

Environmental Regulation, Audit Mechanism and Corporate Financing Constraints

-- From the Perspective of Institutional Change based on the New Environmental Protection Law

Yifan Wu*

College Economics, Nanjing Audit University, Nanjing 210000, China

*Corresponding Author

Abstract

Against the backdrop of the overlapping "dual carbon" goals and high-quality development strategy, the collaborative governance of environmental regulation and audit supervision has become a key path to resolve the contradiction between "green transformation and financing predicament" of heavily polluting enterprises. This study takes A-share main board manufacturing listed enterprises from 2012 to 2019 as samples, and systematically explores the impact and internal transmission logic of environmental audit mechanisms on the financing constraints of heavily polluting enterprises during the mandatory institutional change of the new Environmental Protection Law by adopting difference-in-differences method and other approaches. This study provides new empirical evidence for in-depth exploration of the interrelationship between environmental supervision, auditing and corporate financing behavior, and also has practical guiding significance for realizing the coordination of high-quality economic development and ecological protection goals.

Keywords

Environmental Regulation; Audit; Financing Constraints.

1. Research Background and Significance

1.1. Research Background

The newly revised Environmental Protection Law of the People's Republic of China (hereinafter referred to as the new Environmental Protection Law) was officially implemented on January 1, 2015. Its prominent feature is to emphasize the coordinated promotion of ecological protection and economic development, and strengthen the regulatory responsibilities of governments at all levels and the environmental governance constraints on polluting enterprises. The full implementation of the new Environmental Protection Law has brought unprecedented challenges to enterprises, forcing these entities to invest a large amount of funds in purchasing advanced environmental protection equipment and continuously optimizing technologies to achieve the transformation of environmental protection facilities and the upgrading of pollutant treatment. In this context, enterprises' demand for financing has increased significantly[1].

1.2. Research Significance

The theoretical and practical significance of this study are closely integrated and mutually supportive: at the theoretical level, it not only enriches the research system on the relationship between environmental regulation and corporate financing, breaks through the traditional single cognition, and reveals the transmission path of "environmental regulation - audit

mechanism - financing alleviation" to provide new empirical support for the interdisciplinary research of institutional economics and corporate finance, but also deepens the research on the functional positioning of environmental audits, clarifies their core role in addressing environmental information asymmetry between banks and enterprises, makes up for the insufficient discussion in existing literature on the linkage effect between audit mechanisms and financial resource allocation. Meanwhile, by verifying the impact of enterprise scale heterogeneity on policy effects, it refines the logic of alleviating financing constraints for heavily polluting enterprises of different scales, provides a theoretical basis for differentiated institutional design, and improves the environmental governance theoretical framework from the perspective of enterprise heterogeneity; at the practical level, the research results can not only provide reference for the government to optimize environmental governance and financial support policies, help build an "audit-oriented" differentiated supervision system, promote the coordinated linkage of environmental protection, audit and financial departments, and enhance the implementation efficiency of environmental regulation, but also offer practical guidance for enterprises' green transformation, especially helping small-scale heavily polluting enterprises transmit compliance signals and alleviate financing difficulties through environmental audits, while guiding large-scale enterprises to optimize their audit and environmental management strategies[2]. Additionally, it can provide a scientific basis for financial institutions' credit decisions, promote the establishment of an audit result-oriented credit evaluation system, and facilitate the precise allocation of green credit resources, ultimately achieving the coordinated advancement of ecological protection and high-quality economic development.

2. Literature Review

2.1. Research on Collaborative Governance of Environmental Regulation and Environmental Audit

The effective implementation of environmental regulation relies on supporting supervision mechanisms. As a core supervision tool, the collaborative effect of environmental audit and regulation has been partially verified[3]. Based on green patent data, Li Qingyuan et al. (2020) empirically showed that the collaboration between environmental audit and diversified environmental regulations can stimulate enterprises' green innovation motivation by clarifying responsibility boundaries and reducing policy implementation frictions. Xiong Ling (2023) further confirmed that environmental audit strengthens the promotion effect of financial development and environmental regulation on green technological innovation by reducing information asymmetry between enterprises, governments and financial institutions. Guo Junjie et al. (2024) put forward the view of scale adaptability: large enterprises need to carry out comprehensive audits covering "compliance, performance and risk" due to their complex business layouts and high environmental impact, while small and micro enterprises can focus on core compliance indicators to balance regulatory costs and efficiency. Luo Jian et al. (2025) emphasized that financial incentives should be combined with audit supervision, and promote environmental audit to cover more heavily polluting enterprises by subsidizing audit costs and rewarding audit-compliant enterprises, thus forming a positive cycle of "supervision + incentive" in environmental governance.

