

Study on government environmental audit and enterprise internal control

Zhang Guo

Business School of Northeast Normal University, Northeast Normal University, Jilin, China

zhangg579@nenu.edu.cn

Abstract. The government's environmental control will have different effects on the internal operation of enterprises, but at present, the academic circles pay little attention to how the government's environmental control will affect the internal operation and management of enterprises. This paper selects the data of related companies in China from 2004 to 2015, and designs quasi-natural experiments to explore the relationship between government environmental audit and internal control index of enterprises. The results show that the internal control index of enterprises under the supervision of government environmental audit is lower than that of enterprises without supervision, and through heterogeneity analysis, it is found that the negative effect of government environmental audit on the internal control index of state-owned enterprises, the integration of two jobs and enterprises with lower technical level in their industries is more significant. Further research shows that government environmental audit affects the internal control index of enterprises by increasing external attention.

Keywords: government environmental audit; Internal control index; Analyst attention; Environmental supervision; Internal control; Heterogeneity analysis.

1. Introduction

Government environmental audit will affect many aspects of enterprise production and operation, specifically, it can be divided into macro-level and micro-level impacts. From the micro perspective of individual enterprises, the government environmental audit can reduce costs and increase efficiency: after accepting the government's environmental supervision, the cost of equity capital of enterprises is reduced (Cai Chun, Zheng Kaifang, & Jimson, 2021), investment efficiency (Zhai Huayun, 2010), financial performance (Zhang Guizhi & Sun Hongmei, 2021) and environmental performance (Lian Chaochao, Zhang Weiguo, Bi Qian At the same time, it objectively promoted the green innovation of enterprises (Ye Peixi, 2022); To a certain extent, it reduced the risk of future stock price collapse (Cai Chun, Zheng Kaifang, Chen Ye, & Jimson, 2019). From the macro level of the industry in which the enterprise is located, government environmental control can accelerate the progress of production technology (Zhang Cheng, Lu Yang, Guo Lu, & Yu Tongshen, 2011) and promote the transformation and upgrading of the whole industrial structure (Yuan Yijun & Xie Ronghui, 2014).

However, it is still unknown whether the government environmental audit can affect the internal management quality of enterprises. We can put forward some ideas based on some factors that affect the internal control of enterprises.

The influencing factors of enterprise internal control include those related to enterprise internal governance and those related to enterprise external environment. Internal factors include management, information disclosure (Wang Xiaojun, 2014), characteristics of the board of directors and its subordinate committees, ownership structure, internal audit characteristics and so on. External influencing factors mainly include audit-related factors, financial analyst analysis factors, national culture, government regulation and market environment (Shi Qiu & Chen Qian, 2018).

Secondly, it is found that government environmental regulation mainly generates external pressure by requiring enterprises to disclose information, which is related to management elements and market environment in the above factors. External pressure can be divided into two categories: one is from the government, the other is from the public. First, the government environmental audit puts forward requirements for the company's information disclosure, which is a rigid constraint: through the

establishment of environmental information audit mechanism, the state requires listed companies to report relevant environmental information to relevant securities regulatory agencies on time. Listed companies should immediately disclose relevant environmental protection information, and the state should vigorously support listed companies to voluntarily disclose environmental information (Liu Yali, 2017); Second, the social concern brought by information disclosure is a kind of soft constraint, which is realized through the form of public opinion or market behavior, and is an indirect pressure. The public concern will form the expectation of enterprises, which will form the management pressure of managers, which may affect the governance efficiency of enterprises (Xie Fang & Shi Fangzhi, 2021).

This paper answers the following questions through research: How does the government environmental audit affect the internal control effect of enterprises? What is the transmission mechanism of this influence? Compared with the existing literature, the contributions of this paper are as follows: First, focusing on the internal governance of enterprises, expanding the influence of government environmental audit on the individual level of enterprises, and enriching the relevant theories of government promoting environmental governance through environmental control measures. Secondly, we designed quasi-natural experiments to explore the influence of macro policies of government environmental supervision on internal management of enterprises at micro level. Thirdly, this paper studies the external mechanism of government environmental control affecting the internal governance of enterprises.

The rest of this paper is arranged as follows: the second part is literature review and theory, the third part is data description and method introduction, the fourth part is empirical analysis, the fifth part is heterogeneity test, the sixth part is robustness test, the seventh part is influence path analysis, and the last part is conclusion.

