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Tax incentives, common institutional ownership, and corporate ESG performance

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Abstract

Against the backdrop of sustainable development, enterprises, the general public, and regulatory bodies are exhibiting an escalating level of concern regarding the performance in environmental stewardship, social responsibility, and corporate governance collectively referred to as ESG (Environmental, Social Responsibility, and Corporate Governance). This research, from the vantage point of external fiscal policy, investigates the examination of the impact of tax incentives on corporate ESG performance. Drawing upon panel data spanning from 2010 to 2021 at the level of China's A-share listed companies and grounded in the context of accelerated depreciation policy for fixed assets, this study commitment to both identify and empirically test the presence of a significant positive correlation between tax incentives and corporate ESG performance. Our analysis of the financial mechanism and the Research and Development (R&D) mechanism reveals that tax incentives are instrumental in alleviating the financing constraints faced by corporations, thereby augmenting their financial performance. Furthermore, they serve to intensify R&D efforts, thereby fostering the generation of green innovations. In conclusion, our findings underscore that tax incentive policies significantly enhance the ESG performance of enterprises with common institutional shareholdings, an effect attributed to the presence of governance and synergy effects.

1 | INTRODUCTION

As the world's climate and environmental circumstances worsen, governments, regulatory agencies, and the general people are forced to pay closer attention to sustainable development. Businesses are the main sources of money in society, but they are also the ones who use the most resources and energy. Thus, it is essential that every firm understands and gives priority to the notion of sustainable development in order to start down the path of sustainable growth. The three sustainability pillars of environmental protection, economic growth, and social responsibility are represented by the acronym ESG, which stands for Environmental, Social Responsibility, and Corporate Governance (Litvinenko et al., 2022). Numerous scholars have conducted research into the influencing factors of ESG, encompassing various dimensions. These dimensions include corporate ownership structure (Rees & Rodionova, 2015; Takahashi & Yamada, 2021), internal governance aspects such as boards of directors and supervisory boards (Shakil, 2021), CEO characteristics and powers (Velte, 2019), and external governance facets like institutional investors (Kim et al., 2019), societal public trust, and market attention (Zhou et al., 2022). Additionally, external regulatory intensity (Ran et al., 2015), as well as factors related to religion and cultural backgrounds (Shin et al., 2023), have also been explored. However, it is noteworthy that there has been limited attention to the incentivizing role of fiscal policy, particularly tax incentive policies, within the context of ESG performance.

Tax incentives, as a unique tool for governmental economic regulation, do, in fact, have a significant impact on business operations and

strategic goals (Stantcheva, 2021). They may help reduce regional poverty and promote regional development, as well as encourage innovation and R&D within businesses to make them more competitive in the market (Norouzi et al., 2022). Tax incentives also boost business investment levels (Dai & Chapman, 2022) as well as business digitization, labor market activation that generates new job opportunities (Garrett et al., 2020), labor mobility, and population influx (Kleven et al., 2020). Also, they can entice foreign investors and increase exports, thereby fueling economic growth (Li et al., 2019). It is crucial to acknowledge that different tax incentives yield divergent outcomes. Within the context of sustainable development, there has been limited exploration from the perspective of tax incentives, specifically investigating the impact of a particular tax incentive on corporate ESG performance. Consequently, this study contributes to enriching research related to tax incentives.

In developed countries such as Italy and the United States, the development of ESG and its associated frameworks has reached a relatively mature stage. Corporate ESG reporting has transitioned from voluntary to mandatory disclosure. In contrast, in developing countries like China, the initiation of ESG development occurred later, and ESG-related disclosures are currently in the voluntary stage (Seow, 2023). Currently, international ESG rating agencies assign an average score of around 20 points (out of 100) to thousands of listed Chinese companies. However, according to the 2022 Wind ESG rating data, less than 5% of A-share listed companies exhibit ESG performance at an advanced level, with over half of them still needing improvement (Zhang, 2022). Therefore, the challenge of enhancing the quality of ESG performance and development in China is significant (Khan, 2022). Furthermore, in developed markets, the impact of boards and ownership on corporate ESG performance is more significant. In emerging markets, the primary driving force behind corporate ESG performance is policy and regulations (Lozano & Martínez-Ferrero, 2022). Western countries are gradually considering ESG development as a tool for corporate governance, emphasizing its role in driving economic development. On the other hand, developing countries like China require guidance from relevant policies and regulations to achieve ESG development (Singhania & Saini, 2023). In summary, the influence of tax incentive policies on corporate ESG performance may differ between developed and developing countries.

China, as one of the most representative emerging markets, is the focus of our study. Therefore, we utilized data from Chinese A-share listed companies from 2010 to 2021 and employed a Difference-in-Differences (DID) model to investigate the impact of tax incentives on corporate ESG performance. Specifically, we chose the policy of accelerated depreciation of fixed assets as the exogenous policy shock, exploring and examining its effects on corporate ESG performance.

Our potential contributions are outlined as follows. Firstly, the theoretical contribution of this paper is grounded in resource dependence theory, stakeholder theory, and institutional theory. It validates that tax incentives can enhance corporate Environmental, Social, and Governance (ESG) performance and explores strategies for such enhancement, thereby enriching the body of research on tax incentives. Additionally, existing literature predominantly examines the impact of corporate governance on ESG performance (He et al., 2022; Shakil, 2021), with limited exploration from the perspective of fiscal policy. This paper fills this gap by providing insights into the factors influencing ESG performance and strategies for improvement from the standpoint of fiscal policy.