2.2. Influencing Factors of Corporate Financing Constraints and Research on Environmental Dimensions

The causes and mitigation paths of financing constraints are core issues in the field of corporate finance.[4] Qu Wenzhou et al. (2011) pointed out that third-party certification can reduce the information gap between enterprises and financial institutions and alleviate financing constraints; Wei Zhihua et al. (2014) found that the improvement of the financial ecological

environment can enhance information transparency, and audit supervision is an important means to improve the financial ecology. Lu Shengfeng et al. (2017) confirmed that state-owned enterprises have significantly lower financing constraints than non-state-owned enterprises due to implicit government guarantees. Li Guozhu et al. (2023) believed that under environmental regulation, the increase in enterprises' environmental protection investment leads to cash flow tension, and audit rectification costs further aggravate financing pressure; Yu Lianchao et al. (2021) found that environmental management system certification can transmit compliance signals, reduce the risk concerns of financial institutions and alleviate financing constraints; Shi Yongdong et al. (2022) based on the quasi-natural experiment of the new Environmental Protection Law, confirmed that the financing cost of environmentally compliant enterprises has significantly decreased.

3. Relevant Systems and Theoretical Basis

3.1. Relevant Systems

To fully release the supervisory effect of national audit in ecological environmental protection, China issued the Opinions of the National Audit Office on Strengthening Resource and Environmental Audit Work as early as 2009. This policy clearly requires that provincial audit institutions and audit institutions of cities with independent planning status shall carry out at least one resource and environmental audit work annually, focusing on key areas such as pollutant emission control, ecological restoration, and the use of environmental protection funds to ensure targeted and effective supervision. At the same time, the implementation of the new Environmental Protection Law in 2015 imposed stricter penalties for violations-including daily fines, seizure of polluting facilities, and joint liability for environmental damage-and further strengthened the information disclosure and public participation mechanism. Enterprises are required to publicly disclose environmental compliance information in a timely manner, while social organizations and the public are empowered to supervise and sue polluting enterprises, which together promoted a substantial improvement in enterprises' environmental compliance level[5].

3.2. Theoretical Basis

3.2.1. Synergistic Logic between Environmental Regulation and Audit Mechanism

As the core carrier of mandatory environmental regulation, the newly revised Environmental Protection Law has established an external constraint framework for heavily polluting enterprises by setting strict environmental standards, strengthening the intensity of penalties for violations, and clarifying the main environmental responsibilities of enterprises. This regulation requires enterprises to increase environmental protection investment significantly, such as purchasing advanced pollution control equipment and upgrading production processes to meet emission requirements. However, the high cost of environmental protection will significantly increase enterprises' demand for external financing[6]. Nevertheless, relying solely on regulatory constraints cannot directly improve the financing environment for enterprises; a supporting supervision mechanism is needed to connect regulatory implementation with market resource allocation-and the environmental audit mechanism serves as the key link. As an independent third party, audit institutions, with their professional capabilities, can verify the authenticity and compliance of enterprises' environmental data as well as the performance of environmental protection fund utilization. This not only supervises enterprises in complying with the requirements of the newly revised Environmental Protection Law but also converts enterprises' environmental behaviors into verifiable standardized information, providing reliable environmental risk assessment basis for financial institutions

and other market entities. Thus, a synergistic path of "regulatory constraints - audit certification - information transmission" is formed.

