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Does the Environmental Tax Reform Positively Impact Corporate Environmental Performance?

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Abstract: The environmental tax reform implemented in 2018 is an important initiative of Chinese tax reform, which is deemed a valuable opportunity to encourage firms to improve their environmental performance. This study empirically investigates the impact of the environmental tax reform on corporate environmental performance based on data from Chinese A-share listed firms with heavy pollution from 2016 to 2020 by the differences-in-differences method. It is found that the environmental tax reform can effectively improve corporate environmental performance, and the environmental supervision of local governments is an important channel to realize this. Heterogeneity tests show that the environmental tax reform better impacts the corporate environmental performance of non-state-owned enterprises and firms in western areas. This paper enriches the application scenarios of institutional theory, provides micro evidence for the impact of implementing the Environmental Protection Tax, and provides a decision-making basis for strengthening the environmental supervision of local governments, which has practical guidance significance in forcing corporations to modernize their green technology and realize sustainable economic growth.

Keywords: environmental tax reform; corporate environmental performance; environmental supervision of local government; differences-in-differences method

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1. Introduction

With the proposal of a community with a shared future for humanity, countries worldwide are paying increasing attention to constructing an ecological civilization. The formulation and improvement of environmental protection policies and regulations have been of concern to experts and scholars from various countries. The signing of the Paris Agreement puts forward higher requirements for Chinese environmental governance. In order to build a green ecological society, the Chinese government has made environmental protection a basic national policy. For decades, under the economic model of the government-led and vigorously developing heavy industry, Chinese firms have achieved rapid development. However, they have simultaneously brought about severe ecological and environmental problems [1]. Given this, China carried out the emission fee system in 1979, curbing the willful environmental violations of firms' pollutant emissions [2], which has made contributions to energy conservation and emission reduction. However, due to the lack of mandatory and supervisory power, the pollution levy system presents several problems, such as low executive power and nonstandard market supervision. To complete the economic assessment indicators, some local governments often co-operate with firms, interfere with the collection of environmental fees, and reduce the environmental supervision of high-polluting firms, resulting in the phenomenon of "treating while polluting" and the poor pollution reduction effect of the pollution levy system [3]. In the new era, the Chinese government has put forward higher requirements for the green environmental protection behavior of firms and continuously improves relevant laws and regulations on environmental protection. Therefore, exploring whether macroeconomic environmental

policies can effectively promote the improvement of corporate environmental behavior has theoretical and practical significance.

Environmental performance, as the ultimate standard for evaluating environmental policies, is also an important means of evaluating corporate environmental behavior. Its measurement not only includes financial indicators (such as the payment of environmental taxes, green innovation investment in environmental management, and government subsidies for environmental management) but also non-financial performance indicators (such as the development of environmental protection concepts, green culture, and environment-related policies). In the environmental governance system, the state regulates the environmental behavior of firms via environmental policies and relevant laws, and local governments urge enterprises to pay attention to environmental issues via environmental supervision and other means. However, as an "economic person", a corporation will consider its economic interests from a cost–benefit perspective. It will avoid environmental responsibilities, resulting in the poor implementation of environmental policies. In addition, there is a U-shaped relationship between the environmental investment of firms and environmental regulation. Firms are willing to bear a lower penalty with weak environmental regulation and will not consider a higher environmental investment. In contrast, when environmental regulations are stricter, firms will increase investment in environmental protection, thus improving their environmental performance [4]. Existing literature generally uses evaluation standards issued by relevant departments or pollution emission standards of companies as environmental performance evaluation indicators, such as using sulfur dioxide emission intensity to characterize environmental performance levels [5–8]. However, an increasing number of scholars are combining theories such as the Balanced Scorecard and EVA to construct a comprehensive environmental evaluation system based on information such as annual reports, social responsibility reports, and environmental reports of listed companies [9–13]. This paper quantitatively evaluates the environmental protection strategy, environmental management, and environmental impact of enterprises based on the evaluation criteria constructed by existing literature, which can more comprehensively reflect the environmental performance of firms.

In order to optimize corporate environmental behavior, governments around the world have actively formulated environmental policies, and many scholars have evaluated the effectiveness of environmental policy implementation. According to the experimental results of the effects of environmental protection tax policies in developed countries, gradually increasing the tax can achieve a win–win situation for economic and environmental interests [14]. Environmental tax policies in European countries can affect clean enterprise investment and financing activities [15]. Based on years of implementation of environmental taxes abroad and extensive research by scholars, to solve the drawbacks of the pollution levy system and reduce the pollutant emissions of firms, the Standing Committee of the Twelfth National People's Congress of China promulgated the Environmental Protection Tax Law of the People's Republic of China (hereafter referred to as the Environmental Protection Tax) on 25 December 2016, which was officially implemented on 1 January 2018. In the academic community's research on the policy effectiveness of stricter environmental regulations—Environmental Protection Tax—some scholars analyze the ecological footprint level of provinces from a macro level [16], but more research mainly focuses on the impact of this policy on environmental protection investment, green innovation, and corporate performance at the micro-enterprise level. The research on the impact of environmental regulation on environmental protection investment has yet to reach an agreement [17]. Without external intervention, most firms will not be willing to carry out green technology innovation actively. With government regulation, firms will greatly increase their investment in environmental protection and green technology innovation [18,19].

According to the innovation compensation theory, the strict Environmental Protection Tax will increase the environmental costs of firms in the short term. The firms can obtain green technology innovation by increasing their research and development expenditure, promoting a green transformation. In the long term, it can effectively reduce pollution

emissions to offset the increased costs, enhance market competitiveness, and ultimately improve corporate performance, such as operating profit [20,21]. However, some scholars have proposed that the Environmental Protection Tax will increase firms' green investment, crowding out other resources and reducing corporate performance [22,23]. The effect of the policy implementation on the performance improvement of firms is not evident in the short term. While strengthening the implementation of the policy, it is necessary to restrain the collusion of local governments and local firms in the emission of pollutants to promote and encourage firms to improve the ecological environment [24].