Secondly, existing research often treats common institutional ownership as an explanatory variable. In contrast, this paper considers common institutional ownership as a moderating variable. Drawing on resource dependence theory and stakeholder theory, it explores how common institutional ownership influences the impact of tax incentives on corporate behavior and decision-making, thereby contributing to a richer understanding of common institutional ownership.

Finally, this paper conducts a thorough analysis of corporate heterogeneity, investigating how tax incentives may have varied effects on different types of enterprises.

We proceed as follows: the second part is the institutional background and hypothesis development and the third part is the sample and research design, the fourth part is the analysis of the empirical results, including the stability test, mechanism analysis, and moderating effect analysis, and the fifth part is the conclusions and insights.

2 | INSTITUTIONAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

In October 2014, the Chinese Ministry of Finance and the State Administration of Taxation issued a notice (CaiShui [2014] No. 75) aimed at improving the enterprise income tax policy related to accelerated depreciation of fixed assets. This notice outlined the eligibility for certain industries, including biopharmaceutical manufacturing, specialized equipment manufacturing, railways, ships, aerospace and other transportation equipment manufacturing, computers, communications, and other electronic equipment manufacturing, instrumentation manufacturing, information transmission, software, and information technology services. These industries were allowed to shorten the depreciation period or adopt an accelerated depreciation method for newly purchased fixed assets. In September 2015, another notice (CaiShui [2015] No. 106) was released, expanding the scope of pilot industries eligible for these tax incentives. For the accelerated depreciation method, companies could choose between the double declining balance method and the sum-of-years-digits method. If the double declining balance method was chosen, the calculation formula was (original value−cumulative depreciation) × 2/estimated useful life, with the last two years calculated as (original value−cumulative depreciation−estimated net residual value) /2.

As an example, if a company acquired fixed assets worth 5 million RMB with a depreciation period of 5 years and an estimated net residual value of 0, before enjoying the tax incentives, it could only use the straight-line method for depreciation, resulting in an annual depreciation of 500/5 = 100,000 RMB. In the first two years, the tax incentives would be 100,000 * 2 * 25% = 50,000 RMB. However, after

enjoying the tax incentives, if the double declining balance method was adopted, the first year's depreciation would be 5,000,000 * 2/5 = 2,000,000 RMB, and the second year's depreciation would be (5,000,000-2,000,000) * 2/4 = 1,500,000 RMB. In the first two years, the tax incentives would amount to (2,000,000 + 1,500,000) * 25% = 875,000 RMB. This means that in the first two years, the company saved nearly twice the amount of taxes compared to not having tax incentives. While the depreciation amount decreases in the subsequent years, the total depreciation remains the same. This essentially provides companies with an interest-free loan, alleviating their cash flow pressure and allowing them to amortize their investment costs earlier, thereby increasing the return on investment. This incentive also encourages companies to upgrade and modernize their fixed assets, ultimately improving production efficiency and quality through advanced equipment and processes, thus enhancing capital efficiency and overall fixed asset investment levels (Liu & Mao, 2019).

The evolution of the world economy is significantly influenced by China, a massive emerging economy. Nonetheless, at this time, Chinese listed businesses' ESG performance still has a lot of room for improvement. The average grade for Chinese listed businesses is roughly 20 out of 100 points, according to research by Bloomberg on ESG ratings. This emphasizes the fact that there is a lot of opportunity for improvement in the ESG performance of Chinese-listed corporations. Exploring ways to improve corporate ESG performance is crucial in this situation, for both public firms and government regulatory authorities.

The primary reasons for subpar ESG performance among companies lie in several factors. On one hand, ESG initiatives often require substantial investments, operate on long-term horizons, and may not yield immediate cash flows, which can deter management from readily investing in ESG initiatives (Lokuwaduge & Heenetigala, 2017). On the other hand, some companies may lack the technological prowess and innovation needed to further improve their ESG performance (Yuan et al., 2022).

Institutional theory posits that institutions influence the behavior of individuals and organizations (DiMaggio & Powell, 1983). Institutions encompass a set of norms, customs, and rules, including tax laws and regulations. As a form of tax incentive policy, the Accelerated Depreciation Policy essentially provides businesses with an interest-free loan for acquiring and updating fixed assets, encouraging increased investment in fixed assets (Liu & Mao, 2019). This, in turn, is beneficial for fostering research and innovation within businesses. Sustainably, this policy incentivizes the adoption of more energy-efficient, low-emission production equipment or alternative technologies utilizing renewable energy sources. New equipment often exhibits higher resource utilization efficiency, thereby reducing resource consumption and waste generation (Delmas & Pekovic, 2015). This contributes to enhancing a company's environmental and social responsibility performance by promoting a shift toward more sustainable and eco-friendly practices.

The Resource Dependence Theory posits that businesses need to rely on internal resources to achieve their objectives (Pfeffer & Salancik, 2003). These resources encompass raw materials, fixed assets, and funds, among others (Hillman et al., 2009). To enhance ESG performance and elevate sustainable development levels, companies rely on these resources. The Accelerated Depreciation Policy encourages companies to acquire and upgrade more efficient and energy-saving equipment, essentially providing them with an interest-free loan, and alleviating internal financing constraints to some extent. This policy improves the financial situation of companies, reducing the effort they need to invest in financial matters and allowing them to focus on operational, strategic, and investment aspects (Liu & Mao, 2019).