3.2.2. Operational Principle of Audit Mechanism in Alleviating Financing Constraints

The financing constraints faced by heavily polluting enterprises essentially stem from information asymmetry between banks and enterprises in the environmental dimension. Financial institutions lack professional knowledge in the environmental field, making it difficult for them to accurately assess the environmental compliance risks of enterprises and the sustainability of environmental protection investment[7]. Consequently, they tend to adopt a credit contraction strategy for heavily polluting industries due to risk aversion. Furthermore, some enterprises may engage in "green washing" practices, concealing non-compliance issues through false disclosure of environmental data, which further widens the information gap and leads financial institutions to develop "industry-wide credit discrimination" against heavily polluting sectors. The environmental audit mechanism, however, effectively addresses this dilemma by issuing authoritative audit reports. For enterprises that pass the audit and meet compliance standards, the audit result serves as a "credit endorsement," reducing financial institutions' concerns about environmental risks and prompting them to relax credit terms. For enterprises found to have problems during the audit, the audit report also provides an early risk warning for financial institutions, preventing blind lending. Meanwhile, the audit mechanism standardizes enterprises' environmental behaviors, promotes the establishment of long-term compliance awareness among enterprises, and reduces the risk of losing financing eligibility due to environmental violations, thereby improving the financing environment for enterprises from a long-term perspective.

3.2.3. Mechanism Heterogeneity Under Differences in Enterprise Scale

The alleviating effect of environmental regulation and audit mechanism on financing constraints varies significantly depending on the scale of enterprises. For small-scale heavily polluting enterprises, due to their limited capital accumulation and weak risk resistance, they are more likely to face severe financing constraints under the traditional credit logic, affected by both "scale discrimination" and "industry attribute discrimination." After the implementation of the newly revised Environmental Protection Law, the environmental audit mechanism has become more valuable for small enterprises: by verifying their compliance through audits, small enterprises can quickly convey a "low-risk signal" to financial institutions, break through the original credit barriers, and gain the trust and support of financial institutions. Therefore, the audit mechanism has a more significant effect on alleviating their financing constraints. In contrast, large-scale heavily polluting enterprises have stronger capital strength and more sufficient internal capital reserves, resulting in a relatively lower dependence on external financing. At the same time, large enterprises have more complex business structures, and their environmental risks may involve multiple business segments. A single audit report can hardly cover all risks comprehensively, leading to a relatively limited effect of the audit mechanism in alleviating their financing constraints[8]. This heterogeneous characteristic also provides an important basis for formulating differentiated supervision and audit policies in the future, that is, it is necessary to design adaptive audit standards and supervision measures for enterprises of different scales to maximize the synergistic effect of environmental regulation and audit mechanism[9].

Based on this, this paper puts forward the hypothesis: the implementation of environmental regulation and audit mechanism is conducive to alleviating the financing constraints of heavily polluting enterprises.

4. Research Design and Empirical Analysis

4.1. Research Design

4.1.1. Sample Selection and Data Sources

Referring to the Catalog of Classification Management for Environmental Protection Verification of Listed Companies issued by the Ministry of Environmental Protection, this paper defines mining, iron and steel, cement, electrolytic aluminum, coal, metallurgy, building materials, chemical industry, petrochemical industry, pharmaceutical industry, light industry, textile industry, leather making and thermal power as heavily polluting industries, and other industries as non-heavily polluting industries. This paper takes A-share manufacturing companies as the initial research sample, sets enterprises in the above heavily polluting industries as the experimental group, and sets enterprises in the same category such as wood, furniture and other manufacturing industries as the control group. Since green credit was officially implemented in 2012, and to avoid the impact of the COVID-19 pandemic outbreak in 2020 on the real economy, this paper limits the research period to 2012-2019, and processes the research samples in the following order: excluding ST and *ST companies; excluding companies with missing data; to avoid the interference of extreme values, all continuous variables are winsorized at the 1% and 99% levels. Finally, 22,964 firm-year observations are obtained. The research data mainly come from the CSMAR database and WIND database, and the commercial bank branch data come from the China Banking and Insurance Regulatory Commission.