In today's world, where environmental accounting is increasingly valued, research on corporate environmental performance and the effectiveness of environmental policies is also increasing and becoming more detailed. However, most existing literature studies the macro impact of the Environmental Protection Tax, the impact of environmental taxes on firms (such as corporate environmental investment, green innovation investment, and green total factor productivity), and the impact of other environmental regulatory policies on corporate environmental performance. Can implementing the Environmental Protection Tax, which is still in its infancy, improve corporate environmental performance? Can local governments encourage firms to improve their environmental management level and play an essential role in enhancing corporate environmental performance in strengthening the environmental supervision of firms? The questions above have become vital issues that presently need to be discussed. However, there is currently limited research on the relationship between the Environmental Protection Tax, local regulation, and corporate environmental performance. Based on this, this paper links the three together and explores the impact of the Environmental Protection Tax on corporate environmental performance in heavily polluting industries. The intensity of local environmental regulation is used as an intermediary variable to further study its mediating role.

This paper compiles the relevant data of listed firms in the Chinese A-share heavy-pollution industries from 2016 to 2020 under the background of the environmental tax reform by using the differences-in-differences (DID) method to test the impact of the environmental tax reform on the corporate environmental performance and combines the environmental supervision intensity of local governments to analyze its internal mechanism and the heterogeneity of the impact. It is determined that the environmental tax reform will promote improving corporate environmental performance via local supervision. This policy has a more prominent effect on improving environmental performance in non-state-owned enterprises and western firms.

Compared with the existing literature, the contributions of this paper are as follows: Firstly, it enriches the research on the corporate environmental behavior of the environmental tax reform from the perspective of corporate environmental performance. Most of the available literature primarily focuses on the impact of pollutant emissions, environmental protection investment, green innovation capability, corporate financial performance, or other aspects. This paper, instead, focuses on the effect of the environmental tax reform on corporate environmental behavior to confirm the environmental governance effect of the policy on firms. The evaluation is more comprehensive and is a supplement to the existing literature research perspective.

Secondly, it effectively identifies the specific path of the effect of the environmental tax reform from the central government to firms, supplementing the perspective of institutional theory. This paper put central–local– firms within the same analytical framework, combining the principal–agent theory with institutional theory to analyze the role path of central policies. It is found that the environmental supervision intensity of the local government can increase the environmental governance pressure of firms, drive the green transformation and upgrading of firms, and effectively improve environmental performance.

Thirdly, it clarifies the effective boundary of the environmental tax reform to improve corporate environmental performance, providing policy recommendations for the subsequent reform of the environmental protection tax. The environmental tax reform has a more significant effect on improving corporate environmental performance with different

property attributes and geographical locations. It provides a new concept for promoting the Environmental Protection Tax, giving full play to local governments' regulatory role and improving environmental governance. It has significant practical significance for the central government in formulating laws, local governments in implementing supervision, and enterprises in improving environmental performance levels.

The remainder of this paper is organized as follows: Section 2 provides the institutional background and research hypothesis, Section 3 encompasses the research design, Section 4 provides the empirical results and mechanism test, Section 5 provides further analysis, and Section 6 is the conclusion.

2. Institutional Background and Hypothesis

2.1. Institutional Background

To encourage firms to deal with pollutant emissions and protect the environment, it is not only necessary for the market mechanism to play a regulatory role, but also for the government to formulate and implement environmental governance policies [25]. The "Three Simultaneities" system established in 1973, which belongs to the mandated environmental regulation, is the earliest environmental regulation in China. Although such environmental regulations are effective and reliable, they lack sufficient resources to implement adequate supervision and strict punishments in long-term practice [26], resulting in the increasingly intensified contradiction between economic and ecological development. To balance economic growth and environmental protection, China proposed the pollution levy system in 1979 based on the amount of pollution discharged by firms and promulgated the Interim Measures for the Collection of Environmental Fees in 1982.

The pollution levy system was modified and improved many times from 1991 to 1999 and has significantly contributed to energy conservation and emission reduction. However, the debate on the pollution levy system's effectiveness has never reached a firm agreement [27]. Due to the influence of external factors, such as regional economic differences, local administrative intervention, and legal environment, the pollution levy system has endogenous law enforcement problems among provinces. In contrast, firms' pollution discharge declaration and registration face the problem of concealment and omission, and the government's collection is not comprehensive [28]. At the same time, due to the low collection standard of pollution charges, when the cost of pollution control is higher than the collection standard of pollution charges, most firms often choose to pay for "reasonable pollution discharge", resulting in poor policy implementation. Some scholars believe that the emission fee system did not fully give full play to the pollution reduction effect through the analysis of industrial sulfur dioxide emissions in Chinese cities [29].

As a means to remedy the market failure, the Environmental Protection Tax aims to protect the environment and promote the co-ordinated development of ecological civilization society and economic society. Implementing the policy can enrich the tax framework, reduce corporations' pollutant emissions, promote corporations' green transformation, and achieve the high-quality development of the real economy [30–33]. However, some scholars believe that the impact of this policy on the individual dimension of firms is irregular, and it cannot fundamentally nor effectively reduce the emission of pollutants or achieve innovation in the field of new energy [34].

2.2. Hypothesis

According to institutional theory, public policies have the characteristics of legitimacy, universality, and coercion. The relevant policy formulated by the government is to set reasonable expectations in social moral requirements and socially acceptable standards. The pressure formed by expectations will effectively constrain the management and organizational behavior of enterprises [35]. The environmental protection tax policy, as a public policy, has a certain restraining effect on the environmental behavior of enterprises. At the same time, the Environmental Protection Tax belongs to the Pigou tax, which mainly controls the behaviors that negatively impact society and encourages the behaviors that

have positive impacts. The government can internalize the negative externalities of heavy-pollution firms' emissions via taxation or fees, forcing firms to reduce pollutant emissions. Whether through environmental fees or the Environmental Protection Tax, the decision of firms to reduce pollutant emissions via internal governance depends on the policy's collection standards for pollutant emissions. When the intensity of environmental punishment is far lower than the cost for firms to control pollution, it will lead to policy failure. It can even lead to an increase in pollutant emissions [36]. The pollution levy system was implemented with lower collection standards than the pollutants to be treated in 1979. The overly loose collection standard made firms abandon green innovation and choose to pay for pollution discharge to pollute, resulting in a lower level of corporate environmental performance.