Stakeholder theory asserts that companies can respond to the value propositions of stakeholders such as investors, governments, and the public. Simultaneously, stakeholders can provide resources for a company's sustainable development (Freeman & Reed, 1983). On one hand, companies utilizing tax incentives to upgrade equipment, increase fixed asset investments, and boost R&D expenditures signal positive intentions toward stakeholders. This enhances innovation capabilities and a proactive commitment to environmental and social responsibility, conveying positive signals to stakeholders, and reducing the company's agency and transaction costs (Freeman & Reed, 1983). This, to some extent, elevates the company's governance level. On the other hand, positive interactions with stakeholders contribute to gaining favor with institutional and public investors, enabling companies to break through external financing constraints and access more funds and resources, thus mitigating financing limitations (Santos & Cincera, 2022).

Hypothesis 1. Tax incentives can encourage companies to enhance their ESG performance.

According to the Resource Dependence Theory and Stakeholder Theory, businesses seek external resources, including efficient capital markets and external investors, to achieve their objectives. Institutional investors are crucial stakeholders and play a significant role in external governance, influencing strategic decisions within companies (Chung & Zhang, 2011). Common institutional ownership refers to institutional investors simultaneously holding stocks in two or more companies within the same industry (Wang et al., 2023). Current academic discussions on this topic primarily revolve around collusion fraud and collaborative governance (Yao et al., 2023).

On one hand, common institutional ownership serves as a bridge for communication and information exchange among companies, facilitating collaborative governance. In the context of tax incentive policies, companies with common institutional ownership may benefit from quicker policy understanding and more rapid responses due to information sharing. Additionally, successful policy implementation experiences by one company can be replicated by common institutional investors in another company within the same industry. On the other hand, the objective of common institutional owners is to maximize portfolio value, incentivizing reduced competition and collusion among simultaneously owned companies to achieve higher returns (Hirose & Matsumura, 2022). Concerning tax incentive policies, an increase in common institutional investors correlates with a decrease in market competition intensity, diminishing the willingness of companies to enhance ESG for competitive advantage (Cheng et al., 2022).

Moreover, the high costs associated with Environmental, Social, and Governance (ESG) initiatives may lead companies to prioritize short-term improvements driven by tax incentives, potentially neglecting long-term sustainability. In summary, common institutional ownership can either facilitate collaborative governance or play a collusive role, influencing relevant decisions within companies. Therefore, we propose the following hypotheses:

Hypothesis 2a. Common institutional ownership enhances the effectiveness of tax incentives in improving corporate ESG performance.

Hypothesis 2b. Common institutional ownership diminishes the impact of tax incentives on improving corporate ESG performance.

3 | SAMPLE AND RESEARCH DESIGN

3.1 | Regression model

The accelerated depreciation policy for fixed assets is a public policy announced by the Chinese Ministry of Finance in relevant years. It constitutes a strong exogenous event, and by using it as the core explanatory variable, it addresses the endogeneity issue where explanatory and dependent variables may be mutually causal. Regarding the ESG ratings of companies, China's regulatory authorities have not yet established formal ESG evaluation standards. Therefore, existing ESG rating data in China come from third-party rating agencies. These agencies are subject to supervision by China's capital markets and the general public. Compared to ESG disclosure reports published by companies themselves, rating agency data are considered to be more objective and comprehensive (Zhang, 2022). In this paper, we investigate the impact of the accelerated depreciation policy, based on data from the Chinese Ministry of Finance, as an exogenous shock on the ESG performance of companies. Drawing from relevant literature and employing the difference-in-differences method, we construct Model (1):

$$ESG_{it} = \partial_0 + \partial_1 Treat_i \times Post_t + \partial_2 CV_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (1)$$

Among them, ESG_{it} is the core explained variable of this paper, which reflects the ESG performance of enterprises. $Treat_i \times Post_t$ is the core explained variable of this paper, which reflects the impact of accelerated depreciation policy of fixed assets. CV_{it} is the control scalar collection; μ_i and τ_t are the time-fixed effect and individual fixed effect respectively, ε_{it} is the residual term.

3.2 | Data sources

All of the companies in this study are A-share companies listed on the Shanghai Stock Exchange and the Shenzhen Stock Exchange, and the study employs company-year-level panel data. The ESG rating data from 2010 to 2021 issued by a third-party rating agency Bloomberg is chosen in order to confirm the influence of the adoption of tax incentive policy on the ESG performance of firms, i.e., whether there is any change before and after the policy. In order to ensure the consistency of the data's quality, the sample interval for the other data in this study is also kept between 2010 and 2021. Additionally, this paper replaces the core explanatory variables in the stability test with ESG rating data for the years 2010 through 2021 published by another rating agency, Hua Zheng. The original sample is also pre-processed to eliminate certain industry samples, such as those from the finance and real estate sectors, and samples with the corporate statuses of ST, *ST, and PT. The samples are also shrink-tailed by 1% and 99% to avoid the impact of extreme results, and samples whose ESG ratings are absent for less than five consecutive years due to a lack of ESG ratings are eliminated. The ESG data given by Hua Zheng is from a wind database, the ESG data released by Bloomberg is from Bloomberg, and the remaining data is from the CSMAR database.

