ingegneria sismica
International Journal of Earthquake Engineering
Anno XLIII - Num. 2 - 2026

A Study on the Impact of Environmental Protection Tax on ESG Bleaching Green Behavior of Heavy Polluting Firms in China

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SUMMARY: *This present research paper has the choice to collect data from enterprises with heavy pollution that cover the time interval from 2015 to 2024.After that, we build a multiple linear regression model to do empirical research on the influence that the environmental protection tax has on enterprises' ESG green-washing behaviors, and the basic mechanism through which this influence functions. Combined with the results of the intermediary effect test, we are carrying out the examination on the adjustment function of many kinds of restriction conditions.One series of robustness examinations has been conducted, therefore it makes the conclusions have more reliability and importance. We carry out a heterogeneity evaluation to go deep into the differences that exist in the operation results of enterprises which have different ownership attributes. (1) At the initial stage of policy implementation, the rising tax cost prompts firms to prefer selective ESG bleaching green. With further increase in policy intensity, the regression coefficient of the quadratic term on firms' degree of ESG bleaching is -0.873, and rising tax costs significantly inhibit greenwashing behavior.(2)Before the policy strength exceeds the inflection point, the regression coefficient values of the environmental protection tax policy show a notable positive value (0.175) and a notable negative value (-0.008) on the 1% significance level, the results of this research show that a positive correlative relation exists between the environmental protection tax policy and the degree of financing restriction which enterprises are faced with. Therefore, hence, there exists a negative correlative relation between the environmental protection tax policy and the enterprise financial performance. However, when the strength of policy exceeds the turning-point, therefore the condition becomes opposite. (3) The heterogeneity evaluation shows that the property right feature will produce a heterogeneous effect on the relation between the environmental protection tax policy and the enterprise greenwashing behavior.*

KEYWORDS: *environmental protection tax; heavy polluting enterprises; ESG greenwash behavior; multiple linear regression model; mediation effect*

1 Introduction

In year 2020, China at first put forward the "dual carbon" goal. It clearly put forward the demand that high-pollution enterprises should accelerate their transformation procedures, reduce carbon discharge, and undertake their environmental responsibilities. China has successively introduced environmental standards and emission limits for heavily polluting industries, prompting enterprises to adopt more stringent environmental protection measures in their operations [1, 2].Because of the special characteristics of their industries, companies with high

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https://doi.org/10.65102/is2026600
Published: 30 April, 2026

pollution are easier to actively respond to national policies, and fulfill their environmental and social responsibilities [3].Environment, society, and governance (ESG) expresses the basic thought that sustainable development needs. This idea emphasizes that we need a harmonious matching between a company's doing in environmental, social, governance fields[4].Although some enterprises actively fulfill their social responsibilities, under the pressure of strict environmental regulation, based on reasons such as avoiding high compliance costs and obtaining more profits, some enterprises actively disclose ESG-related information, but do not actually follow the content disclosed in the ESG report, and consequently mislead consumers, i.e., ESG "bleaching green " behavior [5]. Heavily polluting industries are more inclined to "greenwash" to balance the regulatory pressure and operational benefits due to the prominent environmental risks and huge green governance costs [6, 7].

According to the data that comes from the Ministry of Ecology and Environment of the People's Republic of China (MOE), in 2022, a total of 91,000 administrative penalties were imposed by MOE, with fines totaling 7.672 billion yuan. It can be seen that greenwashing can seriously affect consumer and investor confidence in corporate ESG practices as well as disclosure. Greenwash may lead to difficulties in obtaining fair returns for companies that really put in substantial environmental protection efforts, triggering adverse selection problems in the market and ultimately causing damage to the effectiveness of ecological civilization construction [8-11]. At this point, the government must implement external regulatory measures to prevent humans from destroying the environment [12]. On the late year of 2016, the government of China put into effect the Law of Environmental Protection Tax. This rule strengthened the ability that the government has for handling the environment through methods that come from law.The Environmental Protection Tax Law, which is China's first special tax law that focuses on environmental protection, gives power to enterprises to increase their investment on environmental-friendly innovation. This, on the other side, promotes production efficiency, reduces pollution emission, and helps sustainable development in the whole country[13-15].Afterwards, under the background that China's environmental protection tax plan is gradually put into practice and ESG projects are vigorously developing,the core concern of this study is whether the putting of an environmental protection tax can play a role of push for promoting sustainable development abilities and restraining the ESG-whitewashing and green-covering behaviors of high-pollution enterprises.