2. Literature review and theory

There are a lot of researches on government environmental audit in academic circles, and some scholars think that it has positive significance for resource utilization, economic development and national strategy. In terms of resource utilization, the environmental value theory holds that natural resources can create wealth for human beings, but unlimited utilization will lead to resource depletion, so the government environmental audit can play its role. Luo Liangbin (Luo Liangbin & Shi Jinxin, 2019) pointed out that environmental audit in developed countries is helpful to evaluate national resources, assets and environmental impact. Li Panya (Li Panya, 2014) agrees with Luo Liangbin that environmental audit, as a comprehensive means of economic supervision, is an important means to solve resource problems. In the aspect of economic development, Qian Zhengming and others (Qian Zhengming & Liu Xiaochen, 2014) analyzed that environmental regulation can promote the "diffusion effect" and "polarization effect" of green economic efficiency, and force enterprises to carry out green innovation, thus affecting regional industrial upgrading and promoting regional economic development. In terms of national strategy, Luo Liangwen et al. (Luo Liangwen, Lei Pengfei, & Meng Kexue, 2016) found that the difference of environmental regulation strengthened the motivation of highly polluting industries to choose production location by studying environmental regulation and inter-regional transfer of production, and improving the intensity of environmental regulation could effectively hedge the negative impact on the environment and curb the trend of national environmental deterioration.

However, another part of scholars hold different opinions, believing that government environmental audit will also bring some negative impacts, mainly including people's life, enterprise cost and environmental performance. In terms of people's life, Cao Wei (Cao Wei, 2018) thinks that the "deviation effect of standard implementation" in environmental supervision will lead to the indiscriminate shutdown and demolition of pollution sources in some areas, which will affect the normal production and life of enterprises and residents. In the aspect of enterprise cost, Zhang Zhiqiang (Zhang Zhiqiang, 2018) found that the pollution fee of key monitoring enterprises had a

significant effect on the marginal cost, price and price plus of multi-product enterprises, which increased the marginal cost and price of enterprises. Most notably, in terms of environmental performance, the government's environmental control measures are not necessarily beneficial to the national environmental protection, and may even inhibit the environmental protection. Yu Changlin et al. (Yu Changlin & Gao Hongjian, 2015) through empirical analysis, the interaction between environmental control intensity and recessive economic scale has a significant positive effect on China's environmental pollution. It shows that the higher the intensity of environmental control, the greater the negative impact of hidden economy on China's environment.

To sum up, there have been many related researches on government environmental control in academic circles, and the government's environmental supervision system has both positive and negative effects. However, in the theory of environmental audit, there is little direct discussion on the impact on the internal governance of the company, and it is still unknown whether the environmental audit will have an impact on the internal governance of the business operation. This paper intends to establish the theory through the information environment of enterprises, and conduct an empirical test through a quasi-natural experiment. In the process of environmental audit, enterprises increase the disclosure of information through audit reports, and the information effect may not only benefit the governance ability of enterprises, but also reduce the governance efficiency of enterprises, thus having different influences on internal control. From a positive point of view, environmental audit may make the internal information of enterprises more transparent, the business behavior of enterprises may be widely supervised by investors, customers and the public, and corporate executives may be more motivated to improve their governance ability and improve all aspects of internal control of enterprises under the pressure of public opinion. From a negative point of view, environmental audit may make enterprises disclose some involuntary information, which may make enterprises receive more complicated market feedback, and the internal governance ability of enterprises can't adapt immediately in a short period of time, thus reducing the internal control level of enterprises.

Based on this, this paper focuses on the relationship between government environmental audit and internal control of enterprises, and tests the influencing mechanism of information transparency through intermediary effect, in order to answer the above questions and enrich the relevant theories of government environmental audit.

3. Research and design

(A) Sample selection and data source

Considering the reform of accounting standards, this paper selects A-share industrial listed companies in China's Shanghai and Shenzhen stock markets from 2004 to 2015 as the research object. According to "National Economic Industry Classification" (GB/T4754-2011) and "Guidelines for Industry Classification of Listed Companies" (2012), companies belonging to mining, manufacturing, electricity, heat, gas and water production and supply industries are defined as industrial listed companies. Exclude the samples with ST, *ST and missing data during the study period. The data sources of this paper are as follows: (1) Enterprise internal control index, which comes from Dibo database; (2) Government environmental audit, according to the Opinions of National Audit Office on Strengthening the Audit of Resources and Environment issued in 2009, this paper takes heavily polluting enterprises as the experimental group and non-heavily polluting enterprises as the control group, and constructs a double difference model. Among them, the heavily polluting enterprises are defined according to the Catalogue of Classified Management of Listed Companies' Environmental Protection Verification Industries (2008). (3) Control variables, financial data related to control variables are all from Guotai 'an database. In addition, in order to slow down the interference of data on the empirical results, this paper treats all the continuous variables with 1% of the extreme value, and excludes the companies in the financial industry and ST companies. The processing and analysis of all relevant data in this paper is completed by using the software Stata16.