The Porter hypothesis suggests that firms can not only offset the increased costs of meeting environmental regulations through technological innovation, but also improve their operational efficiency [37]. Effective environmental regulation can enhance the green innovation technology of firms, encourage them to transform into environmentally friendly firms, improve the production efficiency and corporate environmental performance, and produce products that are more popular with consumers via green innovation, thus improving the market competitiveness of corporations and enhancing the ability of sustainable development [38,39]. The Environmental Protection Tax implemented in 2018 has raised the collection standard of pollutant emissions and the cost of firms' emissions, which can force firms to improve their environmental management model [40], encouraging firms to upgrade their environmental protection technology and improve environmental performance. At the same time, the Environmental Protection Tax has formed a high entry barrier for potential entrants with low environmental performance, excluding firms that have to bear more environmental costs from the industry, further promoting the environmental performance improvement of heavy-pollution industries [41]. Accordingly, this study proposes the following hypothesis:

Hypothesis 1. *The environmental tax reform positively impacts corporate environmental performance.*

According to the "principal–agent theory", the goal of the central government is to formulate a series of policies for macro management, in order to achieve the effective allocation of public goods and maximize the effectiveness of social welfare, while local governments carry out specific implementation work. Central and local governments have different positions on environmental protection and governance. The economic performance assessment of local governments from the central government drives the local governments to provide a green channel for firms that can create better economic benefits and formulate a relatively loose environmental punishment system, thus introducing firms with good financial performance but relatively severe pollution, as well as leading to the "pollution paradise" artificially created by local governments [42].

As the direct supervisor of firms under their jurisdiction, local governments play an essential role in implementing environmental tax reform [43]. To implement the Environmental Protection Tax, central and local governments have changed the proportion of the original environmental fee income from 1:9 to include all of it in the local fiscal revenue. Tax, management power, and environmental assessment have been included in the scope of local governments, effectively encouraging local governments to promote the protection of the ecological environment. After implementing the policy, the local government manages the environment by itself. It pays more attention to environmental protection, making local supervision stricter, bringing greater supervision pressure to firms, and gradually reducing the local government's "co-contamination" behavior with firms in environmental governance [44]. Therefore, environmental tax reform has a profound impact on environmental supervision from the local government, thus affecting the environmental management strategy of firms, driving corporate green transformation and development, and improving their environmental performance. Accordingly, this study proposes the following hypothesis:

Hypothesis 2. *Local supervision is an important channel for improving corporate environmental performance through the environmental tax reform.*

3. Method

3.1. Sample and Data Collection

Taking the environmental tax reform implemented in 2018 as an exogenous impact event, this paper uses the DID method to explore whether the environmental tax reform can improve corporate environmental performance. Compared to listed firms in other industries, listed firms in heavily polluting industries will inevitably have significant adverse effects on the external environment in their daily production and operation processes, and will be subject to stricter government environmental supervision, becoming the most resposible entities for environment. Similarly, this type of firm will also be more severely affected than other industries when external environmental policies change, and will take the lead in making changes. On the contrary, selecting listed firms across the entire industry as a sample will result in inaccurate research results, as a large number of clean firms with low policy sensitivity will dilute the policy effectiveness. As a result, the A-share listed firms in China's heavy-pollution industries from 2016 to 2020 are selected as the sample. Based on the disclosure time of the Corporate Social Responsibility Report, the Environmental Report, and the Corporate Sustainability Report, as well as based on the Guidelines for Industry Classification of Listed Companies published in 2012, 17 sub-categories were selected from the heavily polluted industries. The samples were processed according to the following principles: (1) eliminate the samples with serious missing or abnormal data; (2) remove samples of ST, SST, * ST, and other abnormalities; and (3) winsorize the data at 1% and 99% to eliminate the influence of outliers. By cleaning duplicate, incomplete, and abnormal data, 336 sample firms and 1647 sample observations were finally obtained. The control variables and relevant data on enterprise environmental performance were obtained from the China Stock Market & Accounting Research Database. The local environmental supervision intensity is represented by the number of cases of regional environmental protection law enforcement. The data are derived from China Economic Information Net Statistics Database. The missing part of the data was sorted out manually.

3.2. Variable Measurement

3.2.1. Explained Variable

The explained variable of this paper is the corporate environmental performance indicator (EPI), which measures firms' environmental management behavior and governance effectiveness. The corporate environmental performance measurement is mainly based on the quantitative evaluation method. Indicators such as environmental pollution control, environmental pollution consumption, and environmental resource recovery are selected under the annual report, social responsibility report, and environmental report of listed companies. Referring to existing research practices [45–47], this paper uses the evaluation index system method to evaluate the corporate environmental performance indicator (EPI). It constructs the corporate environmental performance scoring table in Table 1. The scoring system divides the indicator into three categories: environmental protection strategy, environmental management, and environmental impact, with 15 secondary indicators detailed. We adopt a "back-to-back double evaluation" mechanism, with two authors scoring all indicators. If the corporation discloses relevant contents, it will be recorded as "1"; otherwise, it will be recorded as "0". If there are differences in ratings, the author with a rating of "1" will provide evidence, and the final score will be determined through discussion among other authors.

Table 1. Corporate environmental performance rating table.