This present research paper has chosen 102 companies that carry out business inside China's high-pollution industry during 2015 to 2024 to be the research sample. It then on all sides expounds the data sources and the methods that are utilized for their processing.In this research, we have chosen specific variables in order to construct a two-way fixed-effects model which is used for panel data. Through carrying out a regression analysis on the basic model,our goal is to bring to light the mechanism through which the environmental protection levy influences the ESG "green-washing" conduct of heavy pollution enterprises in China.The mediation effect model is utilized by us to research the regulating effect of the degree of financing constraints and the business financial achievement, which act as mediating variables, in the process that the environmental protection tax influences enterprise ESG greenwashing conduct.We have already done a group of firmness examinations, which include omitted variable analyses, replacement of explanation elements, and placebo experiments. Utilizing a two-way fixed effects model, we have carried out an exploration into the heterogeneity of how environmental protection tax influences the corporate ESG greenwashing behavior. This probing work was finished by dividing companies into groups based on the characteristics of their property rights.

2 Study design

Under the increasingly stringent environmental regulations, whether heavily polluting enterprises can seek changes and break through under the pressure of policy, public opinion and financial performance has become the key to synergize economic development and environmental protection in China, and ESG has become a scientific tool to measure the comprehensive performance of enterprises because of its focus on the integrated development of environment, society and governance.Considering China's system situation, this article carries out deep discussion on the mechanism and the path through which the environmental protection tax influences the ESG greenwashing conduct of high-pollution enterprises in China from the enterprise-level micro angle of view.

2.1 Sample selection and data processing

2.1.1 Sample Selection and Data Sources

According to the related regulatory guiding files, this article chooses a sample of 102 firms from 15 categories of serious pollution industries, containing thermal electricity, steel, cement, and others, in the Shanghai and Shenzhen A-stock markets during 2015 to 2024. In all, 984 data points have been obtained by us.The information about environmental protection tax we get is from enterprises' annual financial reports, thus all other data are gotten from the Cathay Pacific (CSMAR) database.

2.1.2 Data processing

For the purpose of promoting the practical use of the real proof analysis, this article carries out the following works:

(1) ST and *ST companies from 2015 to 2024 are excluded;

(2) Companies with missing relevant data for three consecutive years are also disregarded;

(3) For the purpose of cutting the bad influence which extreme values bring to the test results, this paper, therefore, has carried out compression processing on the data at the 1.5% level;

(4) For decreasing the difference of size among the data, in the course of verifying the intermediary function, this article has conducted standard regularization processing upon the data.

2.2 Definition of variables

2.2.1 Explained Variables

The green washing behaviors of enterprises undertaken by enterprises can be divided into two kinds of methods: selective information disclosure and strategic expression. Selective information opening includes the selective statement of environmental data which brings advantage to the company. This is a method that the company uses to only open positive environmental information to outside, while hiding negative information, therefore effectively covering that it has not done enough actions in environmental protection work; the latter relates to the usage of strategic exhibition to cover up the enterprise's environmental behavior. In place of carrying out actual solid actions, symbolic measures are utilized by people for promoting the company's public image. The latter refers to whitewashing corporate environmental performance through strategic representations, and beautifying corporate image with symbolic initiatives rather than substantive actions.Therefore, this research paper has obtained the related data from the environment research database of CSMAR. After that, this research builds an

index system for measuring the degree of greenwashing behavior (Gwl). This system, it is constituted by two main composition parts and 12 sub-elements. These two composition parts are the revelation of environment responsibility and the revelation of environment effect and administration handling.To speak specifically, the exposure of environment-related responsibilities includes waste water emissions, SO_2 chemical oxygen demand (COD) outputs, many kinds of pollutant discharges (for example, specific gas discharges), soot and dust outputs, as well as the amount of industry solid rubbish that is produced, among other aspects. At the same time, the revealing of environmental performance and governance involves the situation of waste gas emission cutting and management,the decrease and handling of wastewater emissions, the governing of dust and smoke, the use and disposal of solid trash, the administration of noise and light contamination, as well as the present condition of solid trash use and disposal, and the control of radiation and other sorts of contamination,the carrying out of clean production and six other sub-projects is taken into consideration. After that, according to whether the enterprise carries out symbolic or substantial disclosure for each sub-project, we assign points one by one. The index system regarding the extent of green-washing conduct is displayed in Table 1. Among them, symbolic disclosure means that enterprises disclose environmental information that is difficult to verify and easy to imitate by means of qualitative description, programmatic statement, and simple copying of the previous year's statement, etc. Substantive disclosure means that enterprises disclose environmental information that can be verified and not easy to imitate by means of quantitative description, factual statement, and case illustration.

