Frontiers in Economics and Management Volume 7 Issue 6, 2026
ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

Research on the Impact of Carbon Trading Policy on Corporate ESG Performance

Rui Feng*

School of Economics and Management, Southwest Petroleum University, Chengdu 610500, China

*Corresponding Author

Abstract

Selecting Chinese listed enterprises from 2010 to 2024 as the research sample, this study constructs a multi-period difference-in-differences (DID) model to investigate the impact of carbon trading policy on corporate ESG performance. The findings reveal that carbon trading policy significantly enhances the overall ESG performance of enterprises, a conclusion that remains robust after a series of tests, including parallel trend and placebo tests. Heterogeneity analysis demonstrates that the driving effect of the policy varies significantly across different types of enterprises, primarily manifesting in large-scale enterprises, high-carbon industries, and enterprises located in regions with stringent environmental regulations. Mechanism tests indicate that green technology innovation, digital transformation, and political-business connection serve as key moderating variables between carbon trading policy and corporate ESG performance, significantly moderating the policy's effects on ESG outcomes. The research findings of this paper contribute to advancing the government's refinement of the carbon trading market system and promoting high-quality corporate transformation.

Keywords

Carbon Trading Policy; ESG Performance; Corporate Transformation.

1. Introduction

As a core market-based regulatory tool for controlling greenhouse gas emissions, carbon trading policy provides sustained market incentives to drive the green transformation of enterprises (Xu et al., 2026). Carbon trading policy is a primary instrument for guiding enterprises toward green and low-carbon transitions; it internalizes environmental externalities into operational costs by establishing a market-oriented trading system (Chen et al., 2026). This price mechanism not only compels firms to reduce pollutant emissions but also directs resources toward low-carbon technological sectors, thereby facilitating the optimization and upgrading of industrial structures (Yang et al., 2022). The economic consequences generated by carbon trading policies spill over into corporate social images and governance structures. Beyond directly guiding green behaviors, the resulting compliance pressure forces enterprises to optimize resource allocation, enhance governance transparency, and influence employment as well as professional talent demands, making ESG performance the optimal window for observing the policy's micro-level effects (Qin et al., 2024). ESG encompasses not only mandatory environmental protection requirements but also multiple dimensions, such as social responsibility fulfillment and internal governance refinement (Sun et al., 2024). For enterprises, superior ESG performance reflects enhanced market competitiveness and serves as compelling evidence of their commitment to national strategies and social responsibilities (Wang et al., 2025).

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

Investigating whether and how carbon trading policy can promote improved ESG performance holds significant practical value for fostering high-quality corporate development (Tian et al., 2024). Enterprises occupy a unique position in the national economy as the primary force behind carbon reduction; most are concentrated in high-carbon industries such as energy and heavy manufacturing, where the success of their green transformation directly determines the quality of national strategy implementation (Su, 2025).

2. Literature Review

Current research on corporate ESG performance is primarily conducted from two major perspectives: the external institutional environment and internal governance characteristics. Regarding external institutions, corporate ESG performance is constrained by both formal and informal institutional frameworks. On the one hand, formal institutions, such as policy guidance and administrative supervision, possess mandatory binding force. For instance, mandatory ESG information disclosure policies can significantly enhance corporate ESG performance (Tian et al., 2025); conversely, inadequate supervision may lead to a lack of awareness regarding social responsibility fulfillment among enterprises (Dyck et al., 2019). On the other hand, informal institutions, such as social norms and industry practices, also play a crucial role. For example, enterprises headquartered in cities with more stringent environmental regulations typically exhibit higher ESG scores (You, 2023); furthermore, corporate ESG practices demonstrate significant peer effects at the industry level, where followers tend to mimic the actions of industry leaders (Gao et al., 2025). From the perspective of internal governance, an enterprise's own management structure and technological foundation are pivotal in determining ESG decisions. Existing studies have shown that both board size and more frequent board meetings contribute to the improvement of ESG performance (Octavio et al., 2025). Additionally, factors such as corporate capital intensity and executive compensation incentive systems significantly influence corporate ESG decision-making (Li & Xu, 2024).