First-Level Indicators	Second-Level Indicators	Scoring Rules
Environmental protection strategic indicators	Environmental protection concept Environmental risks and countermeasures Environmental management system Environment and sustainable development Refer to Global Reporting Initiative "Guidelines for Sustainable Development"	1 point for disclosure and 0 points for non-disclosure
Environmental management indicators	Whether to set up a safety and environmental protection department Whether it has passed ISO14001 certification Whether there is environmental protection education and training Whether a plan for environmental emergencies has been established Whether to disclose the social responsibility report	1 point for disclosure and 0 points for non-disclosure
Environmental impact indicators	Treatment measures and utilization rate of "three wastes" Quantitative energy conservation and emission reduction indicators Whether to quantitatively disclose pollutants	1 point for disclosure and 0 points for non-disclosure
	Whether there is environmental administrative punishment	If you are punished in the current year, score 1 point; otherwise, score 0 points
	Environmental protection award	1 point for the reward in the current year, and 0 points for the contrary

3.2.2. Explanatory Variable

The explanatory variable of this paper is the environmental tax reform. Here, POLICY is a grouping variable. Referring to the division method of pilot provinces [24], 31 provinces in China (including municipalities directly under the Central Government and autonomous regions) are divided into the experimental group (tax standard raising) and the control group (tax translation) according to whether pollutant emission standards were improved. For the experimental group, POLICY is assigned a value of 1. For the control group, POLICY is assigned a value of 0. The TIME dummy variable is introduced to quantify the time of policy implementation. The value is 0 before 1 January 2018, and 1 afterward. The coefficient of the POLICY × TIME interaction is the impact of the policy on corporate environmental performance.

3.2.3. Mediation Variable

The quantitative methods of local environmental supervision intensity in the existing literature mainly include the China Pollution Source Regulatory Information Disclosure Index (PITI Index), the total number of local environmental protection regulations and rules issued by each province in the same year, and the environmental monitoring business funds of each province. Because the Environmental Protection Tax is a provincial policy, while the PITI index is municipal, this paper's research window is up until 2020. However, the China Environmental Yearbook lacks data on environmental protection regulations, the total number of regulations, environmental monitoring, and other data in 2020. Therefore, this paper uses a quantitative method to measure the local regulatory intensity (LRI) by using the number of environmental protection law enforcement cases in each province [47].

3.2.4. Control Variables

Referring to existing research [43,48,49], this paper adds the following control variables to the model: return on total assets (ROA), market power (MARKET), the shareholding ratio of the largest shareholder (FIRST), years of establishment (AGE), Tobin's Q value (TQ),

nature of property rights (PROPERTY), and GDP per capita (PerGDP). In addition, it adds industry dummy variables and year dummy variables to control industry and year fixed effects. The variable definitions in this paper are shown in Table 2.

Table 2. Variable definition and measurement.

Variable	Symbol	Measurement
Corporate environmental performance	EPI	Total according to the environmental performance scoring table/10
Policy dummy variable	POLICY	The policy pilot corporate is 1, and vice versa is 0
Time dummy variable	TIME	0 before 2018, 1 after
Local environmental supervision intensity	LRI	Number of regional environmental protection law enforcement cases
Return on total assets	ROA	Net profit/shareholders' equity × 100%
Market power	MARKET	The logarithm of the ratio of annual total income to annual total cost
Shareholding ratio of the largest shareholder	FIRST	Shareholding ratio of the largest shareholder of the corporate/100
Years of establishment	AGE	Rounding off the number of years of establishment
Tobin Q value	TQ	Tobin Q value
Nature of property rights	PROPERTY	1 for state-owned enterprises and 0 for others
GDP per capita	PerGDP	The logarithm of the province's GDP per capita in the current year

3.3. Valuation Model

To test the impact of environmental tax reform on corporate environmental performance, this paper constructs the following measurement model:

$$EPI_{i,t} = \beta_0 + \beta_1 \times POLICY_i \times TIME_t + \sum_a \beta_a \times CONTROLS_{i,t} + \sum_b \beta_b \times YEAR_b + \sum_c \beta_c \times INDUSTRY_c + \varepsilon_{i,t} \quad (1)$$

$$LRI_{i,t} = \beta_0 + \beta_1 \times POLICY_i \times TIME_t + \sum_a \beta_a \times CONTROLS_{i,t} + \sum_b \beta_b \times YEAR_b + \sum_c \beta_c \times INDUSTRY_c + \varepsilon_{i,t} \quad (2)$$

$$EPI_{i,t} = \beta_0 + \beta_1 \times LRI_{i,t} + \beta_2 \times POLICY_i \times TIME_t + \sum_a \beta_a \times CONTROLS_{i,t} + \sum_b \beta_b \times YEAR_b + \sum_c \beta_c \times INDUSTRY_c + \varepsilon_{i,t} \quad (3)$$

Model (1) is a DID model, which fixes the fixed effect of year and industry. Models (2) and (3) are stepwise regression models, which also control the year and industry. Among them, the coefficient of the POLICY × TIME interaction item is the impact of Environmental Protection Tax on corporate environmental performance, CONTROLS is the control variable group, i is the corporation, t is the year, INDUSTRY is the industry fixed effect, YEAR is the year fixed effect, and ε is a random disturbance item.

4. Empirical Results

4.1. Descriptive Statistics

As shown in Table 3, the maximum value of the environmental performance (EPI) of the sample corporations is 1.2, indicating that the firms in the sample have begun to attach importance to environmental performance and disclose environment-related information to the public for public supervision. It also reflects that there is still room for improvement in environmental governance. The average environmental performance is 0.555, which is less than the median of 0.6, and the sample data are on the left. It may be that the environmental performance of many corporations is at a low level, pulling down the average value. It may also be that implementing the Environmental Protection Tax has improved the level of the corporate environmental performance, increasing the level of the environmental performance of some corporations and increasing the median. The maximum value of local regulation (LRI) is 9.747, and the mean and median are close to the maximum value, indicating that the regulatory intensity of most regions in the sample is not much different, and only a few regions have weak regulatory intensity. For the control variables at the firm

level, such as the return on total assets, the shareholding ratio of the largest shareholder, and Tobin's Q value, the range between different firms is large, indicating that the sample selection is relatively comprehensive. The median of property rights is 1, indicating a relatively large number of state-owned enterprises in the sample.