Table 1: Indicator system for the degree of greenwashing behavior

Serial number	The project	
1	Revelation of environmental responsibility	Waste water discharge
2		COD emissions
3		SO_2 emissions
4		CO_2 emissions
5		Discharge of smoke soot and grit
6		Creation of industry solid garbage
7	Revelation of Environmental Behavior and Management	Decrease and management of discharge quantities
8		Processing and Decrease of Sewage Water
9		Dust and smoke control
10		Obtain Work Position and Clear Away Solid Junk
11		Acoustic interference, luminous contamination, radiation therapy
12		Implementation of cleaner production

After the scores have been given out, the number of items is counted up. After that, according to this counting result, the value of selective information opening (Gwls) and the degree of intentional expression (Gwle) are calculated out.In this article, the degree of selective disclosure (Gwls) is measured by the ratio of the number of items which ought to have been disclosed but were not to the total number of items that should have been disclosed. The numerical value of this proportion is twelve.The quantification of the strategic expression degree (Gwle) is realized through confirming the proportion of the number of items an enterprise reveals through symbolic methods to the total number of disclosed items. After that, the geometric average of these two numerical values is utilized for calculating the degree of greenwashing behavior (Gwl).Therefore, the bigger numerical value of Gwl hence indicates

that a bigger scope of greenwashing action which is done by the enterprise. The formula that we put forward is as below:

Degree of selective disclosure

$$(Gwls) = 100 \times \left(\begin{matrix} \text{1-Number of} \\ \text{disclosed items} \end{matrix} \Big/ \begin{matrix} \text{Number of items} \\ \text{subject to disclosure} \end{matrix} \right) \tag{1}$$

Degree of strategic representation

$$(Gwle) = 100 \times \left(\begin{matrix} \text{Number of items subject to} \\ \text{symbolic disclosure} \end{matrix} \Big/ \begin{matrix} \text{Number of} \\ \text{items disclosed} \end{matrix} \right) \tag{2}$$

Degree of greenwashing behavior

$$(Gwl) = \sqrt{\begin{matrix} \text{Degree of Selective Disclosure} \\ \times \text{Degree of Strategic Presentation} \end{matrix}} \tag{3}$$

2.2.2 Explanatory variables

In the year 2018, China put into effect an environmental protection tax, this represents a change from the original sewage charging system. This tax follows the rule of "equalness between taxes and fees" on the whole. Due to the policy that uses taxes to take the place of fees, there did not exist big changes in the range and sum of money that people collected.therefore,therefore, this article thus chooses to use the sewage charge data which is before 2018 as the substitution of the environmental protection tax data. According to the notes on enterprises' financial statement, the data about environmental protection tax is collected by hand,we utilize the natural logarithm to be the explanatory variable for measuring the influence of the environmental protection tax upon enterprises from the micro-level angle of view.

2.2.3 Intermediate variables

In the present research paper, we have developed the KZ index for measuring the degree of financing restriction that enterprises are facing with. The calculation formula of this index has already included net working cash flow and cash bonus distribution,we have considered cash reserve, debt-to-equity ratio, and Tobin's Q value, hence the first three indicators are through the method of standardization, this method utilizes the total assets that are at the beginning of the year.

Because the calculation of the KZ index includes very many important company finance targets, and enterprises that have a low net operation cash flow, low cash dividend pay amount, low cash reserve level, and high leverage ratio,the enterprises which possess high Tobin's Q-value generally meet with more serious financing restrictions. Under this circumstance, the utilization of the KZ index for measuring the degree of financing constraints is more accurate and is not influenced by any deviation. Furthermore, this index has obtained widespread usage in the domain of financing constraint research.Therefore, this research article uses the KZ index to measure the degree of enterprise financing restriction problems. A bigger numerical value of this index shows a higher degree of financing restrictions. Furthermore,This research paper uses a broadly used measurement in the academic circle, that is, the Eeturn on Total Assets (ROA), to evaluate the financial behavior of enterprises. Return on assets (ROA) is calculated as the

outcome that is gotten after current net profit is divided by total assets at the end of the accounting term.