3. Theoretical Analysis and Research Hypotheses

3.1. Carbon Trading Policy and Corporate ESG Performance

The "strong version of the Porter Hypothesis" posits that appropriate environmental regulatory tools can enhance the utilization level of carbon assets among enterprises, thereby balancing the optimization of production efficiency with the improvement of environmental performance to achieve a win-win synergy between economic development and environmental protection (Cheng & Meng, 2023). Following the implementation of carbon trading policies, enterprises that fail to proactively reduce emissions must not only bear compliance costs but also face potential reputational risks.

Accordingly, this paper proposes the following hypothesis:

H1: Carbon emission trading policy significantly enhances corporate ESG performance.

3.2. Heterogeneity of Corporate Characteristics

Firm size determines the resource base available to respond to external policy shocks. Large-scale enterprises typically possess abundant slack resources and stronger risk resistance, enabling them to undertake ESG investments more effectively in response to policies (Zhang et al., 2024). Consequently, size serves as a critical threshold for determining whether an enterprise can transform external pressure into internal momentum. Industry attributes dictate the direct intensity of constraints imposed by carbon trading policies, which exhibit clear regulatory orientation. High-carbon industries face more stringent quota restrictions and compliance costs, whereas low-carbon industries experience relatively weaker direct impacts, leading to differentiated ESG performance responses based on industry attributes (Liu et al.,

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

2021). The intensity of regional environmental regulation reflects the institutional constraint environment; enterprises in regions with high regulatory intensity are often subjected to more rigorous government supervision and public pressure (Wu et al., 2025).

Accordingly, this paper proposes the following hypotheses:

H2a: The impact of carbon trading policy on corporate ESG is more significant for large-scale enterprises and weaker for small-scale enterprises.

H2b: The promotional effect of carbon trading policy on ESG performance is stronger for enterprises in high-carbon industries than for those in low-carbon industries.

H2c: The improvement effect of carbon trading policy on ESG performance is significantly stronger for enterprises in high environmental regulation regions than for those in low environmental regulation regions.

3.3. Moderating Effects of Green Technology, Digitalization, and Political-Business Connection

Carbon trading policies increase the emission costs of enterprises through market-oriented pricing. Whether an enterprise can convert this external cost pressure into internal development momentum depends crucially on whether it possesses sufficient green technology reserves (Han et al., 2023). Enterprises with high levels of green innovation capability can achieve emission reductions at lower costs and may even generate revenue by selling surplus quotas. In the absence of green technology, enterprises face rigid compliance costs. The implementation of carbon trading policies requires enterprises to conduct rigorous carbon emission monitoring; in response to this external regulatory pressure, digital transformation serves as an effective management optimization tool, enabling firms to complete carbon data collection and accounting at lower marginal costs (Wang et al., 2024). As an informal institution, political-business connection plays a vital moderating role in corporate responses to environmental regulation by alleviating resource constraints and providing policy information (Liu et al., 2020).

Accordingly, this paper proposes the following hypotheses:

H3a: Green technology exerts a positive moderating effect on the relationship between carbon trading policy and corporate ESG performance; the higher the level of green technology innovation, the more pronounced the promotional effect of the policy on ESG.

H3b: Digitalization degree exerts a positive moderating effect on the relationship between carbon trading policy and corporate ESG performance; the higher the degree of digitalization, the more pronounced the promotional effect of the policy on ESG.

H3c: Political-business connection exerts a positive moderating effect on the relationship between carbon trading policy and corporate ESG performance; the higher the degree of political connection, the more pronounced the promotional effect of the policy on ESG.

4. Research Design

4.1. Benchmark Model Construction

Considering the staggered initiation times of carbon emission trading pilots across different regions in China, this study constructs a multi-period difference-in-differences (DID) model to evaluate the net effect of the policy. The model is specified as follows:

$$ESG_{it} = a_0 + a_1 DID_{it} + \sum Controls_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (1)$$

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

Where ESG_{it} represents the ESG performance of firm i in year t; DID_{it} is the core explanatory variable, denoting the treatment status under the policy; $Controls_{it}$ denotes a set of control variables; μ_i and δ_t represent firm-fixed effects and year-fixed effects, respectively; and ε_{it} is the idiosyncratic error term.