4.1.2. Model Construction

To systematically study the multi-faceted and subtle mechanism of the new Environmental Protection Law on corporate financing conditions after its implementation, this study constructs an empirical-based evaluation system and selects the difference-in-differences (DID) model as the core econometric method. The model design fully considers the heterogeneity of individual characteristics and time trends, and reduces endogeneity problems by controlling individual fixed effects and time dummy variables to ensure the robustness of policy evaluation results. The specific form of the model is described as follows:

$$KZ_{i,t} = \beta_0 + \beta_1 \text{Treat}_i \times \text{Post}_t + \beta_2 \text{Controls}_{i,t} + \text{Firm}_i + \text{Year}_t + \varepsilon$$

In the stated model, i identifies the enterprise and t denotes the specific year. The set Controls include a series of control variables. To eliminate the distortion of standard errors caused by cluster effects at the firm level, cluster analysis at the firm level is specifically applied in the regression analysis process to enhance the reliability and accuracy of the conclusions.

4.1.3. Variable Selection

The KZ index is an authoritative indicator that can accurately measure the external financing constraints faced by enterprises. Its core connotation is jointly interpreted by five key variables: the enterprise's operating cash flow, cash holdings, Tobin's Q value, asset-liability ratio, and dividend payout ratio. Usually, the level of the KZ index shows an obvious positive correlation with the degree of financing constraints borne by the company.

In the variable design, a policy dummy variable $\text{Treat} \times \text{Post}$ is constructed to systematically evaluate the policy effect. In this framework, Treat is defined as a key grouping variable: entities identified as heavily polluting industries are assigned a value of 1 for Treat , while enterprises in non-heavily polluting industries are assigned a value of 0 for Treat . On the other hand, the time variable Post is divided based on 2015, the effective year of the Environmental Protection Law.

Table 1. Detailed Definition and Measurement Methods of Variables

Category	Symbol	Explanation
Dependent Variable	KZ	The higher the index, the more serious the corporate financing constraints
Independent Variable	Treat	1 if the enterprise belongs to the experimental group; 0 if it belongs to the control group
Independent Variable	Post	1 if the sample observation is in 2015 or later; 0 otherwise
Control Variable	ES	Enterprise size, measured by the natural logarithm of total assets
Control Variable	EA	Enterprise age, measured by the number of years since the enterprise was established
Control Variable	Lev	Asset-liability ratio, calculated as total liabilities / total assets
Control Variable	Cfo	Operating cash flow, calculated as net cash flow from operating activities / total assets
Control Variable	Roe	Return on equity, calculated as net profit / shareholders' equity
Control Variable	GR	Operating income growth rate, calculated as (year-end main business income - beginning main business income) / beginning main business income
Control Variable	FR	Fixed asset ratio, calculated as net fixed assets / total assets
Control Variable	Soe	Ownership nature, 1 for state-owned enterprises; 0 otherwise
Control Variable	Firm	Individual dummy variable, 1 for the corresponding individual; 0 otherwise
Control Variable	Year	Time dummy variable, 1 for the corresponding year; 0 otherwise

In the econometric model constructed in this study, we have systematically introduced a number of representative control variables (Controls) to ensure that the research results can accurately reflect the real situation and effectively control potential interfering factors. Firstly, enterprise size (ES) is included in the model as a key indicator to measure an enterprise's comprehensive strength and market influence, and its changes can reflect the enterprise's competitive position and development potential in the industry. Secondly, years of establishment (EA) is used to reflect the enterprise's historical accumulation and brand reputation. Financial leverage level (Lev) intuitively presents the enterprise's financial stability and risk-bearing capacity through capital structure and debt ratio. Net cash flow from operating activities (Cfo) not only reflects the profitability of the enterprise's core business, but also indirectly reflects its cash flow status and debt-servicing potential. As a core profitability indicator, return on equity (Roe) can reveal the efficiency of the enterprise's value creation. From the perspective of asset structure, fixed asset ratio (FR) shows the differences in the enterprise's investment return cycle and operational flexibility. Growth potential (GR) comprehensively evaluates the enterprise's market expansion capacity and future development space through dynamic indicators such as revenue and profit growth rates. As an

institutional background variable, ownership nature (Soe) helps to distinguish the systematic differences in business objectives, risk preferences and other aspects between enterprises of different ownership types. On this basis, to more accurately capture and analyze the potential relationships in the data, the model further integrates the fixed effects at the individual enterprise level and the annual time effects. By incorporating these effects, this study can more effectively control the impact of unobservable individual heterogeneity and time trends on enterprise performance, thereby improving the accuracy and reliability of model estimation. For the detailed definition and specific measurement methods of each variable, refer to Table 1.