2.2.4 Control variables

When we think about both the financial situation of enterprises and the degree of internal management, other factors that could affect an enterprise's greenwashing behavior are being considered by us. The factors that are connected with the financial situation of an enterprise include the aspects like enterprise scale (Size), debt-equity proportion (Lev), and profit ability (Profit). At the same time, the factors that have relation with inner government management level include the dimension of the director board (Board), the property right character (Soe), and the like.For more comprehensively considering unobservable factors which keep unchanged through time, sector, regional limits which include year, industry and province, therefore the model has been added with three fixed-effect parts: the parts connected with year, the connected with industry, and the connected with province. The detailed definitions and descriptions of the concrete variables are given by Table 2.

Table 2: Definition and description of variables

Variable type	Variable name	Variable notation	Variable definition
Explained variable	Degree of greenwashing behavior	Gwl	Geometric mean of Gwls and Gwle
	Degree of selective disclosure	Gwls	100 × (1- number of disclosed projects / number of disclosed projects)
	Degree of strategic presentation	Gwle	100 × (the ratio that the symbolic amount of revealed elements accounts for in the amount of revealed elements)
Explanatory variable	Ecology protection charge	Tax	The nature logarithm of the environment protection charge
Mediator variable	Degree of financing constraints	KZ	The larger the KZ index, the higher the degree of financing constraint
	Corporate financial performance	ROA	Current net profit/total assets at the end of the period
Control variable	Enterprise size	Size	The natural logarithm number of the total quantity of attributes at the end of the given time period
	Asset-liability ratio	Lev	Total liabilities at end/total assets at end
	Profitability	Profit	Current net profit/current operating income
	Board size	Board	The nature logarithm of the amount of persons on the director board
	Property right nature	Soe	The value is 1 for state-owned enterprises and 0 otherwise
	Year	Year	The fixed effect items for every single year were all taken into calculation.
	Industry	Industry	We have carried out the accounting for the influence of fixed factors that are specific to each industry.
	Province	Province	The fixed effects which belong to the province were taken into account and were also controlled for.

2.3 Modeling

For the purpose of probing into the effect that environmental protection tax exerts upon the green-washing conduct of enterprise ESG, the present research establishes the model which follows:

$$Y_{i,t} = \beta_0 + \beta_1 Tax_{i,t} + \beta_2 Controls_{i,t} + \sum Year + \sum Industry + \sum Province + \varepsilon \quad (4)$$

In the model which is numbered as (1), dummy variables that belong to the *Year*, the *Industry* and the *Province* have been incorporated by us. The main coefficient of interest of the model is β_1, if the environmental protection charge brings a promoting influence on enterprises' ESG greenwashing behaviors, then β_1 should be significantly positive.

3 Empirical testing and analysis

3.1 Descriptive analysis

Table 3 gives the results of the description statistics for the main variables. In the explanatory variables, the mean value of the degree of greenwashing behavior among the selected enterprises is 59.395, and it has a standard deviation of 22.184. This indicates that, as a whole, the degree of greenwashing conduct among the enterprises we sampled is comparatively high, and there are obvious differences in greenwashing degrees between different enterprises.Furthermore, when we make a comparison with the degree of selective information revealing, the scope of strategic expression among our sampled enterprises is more obvious. These business units have the tendency to utilize a method of "difference between speech and conduct" to carry out greenwashing.The mean value and the standard deviation of Gwle are all obviously bigger than the corresponding values of Gwls. The average magnitude of the explanatory variable, which is called the environmental protection levy, is 15.134, and the standard deviation holds at 2.197. This shows that the number of the environmental protection levy is comparatively high.In all mediating variables, the average value and the standard deviation of the financing constraint level are 1.956 and 2.004 separately. This therefore indicates that, as a whole, the financing restriction degree of these sampled enterprises is not extremely high. Nevertheless, it is the fact that concerning the financing constraint degrees, there exist obvious differences between different enterprise entities. The mean value of the financial performance of enterprises is 5.2%,this therefore indicates that the whole financial running condition of the chosen enterprises has very many aspects that need improvement. With respect to the remaining variables, no obvious big abnormalities can be seen.