3.3 | Variable settings

Core Independent Variable: In accordance with the regulations specified in the "Notice on Improving the Enterprise Income Tax Policy for Accelerated Depreciation of Fixed Assets" (Cai Shui [2014] No. 75) and "Notice on Improving the Enterprise Income Tax Policy for Accelerated Depreciation of Fixed Assets" (Cai Shui [2015] No. 106) by China's Ministry of Finance, we construct the core explanatory variables using a double-difference model. These variables consist of "Treat" and "Post." If a company belongs to the industries specified in the Tax Incentive (TI) scope as outlined in the above-mentioned documents, we set "Treat" to 1; otherwise, it is set to 0. Similarly, we set "Post" to 1 if the time period falls after the effective date of the policy changes stipulated in the mentioned documents; otherwise, it is set to 0. Consequently, when the product of "Treat" and "Post" (Treat × Post) equals 1, the company is categorized as the treatment group; otherwise, it falls into the control group. The use of Treat × Post allows us to reflect on the effects of policy influence on the ESG performance of companies.

Core Dependent Variable: In the context of China's "dual-carbon" goals of achieving both carbon peak and carbon neutrality, the performance and ratings of corporate ESG (Environmental, Social, and Governance) factors have garnered increasing attention from capital markets and the general public. Consequently, many institutions have started evaluating corporate ESG reports based on indicator-based assessment systems, which serve as a means to gauge a company's ESG performance. In China, companies like Shang dao Rong lv began publishing ESG rating reports for Chinese enterprises in 2015. However, the time span covered by these reports does not align with the effects of policies considered in this study. In contrast, Bloomberg, one of the most influential international rating agencies, has been releasing ESG rating data reports for Chinese companies since 2010.

Therefore, this paper chooses ESG ratings as the measure of ESG performance, with Bloomberg's ESG rating data serving as the core dependent variable. Additionally, ESG rating data from one of China's domestic rating agencies, Hua Zheng, is used as an alternative variable for stability testing of the core dependent variable.

Control variables: Referring to the studies of (Jang et al., 2022), this paper controls for variables that would have an impact on ESG performance, including firm size (size), the natural logarithm of the firm's total assets at the end of the year; gearing (Lev), the natural logarithm of the total responsibility divided by the total assets at the end of the year; the net rate of interest on total assets (ROA). Net profit divided by the average balance of total assets; the company's years of existence (Firmage), ln (the year—the year of the company's establishment +1); two positions in one (Dual), the chairman of the board of directors and general manager of the same person for 1, otherwise 0; the number of shares held by the first major shareholder (Top1), the number of shares held by the first major shareholder/ the total number of shares; Audit Opinion (Opinion), if the company's financial reports for the year Audit opinion (Opinion), if the company's financial report for the year was issued a standard audit opinion, the value of 1, otherwise 0; operating income growth rate (Growth), the current year's operating income/the previous year's operating income −1; Tobin's Q value (TobinQ), (market value of the outstanding shares + number of shares of non-official shares x net asset value per share + book value of liabilities)/Total Assets; Listed Years (Listage), ln (the current year year—the year of the listed year + 1).

4 | ANALYSIS OF THE EMPIRICAL RESULTS

4.1 | Descriptive statistics

From Table 1, we can observe that the ESG ratings (ESG) published by Bloomberg range from a minimum score of 9 to a maximum score of 64, with an average and median score of around 20. This indicates that the ESG performance of listed companies in China tends to be relatively low, suggesting there is significant room for improvement. Regarding the variable "whether benefited from the policy" (Treatxpost), the median is 0, and the average is 0.42, indicating that less than half of the sampled listed companies benefited from the policy. The average value for the size of listed companies (Size) is around 23, with minimal differences between the maximum and minimum values, suggesting that the sampled listed companies generally have a certain scale, and their size levels are relatively consistent. The variables asset-liability ratio (Lev), return on assets (ROA), and revenue growth rate (Growth) have average values and medians that are close to each other, indicating a relatively even distribution among listed companies. On average, these companies exhibit a reasonable level of revenue growth. As for the variables Listage, the maximum values is 3.4, while the average values is 2.5. Finally, concerning the variable "Audit Report Opinion" (Opinion), the average value is 0.98, implying that the vast majority of listed companies received standard unqualified audit opinions, indicating that their financial reports are recognized by audit institutions.

TABLE 1 Descriptive statistics.

Variables	(1) N	(2) Mean	(3) Min	(4) p50	(5) Max	(6) SD
ESG	9,342	20.61	9.091	19.83	64.63	6.406
Size	9,284	23.12	20.47	23.01	27.00	1.256
Lev	9,284	0.476	0.072	0.487	0.869	0.193
ROA	9,284	0.048	−0.166	0.039	0.235	0.053
ROE	9,281	0.087	−0.442	0.085	0.380	0.096
Growth	9,098	0.131	−0.391	0.099	1.274	0.243
Dual	9,472	0.200	0	0	1	0.400
Top1	9,284	0.369	0.082	0.358	0.771	0.154
TobinQ	9,472	1.938	0.674	1.472	29.17	1.529
ListAge	9,472	2.491	0.693	2.639	3.434	0.601
Opinion	9,472	0.982	0	1	1	0.133
SA	9,472	−3.782	−4.710	−3.800	−2.113	0.284
TreatxPost	9,472	0.429	0	0	1	0.495
RDSpendSumRatio	7,167	3.837	0.020	3.140	26.60	3.937
lsfmsq	7,882	2.916	0	0	121	10.05
Cldum	9,472	0.173	0	0	1	0.378
Clnum	9,472	0.117	0	0	1.558	0.271
Clratio	9,472	4.530	0	0	88.44	12.82

Note: For all variable definitions, see Appendix A.