4.2. Moderating Effect Test Model

o examine the moderating roles of green technology innovation, digitalization degree, and political-business connection in the process of carbon trading policy affecting corporate ESG performance, this study introduces moderating variables and their interaction terms with the core explanatory variable based on the benchmark model, constructing the following moderation model:

$$W_{it} = \gamma_0 + \gamma_1 DID_{it} + \gamma_2 W_{it} + \gamma_3 (DID_{it} \times W_{it}) + \sum Controls_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (2)$$

Where W_{it} denotes the moderating variable; specifically, this study employs the level of green technology innovation (GreenPatent), the degree of digitalization (Digital), and the intensity of political-business connection (PolCon) as moderators.

4.3. Variable Selection

4.3.1. Dependent Variable

The dependent variable is corporate ESG performance, measured by the Huazheng ESG rating composite score, a system that aligns closely with the practicalities of the Chinese market.

4.3.2. Explanatory Variable

The core explanatory variable is the dummy variable for carbon trading policy, denoted as DID. The DID variable takes a value of 1 if the enterprise is registered in a carbon trading region and the year is at or after the implementation of the policy; otherwise, it is 0.

4.3.3. Control Variables

This study selects firm size (*Size*), leverage ratio (*Lev*), independent director ratio (*Indep*), listing age (*ListAge*), duality of CEO and Chairman (*Dual*), board size (*Board*), and Tobin's Q ratio (*TobinQ*) as control variables, while simultaneously controlling for firm and year fixed effects. The definitions of the primary variables are presented in Table 1:

Table 1. Definition of Key Variables

Variable Types	Variables	Variable Definition
Dependent Variable	*ESG*	Huazheng ESG Composite Score
Independent Variable	*DID*	1 if the company is located in a pilot region and the policy was implemented in the current year or later; otherwise, 0
Mediating Variable	*GreenPatent*	Total number of applications for green utility model patents
	LnEmploy	In(Total number of employees)
	LnRD	In(Total R&D expenditure + 1)
Moderating Variable	*CapI*	Total Assets / Operating Revenue
	Pay	In(Total Annual Compensation for Management)
Control Variable	*Size*	Natural Logarithm of Total Assets
	Indep	Number of Independent Directors / Total Number of Board Members
	ListAge	In(Current Year - Year of Listing + 1)
	Dual	1 if the Chairman and General Manager are the same person
	Board	Natural Logarithm of the Number of Board Members
	TobinQ	Market Capitalization / (Total Assets – Net Intangible Assets – Net Goodwill)

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

4.4. Data Sources

The research sample consists of State-Owned Enterprises listed on the Chinese A-share markets from 2010 to 2024. To ensure data quality, the following screening and processing measures were implemented: (1) Financial sector firms and Special Treatment (ST) enterprises were excluded; (2) observations with significant missing values for key variables were removed; (3) all continuous variables were winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. Descriptive statistics for the variables are shown in Table 2:

Table 2. Descriptive Statistics for Variables

Variable Types	Variables	Observations	Mean	Standard Deviation	Min	Max
Dependent Variable	*ESG*	12828	73.580	5.042	46	93
Independent Variable	*DID*	12828	0.639	0.480	0	1
Mediating Variable	*GreenPatent*	12828	2.743	1.943	0	9
	Digital	12828	1.275	1.306	0	4.584
	PolCon	12828	0.174	0.379	0	1
Moderating Variable	*Size*	12828	22.805	1.507	18	29
	Lev	12828	0.508	0.257	0.063	0.952
	Indep	12828	37.102	5.936	20	80
	ListAge	12828	2.517	0.755	0	4
	Dual	12828	0.120	0.325	0	1
	Board	12828	2.040	0.200	1	3
	TobinQ	12828	1.807	1.754	1	57

5. Empirical Results and Analysis

5.1. Benchmark Regression Analysis

Table 3 Column (1) shows that the coefficient of the core explanatory variable is 0.573. Column (2) incorporates all control variables, yielding a coefficient for the core explanatory variable of 0.581; this indicates that the carbon emission trading policy significantly enhances corporate ESG performance. In Column (3), the results show a regression coefficient of 0.581, Column (4) further introduces industry-year interactive fixed effects to eliminate interference from time-varying industry characteristics, resulting in a coefficient increase to 0.618, significant at the 1% level.