Table 3:Describe statistics which are about the main variables

Variable	N	Mean	SD	Min	Max
Gwl	984	59.395	22.184	0.000	92.546
Gwls	984	53.017	20.476	7.497	89.497
Gwle	984	71.386	29.447	0.000	100.000
Tax	984	15.134	2.197	5.008	21.483
KZ	984	1.956	2.004	-4.922	6.038
ROA	984	0.052	0.027	-0.195	0.199
Size	984	13.976	1.224	10.038	21.473
Lev	984	0.573	0.205	0.009	1.736
Profit	984	0.083	0.099	-0.472	0.501
Board	984	1.978	0.212	1.553	2.645
Soe	984	0.537	0.411	0.000	1.000

3.2 Dynamic effects test

In the empirical test, taking 2018, the year that the policy was brought into effect, as the reference time period, an interaction item was constructed for the ten-year period from 2015 to

2024. This processing was conducted for both the grouping aspect and the time aspect. After that, we have carried out one regression test,if the coefficient of the interaction term which is before the base period is tested to be non-significant, and the coefficient which is after the base period becomes significantly positive, therefore this indicates that the empirical sample satisfies the dynamic effect test requirement. Figure 1 gives out the results of the dynamic effect test.Before the policy reform, that is in the years 2015, 2016 and 2017, the coefficients cannot pass the significance test, and the coefficients of the interaction term show similar characteristics. Nevertheless, after the environmental protection tax has been carried out, during the period from 2019 to 2024, the coefficients of the cross-multiplier term present a relatively large growth.

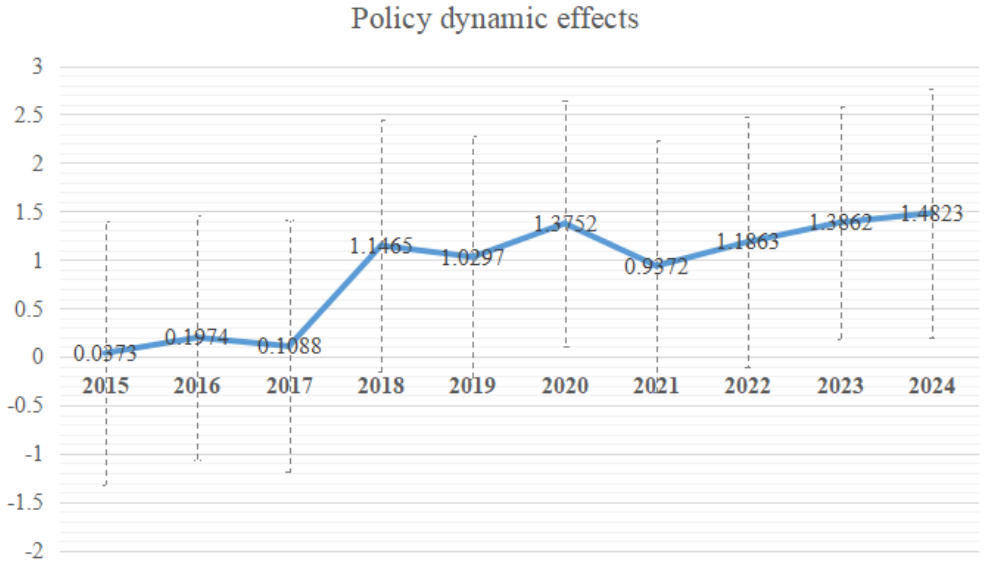


Figure 1: Results of dynamic effects tests

3.3 Regression results and analysis

3.3.1 Basic model regression results

Table 4 gives out the result of the baseline regression analysis which studies the relation between the environmental protection tax and the ESG greenwashing behavior of enterprises, and this paper examines its nonlinear effect on firms by introducing the quadratic term of the explanatory variables. The results in Column (1) show that in the early stage of policy implementation, the collection of environmental protection tax significantly enhances firms' ESG bleaching. When the policy intensity exceeds the inflection point, its reverse effect starts to appear and suppresses the firms' green-bleaching behavior. Corporate greenwashing behavior can be subdivided into selective disclosure and strategic presentation, so this paper further explores the differential impact of environmental protection tax on different greenwashing methods.The research results that this paper gives in Column (2) and Column (3) show that the regression coefficient values of the environmental protection tax on the selective disclosure degree and the strategic expression degree are 2.156 and 1.537 respectively.These two coefficients both have statistical significance on the 1% significance level.The regression coefficient values of the quadratic item for the degree of selective information disclosure and strategic expression are -1.024 and -0.735 respectively. These two coefficients both have statistical significance on the 5% significance level.