Table 3. Full-sample descriptive statistics.

Variable	N	MEAN	SD	MIN	P50	MAX
EPI	1647	0.555	0.315	0.000	0.600	1.200
POLICY × TIME	1647	0.330	0.470	0.000	0.000	1.000
LRI	1607	7.107	1.428	1.946	7.148	9.747
ROA	1647	4.793	5.758	−20.08	3.871	21.27
MARKET	1647	0.386	0.364	−0.033	0.274	1.910
FIRST	1647	0.374	0.158	0.091	0.356	0.794
AGE	1647	3.079	0.192	2.485	3.091	3.584
TQ	1647	1.717	1.154	0.792	1.347	8.083
PROPERTY	1647	0.554	0.497	0.000	1.000	1.000
PerGDP	1647	11.144	0.426	10.268	11.138	12.013

Note. The data of Tibet in the number of regional environmental law enforcement cases (LRI) is missing, resulting in 1607 samples of this variable.

4.2. Parallel Trend Test

To test the reliability of the regression results, this paper uses the parallel trend to test whether the environmental performance of the control group and the experimental group has the same trend before implementing the policy. Conducting this test helps this paper clarify whether the change in corporate environmental performance is affected by the environmental tax reform and whether the policy effect is reasonable. In Table 4, it can be observed that there was no significant difference between the test group and the control group before the policy time point. That is, it passed the parallel trend test. The interaction coefficient of the policy implementation year and the next two years are significantly positive, indicating that the policy implementation impacts the corporate environmental performance and the effect is sustainable.

Table 4. Common trend test.

EPI	Coef.	Std. Err.	*T*	$p > \|t\|$	[95% Conf. Interval]	
Pre_two	0.065	0.065	1.01	0.328	−0.072	0.202
Pre_one	0.057	0.033	1.73	0.102	−0.013	0.126
Current	0.082	0.039	2.08	0.054	−0.001	0.165
Post_one	0.067	0.029	2.31	0.021	0.011	0.124
Post_two	0.077	0.026	2.94	0.010	0.022	0.133

4.3. Main Results

The impact of the Environmental Protection Tax on corporate environmental performance is shown in Table 5. The coefficient of POLICY × TIME is positive and significant at the 1% level. The results indicate that implementing the Environmental Protection Tax can improve corporate environmental performance, supporting H1. The nature of corporate property rights also affects corporate environmental performance, indicating that the environmental performance of state-owned enterprises is better than that of non-state-owned enterprises.

Table 5. Regression results of environmental protection "fee to tax" and corporate environmental performance.

Variable	EPI
POLICY × TIME	0.058 ***
	(3.13)
ROA	0.002
	(0.89)
MARKET	0.018
	(0.40)
FIRST	0.082
	(0.62)
AGE	−0.040
	(−0.46)
TQ	−0.037 **
	(−2.25)
PROPERTY	0.095 ***
	(3.06)
PerGDP	0.066
	(1.23)
_ cons	−0.107
	(−0.19)
YEAR	Yes
INDUSTRY	Yes
N	1647
R^2	0.151

Note. *, **, and *** in the table indicate the significance level of 10%, 5%, and 1% respectively; the values in brackets are t values. The standard error is adjusted by clustering at the industry level.

4.4. Mediation Effect Test

To verify H2, this paper uses the stepwise regression method to test whether local regulation plays an important role in the impact of the Environmental Protection Tax and corporate environmental performance; that is, we first regress the interaction between the Environmental Protection Tax and the implementation time of the policy and the regional environmental protection law enforcement, and then regress the independent variable, the intermediate variable, and the dependent variable.

Table 6 Column (1) shows that implementing the Environmental Protection Tax has a significant positive impact at the 1% level. Column (2) in Table 6 shows that the impact of local regulation and Environmental Protection Tax policies on corporate environmental performance is positively significant at the 5% level. This indicates that environmental tax reform can improve corporate environmental performance by increasing the intensity of local supervision. Hence, it can be concluded that H2, which states that local environmental supervision is an important channel for the environmental tax reform to improve corporate environmental performance, is accepted.

Table 6. Intermediary effect of local regulation.

Variable	(1)	(2)
	LRI	EPI
LRI		0.016 **
		(2.16)
POLICY × TIME	1.253 ***	0.041 **
	(9.27)	(2.29)
ROA	0.019 ***	0.003
	(3.09)	(1.19)
MARKET	−0.196	0.011
	(−0.94)	(0.28)

Table 6. *Cont.*

Variable	(1)	(2)
	LRI	EPI
FIRST	0.019	0.070
	(0.03)	(0.53)
AGE	0.575	−0.038
	(1.39)	(−0.42)
TQ	−0.102	−0.038 **
	(−1.48)	(−2.66)
PROPERTY	−0.368 ***	0.103 ***
	(−3.66)	(3.14)
PerGDP	1.628 ***	0.043
	(11.99)	(0.84)
_ cons	−12.832 ***	0.046
	(−7.37)	(0.09)
YEAR	Yes	Yes
INDUSTRY	Yes	Yes
N	1607	1607
R^2	0.260	0.156

Note. *, **, and *** in the table indicate the significance level of 10%, 5%, and 1%, respectively; the values in brackets are t values. The standard error is adjusted by clustering at the industry level.

4.5. Robustness Test

4.5.1. Placebo Test

To avoid the false association caused by other external factors, this paper randomly selects the experimental group, retains the proportion of 180 groups in the original sample as the experimental group, and constructs 400 virtual experimental groups and control groups. The results are presented in Figure 1. Most randomly generated experimental groups have *p* values greater than the real *p* values after regression, and most *p* values are above 0.1. Only a few *p* values are close to the real *p* values, indicating that implementing the environmental tax reform can effectively promote the improvement of corporate environmental performance. This conclusion is robust.

