environmental audit personnel needs not only the support of the national audit department and the environmental protection department but also the internal efforts of the accounting firms. The accounting firm should strengthen the training of the auditors, build up the cooperation with the universities and the training institutions, strengthen the training of the personnel of the CPAs, make up the shortage of the existing environmental audit personnel, enhance the auditing ability of the CPAs, and perform better the responsibility of the social supervision.

The government of China should perfectly frame relevant laws and regulations. The time of environmental audit in China is relatively late, although it has been carried out for 30 years, the whole is still in the primary exploration stage. The main body of environmental audit is still based on government audits. Environmental laws and regulations are still not perfect, and there is no perfect environmental legal system. Besides, 33 items of the corresponding environmental laws have been formulated in China. There are more than 48 environmental regulations and more than 100 departmental rules and regulations, but the overall operability is not strong. There is no unified standard and standard for the form, content, and degree of environmental information disclosure. There is no unified method for the accounting and measurement of environmental accounting information. It has caused hindrance to the disclosure of environmental information and environmental audit. Therefore, environmental auditing must establish a perfect environmental legal system and environmental auditing standards, which are the necessary conditions for the development of environmental auditing.

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