4.2. Empirical Results and Analysis

4.2.1. Descriptive Statistics

In this study, a systematic analysis was conducted on the comprehensive dataset containing 22,964 sample observations using descriptive statistical methods. The results show that the mean value of the core indicator KZ index is determined to be 0.820 after robustness test, with a relatively obvious degree of dispersion-specifically, the standard deviation reaches 2.321. The minimum and maximum values of this index are recorded as -6.054 and 5.694 respectively. This significant value range highlights the high heterogeneity of sample enterprises in terms of financing constraints, generally showing the characteristics of moderate financing pressure, which is unevenly distributed among different samples. In addition, the average level of the policy interaction term Treat×Post is calculated as 0.226 with a standard deviation of 0.418, indicating that approximately 22.6% of the sample enterprises have received policy intervention measures. However, the intervention effect shows significant individual differences among sample groups, which is reflected in the relatively scattered distribution of observations. Further examining the distribution of ownership nature (Soe), it can be seen that state-owned enterprises account for a relatively high proportion of 35% in the sample, showing a specific ownership structure tendency.

Table 2. Descriptive Statistical Results of Main Statistics

Statistic	Sample Size	Mean	Standard Deviation	Minimum	Maximum
KZ	22964	0.8203	2.320	-6.054	5.693
Treat×Post	22964	0.226	0.418	0.000	1.000
ES	22964	22.385	1.292	20.116	26.365
EA	22964	11.310	7.318	2.000	32.000
Lev	22964	0.426	0.200	0.057	0.868
Cfo	22964	0.156	0.117	0.011	0.575
Roe	22964	0.059	0.133	-0.760	0.308
GR	22964	0.368	0.899	-0.704	6.188
FR	22964	0.210	0.159	0.002	0.693
Soe	22964	0.350	0.477	0.000	1.000

4.2.2. Parallel Trend Test

Satisfying the parallel trend hypothesis is a prerequisite for the validity of the difference-in-differences (DID) model. Specifically, before the implementation of the new Environmental Protection Law, unobservable factors led to the same changing trend in both the experimental group and the control group; however, after the law's implementation, the two groups exhibited distinct trends. Only under the parallel trend hypothesis can the policy effect be estimated effectively. Figure 1 presents the parallel trend test of financing constraints for the experimental group and the control group. It can be observed that prior to the implementation of the new Environmental Protection Law, the financing constraints (measured by the KZ index) of the two groups followed the same trend, with the experimental group facing more severe financing constraints. After the law's implementation, however, the financing constraints of the two groups diverged: compared with the control group, the financing constraints of the experimental group were significantly alleviated. This change clearly confirms that the introduction and implementation of the new Environmental Protection Law is the primary factor contributing to the improvement of financing constraints in the treatment group.