Table 3. Benchmark Regression Results

Variable	(1)	(2)	(3)	(4)
	ESG	ESG	ESG	ESG
DID	0.573***	0.581***	0.581**	0.618***
	(2.669)	(2.789)	(2.300)	(2.920)
Control variables	No	Yes	Yes	Yes
Constant	72.560***	58.484***	58.484***	59.620***
	(388.160)	(25.345)	(22.913)	(16.586)
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry×Year FE	No	No	No	Yes
Clustering level	Firm	Firm	Province	Firm
N	12828	12828	12828	12828
R^2	0.026	0.039	0.039	0.098

Notes: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively; t-values are reported in parentheses.

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

5.2. Robustness Checks

5.2.1. Parallel Trend Test

To satisfy the parallel trend assumption, this study follows the methodology of Beck et al.(2010) to construct the following event study model; the parallel trend test results are illustrated in Figure 1.

$$ESG_{it} = \alpha_0 + \sum_{k=-5,k\neq-1}^{10} \beta_k D_{it}^k + \gamma X_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (3)$$

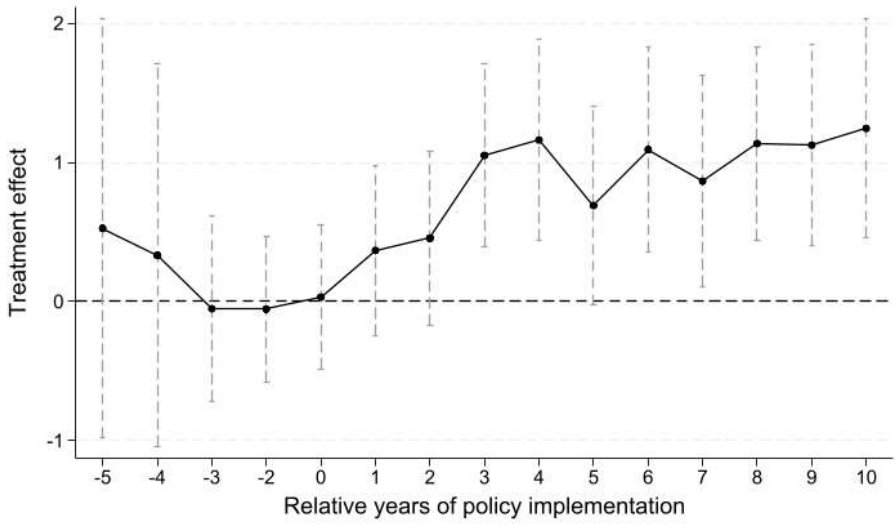

Figure 1. Parallel Trend Test

5.2.2. Placebo Test

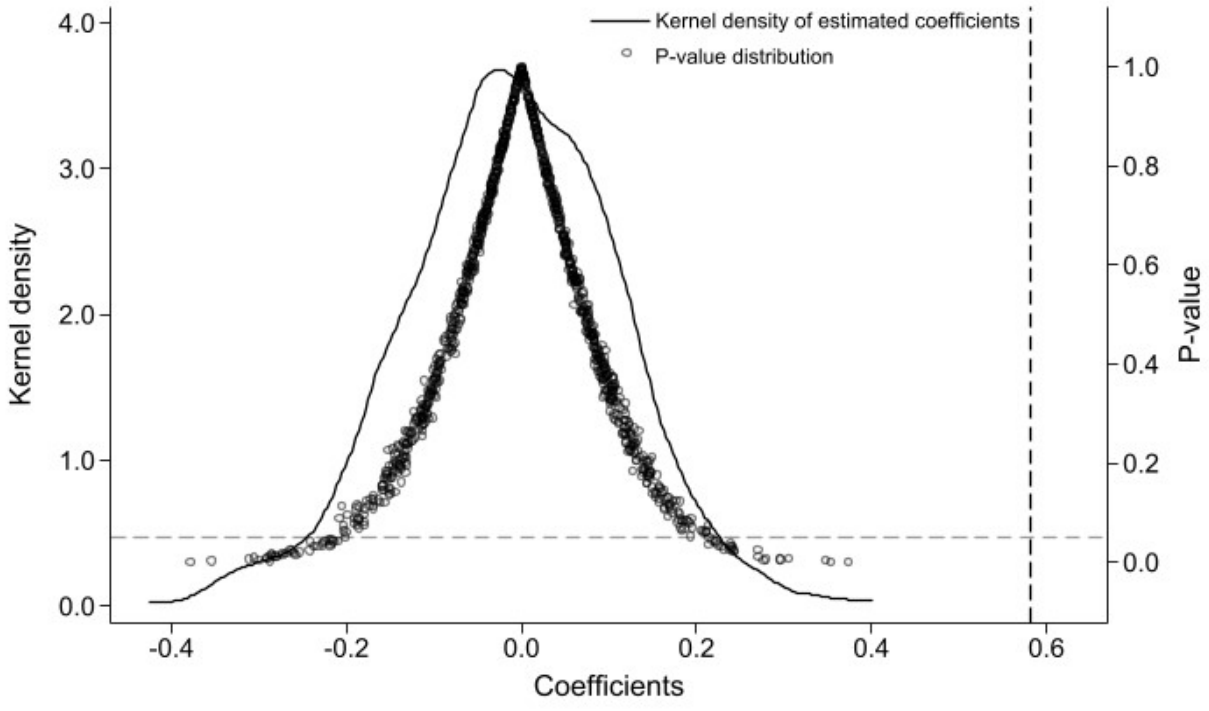

Figure 2. Placebo Test

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

To examine whether the benchmark regression results are contaminated by unobservable factors, this study conducts a placebo test by randomly assigning policy treatment status and repeating the simulation 1000 times. The results of the placebo test are illustrated in Figure 2. The randomly generated estimated coefficients are centrally distributed around zero and approximately follow a normal distribution; the actual policy coefficient of 0.549 lies in the right tail of the distribution, with a p-value less than 0.01.

5.2.3. Altering the Research Period

The national unified carbon market was launched in 2021; to exclude potential interference from this launch, the sample period is restricted to 2010–2020 for re-regression. As shown in Column (1) of Table 4, the DID coefficient is 0.648 and remains significant at the 1% level, with its direction, significance, and magnitude highly consistent with the benchmark regression. This indicates that the previous conclusions primarily stem from local pilot policies rather than the confounding influence of the national market, confirming the robustness of the policy's net effect.

5.2.4. Excluding Interference from Other Policies