4.2 | Regression

Table 2 presents the regression results based on Hypothesis 1. Columns 1 and 2 show the baseline regression results without and with control variables, respectively. In both cases, the coefficients are positive and statistically significant at the 1% level ($p < 0.01$), indicating that the policy can, to some extent, improve a firm's ESG performance. After including control variables, the regression coefficient is 0.47. This suggests that, compared to other companies, firms within the policy's scope experience a 4.7% improvement in ESG performance. Importantly, this regression result is statistically significant at the 1% level. These regression results validate Hypothesis 1, demonstrating that the targeted investment policy can indeed promote improvements in a company's ESG performance.

TABLE 2 Regression.

Variables	(1) ESG	(2) ESG
Treat × Post	0.544***	0.470***
	(3.41)	(2.71)
Size		1.609***
		(10.97)
Lev		−1.304**
		(−2.29)
ROA		1.324
		(1.03)
Dual		−0.194
		(−1.34)
Top1		2.172***
		(2.84)
Opinion		−0.071
		(−0.19)
Growth		−0.293*
		(−1.71)
TobinQ		0.297***
		(5.08)
ListAge		−0.540
		(−1.25)
Year	Yes	Yes
Firm	Yes	Yes
Constant	20.378***	−14.293***
	(266.42)	(−3.13)
Observations	9, 338	8, 234
Adjusted R^2	0.747	0.748

***Significance at the 1% level.
**Significance at the 5% level.
*Significance at the 10% level.

4.3 | Robustness check

4.3.1 | Parallel trend test

Before employing the difference-in-differences (DID) model, it is essential to satisfy a fundamental assumption: the treated and control groups must exhibit parallel trends in the absence of policy intervention. This parallel trend assumption is crucial for accurately measuring the impact of policies. In this study, we followed the approach outlined by Atkin (2016) to construct Model (2) and validate the effect of Trade Integration (TI) on firms' ESG performance. Due to the nature of our data, where rating agencies release data for the previous year only in the second year, and firms may have a transitional period for policy-related investments, there is a lag effect associated with the policy. Consequently, we conducted a parallel trend test using four years before and four years after the policy implementation. To address issues of collinearity, we omitted the year immediately preceding the policy change. As depicted in Figure 1, prior to the policy change, the dashed lines for each variable intersected the axis with regression coefficients near zero, indicating that their confidence intervals were below 90%, thus failing to meet the significance criterion. However, post-policy implementation, we observed a significant improvement in firms affected by the policy starting in the second year, with even greater significance in the third and fourth years. Notably, the coefficients also exhibited a clear increase. These findings suggest that the DID model largely satisfies the parallel trend assumption.

$$ESG_{it} = \beta_0 + \sum \beta_t (Treat \times pre_{1\_4}) + \rho(Treat \times current) + \sum \gamma_t (Treat \times post_{1\_4}) + \beta_2 CV_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (2)$$

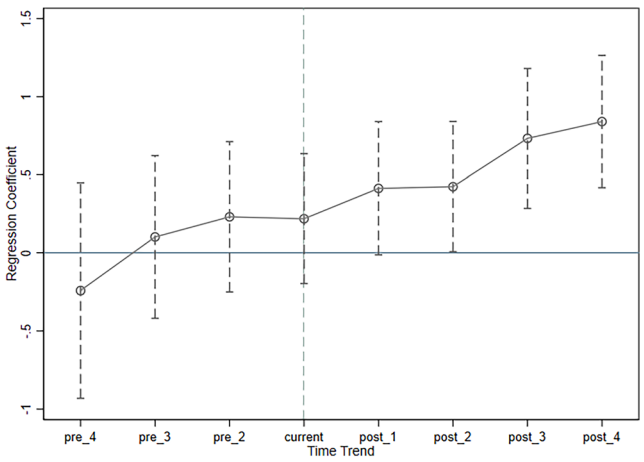

FIGURE 1 Parallel trend test (draw by stata16). *Note*: In the graph, 'pre_4,' 'pre_3,' and 'pre_2' represent the years four, three, and two years before the policy change, respectively. To address collinearity concerns, the year immediately preceding the policy change was dropped from the analysis. 'Current' denotes the year of the policy change, which in this study is 2015. 'Post_1,' 'post_2,' 'post_3,' and 'post_4' correspond to the years one, two, three, and four years after the policy change, respectively.