Table 4: Baseline regression results

Variable	(1) Gwl	(2) Gwls	(3) Gwle
did	1.842*** (6.824)	2.156*** (8.015)	1.537*** (5.672)
did^2	-0.873** (-2.453)	-1.024** (-2.876)	-0.735** (-2.067)
Size	-3.972*** (-10.373)	-3.175*** (-11.364)	-4.017*** (-8.037)
Lev	2.286 (1.367)	1.636 (1.177)	2.319 (0.973)
Profit	7.945*** (3.634)	7.992*** (3.826)	7.177*** (2.034)
Board	-7.486*** (-4.273)	-5.993*** (-4.926)	-6.357*** (-3.018)
Soe	-1.472*** (-2.186)	-0.208 (-0.297)	-2.977*** (-3.947)
Constant	2.501*** (1.647)	2.435*** (1.958)	2.616*** (1.204)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Province	Yes	Yes	Yes
Observations	984	984	984
R-squared	0.732	0.724	0.743

3.3.2 Brokering effects

The regression results that concern the mediating function are shown in Table 5. For Column (1) and Column (3), the coefficient numerical values of the environmental protection tax and its quadratic term are 0.175/-0.091 and -0.008/0.004 respectively.These coefficient values possess statistical significance on the 1% significance level. In Columns (2) and (4), the numerical values of the coefficient items for the degree of enterprise financing constraint and the enterprise financial performance are 0.421 and -0.789 respectively,each one separately. These numerical results have significance under the 5 percent standard, which therefore indicates that one mediation effect does exist.Through deeper inspection, we have discovered that in Columns (2) and (4), the coefficient values of the environmental protection tax and its quadratic term are 1.665 and -1.562, and also 1.472 and -1.345 separately. These coefficient numerical values possess importance at the 1% significance level. This indicates that in the course that the environmental protection tax first promotes and then restrains the ESG white-washing and green behaviors of enterprises, the degree of financing constraints and the enterprise's financial achievement play the role of mediators.

Table 5: Regression results for mediating effects

Variable	(1) KZ	(2) Gwl	(3) ROA	(4) Gwl
did	0.175*** (6.276)	1.665*** (5.447)	-0.008*** (-5.038)	1.472*** (3.286)
did^2	-0.091*** (-5.973)	-1.562*** (-5.214)	0.004*** (4.932)	-1.345*** (-3.987)
KZ		0.421** (2.145)		
ROA				-0.789** (-3.452)
Size	-0.311*** (-12.864)	-3.856*** (-9.876)	0.007*** (15.381)	-3.912*** (-9.987)
Lev	5.863*** (38.587)	-1.154 (-0.243)	-0.055*** (-10.497)	2.245 (1.298)
Profit	-4.275*** (-30.286)	9.812*** (3.587)	0.297*** (67.844)	17.896*** (3.621)
Board	-0.338*** (-2.577)	-7.321*** (-4.156)	0.012*** (4.002)	-7.401*** (-4.203)
Soe	0.228*** (6.993)	-1.387** (-2.076)	-0.006*** (-4.847)	-1.423** (-2.134)
Constant	3.927*** (9.942)	2.456*** (1.587)	-0.145*** (-10.043)	2.487*** (1.612)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Observations	984	984	984	984
R-squared	0.824	0.741	0.857	0.735

3.4 Robustness Tests

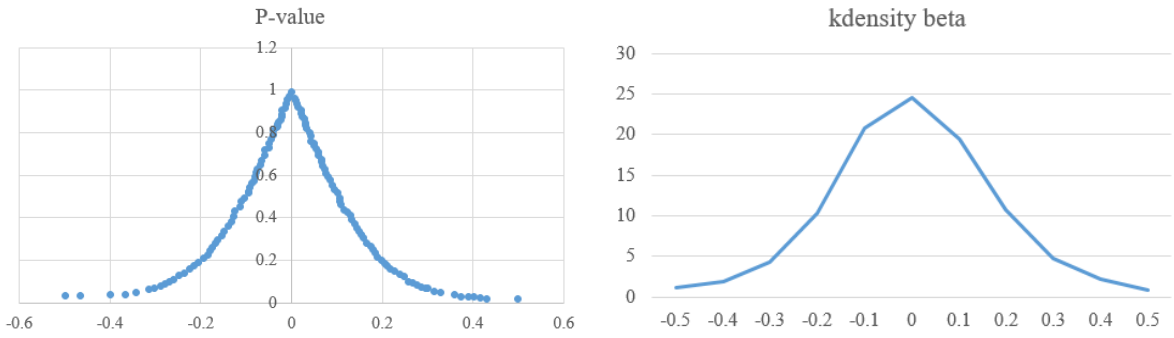
3.4.1 Missing variable test

The coefficient estimates for the interaction term $Pollind_t \times Time_t$ are:

$$\hat{\beta} = \beta + \gamma \frac{Cov\left(Pollind_t \times Time_t, \varepsilon \middle| x\right)}{Var\left(Pollind_t \times Time_t \middle| x\right)} \tag{5}$$