(B) Model building and variable definition

In order to study the influence of government environmental audit on internal control of enterprises, this paper constructs a double difference model, as shown in model (1).

$$Inc = \alpha_0 + \alpha_1 Treat \times After + \sum x_j + \mu_{Year} + \mu_{Firm} + \varepsilon \quad (1)$$

The definitions and descriptions of the main variables in this paper are as follows:

Enterprise internal control index (*Inc*). According to Cheng Huifang's point of view (Cheng Huifang, 2014), there are three main evaluation methods of enterprise internal control: taking the relevant information directly disclosed by listed companies as indicators; Take the results of questionnaire survey as indicators; Construct index as index. However, due to the poor reliability of internal control information in China and the strong pertinence of questionnaire survey, this paper chooses the construction index method, Enterprise internal control index (*Inc*) is used to evaluate enterprise internal control. At the same time, the internal control index of Xiamen University Edition focuses on theoretical research, while the internal control index of Dibo Edition focuses on providing basis for enterprise risk management, etc., which is more closely related to reality and has more reference significance for regulatory authorities. Therefore, this paper selects the internal control index of Dibo Database to study the government environmental audit and internal control of enterprises.

Government environmental audit (*Treat* × *After*). As described by Zhang Long Ping and Li Lu (Zhang Longping & Li Lu, 2009), environmental audit is a kind of economic supervision, an expansion of audit supervision content, involving environmental protection, natural resource utilization and sustainable development. According to Xie Zhihua, Tao Yuxia and others (Xie Zhihua, Tao Yuxia, & Du Haixia, 2016), environmental audit is a state-led supervision system, while internal audit is in a basic position, and social audit should actively participate. According to the Opinions of the National Audit Office on Strengthening the Audit of Resources and Environment, this paper takes heavily polluting enterprises as the experimental group and non-heavily polluting enterprises as the control group, and conducts quasi-natural experiments to measure the government environmental audit. The specific variables are designed as follows:

In this paper, space dummy variable (*Treat*), time dummy variable (*After*) and their interaction items (*Treat* × *After*) are constructed respectively, in which *Treat* represents space dummy variable, which is assigned to 1 if the enterprise is a heavily polluting enterprise, otherwise 0; *After* represents a virtual variable of time. If the year belongs to the year when the National Audit Office's Opinions on Strengthening the Audit of Resources and Environment was promulgated and later years, that is, 2009 and later years, it is assigned a value of 1; otherwise, it is 0; *Treat* × *After* represents the cross term of spatial virtual variables and temporal virtual variables. In this paper, there are two reasons for taking heavily polluting enterprises as the experimental group. First, the necessity of supervision: compared with non-polluting enterprises, heavily polluting enterprises do more harm to the environment, which is not only the top priority of national environmental governance, but also the key object of government environmental audit; Second, the priority of supervision: due to the limited resources of the government environmental audit, the government environmental audit will give priority to the relevant supervision and examination of heavily polluting enterprises, so the government environmental audit tends to audit heavily polluting enterprises more strongly and vigorously.

Control variable (x_j). Referring to the related research of Cai Chun, Zheng Kaifang, etc. (Cai Chun et al., 2021), this paper controls the following variables: enterprise (*Size*), that is, natural logarithm of total assets; Asset liability ratio (*Lev*), the ratio of total liabilities to total assets; (*Loss*) that is, if the net profit of the enterprise is negative, take 1; otherwise, take 0; (*Cash*) holdings: the ratio of monetary funds to total assets; Proportion of independent directors (*Id*): the proportion of independent directors to the number of directors. The main variables are described in Table 1.

Table 1. Description of main variables

Variable name	variable	Descriptive variable
Profit and loss nature	<i>Loss</i>	If the net profit of the enterprise is negative, take 1; otherwise, take 0
Proportion of independent directors	<i>Id</i>	Proportion of independent directors to the number of directors
size	<i>Size</i>	Natural logarithm of total assets
Asset-liability ratio	<i>Lev</i>	Ratio of total liabilities to total assets
Cash holdings	<i>Cash</i>	The ratio of money to total assets
Annual fixed effect	<i>Year</i>	Annual dummy variable
Individual fixation effect	<i>Firm</i>	Company virtual variable

4. Empirical analysis

(A) Descriptive statistical analysis

Descriptive statistical results of main variables are shown in Table 2. The minimum value of enterprise internal control index is 0, the maximum value is 996.3, the average value is 669.3, the median value is 683., and the standard deviation is 121.0, which shows that the enterprise internal control index approximately conforms to the assumption of normal distribution, and the environmental performance of different enterprises has significant differences. The standard deviation of virtual variables, time virtual variables and their interaction items is less than 1.000, and the fluctuation range is small. Most of the standard deviations of control variables are less than 1.000, with a small fluctuation range, but the standard deviations of enterprise scale and asset-liability ratio are greater than 1.000, with a large fluctuation range.