4.3.2 | Placebo test

To ensure that the impact of the Trade Integration (TI) policy on corporate ESG performance is not merely a 'placebo' effect, indicating a substantive influence, this study employed a placebo test following the approach outlined by La Ferrara et al. (2012). In accordance with the distribution of policy implementation in the baseline regression, 500 pseudo-policy dummy variables were randomly generated. Model (1) was then used to re-estimate the regression, and the *p*-values were examined as depicted in Figure 2. The vast majority of these *p*-values were statistically insignificant, i.e., $p > 0.01$. Furthermore, the coefficient distribution, as shown in Figure 3, largely remained significantly lower than the baseline regression coefficient of 0.47. These results indicate that the impact of the TI policy on ESG performance is not attributable to random factors. Therefore, the conclusions drawn earlier in this paper are robust.

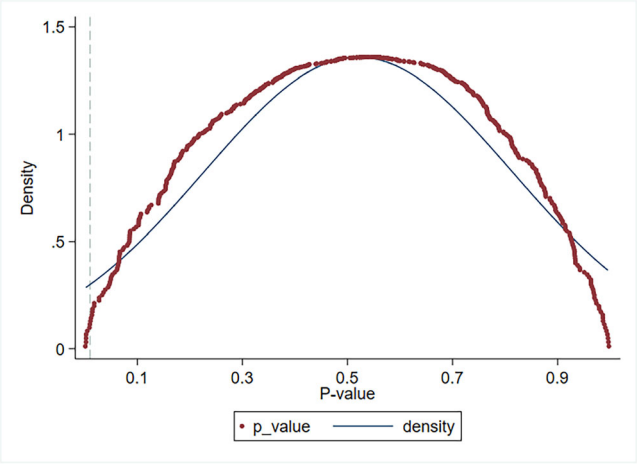

FIGURE 2 Placebo test *p*-value (draw by stata16).

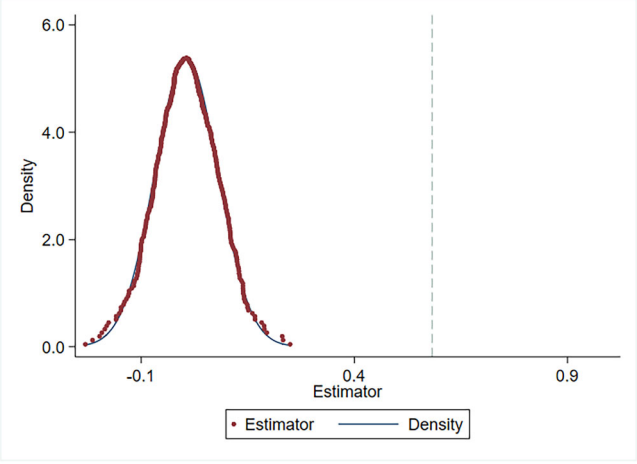

FIGURE 3 Placebo test coefficients (draw by stata16).

4.3.3 | PSM-DID test

Rating agencies may decide to evaluate businesses with a lot of information or those with significant scale and profitability when issuing ESG rating data. This study used the Kernel Matching and Nearest Neighbor Matching methods from Propensity Score Matching to address potential sample selection bias (PSM). In the PSM, covariates such as company size, leverage ratio, and total asset turnover were utilized to choose control companies with properties similar to those of the treatment group. After PSM, a stability test was conducted, yielding an Average Treatment Effect on the Treated (ATT) with a T-value of 7.01, significantly exceeding the threshold of 2.56 at the 1% level. Additionally, the %bias for each covariate after matching remained within 1.6%, while prior to matching, the impact of these covariates on Y was statistically significant. This observation suggests that matching effectively mitigated sample selection bias resulting from various covariates. In summary, these results demonstrate the robustness of the PSM outcomes. Subsequently, the matched sample was subjected to regression analysis, as shown in Table 3. Post-matching, both Kernel Matching and Nearest Neighbor Matching revealed that the policy continued to significantly enhance corporate ESG performance, affirming the stability and validity of the main regression results.

4.4 | Replace the core dependent variable

The core dependent variable in this study comprises corporate ESG rating data published by Bloomberg, an international rating agency. To further establish the robustness of the conclusion that trade integration (TI) can enhance corporate ESG performance, this paper substitutes the core dependent variable with ESG rating data provided by China's rating agency, Huazheng. Following the approach of Wang et al. (2023) and others, a numerical value of 1 to 9 was

TABLE 3 PSM matching results.

Variables	Kernel matching ESG	Nearest neighbor matching ESG
Treat × Post	0.471***	0.562**
	(2.91)	(2.11)
Controls	Yes	Yes
Year	Yes	Yes
Firm	Yes	Yes
Constant	−14.257***	−16.705***
	(−3.72)	(−2.89)
Observations	8, 233	4, 027
Adjusted R^2	0.748	0.762

***Significance at the 1% level.
**Significance at the 5% level.
*Significance at the 10% level.

TABLE 4 Replace the core dependent variable.