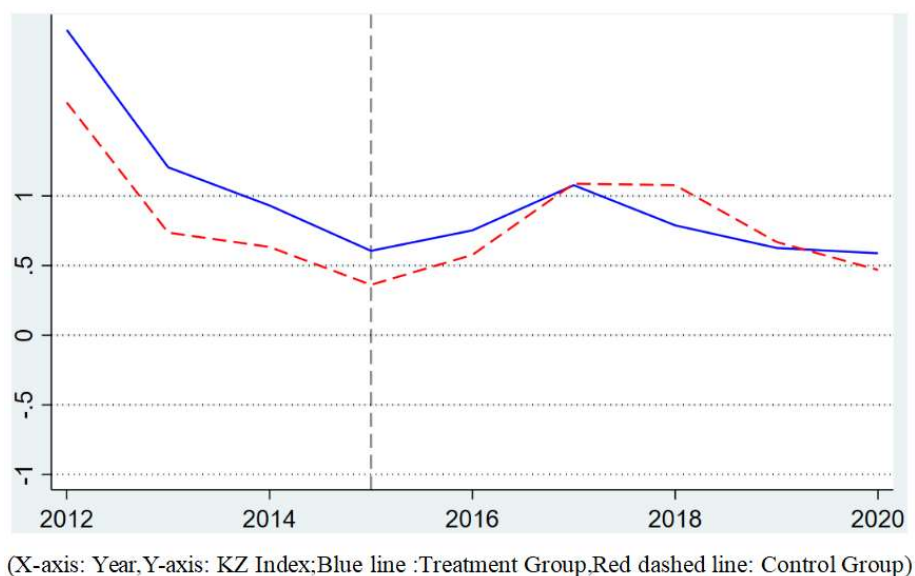


Figure 1. Parallel Trend Test Chart

4.2.3. Benchmark Regression Results

The basic regression analysis results of the difference-in-differences (DID) model are detailed in Table 3. Model (1) focuses on examining the independent effect of the policy dummy variable $Treat \times Post$, while Model (2) enhances the reliability of the results by introducing control variables. Comparisons show that after adding the control terms, the adjusted R^2 of the model increases significantly, reflecting a stronger fitting ability. Both models indicate that $Treat \times Post$ has a significant negative effect at the 1% confidence level, proving that the KZ index of enterprises shows an obvious downward trend after the implementation of the Environmental Protection Law. This effectively improves the financing environment of heavily polluting enterprises, lowers the threshold for their capital acquisition, and provides sufficient evidence for the research hypothesis.

The model estimation outputs of each variable are basically consistent with theoretical assumptions. The significant increase in the model's goodness of fit (R^2), jumping from 0.007 to 0.493, indicates that the inclusion of control variables has significantly improved the explanatory power of the KZ index model. Statistical analysis of the control variables reveals the diverse and complex relationships between enterprise characteristics and financing constraints. Enterprise size shows a significant negative correlation with capital acquisition

capacity-leading enterprises with strong capital strength are more likely to gain favor from financial institutions due to economies of scale. In addition, net operating cash flow and return on equity (Roe) have a significant negative correlation with the KZ index, strongly proving that enterprises' endogenous growth potential and financial stability have a direct effect on alleviating financing constraints. The KZ index of state-owned enterprises is generally higher than that of non-state-owned enterprises, a phenomenon that may be inherently related to the former's special financing channels and cumbersome administrative supervision systems.

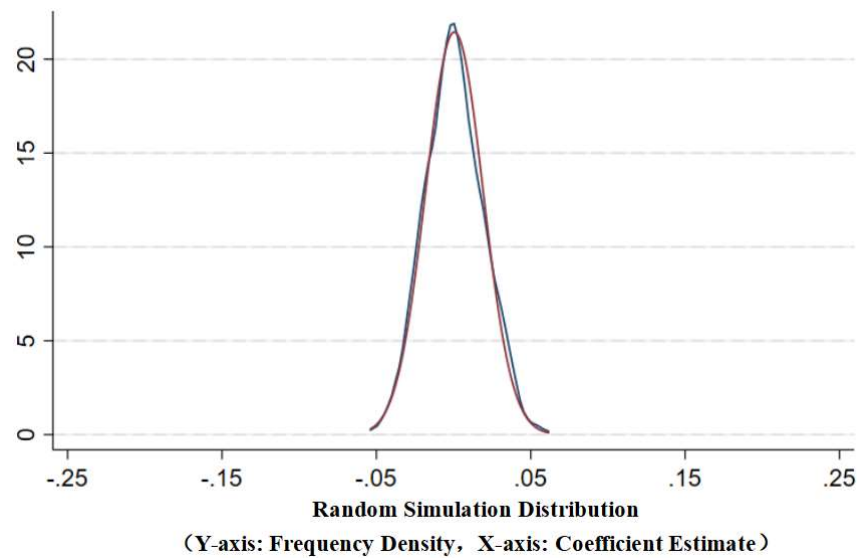
Table 3. Benchmark Regression Results of the Difference-in-Differences Model

Statistic	KZ(1)	KZ(2)	Statistic	KZ(1)	KZ(2)
Treat×Post	-0.472***	-0.200***	Gr		-0.011
	(-7.827)	(-4.288)			(0.739)
ES		0.149***	FR		0.678***
		(0.061)			(3.961)
EA		0.005	Soe		0.175**
		(0.775)			(2.361)
Lev		5.323***	Firm Fixed Effects	YES	YES
		(0.906)	Year Fixed Effects	YES	YES
Cfo		-8.616***	_cons	0.927***	12.980***
		(0.312)		(68.156)	(15.018)
Roe		-1.918***	N	22964	22964
		(0.312)	Adjusted R ²	0.007	0.493

Note: Standard errors clustered at the enterprise level are shown in parentheses, and significance is marked with asterisks, where *, **, *** correspond to 10%, 5% and 1% significance levels respectively.