The Low-Carbon City Pilot policy is a significant environmental regulatory measure implemented during the same period, which may also promote corporate ESG performance and thus bias the benchmark regression results. To eliminate the interference of the Low-Carbon City Pilot policy, the sample excluding these pilot cities was re-regressed, with the results presented in Column (3) of Table 4. After excluding the Low-Carbon City Pilot sample, the DID coefficient stands at 0.628 and is significant at the 5% level, suggesting that the carbon emission trading system can independently enhance corporate ESG performance.

Table 4. Robustness Tests

Variable	Altered Research Interval	Excluding LCCP
DID	0.648*** (2.848)	0.628** (2.212)
Control variables	Yes	Yes
Constant term	56.493*** (20.477)	54.832*** (17.615)
Firm FE	Yes	Yes
Year FE	Yes	Yes
N	9690	7226
R^2	0.033	0.036

Notes: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively; t-values are reported in parentheses.

5.3. Heterogeneity Tests

5.3.1. Heterogeneity in Firm Size

Large-scale enterprises typically possess more abundant capital and technological reserves to cope with the cost pressures arising from environmental regulations. Accordingly, the sample is divided into two groups, "large-scale enterprises" and "small-scale enterprises," based on the median of firm asset size (Size) for regression analysis. The results in Columns (1) and (2) of Table 5 show that the carbon trading policy significantly promotes the ESG performance of large-scale enterprises, with a DID coefficient of 1.045, whereas the impact on small-scale enterprises is not statistically significant. This indicates that the policy effect is primarily concentrated among large-scale enterprises, providing empirical support for Hypothesis H2a.

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

5.3.2. Sectoral Heterogeneity

Following the CSRC industry classification, key emission sectors—including petrochemicals, chemicals, building materials, steel, non-ferrous metals, papermaking, power, and aviation—are defined as "high-carbon industries," while others are categorized as "low-carbon industries". The results in Columns (3) and (4) of Table 5 reveal that the policy is significant only within the high-carbon industry sample, with a coefficient of 0.562, suggesting that its constraint mechanism effectively forces high-emission firms to improve their ESG performance. Thus, Hypothesis H2b is supported.