Table 2. Descriptive statistics of main variables

variable	N	mean	min	max	p25	p50	p75	sd
<i>Inc</i>	12354	669.3	0	996.3	632.3	683	717.3	121.0
<i>Treat</i>	12354	0.480	0	1	0	0	1	0.500
<i>After</i>	12354	0.710	0	1	0	1	1	0.450
<i>Treat × After</i>	12354	0.330	0	1	0	0	1	0.470
<i>Loss</i>	12354	0.100	0	1	0	0	0	0.300
<i>Id</i>	12313	0.370	0	0.710	0.330	0.330	0.400	0.0600
<i>Size</i>	12335	7.790	2.200	13.22	6.990	7.730	8.540	1.240
<i>Lev</i>	12354	0.470	0.0100	124.0	0.300	0.460	0.610	1.290
<i>Cash</i>	12354	0.170	0	0.910	0.0800	0.140	0.220	0.130

(B) Correlation analysis

In order to improve the accuracy of the regression analysis model, this paper analyzes the correlation of related variables. Table 3 reports the Pearson correlation coefficient of main variables. It can be seen from the table that the correlation coefficients between variables are small, and there is no data greater than 0.2, so there is no serious multicollinearity problem that distorts the model estimation.

Table 3. Pearson correlation coefficient of main variables

Variables	(<i>Treat</i>)	(<i>After</i>)	(<i>Loss</i>)	(<i>Id</i>)	(<i>Size</i>)	(<i>Lev</i>)	(<i>Cash</i>)
<i>Treat</i>	1.000						
<i>After</i>	-0.048***	1.000					
<i>Loss</i>	0.018**	-0.024***	1.000				
<i>Id</i>	-0.056***	0.171***	-0.021**	1.000			
<i>Size</i>	0.132***	0.026***	-0.045***	-0.021**	1.000		
<i>Lev</i>	-0.009	-0.036***	0.059***	0.005	0.046***	1.000	
<i>Cash</i>	-0.138***	0.138***	-0.145***	0.023***	-0.182***	-0.063***	1.000

***p<0.01, **p<0.05, *p<0.1

(C) Regression analysis

Table 4 lists the regression results of government environmental audit and enterprise internal control index, and in order to get more accurate estimation results, the fixed effects of year and company are added. It can be seen from the table that the regression coefficient of the interactive term is -15.256 without controlling other variables, and it is significant at the level of 5%. When other variables are controlled, the regression coefficient of the interactive term is -14.546, which is significant at 5%. It shows that compared with the industrial listed companies that are not supervised by the government environmental audit, the internal control index of the supervised industrial listed companies will significantly decrease by 2.17%. Among the control variables studied, profit and loss nature will increase the internal control index of enterprises, while enterprise scale, asset-liability ratio, proportion of independent directors and cash holdings will decrease the internal control index of enterprises.

Table 4. Government environmental audit and enterprise internal control index

VARIABLES	(1) <i>Inc</i>	(2) <i>Inc</i>
Treat × After	-15.256** (-2.49)	-14.546*** (-3.07)
<i>Loss</i>		-156.229*** (-30.87)
<i>Id</i>		22.528 (0.97)
<i>Size</i>		11.369*** (4.42)
<i>Lev</i>		-13.664*** (-3.55)
<i>Cash</i>		-3.812 (-0.30)
Constant	694.295*** (182.41)	618.738*** (28.70)
Year FE	Yes	Yes
Firm FE	Yes	Yes
N	12,354	12,294
R-squared	0.081	0.275

Robust t-statistics in parentheses

***p<0.01, **p<0.05, *p<0.1

5. Heterogeneity analysis

The influencing factors of policy effect are not single. When analyzing the effectiveness of policy implementation, we need to consider its universality, but not across the board. In this paper, we need to explore what kind of industrial enterprises' internal control index the government environmental audit has more profound influence, and then provide the government with a better idea about influencing the internal management of enterprises. Considering that the company's equity, the combination of two jobs and the industry will have an impact on the internal control of enterprises (Shi Qiu & Chen Qian, 2018), this paper analyzes the heterogeneity of industrial companies according to the nature of equity, the combination of two jobs and the level of industry technology.

The grouping variables in this paper are defined as follows: First, equity nature. If the enterprise is state-owned, the assignment is 1; If it is non-state-owned, the assignment is 0; Data comes from Guotai 'an database. Second, the unity of two jobs (Dual). If the chairman and general manager of the enterprise are concurrently employed, the value is assigned to 1; Otherwise, assign a value of 0; Data comes from Guotai 'an database. Third, the technical level of the industry. According to the classification of OECD, enterprises are divided into two groups in this paper: enterprises in low-tech

industries or medium-low-tech industries are assigned 1 and 2 respectively; Enterprises in medium and high-tech industries or high-tech industries are a group, which are assigned 3 and 4 respectively. The data comes from the National Bureau of Statistics. According to the above variables, this paper is divided into groups to explore whether there are significant differences in the influence of government environmental audit on internal control of enterprises under different equity nature, integration of two positions and industry technology level.