4.2.4. Robustness Test

To accurately test the validity and stability of the benchmark model results, this study systematically deployed and completed a series of rigorous robustness analysis methods. The sampling distribution characteristics of each regression coefficient are visualized in Figure 5. The coefficient estimates of the randomly treated control group and treatment group are basically concentrated near zero, showing a significant centralization feature, indicating that the benchmark results have good robustness. It shows that the implementation of the new Environmental Protection Law has a substantial impact on the financing constraints of heavily polluting enterprises.

**Figure 2.** Placebo Test Result Chart

4.3. Heterogeneity Test

Table 4. Heterogeneity Result Table

Statistic	KZ (Small-Scale)	KZ (Large-Scale)
Treat×Post	-0.238**	-0.126
	(0.136)	(0.091)
Control Variables	YES	YES
Firm Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
_cons	-24.061***	-14.965***
	(3.454)	(3.764)
N	11483	11481
Adjusted R ²	0.663	0.612

To deeply analyze how enterprise size significantly affects the policy implementation effect of the new Environmental Protection Law, this study uses the annual median of the logarithm of total enterprise assets as the benchmark to specifically divide into two groups: small enterprises and large enterprises. The research results are shown in Table 4. The regression analysis of the small enterprise subgroup shows that the coefficient value of the Treat × Post interaction term reaches -0.238, which is highly significant statistically. This finding strongly verifies that under the background of the new Environmental Protection Law, environmental audit has a significant incentive effect on small heavily polluting enterprises facing development bottlenecks; in the regression analysis of large-scale enterprises, it does not reach

the statistical significance level, suggesting that the role of environmental audit in alleviating the financing constraints of large enterprises is limited.

5. Conclusion and Policy Recommendations

5.1. Research Conclusion

Based on a sample of listed manufacturing enterprises on the A-share main board from 2012 to 2019, this study empirically explores the impact of environmental regulation and audit mechanisms on the financing constraints of heavily polluting enterprises under the background of the implementation of the newly revised Environmental Protection Law, using the difference-in-differences (DID) model. The core conclusions are as follows:

First, the implementation of the newly revised Environmental Protection Law has effectively alleviated the financing constraints of heavily polluting enterprises. As a core system of mandatory environmental regulation, the law, by strengthening environmental constraints and clarifying compliance requirements, coupled with the certification and supervision functions of environmental audits, has significantly reduced the KZ index of heavily polluting enterprises and substantially improved their financing environment. This verifies the effectiveness of the transmission path of "environmental regulation - audit mechanism - financing alleviation".

Second, environmental audit is the key link connecting environmental regulation and financial resource allocation. Through independent third-party certification, environmental audits verify the authenticity, compliance of enterprises' environmental data and the performance of fund utilization, effectively reducing the environmental information asymmetry between banks and enterprises. It not only provides reliable risk assessment basis for financial institutions but also helps compliant enterprises transmit low-risk signals, becoming a core support for alleviating financing constraints.

Third, there is significant enterprise scale heterogeneity in the financing alleviation effect of environmental regulation and audit mechanisms. For small-scale heavily polluting enterprises with limited capital accumulation and weak risk resistance, the "signal transmission" function of environmental audits is more prominent, and the effect of alleviating their financing constraints is significantly better than that of large-scale heavily polluting enterprises. Due to sufficient internal capital reserves and complex business structures, large enterprises have lower dependence on external financing, and their environmental risks are difficult to be fully covered by a single audit, resulting in a relatively limited alleviation effect of the audit mechanism.

5.2. Policy Recommendations

5.2.1. Government Level: Build an Audit-Oriented Differentiated Environmental Supervision System

Formulate environmental audit standards suitable for enterprises of different scales. For small-scale heavily polluting enterprises, focus on the audit of core compliance indicators and simplify non-critical processes; for large-scale enterprises, implement a full-dimensional audit of "compliance - performance - risk" and strengthen the coverage of environmental risks across multiple business segments.