Variables	(1) ESG_0	(2) ESG_1	(3) ESG_2
Treat × Post	0.406***		
	(3.78)		
Treat × Post		0.403**	0.373**
		(2.40)	(2.13)
Controls	Yes	Yes	Yes
Year	Yes	Yes	Yes
Firm	Yes	Yes	Yes
Constant	49.941***	−4.835	5.912
	(25.14)	(−0.98)	(1.12)
Observations	22, 311	20, 275	18, 219
Adjusted R^2	0.498	0.536	0.535

***Significance at the 1% level.
**Significance at the 5% level.
*Significance at the 10% level.

assigned to the CCC-AAA nine-grade rating data, with lower ratings receiving lower values. As shown in Table 4, the regression results indicate that TI has a coefficient of 0.4, significantly significant at the 1% level, when using the ESG performance based on Huazheng's ratings, denoted as ESG_0. This reaffirms the reliability of the baseline regression results. Additionally, to verify the sustainability of TI's impact on corporate ESG performance, this paper lagged the core dependent variable by one and two periods, creating ESG_1 and ESG_2, respectively. These lagged variables were then incorporated into the regression model. The results, significant at the 5% level, with coefficients similar to the contemporaneous ESG variable, align with expectations. This suggests that TI's effect on enhancing corporate ESG performance through improvements in fixed asset equipment, increased efforts in energy conservation and emissions reduction, and higher environmental scores is sustainable.

4.5 | Mechanism analysis

In the preceding section, we conducted empirical analysis and verification to establish that tax incentives can enhance corporate ESG performance. In this section, we investigate the mechanisms through which this enhancement occurs, considering two aspects: the facilitation of fixed asset investments and the promotion of green innovation within enterprises. To elucidate these mechanisms, we draw upon established research and construct Models 3 and 4. We then integrate these models with Model 1 to analyze and test the hypotheses concerning the mechanisms of fixed asset investments and green innovation. In these models, M_it represents the mechanism variables that gauge corporate fixed asset investments and green innovation, while the remaining variables align with those in Model 1.

TABLE 5 Accelerated depreciation policy for fixed assets and financial mechanisms.

	Financial constraints		Financial performance	
Variables	(1) SA	(2) SA	(3) ROE	(4) ROE
Treat × Post	−0.047***	−0.029***	0.013***	0.008**
	(−15.26)	(−12.62)	(3.92)	(2.56)
Controls	NO	Yes	Yes	NO
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Observations	9,469	8,601	9,278	8,489
Adjusted R^2	0.964	0.975	0.396	0.520

***Significance at the 1% level.
**Significance at the 5% level.
*Significance at the 10% level.

4.5.1 | Analysis of the financial mechanism

In the analysis of financial mechanisms, we conducted research using financing constraints (SA) and financial performance (ROE) as mechanism variables. To measure financing constraints, we constructed the SA index following the methodology outlined by Hadlock and Pierce (2010). Additionally, to capture a company's financial performance, we employed the return on equity (ROE), as suggested by the study conducted by Lee and Raschke (2023).

$$SA = -0.737 * Size + 0.043 * Size^2 - 0.040 * Age.$$

The empirical results, as displayed in Table 5, indicate that the accelerated depreciation policy for fixed assets reduces firms' financing constraints and enhances their financial performance. Essentially, this policy provides companies with an interest-free loan, which, to a certain extent, ameliorates their financing situation. As firms experience a partial alleviation of financing constraints, within the context of sustainable development, they are better positioned to allocate more funds to activities related to ESG practices such as technological transformation, upgrading, and green development. This, in turn, contributes to the actual improvement of their financial performance, rectifying any behavior veering towards speculative activities and reinforcing their commitment to tangible outcomes.

4.5.2 | R&D mechanism analysis

As indicated in Table 6, concerning research and development (R&D) investment, the accelerated depreciation policy for assets and the accelerated depreciation policy for R&D mechanisms have both contributed to an increase in a company's R&D intensity. This policy encourages companies to acquire and replace fixed assets, which, in turn, facilitate technological upgrades and product development.

TABLE 6 Accelerated depreciation policy for fixed assets and R&D mechanism.

	R&D intensity		R&D output	
Variables	(1) RD	(2) RD	(3) Gp	(4) Gp
Treat × Post	0.294***	0.331***	1.070***	1.217***
	(3.37)	(3.80)	(4.44)	(4.37)
Controls	NO	Yes	Yes	NO
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Observations	7,135	6,407	7,873	7,075
Adjusted R^2	0.835	0.873	0.629	0.623

***Significance at the 1% level.
**Significance at the 5% level.
*Significance at the 10% level.

Furthermore, in terms of R&D output, the implementation of the accelerated depreciation policy for fixed assets has led to a significant rise in a company's green invention patents. This can be attributed to companies increasing their R&D investments. In the context of sustainable development, companies are more inclined to engage in green research related to environmental protection and resource conservation.

4.5.3 | Analysis of moderating effects

Following the methodology outlined by Cheng et al. (2022), we introduced variables to measure the presence and extent of institutional co-ownership in companies. Specifically, we defined the variable 'Cldum' to represent whether there is institutional co-ownership. If present, it takes a value of 1; otherwise, it is assigned 0. Additionally, we introduced 'Clnum' to signify the number of institutions with co-ownership and 'Clratio' to denote the proportion of institutional co-ownership. Building upon Model (1), we developed Models (3), (4), and (5) to investigate and validate Hypothesis 2.

$$ESG_{it} = \partial_0 + \partial_1 Treat_i \times Post_t + \partial_2 Treat_i \times Post_t \times Cldum_i + \partial_3 CV_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (3)$$

$$ESG_{it} = \partial_0 + \partial_1 Treat_i \times Post_t + \partial_2 Treat_i \times Post_t \times Clnum_i + \partial_3 CV_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (4)$$

$$ESG_{it} = \partial_0 + \partial_1 Treat_i \times Post_t + \partial_2 Treat_i \times Post_t \times Clratio_i + \partial_3 CV_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (5)$$

The empirical results, as shown in Table 7, indicate that the regression coefficients of TreatxPost are all positive and pass the statistical significance test at the 1% level. Similarly, the coefficients of TreatxPostxCldum, TreatxPostxClnum, and TreatxPostxClratio, which represent the interactions, are also positive and statistically significant at the 1% level. This suggests that the policy of accelerated depreciation of fixed assets has a significant promoting effect on corporate ESG performance, particularly pronounced in firms with shared institutional ownership, thus validating hypothesis 2a.