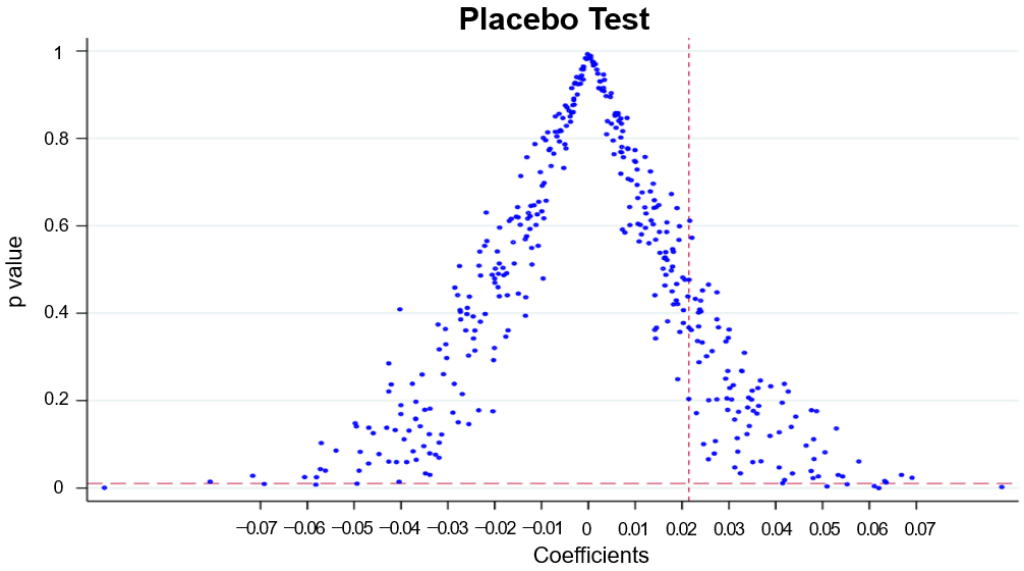

Figure 1. Test of the randomly generated experimental group.

4.5.2. Replacement of Variables

To avoid the error caused by the quantified environmental performance, the environmental impact indicators in the corporate environmental performance scoring table are used

to measure the corporate environmental performance. This is because the environmental impact indicators are more focused on the results of corporate environmental management and can better reflect the actual environmental performance level of firms compared with the environmental protection strategic indicators and environmental management indicators. Therefore, this paper summarizes and standardizes the environmental impact indicators and returns them. The results are shown in Table 7 and are consistent with the previous results. The environmental tax reform positively impacts corporate environmental performance, and local supervision plays an intermediary role in it, supporting H1 and H2.

Table 7. Replacement of the interpreted variable.

Variable	(1)	(2)	(3)
	EPI	LRI	EPI
LRI			0.028 *
			(1.89)
POLICY × TIME	0.099 **	1.253 ***	0.067 *
	(2.30)	(9.27)	(1.92)
ROA	0.003	0.019 ***	0.004
	(0.46)	(3.09)	(0.66)
MARKET	0.055	−0.196	0.052
	(0.55)	(−0.94)	(0.54)
FIRST	0.242	0.019	0.217
	(0.91)	(0.03)	(0.81)
AGE	−0.160	0.575	−0.176
	(−0.96)	(1.39)	(−1.01)
TQ	−0.059 **	−0.102	−0.061 ***
	(−2.64)	(−1.48)	(−3.21)
PROPERTY	0.200 ***	−0.368 ***	0.218 ***
	(3.37)	(−3.66)	(3.79)
PerGDP	0.035	1.628 ***	−0.007
	(0.33)	(11.99)	(−0.08)
_ cons	0.603	−12.832 ***	0.928
	(0.54)	(−7.37)	(0.87)
YEAR	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes
N	1647	1607	1607
R^2	0.130	0.260	0.133

Note. *, **, and *** in the table indicate the significance level of 10%, 5% and 1% respectively; the values in brackets are t values. The standard error is adjusted by clustering at the industry level.

4.5.3. Replacement of the Model

Because the value range of the explained variable is [0, 1.2] and the value is not continuous, the logit model is selected for further regression analysis to ensure the robustness of the results. Since the logit model is more suitable for interpreting the two-valued variables, this paper binarizes environmental performance. First, a new environmental performance variable (EPII) is generated, a value of 1 is assigned if the environmental performance value is greater than its mean value of 0.55, and a value of 0 is assigned if it is less than or equal to 0.55. Then, regression is carried out for fixed individuals and years. The results are shown in Table 8 Column (1). Due to the widening gap in corporate environmental performance, the coefficient of POLICY × TIME in Column (1) increased significantly. It was significantly positive at the 5% level, verifying the robustness of the benchmark regression results. Columns (2) and (3) in Table 8 are the robustness tests of the intermediary effect.

Table 8. Replacement model.

Variable	(1)	(2)	(3)
	EPII	LRI	EPII
LRI			0.412 ***
			(3.09)
POLICY × TIME	0.517 **	0.844 ***	0.175 **
	(2.07)	(12.26)	(2.88)
ROA	−0.049 **	0.004	−0.060 **
	(−1.99)	(1.21)	(−2.37)
MARKET	1.243	−0.120	1.238
	(1.31)	(−0.75)	(1.28)
FIRST	−0.271	0.554	−0.282
	(−0.17)	(1.45)	(−0.18)
AGE	−7.417 ***	0.301	−6.483 ***
	(−3.46)	(0.22)	(−2.99)
TQ	−0.820 ***	0.022	−0.758 ***
	(−4.32)	(0.76)	(−4.01)
PROPERTY	0.874	−0.076	0.870
	(0.95)	(−0.36)	(0.91)
PerGDP	1.335	−1.353 ***	1.422
	(1.08)	(−6.26)	(1.12)
_ cons	-	20.799 ***	-
	-	(4.46)	-
YEAR	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes
N	830	1607	802
R^2	-	0.204	-

Note. *, **, and *** in the table indicate the significance level of 10%, 5%, and 1%, respectively; the values in brackets are t values.