5.3.3. Regional Heterogeneity

This study takes the nationally piloted low-carbon cities as a signal of strong environmental regulation; samples from provinces containing low-carbon pilot cities are defined as "high environmental regulation regions," while those without such cities are defined as "low environmental regulation regions" for group testing. The results in Columns (5) and (6) of Table 5 demonstrate regional disparities: the regression coefficient for high environmental regulation regions is significantly positive at the 1% level, whereas the coefficient for low regulation regions fails the significance test. These results indicate that the improvement in ESG performance is more pronounced for enterprises in high environmental regulation regions, supporting Hypothesis H2c.

Table 5. Regression Results of Heterogeneity Analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Large-scale Enterprises	Small-scale Enterprises	High-carbon Industries	Low-carbon Industries	High Environmental Regulation	Low Environmental Regulation
DID	1.045** (2.194)	0.382 (1.619)	0.562** (2.134)	0.565 (1.553)	0.806*** (2.861)	0.245 (0.726)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Constant	56.428*** (8.277)	56.635*** (17.834)	58.366*** (19.832)	60.542*** (15.940)	63.469*** (21.653)	51.145*** (13.750)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3788	9197	8213	4772	7711	5274
R^2	0.092	0.029	0.044	0.030	0.043	0.042

Notes: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively; t-values are reported in parentheses.

5.3.4. Heterogeneous Intersection Groups

To further verify the robustness of the aforementioned logic and accurately identify the core target audience of the policy, this study simultaneously possess the dual characteristics of "large-scale enterprises" and "high-carbon industries" for an intersection group test. Column (1) of Table 6 shows that within the dual intersection group of "large-scale enterprises" and "high-carbon industries," the DID coefficient is 1.399 and significant at the 5% level. Column (2) shows that the regression results for the control group of "small-scale enterprises" and "low-carbon industries" are not statistically significant, confirming that the policy effect exerts a significant driving influence on key regulatory targets.

In summary, the carbon trading policy exhibits distinct structural characteristics of "focusing on large entities while releasing small ones" and "achieving key breakthroughs." The policy most effectively promotes improvements in ESG performance among enterprises that

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

simultaneously possess resource advantages, transformation pressures, and strong external constraints. In contrast, for small-scale low-carbon enterprises in non-key regulatory sectors, the impact of the policy remains relatively limited.

Table 6. Regression Results of Heterogeneous Intersection Groups

Variables	(1)	(2)
	Large-scale Enterprises + High-carbon Industries	Small-scale Enterprises + Low-carbon Industries
DID	1.399**	0.624
	(2.217)	(1.427)
Control Variables	Yes	Yes
Constant	48.430***	58.368***
	(4.996)	(10.708)
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	2237	3221
R^2	0.104	0.025

Notes: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively; t-values are reported in parentheses.

5.4. Moderating Effect Analysis

5.4.1. Moderating Effect of Green Technology Innovation

The Porter Hypothesis suggests that a firm's green innovation capability is pivotal in transforming external environmental regulations into internal governance advantages. An interaction effect model is employed for empirical analysis to verify H3, with the results presented in Table 7. Column (2) shows that the coefficient of the interaction term DID × GreenPatent is 0.438, significant at the 1% level, confirming the positive moderating role of green innovation and validating Hypothesis H3a. Compared to the benchmark regression model, the coefficient of carbon trading policy loses its significance after the inclusion of the interaction term. This indicates that for enterprises with low levels of green technology innovation, carbon trading policy does not directly enhance their ESG performance.

5.4.2. Moderating Effect of Digitalization Degree

Column (3) shows that the coefficient of the interaction term DID×Digital is 0.354, significant at the 5% level, indicating that the degree of digitalization also significantly strengthens the promotional effect of the policy, thus validating Hypothesis H3b. Distinct from the mechanism of green technology innovation, the main effect coefficient of DID in Column (3) is 0.448 and remains significant at the 5% level. This suggests that while the policy generates a fundamental promotional effect regardless of digitalization levels, high-digitalization firms further amplify policy dividends by reducing information costs and optimizing resource allocation. Green technology innovation determines whether a firm can convert policy pressure into ESG advantages, whereas the degree of digitalization dictates the efficiency of this conversion.