In equation (5), x this model has brought in a group of control variables which, therefore, can produce an influence on enterprise bodies., regions, environment and economy, and if $\gamma = 0$, the unobserved factors have little influence on the results of the econometric regression, i.e., they are unbiased. Given that the value of γ cannot be derived by direct calculation, it can only be deduced backwards by using the fact that both $\hat{\beta}$ and β are 0 to derive $\gamma = 0$. Specifically, if the interaction term can be replaced by a variable that is not correlated with the explanatory variables, and if the estimated value obtained after the regression is also approximately equal to zero, then $\gamma = 0$ can be known.Therefore, inside the range of this research paper, the effect of the environmental protection tax policy on one special industry is simulated 1000 times randomly by the use of software. This stochastic method guarantees that between the effect of the environmental protection tax policy and the enterprises' ESG green-washing conduct, no causal connection exists, which ensures that $\beta = 0$.The results that we have obtained are shown in Figure 2(a~b). This picture shows the result got from 1000 random simulation experiments, $\hat{\beta}$ are all clustered around 0 with normal distribution, so it can be inferred that $\gamma = 0$,therefore, the result indicates that the unobserved correlation characteristics

nearly do not have any effect on the estimation results.and that the conclusion of the previous model regression is reliable.



(a) P-value (b) kdensity beta

Figure 2: Observations

3.4.2 Replacement of explanatory variables

The level of greenwash behavior of the explanatory variable in the main test is a continuous variable calculated using geometric means and is regressed using ordinary least squares.For the purpose of more intuitively measuring the real degree of enterprises' greenwashing conduct, this paper employs the median value of Gwl as the threshold value to construct the explanatory variable Gwl2,which takes the value of 1 when Gwl is greater than its median, and 0 otherwise, and performs the model regression again. Table 6 shows the regression results about the influence that the putting into effect of the environmental protection tax exerts on enterprises' Gwl2. The discovering in column (2) point out that the effect of the environmental protection tax on the Gwl2 of serious pollution enterprises at first shows a positive tendency and hence afterward changes to negative.This effect has obtained statistical significance at the 1% level. In general terms, the results of regression do not have large deviation from the results which the benchmark regression gives.

Table 6: Regression results with replacement of explained variables

Variable	(1) Gwl2	(2) Gwl2
did	2.187*** (7.445)	2.014*** (7.221)
did^2	-1.908*** (-6.172)	-1.836*** (-6.033)
Size		-2.446*** (-11.282)
Lev		1.998 (1.445)
Profit		8.048*** (2.576)
Board		-6.383*** (-3.227)
Soe		-1.554*** (-2.864)
Constant		2.566*** (1.426)
Year	Yes	Yes
Industry	Yes	Yes
Province	Yes	Yes
Observations	984	984
R-squared	0.663	0.726

3.4.3 Placebo test

Seventh table gives the results of the placebo influence checking. The coefficients of the explanatory variables and their quadratic terms are positive and negative, respectively,however, it does not possess prominent significance. Therefore, this result indicates that, when the real effect from outside environmental protection tax policy does not exist, the degree of enterprises' ESG green-washing behavior does not have obvious change,hence, this hence proves the reliability of the benchmark regression.