4.5.4. Subsample Regression

Based on the practice of Youliang Jin, this section selects the sub-samples of industries ranking in the top 11 in heavily polluted industries, with the regression results shown in Table 9 [24]. In Table 9 (1), the coefficient of POLICY × TIME is significantly positive, assuming 1 is robust. In addition, in Table 9 (2) and (3), the coefficient of POLICY × TIME is significantly positive, and H2 is also robust.

Table 9. Subsample regression.

Variable	(1)	(2)	(3)
	EPI	LRI	EPI
LRI			0.017 *
			(2.08)
POLICY × TIME	0.062 ***	1.280 ***	0.044 **
	(3.55)	(8.78)	(2.55)
ROA	0.002	0.016 **	0.003
	(0.83)	(2.64)	(1.15)
MARKET	0.035	−0.204	0.030
	(0.95)	(−0.96)	(0.97)
FIRST	0.067	−0.045	0.056
	(0.49)	(−0.07)	(0.41)
AGE	−0.067	0.503	−0.066
	(−0.76)	(1.12)	(−0.72)
TQ	−0.039 **	−0.091	−0.040 **
	(−2.18)	(−1.28)	(−2.59)
PROPERTY	0.103 ***	−0.360 ***	0.112 ***
	(3.09)	(−3.40)	(3.20)

Table 9. *Cont.*

Variable	(1)	(2)	(3)
	EPI	LRI	EPI
PerGDP	0.071	1.587 ***	0.047
	(1.29)	(11.15)	(0.92)
_ cons	−0.072	−12.158 ***	0.074
	(−0.13)	(−6.74)	(0.13)
YEAR	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes
N	1548	1508	1508
R^2	0.155	0.449	0.161

Note. *, **, and *** in the table indicate the significance level of 10%, 5%, and 1%, respectively; the values in brackets are t values. The standard error is adjusted by clustering at the industry level.

5. Heterogeneity Test

5.1. Property Right Character

Corporations with different property rights will have different impacts on different environmental regulations. In the face of a mix of environmental regulation tools and command control environmental regulation tools, the environmental regulation effect of state-owned enterprises is often better than that of non-state-owned enterprises, and non-state-owned enterprises perform better under market incentive environmental regulation [50]. Thus, to examine the impact of the environmental tax reform on corporate environmental performance under different property rights, this paper divides the sample into state-owned enterprises and non-state-owned enterprises according to property rights.

As can be observed in Table 10, the positive impact of the Environmental Protection Tax on corporate environmental performance is not evident in state-owned enterprises. In non-state-owned enterprises, the coefficient of policy interaction is greater than the coefficient of full-sample regression. It is significant at the 5% level, which verifies that market-based environmental regulation tools play a better role in non-state-owned enterprises.

Table 10. Heterogeneity test—property right character.

Variable	State-Owned Enterprises	Non-State-Owned Enterprises
	EPI	EPI
POLICY × TIME	0.027	0.084 **
	(1.15)	(2.92)
ROA	0.005	0.002
	(1.62)	(0.58)
MARKET	−0.010	0.028
	(−0.26)	(0.52)
FIRST	0.114	0.008
	(0.95)	(0.03)
AGE	−0.075	−0.066
	(−0.72)	(−0.69)
TQ	−0.057 **	−0.017
	(−2.58)	(−1.05)
PerGDP	0.054	0.073
	(0.76)	(1.32)
_ cons	0.244	−0.119
	(0.30)	(−0.24)
YEAR	Yes	Yes
INDUSTRY	Yes	Yes
N	913	734
R^2	0.190	0.177

Note. *, **, and *** in the table indicate the significance level of 10%, 5%, and 1%, respectively; the values in brackets are t values. The standard error is adjusted by clustering at the industry level.

5.2. Location

Due to the different levels of economic development in different regions, there are great differences in local policies and local supervision for local firms. Therefore, according to the economic development level and future construction plan of the region where the firms are located, the whole country is divided into the eastern region, the central region, and the western region to compare and analyze the differences in the policy effect of the environmental tax reform in different corporate locations.

According to Table 11, the Environmental Protection Tax has a weak impact on corporate environmental performance in the eastern and central regions but a significant impact on corporations in the western regions. Through the descriptive statistics of different groups, the overall corporate environmental performance in the eastern region is better than in other regions. The overall local supervision intensity is also more substantial than in other regions.

Table 11. Heterogeneity test—location.

Variable	Eastern Region	Central Region	Western Region
	EPI	EPI	EPI
POLICY × TIME	0.009	−0.010	0.193 **
	(0.28)	(−0.24)	(2.48)
ROA	0.005	0.001	0.002
	(0.94)	(0.28)	(0.48)
MARKET	0.028	0.104 **	−0.064
	(0.34)	(2.40)	(−1.11)
FIRST	0.021	0.009	0.316
	(0.12)	(0.07)	(1.41)
AGE	0.101	−0.094	−0.132
	(0.99)	(−0.62)	(−0.90)
TQ	−0.052 ***	−0.022	−0.014
	(−3.31)	(−0.76)	(−0.43)
PROPERTY	0.091 *	0.061	0.110
	(2.01)	(1.03)	(1.29)
PerGDP	0.026	−0.319 **	−0.177
	(0.22)	(−2.61)	(−1.44)
_ cons	−0.014	4.229 ***	2.635 *
	(−0.01)	(3.89)	(1.78)
YERA	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes
N	872	434	341
R^2	0.150	0.268	0.335

Note. *, **, and *** in the table indicate the significance level of 10%, 5%, and 1%, respectively; the values in brackets are t values. The standard error is adjusted by clustering at the industry level.