Strengthen cross-departmental coordination and linkage, establish an information sharing mechanism among environmental protection, audit, and financial supervision departments, and directly link environmental audit results with enterprise credit rating, credit approval, and policy subsidies to enhance the authority and application scenarios of audit results.

Increase audit support for small and medium-sized enterprises, reduce the audit costs of small-scale heavily polluting enterprises through financial subsidies, tax reductions and exemptions,

encourage more enterprises to participate in third-party environmental audits, and expand the coverage of audits.

5.2.2. Enterprise Level: Integrate Environmental Audit into Green Transformation Strategy

Heavily polluting enterprises should take the initiative to establish a closed-loop management mechanism of "audit - rectification - optimization", regard environmental audit as a regular management tool, identify loopholes in environmental management through audits, and continuously improve compliance levels and the performance of environmental protection investment.

Small-scale heavily polluting enterprises need to focus on giving play to the "signal transmission" function of audits, take the initiative to disclose audit reports, transmit compliance information to financial institutions and the market, and break the financing barriers caused by scale and industry discrimination.

Large-scale heavily polluting enterprises should integrate environmental data from multiple business segments, cooperate with audit institutions to carry out full-chain risk assessment, and maximize the positive impact of audits on the financing environment by refining audit dimensions and strengthening rectification and implementation.

5.2.3. Financial Institution Level: Establish an Audit Result-Oriented Credit Evaluation System

Take environmental audit reports as the core basis for credit approval of heavily polluting enterprises, and formulate differentiated credit policies: provide support such as preferential interest rates, credit limit inclination, and simplified approval processes for audit-compliant enterprises; adopt credit restrictions or require risk mitigation measures for audit-non-compliant enterprises.

Strengthen the construction of internal environmental risk assessment capabilities of financial institutions, and build a refined credit risk assessment model combined with specific indicators in audit reports (such as the efficiency of environmental protection fund utilization, the effect of pollutant emission reduction, etc.) to improve the accuracy of identifying enterprises' environmental risks.

Expand the scale of green credit issuance, focus on tilting towards small-scale heavily polluting enterprises that have passed environmental audits, help them solve the financing gap of environmental protection investment, and promote the overall green transformation of the industry.

References

- [1] Mengting Zhang, Ziwen Bao, Binghao Chen, Feng Yu. Can enhanced intra-regional transport accessibility alleviate corporate financing constraints? Evidence from China[J]. Pacific-Basin Finance Journal, 2025, 91.
- [2] Hasnain Javed, Jianguo Du, Muhammad Farooq Islam. Unpacking organizational capabilities and green Innovation for sustainable Performance: The role of environmental regulations in manufacturing industry[J]. Journal of Cleaner Production, 2025, 507.
- [3] Mengting Zhang, Ziwen Bao, Binghao Chen, Feng Yu. Can enhanced intra-regional transport accessibility alleviate corporate financing constraints? Evidence from China[J]. Pacific-Basin Finance Journal, 2025, 91.
- [4] Shi Yi Chen, En Dong Liang, Chao Liang Liu. "Size-dependent" environmental regulations and spatial labor allocation[J]. Journal of Environmental Economics and Management, 2025, 132.
- [5] Wu Q ,Wu Y . Artificial intelligence technology, financing constraints, and tourism enterprise value[J].Finance Research Letters,2025,86(PF):108817-108817.

- [6] Earnings management practices and effectiveness of auditing mechanisms in Islamic and emerging economies[J].Journal of Islamic Accounting and Business Research,2025,16(7):1223-1246.
- [7] Yu L ,Sha H ,Ji P . Government-led voluntary environmental regulation and corporate investment efficiency: Evidence from the green factory certification in China[J].Energy Economics,2025,152109004-109004.
- [8] Wang J ,Liu Y ,Zou B , et al. Green Light or Green Burden: ESG's Dual Effect on Financing Constraints in China's Heavily Polluting Industries[J].Sustainability,2025,17(20):9263-9263.
- [9] Zhang C Enhancing blockchain-based audit data privacy via hybrid chaotic and RSA encryption: mechanism design and performance evaluation[J].Discover Artificial Intelligence,2025,5(1):261-261.