Table 7: Results of placebo effect tests

Variable	(1) Gwl2	(2) Gwl2
did	2.018*** (6.973)	-1.985*** (9.442)
did^2	-1.989 (-5.993)	-1.907 (-7.037)
Size		-2.318*** (-10.042)
Lev		2.051 (1.336)
Profit		7.993*** (2.249)
Board		-5.937*** (-2.945)
Soe		-1.329*** (-2.451)
Constant		2.398*** (1.375)
Year	Yes	Yes
Industry	Yes	Yes
Province	Yes	Yes
Observations	984	984
R-squared	0.694	0.705

3.5 Heterogeneity analysis

When we carry out analysis work, we divide enterprises into state-owned and non-state-owned types according to the property right nature. The aim is to research whether the environment protection tax can produce different impacts on the ESG green-washing acts of enterprises which have different property rights and run in the same business environment.The results of the heterogeneity analysis are put in Table 8. When we carry out group regression, both state-owned and non-state-owned enterprises all pass the significance test at not lower than the 1% significance level.All coefficient values of these explanatory variables possess positive signs. On the opposite side, the coefficient values of these quadratic items are all negative. This result shows that the influence of the environmental protection tax upon the degree of ESG greenwashing conduct among both state-owned and non-state-owned enterprises conforms to an inverted U-shaped trend,which first is positive and then becomes negative. The group regression cannot directly compare the size of the coefficients, so this paper puts the two groups of results into Fisher's portfolio test.The result of the regression analysis shows that an obvious difference exists in the way that environmental protection tax influences the ESG green-directed

behaviors of state-owned and non-state-owned enterprises.When compared with state-owned companies, non-state-owned enterprises display a higher level of sensitivity toward the environmental protection levy. Before we arrive at the inflection point, for every one percent increase of the environmental protection levy,the degree of ESG whitewashing conduct among non-state-owned enterprises increases by 2.645. This rising scope is obviously larger than that of state-owned enterprises, and it has reached the meaning of statistics at the 5% level.After the inflection point, when the environmental protection levy has every 1% increase, the degree of ESG green-direction behavior in non-state-owned enterprises has a drop of 2.301.It is very obvious that this decrease is more large in degree than the decrease which belongs to state-owned enterprises. Therefore, the difference has statistics meaning on the 1% level.

Table 8: Results of heterogeneity analysis

Variable	(1) State-owned enterprises	(2) Non-state-owned enterprises
did	2.271** (7.874)	2.645** (11.362)
did^2	-2.084*** (-6.038)	-2.301*** (-9.038)
Size	-5.011*** (-13.576)	-3.008*** (-7.957)
Lev	3.994 (1.802)	0.499 (0.274)
Profit	3.995 (1.367)	9.018*** (3.148)
Board	-10.974*** (-5.038)	-8.386*** (-4.011)
Constant	4.011*** (1.978)	4.275*** (2.005)
Year	Yes	Yes
Industry	Yes	Yes
Province	Yes	Yes
Observations	984	984
R-squared	0.747	0.698

4 Conclusion

This research article systematically probes the inner connection between the environmental protection tax and the green whitening behavior (enterprise ESG bleaching green behavior) of enterprises. In addition, this research carries out exploration on the moderating functions of two constraint factors, that is, the degree of financing constraints and corporate financial performance, on the relationship between the two, and further explores the heterogeneity of the relationship between the two in enterprises with different property rights.According to the experiment and experience-based design, the main findings of this research paper are showed in the following.

(1) Under the 1% significance level, the regression coefficient of the explanation variable, that is the environmental protection tax, therefore displays an obviously positive numerical value (1.842). At the same time, on the 5% significance level, the coefficient of the quadratic item in the regression analysis displays an obvious negative property, specifically it is measured

at -0.873. This shows that the carrying out of the environmental protection tax at first has a positive effect on the degree of enterprises' greenwashing conduct, then it has a negative effect. After the policy intensity exceeds the inflection point, the regression coefficients of environmental protection tax collection and the degree of selective disclosure are -1.024, and the regression coefficients of the degree of strategic representation are -0.735, and both of them are significant at the 5% level. This suggests that at this time under low tax policy heavy polluting firms may bleach green through both selective disclosure and strategic representation, but prefer to use selective disclosure.

(2)No matter how policy strength changes, both the degree of financing restriction and the business finance achievement of enterprises all produce a partial middle influence between the environmental protection tax policy and the degree of enterprises' greenwashing behavior.

(3)To the non-state-owned enterprises, the relation between the environmental protection tax policy and the degree of greenwashing behavior is more obvious.When the policy strength already exceeds the turning point, under the situation of a low-strength environmental protection tax system, non-state-run enterprises have a higher possibility to face difficult financing constraints and financial achievement pressures. Therefore, they have stronger motivation that they do greenwashing behaviors.

Funding

This work was supported by General Project of Philosophy and Social Sciences Planning in Heilongjiang Province (23GLB030).

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