6. Discussion and Conclusions

6.1. Discussion

As a major reform of the Chinese environmental tax system, the environmental tax reform has promoted improving corporate environmental performance. Based on data from Chinese-listed heavy-pollution firms from 2016 to 2020, this paper evaluates the environmental management behavior of firms and the governance effectiveness of the environmental tax reform via the differences-in-differences (DID) method. It is found that implementing the environmental tax reform will promote the improvement of corporate environmental performance, which can be achieved via the environmental supervision of local governments. Among non-state enterprises and firms in the western region, the environmental tax reform has a more significant effect on improving corporate environmental performance.

Through the main effect test, the implementation of the Environmental Protection Tax will increase the environmental performance score of firms by 0.58. Our study shows that the implementation of the Environmental Protection Tax will improve firm environmental performance, and H1 is accepted. Although some scholars currently believe that the promotion effect is not significant [23], more scholars believe that this policy is effective from the perspective of emission levels [33]. The reason for the differences may lie in the inclusion of different measurement standards in the construction of environmental performance evaluation systems. This paper constructs an evaluation index system for the environmental protection strategy, environmental management, and environmental impact based on the annual report, social responsibility report, and environmental report of listed companies, selecting multiple indicators such as environmental pollution control, environmental pollution consumption, and environmental resource recovery, with wider coverage.

In the parallel trend test, we found that the interaction coefficient of the year after policy implementation has improved. Although the confidence interval at the 5% level is not significantly different from zero, it can be significantly different from zero with 90% confidence. In the year after implementation, the confidence interval can be significantly different from zero at the 5% confidence level. This can indicate that the implementation of policies has an impact on corporate environmental performance, but there is a certain lag in policies, which is basically consistent with the conclusions of existing literature [24].

After adding the mechanism variable LER, the impact of the Environmental Protection Tax on corporate environmental performance is still significantly positive, indicating that the mediating effect of local environmental regulation is the result of partial mediation. After the implementation of the Environmental Protection Tax, all environmental taxes will belong to the local government, and the central government will supervise and assess the governance achievements of the local government. Starting from the principal–agent theory, the Environmental Protection Tax enhances the autonomy and governance enthusiasm of local governments. Therefore, local government regulation plays a positive role in promoting the growth of corporate environmental performance, and H2 is accepted.

In the heterogeneity test, the Environmental Protection Tax has a more significant effect on improving the environmental performance of non-state-owned and western-region enterprises. The positive impact of the Environmental Protection Tax on corporate environmental performance is not significant among state-owned enterprises, possibly due to the fact that state-owned enterprises already had better environmental performance before the policy implementation compared to non-state-owned enterprises. The overall environmental performance and local regulatory intensity of enterprises in the eastern region are higher, possibly because the environmental performance level of enterprises in the eastern region was already at a good level before the implementation of policies, and the impact of environmental tax policies on environmental performance is not significant. At the same time, it may be because the local governments in the central region did not have a significant difference in setting environmental protection tax collection standards compared to the previous pollution discharge fees, so the average interaction term of enterprises with the Environmental Protection Tax in the central region is significantly lower than in other regions.

6.2. Theoretical and Practical Contributions

This paper enriches the institutional theoretical framework by combining the principal–agent theory. The existing literature on the effectiveness of environmental systems is limited to the impact of policies on industries or firms, and lacks the observation of policy implementation paths. This paper considers the transmission mechanism of central policies, optimizes the agency relationship between the central government and local governments through environmental tax reform, and expands the application scenarios of institutional theory in environmental protection.

In response to the above discussions and conclusions, this paper proposes the following policy implications, which have practical guiding significance for the central government, local governments, and firms:

(1) The central government should adequately implement the rights and responsibilities of environmental governance to the local government, and the local government should strengthen the supervision of the environmental pollution emissions of local firms. The central government considers environmental protection an essential part of the national development strategy. Through implementing taxation and management power at all levels, the initiative of local governments in environmental protection can be enhanced. At the same time, the central government can reduce the possibility of local governments ignoring environmental performance and co-operating with high-polluting corporations to achieve economic performance indicators by building a comprehensive evaluation system and supervising local governments through a multi-dimensional environmental performance assessment of local governments.

(2) Local governments need to strengthen the environmental supervision of local firms further to achieve the long-term co-ordinated development of the regional economy and environmental protection. By improving the tax mechanism, enhancing tax collection management, and adequately raising the tax collection standards, the local government forces firms to reduce pollution, prevents firms from paying pollution discharge to pollute, and promotes the green transformation and modernization of firms.

(3) Firms with heavy pollution should optimize their internal environmental management and reduce their environmental risks according to the continuous changes in environmental policies. When there are major changes in the external environment (such as implementing stricter Environmental Protection Tax policies), non-state-owned enterprises with less supervision and firms with heavy pollution in the western region will be more affected. Firms should strengthen their management, enhance their green innovation capacity, actively disclose environmental protection policies and green performance, conduct production activities with higher standards, reduce the risks brought by changes in environmental policies to corporations, and take appropriate preventive measures.

6.3. Limitations and Further Study

The main limitations of this study are as follows: (1) The time window for studying the Environmental Protection Tax is relatively short. The policy was implemented in 2018, so this paper selects 2016–2020 as the research window period. However, the effects of macroeconomic environmental regulation policies often have hysteresis, making it difficult to see changes at the micro level in the short term of one or two years. (2) The research object is currently concentrated on listed companies of heavily polluting firms, and there are more heavily polluting small- and medium-sized firms that have not been considered. For these small- and medium-sized unlisted firms, government regulation will be more difficult and will have a partial impact on the results.

The following improvements can be made in future research: (1) Expand the sample object data, expand the policy research time to five years before and after, and use empirical verification to verify the conclusions again. (2) If the government puts forward more requirements for the disclosure of the environmental performance of various enterprises, we can include more non-listed companies in the future.

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