(A) the nature of equity, government environmental audit and internal control of enterprises

According to the ownership nature of enterprises, this paper divides industrial listed companies into state-owned enterprise groups and non-state-owned enterprise groups. Table 5 reports the heterogeneous regression results of the ownership nature: when the enterprise is a state-owned enterprise, the regression coefficient of the interactive term is -11.300, which is significant at the level of 10%; When the enterprise is a non-state-owned enterprise, the regression coefficient of the interactive term is -17.551, which is significant at 5%. It can be seen that compared with state-owned enterprises, the negative impact of government environmental audit on internal control of non-state-owned enterprises is more significant. Therefore, the study assumes that H2 is proved.

Table 5. Equity nature, government environmental audit and enterprise internal control index

VARIABLES	(1) state-owned enterprise <i>Inc</i>	(2) Non-state-owned enterprises <i>Inc</i>
<i>Treat × After</i>	-11.300* (-1.89)	-17.551** (-2.01)
<i>Loss</i>	-153.387*** (-24.60)	-131.625*** (-14.80)
<i>Id</i>	-6.918 (-0.22)	58.590* (1.92)
<i>Size</i>	10.918*** (2.93)	14.233*** (3.30)
<i>Lev</i>	-115.743*** (-6.19)	-11.569*** (-5.42)
<i>Cash</i>	-17.569 (-0.84)	-18.816 (-1.17)
Constant	685.332*** (22.22)	584.535*** (16.79)
N	6,383	5,179
R-squared	0.313	0.226

Robust t-statistics in parentheses

***p<0.01, **p<0.05, *p<0.1

(B) the combination of two jobs, government environmental audit and enterprise environmental performance

According to the situation of integration of two jobs in enterprises, this paper divides industrial listed companies into two groups: integration of two jobs and separation of two rights. Table 6 reports the heterogeneous regression results of the integration of two jobs: when there is no integration of two jobs in the enterprise, the regression coefficient of the interactive item is 2.803, and it fails the significance test; When there is a combination of two jobs in an enterprise, the regression coefficient of interactive items is -17.837, which is significant at the level of 5%. The results show that, compared with the enterprises with separate rights, the negative impact of government environmental audit on the internal control of enterprises with two functions is more significant. Therefore, the research assumes that H3 is proved.

Table 6. Integration of two functions, government environmental audit and enterprise internal control index

VARIABLES	(1) Non-integration of two functions	(2) Combination of two jobs
	<i>Inc</i>	<i>Inc</i>
<i>Treat × After</i>	2.803 (0.05)	-17.837*** (-3.66)
<i>Loss</i>	-174.783*** (-10.28)	-153.711*** (-28.89)
<i>Id</i>	-304.526 (-1.57)	42.841* (1.88)
<i>Size</i>	4.208 (0.36)	11.268*** (4.24)
<i>Lev</i>	-146.415*** (-2.96)	-13.909*** (-3.53)
<i>Cash</i>	45.169 (0.65)	-9.172 (-0.68)
Constant	837.022*** (6.83)	609.916*** (27.31)
N	724	11,570
R-squared	0.535	0.267

Robust t-statistics in parentheses

***p<0.01, **p<0.05, *p<0.1

(C) Industry technical level, government environmental audit and enterprise environmental performance

Table 7. Industry technical level, government environmental audit and enterprise internal control index

VARIABLES	(1) hi-tech industry	(2) Low-tech industry
	<i>Inc</i>	<i>Inc</i>
<i>Treat × After</i>	7.305 (0.55)	-46.351*** (-2.62)
<i>Loss</i>	-139.680*** (-19.59)	-142.249*** (-9.82)
<i>Id</i>	6.766 (0.19)	-4.645 (-0.07)
<i>Size</i>	15.251*** (3.36)	37.389*** (3.03)
<i>Lev</i>	-119.555*** (-6.31)	-245.031*** (-5.00)
<i>Cash</i>	-58.770*** (-2.65)	-28.030 (-0.66)
Constant	640.739*** (17.29)	550.315*** (5.82)
N	5,299	1,107
R-squared	0.266	0.385

Robust t-statistics in parentheses

***p<0.01, **p<0.05, *p<0.1

According to the technical level of the industry in which the enterprises are located, this paper divides the industrial listed companies into low-tech industry groups and high-tech industry groups. Table 7 reports the heterogeneous regression results of industry technology level: when the industry technology level of the enterprise is high, the regression coefficient of the interactive item is 7.305, which fails the significance test; When the technology level of the industry in which the enterprise is located is low, the regression coefficient of the interactive term is -46.351, and through the

significance test, it can be seen that the government environmental audit has a more significant inhibitory effect on the internal control of the enterprise when the technology level of the industry is low. Therefore, compared with the enterprises with higher technical level in the industry, the negative impact of government environmental audit on the internal control of enterprises with lower technical level in the industry is more obvious. Therefore, the research hypothesis H4 is proved.

6. Robustness test

In order to verify the reliability of the empirical results, this paper carries out the following robustness test.