5.4.3. Moderating Effect of Political-Business Connection

Column (4) reveals that the coefficient of the interaction term DID × PolCon is 1.253, significant at the 1% level, thereby validating Hypothesis H3c. Political-business connections enable enterprises to perceive policy orientations more keenly and secure greater resource support. Under policy pressure, firms with stronger political connections tend to fulfill social responsibilities and enhance governance levels more proactively, making the ESG-enhancing effect of the policy more prominent.

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

Table 7. Estimation Results of the Moderating Effects of Carbon Trading Policy on Corporate ESG

Variables	(1)	(2)	(3)	(4)
	Benchmark Regression Model	DID × GreenPatent	DID×Digital	DID × PolCon
DID	0.581*** (2.789)	0.008 (0.034)	0.448** (2.107)	0.393* (1.873)
Interaction Term Coefficient		0.438*** (3.209)	0.354** (2.069)	1.253*** (3.088)
Control Variables	Yes	Yes	Yes	Yes
Constant	58.484*** (25.345)	60.434*** (26.081)	58.194*** (25.094)	58.718*** (23.967)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	12828	12828	12828	12828
R^2	0.026	0.042	0.038	0.041

Notes: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively; t-values are reported in parentheses.

6. Conclusion

6.1. Conclusion and Recommendations

Selecting Chinese A-share listed companies from 2010 to 2024 as the research object, this study treats the carbon trading pilot policy as a quasi-natural experiment and systematically examines its impact on corporate ESG performance and the underlying mechanisms using a multi-period DID model. The primary research conclusions are as follows:

First, carbon trading policy exerts a significant promotional effect on corporate ESG performance. Empirical results demonstrate that the policy effectively drives enterprises to improve their environmental, social, and governance levels; this conclusion remains robust after undergoing a series of tests, including parallel trend and placebo tests.

Second, the policy-driven effects exhibit pronounced heterogeneity across different types of enterprises. Regarding firm size, large-scale enterprises show significantly stronger policy response effects than small-scale enterprises due to their more extensive resource reserves. In terms of industry attributes, firms in high-carbon industries face greater compliance pressure, resulting in higher degrees of ESG improvement compared to those in low-carbon industries. Concerning regional distribution, the policy effect is more prominent for enterprises located in areas with high environmental regulatory intensity. This indicates that policy implementation outcomes are jointly influenced by firm-specific characteristics and the external regulatory environment.

Third, green technology innovation, digital transformation, and political-business connection play positive moderating roles in policy transmission. The study finds that enterprises with higher levels of green technology innovation are better equipped to transform external policy pressure into internal competitive advantages, thereby enhancing ESG performance. Digital transformation enhances policy implementation efficiency by reducing information asymmetry and transaction costs. Furthermore, political-business connections help firms secure more transformation resources and policy support, further amplifying the promotional effect of the policy.

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

6.2. Policy Recommendations

First, the government should continuously refine carbon trading market mechanisms to provide a stable institutional environment for enterprises. Relevant authorities should further expand the coverage of the carbon market and establish a more scientific quota allocation system. By strengthening market constraints and policy expectations, more enterprises can be guided to integrate environmental responsibility into their long-term development strategies.

Second, management departments should implement differentiated regulatory strategies to achieve key breakthroughs and targeted support. In subsequent policy formulation, the government should adopt the strategy of "focusing on large entities while releasing small ones," maintaining strict supervision over large-scale high-polluting enterprises. Simultaneously, specialized support or technical guidance should be provided to small-scale or low-carbon firms to narrow the transformation gap between different enterprises.

Third, enterprises should strengthen their technological reserves and management methods to improve the conversion efficiency of policy implementation. On the one hand, firms should increase investment in green R&D to reduce compliance costs for carbon reduction through technological innovation. On the other hand, enterprises should accelerate digital construction and utilize information technology to establish accurate carbon accounting systems. Additionally, enterprises with political connection advantages should actively play a leading role in demonstrating and proactively fulfilling social responsibilities.

References

[1] Xu, Y., Yao, H., Chen, J., et al. (2026). Market-based environmental regulation and carbon emission reduction: Evidence from China's carbon emission trading market. Industrial Management & Data Systems, 126(3), 865–887.