First, parallel trend test. In order to make the effect differentiated by the model a real policy effect, we need to conduct parallel trend test to ensure that the trend of the treatment group and the control group is the same before the implementation of the policy. The results showed that the coefficient fluctuated around 0 before the policy, and there was no significant difference between the experimental group and the control group. However, the coefficient gradually deviates from 0 one year after the policy, and there is a significant difference between the experimental group and the control group, and the difference is close to the coefficient in the regression model, which shows that the experimental group and the control group can indeed be compared. Table 8 and Figure 1 show the results of parallel trend test.

Table 8. Test results of parallel trend

VARIABLES	(1) <i>Inc</i>
pre_3	8.143 (1.26)
pre_2	1.051 (0.12)
current	-5.657 (-0.68)
post_1	-13.140 (-1.60)
post_2	-15.107** (-1.97)
post_3	-12.315** (-2.20)
Constant	690.251*** (133.57)
N	12,354
R-squared	0.081

t-statistics in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

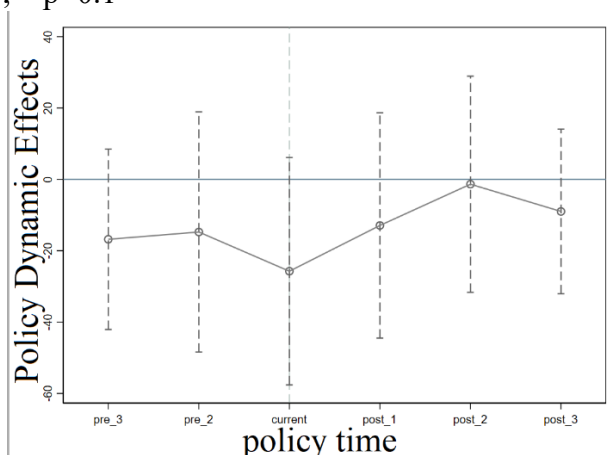


Fig. 1 Parallel trend inspection image

Second, placebo test. Even if we pass the parallel trend test, in order to ensure the rigor of the model, we still need to exclude the influence of other policies that may affect the changing trend. In this paper, we randomize the experimental group, randomly sample the variables of the experimental group for a certain number of times, and then observe whether the nuclear density images of the randomized observed values are concentrated around 0 and significantly deviate from their true values. The results of placebo test show that when the simulation is conducted 500 times, most of the coefficients are concentrated around 0, which obviously deviates from the true value, which means that the benchmark regression results of this paper have passed the placebo test. Figure 2 shows the results of placebo test.

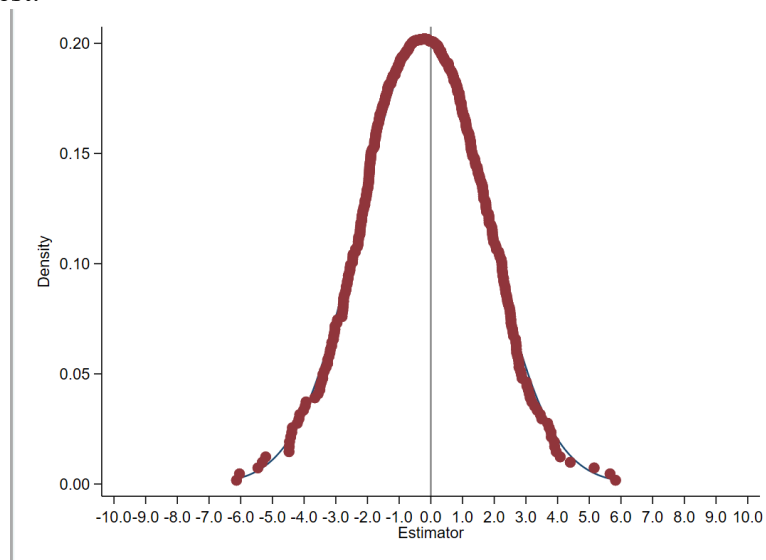


Fig. 2 Results of placebo test

Table 8. Results of tendency score matching method plus double difference method

VARIABLES	(1) <i>Inc</i>
<i>new Treat × After</i>	-16.029*** (-3.39)
<i>Loss</i>	-147.031*** (-28.85)
<i>Id</i>	14.261 (0.59)
<i>Size</i>	13.654*** (4.91)
<i>Lev</i>	-100.491*** (-8.25)
<i>Cash</i>	-34.102** (-2.43)
Constant	640.963*** (28.35)
Year FE	Yes
Firm FE	Yes
N	11,607
R-squared	0.269

Robust t-statistics in parentheses

***p<0.01, **p<0.05, *p<0.1

Third, the tendency score matching method plus double difference method. In order to avoid the influence of subjective factors in sample selection, there is no significant difference among experimental individuals except whether they accept the government environmental audit policy. This paper uses the tendency score matching method to make double difference again. The specific steps

are as follows: firstly, all control variables are used as covariates to match heavily polluting enterprises and non-polluting enterprises. The matching method uses the nearest neighbor matching method with a matching ratio of 1: 1, and the matched samples are retained. Then, the matched samples are regressed by double difference model, which alleviates the self-selection bias to a certain extent. After re-screening the experimental group and the control group, there is a double difference again. The results are shown in Table 8: the interactive coefficient is significantly negative with an absolute value of 16.029, which is close to the absolute value of the coefficient in the basic regression model (14.545), which proves that the experimental results in this paper are reliable and scientific.

7. The Influence Path Analysis

The empirical results show that the internal control index of industrial listed companies has decreased after strengthening environmental audit, but what is the mechanism? How does the government environmental audit affect the internal control of enterprises? This paper makes the following conjectures: under the pressure of government environmental audit, company information becomes more transparent, analysts pay more attention to the company, and the company can't adapt to the change of external environment in a short period of time, which leads to the reduction of internal governance efficiency. In order to further explore the influence path of government environmental audit on internal control of enterprises, this study uses the attention data of company analysts to represent information transparency.

Analyst's attention is an important factor that affects the internal control of enterprises. Analysts' attention has an inducing effect (Xie Fang & Shi Fangzhi, 2021), and its forecast is easy to form market expectation, which causes the pressure of management. Enterprises accept government environmental audit, which is followed by the increasing pressure of analysts' attention, which will overwhelm the management of enterprises, and induce the management to manipulate the internal management of enterprises, resulting in opportunistic behaviors (Hu Chuan, Wang Linjiang, & Zhang Guiling, 2020), which will reduce the quality of internal control. Therefore, the first path of influence is: government environmental audit-analyst attention-enterprise internal control. To verify this influence path, set up model (2) to test:

$$AnaAttention = \beta_0 + \beta_1 Treat \times After + \sum x_j + \mu_{Year} + \mu_{Firm} + \varepsilon \quad (2)$$

Table 8. Government environmental audit and analyst attention

VARIABLES	(1) <i>AnaAttention</i>
<i>Treat × After</i>	1.668*** (3.39)
<i>Loss</i>	-2.840*** (-10.30)
<i>Id</i>	3.627* (1.71)
<i>Size</i>	1.462*** (4.67)
<i>Lev</i>	-2.216** (-1.97)
<i>Cash</i>	2.148* (1.70)
Constant	-11.666*** (-4.40)
Year FE	Yes
Firm FE	Yes
N	9,120
R-squared	0.227

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

AnaAttention represents analyst attention. As for the control variables, five control variables selected in regression analysis are used: enterprise Size (*Size*), asset-liability ratio (*Lev*), profit and Loss nature (*Loss*), Cash holdings (*Cash*) and independent director ratio (*Id*). Table 8 reports the influence of government environmental audit on the internal control index of industrial listed enterprises. It can be seen from the table that the regression coefficient of the interactive term is 1.668, which is significant at the level of 1%. It shows that compared with the companies that are not supervised by the government environmental audit, the analyst attention level of the companies that are supervised by the government environmental audit has been improved to some extent. It can be seen that the government environmental audit is conducted from the analyst's attention to the internal control of enterprises, which accords with the expected assumption.

8. Summary

Taking corporate governance as the starting point, this paper studies how the strict government environmental supervision mechanism affects the internal management level of enterprises. By designing quasi-natural experiments, it is concluded that a higher degree of government environmental audit will reduce the internal control index of enterprises. The experimental results have passed the parallel trend test, placebo test and PSM analysis, and the experimental results are reliable and rigorous.

Heterogeneity analysis was also carried out in the experiment. Through grouping review, it was found that there were obvious differences in the supervision of government environmental audit for enterprises with different ownership, two positions and technical level of the industry: compared with state-owned enterprises, the internal control level of non-state-owned enterprises was more vulnerable to the negative influence of government environmental audit supervision; However, the internal control level of enterprises with two functions in one falls more significantly than that of enterprises with two powers separated. For enterprises in low-tech industries, the negative effect of government environmental audit on internal control is more significant.

This paper also further discusses the path mechanism of government environmental management for enterprise internal management: under the influence of government environmental audit, enterprises need to disclose the internal governance and internal control defects to the outside world, which will inevitably increase the attention of analysts to enterprises and form market expectations for enterprises. The induction effect brought by this expectation increases the pressure of management. If the pressure of enterprise management is too great to bear, it will induce management to take risks, interfere with enterprise internal management, disrupt enterprise internal management order and reduce the quality of internal control.