[2] Chen, J., Feng, T., Hu, J., et al. (2026). Effects of carbon emission trading policy on the low-carbon transition of industrial energy: Evidence from China. Energies, 19(4), 940.

[3] Yang, Z., Gao, W., & Li, J. (2022). Can economic growth and environmental protection achieve a "win–win" situation? Empirical evidence from China. International Journal of Environmental Research and Public Health, 19(16), 9851.

[4] Qin, Z., Tu, C., Han, W., et al. (2024). The impact of market-incentive environmental regulation policies on corporate environmental costs: Evidence from China's carbon trading policy. PLOS ONE, 19(2), e0297003.

[5] Sun, H., Bai, T., Fan, Y., et al. (2024). Environmental, social, and governance performance and enterprise sustainable green innovation: Evidence from China. Corporate Social Responsibility and Environmental Management, 31(4), 3633–3650.

[6] Wang, X., Yuan, M., Suo, X., et al. (2025). Strategic imperatives of ESG in fostering corporate digital innovation: A resource-based view. Journal of the Knowledge Economy, 16(4), 15286–15315.

[7] Tian, B., Yu, J., & Tian, Z. (2024). The impact of market-based environmental regulation on corporate ESG performance: A quasi-natural experiment based on China's carbon emission trading scheme. Heliyon, 10(4).

[8] Su, L. (2025). Environmental regulation and corporate green innovation: Evidence from the implementation of the total energy consumption target in China. Journal of Business Economics, 95(4), 499–526.

[9] Tian, Y., Hou, A., Hu, C.-C., et al. (2025). Policy-driven ESG mandates for immediate financial performance and long-term innovation: Synergistic insights from Chinese enterprises. Journal of Cleaner Production, 520, 146142.

[10] Dyck, A., Lins, K. V., Roth, L., et al. (2019). Do institutional investors drive corporate social responsibility? International evidence. Journal of Financial Economics, 131(3), 693–714.

ISSN: 2692-7608 DOI: 10.6981/FEM.202606_7(6).0004

[11] You, L. (2023). The impact of social norms of responsibility on corporate social responsibility. Journal of Business Ethics.

[12] Gao, Y., Liu, S., & Yang, L. (2025). The dynamics of peer influence in corporate ESG practices. International Review of Financial Analysis, 103, 104186.

[13] Octavio, M. F. R., Setiawan, D., Aryani, Y. A., et al. (2025). Corporate governance as a driver: Enhancing ESG performance in ASEAN companies. Business Strategy & Development, 8.

[14] Li, J., & Xu, X. (2024). The relationship between corporate social responsibility and financial performance. Highlights in Business, Economics and Management, 35, 116–122.

[15] Cheng, Z., & Meng, X. (2023). Can carbon emissions trading improve corporate total factor productivity? Technological Forecasting and Social Change, 195, 122791.

[16] Zhang, S., Cheng, L., Ren, Y., et al. (2024). Effects of carbon emission trading system on corporate green total factor productivity: Does environmental regulation play a role of green blessing? Environmental Research, 248, 118295.

[17] Liu, M., Zhou, C., Lu, F., et al. (2021). Impact of the implementation of carbon emission trading on corporate financial performance: Evidence from listed companies in China. PLOS ONE, 16(7), e0253460.

[18] Wu, J., Yu, Z., Wang, B., et al. (2025). Environmental regulations and carbon intensity: Assessing the impact of command-and-control, market-incentive, and public-participation approaches. Carbon Management, 16(1), 2499091.

[19] Han, Y., Zhe, C., & Liu, X. (2023). Is the carbon emissions trading system conducive to the urban green technology innovation level? Evidence from China. Energy Reports, 9, 3787–3799.

[20] Wang, D., Sun, M., Meng, B., et al. (2024). Can carbon market efficiency promote green technology innovation for Chinese companies? Energy, 309, 133157.

[21] Liu, W., Yu, C., Cheng, S., et al. (2020). China's carbon emissions and trading pilot, political connection, and innovation input of publicly listed private firms. International Journal of Environmental Research and Public Health, 17(17), 6084.

[22] Beck, T., Levine, R., & Levkov, A. (2010). Big bad banks? The winners and losers from bank deregulation in the United States. The Journal of Finance, 65(5), 1637–1667.