References

- [1] Cai Chun, Zheng Kaifang, Chen Ye, & Jimson. (2019). Research on the influence of government environmental audit on corporate environmental responsibility information disclosure—Based on the empirical evidence of "Three Rivers and Three Lakes" environmental audit. *Audit Research* (06), 3-12.
- [2] Cai Chun, Zheng Kaifang, & Jimson. (2021). Research on the influence of government environmental audit on corporate environmental governance. *Audit Research* (04), 3-13.
- [3] Cao Wei. (2018). Research on "Deviation Effect of Standard Implementation" in Environmental Supervision. *Chinese Law* (06), 258-279. DOI: 10.14111/J. CNKI. ZGFX.2018.06.013.
- [4] Cheng Huifang. (2014). The quality evaluation of internal control is a bit hazy —— based on the index comparison between Dibo Edition and Xiamen University Edition. *Accounting Monthly* (01), 102-105. DOI: 10.19641/J.CNKI.42-1290/F.2014.01.044.
- [5] Zhai Huayun. (2010). Legal Environment, Audit Quality and Corporate Investment Efficiency —— Empirical Evidence from Chinese Listed Companies. *Southern Economics* (08), 29-40.

- [6] Hu Chuan, Wang Linjiang, & Zhang Guiling. (2020). Analyst tracking, effectiveness of internal control and innovation of small and medium-sized technology-based enterprises. *Science and technology progress and countermeasures*, 37(03), 88-97.
- [7] Li Panya. (2014). Research on Chinese government environmental audit. (Master), Capital University of economics and business, Available from Cnki.
- [8] Liu Yali. (2017). Research on the relationship between enterprise environmental information disclosure, environmental audit and internal control. *Journal of Chifeng University (Natural Science Edition)*, 33 (15), 137-138. DOI: 10.13398/J. CNKI. ISSN 1673-260x.2017.15.050.
- [9] Luo Liangwen, Lei Pengfei, & Meng Kexue. (2016). Enterprise environment seeking, interregional transfer of pollution-intensive production and environmental supervision. *china population resources and environment*, 26(01), 113-120.
- [10] Luo Liangbin, & Shi Jinxin. (2019). International experience of government environmental audit and its enlightenment. *Asia-Pacific Economy* (06), 74-79+146. DOI: 10.16407/J. CNKI.1000-6052.200107.000000006.
- [11] Qian Zhengming, & Liu Xiaochen. (2014). Environmental control, industrial structure adjustment and regional economic development. *Economist* (07), 73-81. DOI: 10.16158/J.CNKI.51-1312/F.2014.07.007.
- [12] Shi Qiu, & Chen Qian. (2018). Summary of research on measurement and influencing factors of enterprise internal control quality. *Theory Monthly* (07), 137-141. DOI: 10.14180/J. CNKI.1004-0544.2018.07.021.
- [13] Wang Xiaojun. (2014). Research on influencing factors of internal control effectiveness of listed companies. (Master), Shanxi University of Finance and Economics, Available from Cnki.
- [14] Xie Fang, & Shi Fangzhi. (2021). The quality of enterprise internal control and the effectiveness of analyst's external governance. *Journal of Guangdong Polytechnic of Agriculture, Industry and Commerce*, 37(03), 23-29.
- [15] Xie Zhihua, Tao Yuxia, & Du Haixia. (2016). Thinking about the orientation of environmental audit of audit institutions. *Audit Research* (01), 11-16.
- [16] Ye Xi. (2022). Empirical analysis of the role of environmental audit in promoting green innovation of enterprises. *Modern Business* (03), 165-168. DOI: 10.14097/J. CNKI.5392/2022.03.052.
- [17] Yu Lianchao, Zhang Weiguo, Bi Qian, & Dong Jinting. (2020). Will government environmental audit improve the environmental performance of enterprises? *Audit and Economic Research*, 35(01), 41-50.
- [18] Yu Lin, & Gao Hongjian. (2015). The influence of environmental regulation on China's environmental pollution —— from the perspective of recessive economy. *China's industrial economy* (07), 21-35. DOI: 10.19581/J. CNKI. CIE Journal. 2015.07.002.
- [19] Yuan Yijun, & Xie Ronghui. (2014). Research on industrial structure adjustment effect of environmental regulation —— Empirical test based on China's provincial panel data. *China's industrial economy* (08), 57-69. DOI: 10.19581/J. CNKI. CIE Journal. 2014.08.005.
- [20] Zhang Cheng, Lu Yang, Guo Lu, & Yu Tongshen. (2011). Environmental Regulation Intensity and Production Technology Progress. *Economic Research*, 46(02), 113-124.
- [21] Zhang Guizhi, & Sun Hongmei. (2021). Environmental audit, environmental protection investment and financial performance of enterprises —— An empirical study based on panel data. *Business accounting* (13), 25-31.
- [22] Zhang Longping, & Li Lu. (2009). Research on the improvement of government audit quality control in China. *Management World* (05), 176-177. DOI: 10.19744/J.CNKI.11-1235/F.2009.05.023.
- [23] Zhang Zhiqiang. (2018). Environmental control, price transmission and the pollution burden of Chinese manufacturing enterprises —— Evidence based on the sewage charges of key monitoring enterprises. *Industrial Economic Research* (04), 65-75. DOI: 10.13269/J. CNKI. IER.2018.04.006.