TABLE 7 Heterogeneity analysis.

	(1)	(2)	(3)
Variables	ESG	ESG	ESG
Treat × Post	0.540***	0.557***	0.590***
	(3.41)	(3.53)	(3.71)
Cldum	0.904***		
	(5.16)		
TreatxPostxCldum	2.985***		
	(11.69)		
Clnum		2.069***	
		(7.47)	
TreatxPostxClnum		4.556***	
		(11.83)	
Clratio			0.045***
			(6.78)
TreatxPostxClratio			0.074***
			(8.58)
Controls	Yes	Yes	Yes
Year	Yes	Yes	Yes
Firm	Yes	Yes	Yes
Constant	−13.403***	−13.346***	−15.460***
	(−4.64)	(−4.64)	(−5.34)
Observations	8, 366	8, 366	8, 366
Adjusted R^2	0.753	0.754	0.751

***Significance at the 1% level.
**Significance at the 5% level.
*Significance at the 10% level.

4.6 | Further analysis

To investigate the distinctive features of the impact of tax incentives on corporate Environmental, Social, and Governance (ESG) performance, enrich research content, and expand research boundaries, this paper conducts a discussion on corporate heterogeneity in three aspects: 1. Discussion based on industry attributes: Examining heavy-polluting enterprises and non-heavy-polluting enterprises, with the identification criteria primarily based on the 16 categories specified in the "Guidelines for Environmental Information Disclosure of Listed Companies" published by the China Securities Regulatory Commission (https://www.gov.cn). 2. Discussion based on the company's own debt level: Analyzing the impact of the company's debt level on ESG performance. 3. Discussion based on property rights attributes: Categorizing companies into state-owned and non-state-owned enterprises. The results are presented in Table 7.

TABLE 8 Moderating effects of common institutional holdings.

Variables	(1) ESG	(2) ESG	(3) ESG
Treat × Post	0.394**	0.556***	0.479***
	(2.43)	(3.44)	(2.96)
Zwr	0.054		
	(0.13)		
Treat × Postxzwr	1.186***		
	(5.86)		
Lev		−1.095**	
		(−2.00)	
Treat × PostxLev		3.742***	
		(6.90)	
SOE			0.950***
			(2.78)
Treat × PostxSoc			0.544***
			(2.63)
Controls	Yes	Yes	Yes
Year	Yes	Yes	Yes
Firm	Yes	Yes	Yes
Constant	−15.091***	−16.843***	−16.055***
	(−3.95)	(−4.39)	(−4.17)
Observations	9,472	9,472	9,472
Adjusted R^2	0.749	0.750	0.749

***Significance at the 1% level.
**Significance at the 5% level.
*Significance at the 10% level.

In Table 8, Zrw indicates whether a company is a heavy-polluting enterprise, with 1 indicating yes and 0 indicating no. In the first column of Table 8, the coefficient of the interaction term between TI and Zwr is positive and significant at the 1% level, indicating that the policy has a better-enhancing effect on ESG performance in high-pollution enterprises. This is mainly attributed to the series of green credit and green financial policies implemented by the government in recent years, leading to a significant increase in financing costs for heavy-polluting enterprises. Consequently, the motivation for these enterprises in the heavy-pollution industry to improve ESG performance is stronger. The policy can stimulate fixed asset investment, and these enterprises are more inclined to choose environmentally friendly or energy-efficient equipment, making TI more effective in promoting ESG performance for such companies.

Lev is an indicator of the asset-liability ratio, measuring the company's debt level. In the second column of Table 8, the coefficient of the interaction term between TI and Lev is also positive and significant at the 1% level, indicating that the policy has a better-enhancing effect on ESG performance in companies with higher asset-liability ratios. This is because companies with higher debt ratios often face insufficient cash flow when investing in fixed assets, and the policy essentially provides interest-free loans to improve their cash flow, assisting them in better completing fixed asset investments.

SOE indicates whether a company is state-owned, with 1 indicating yes and 0 indicating no. In the third column of Table 8, Treat×Post represents the impact of the policy on ESG performance, with a positive and significant coefficient. The regression coefficient for the interaction term between TI and state-owned enterprises (SOE) is also positive and significant at the 1% level. This suggests that among companies benefiting from TI, state-owned enterprises exhibit better ESG performance compared to private enterprises. This could be due to state-owned enterprises being more sensitive to policies issued by the government, enabling them to make faster adjustments in operational and investment strategies according to policy changes. Additionally, the government can directly influence and guide the investment and operational decisions of state-owned enterprises, making them more proactive in responding to policies.

5 | CONCLUSIONS

The ESG performance of a company holistically represents its level of sustainable development against the backdrop of the sustainability of the global economy. In developed countries, the disclosure and measurement mechanisms connected to ESG have reached maturity. But, emerging nations like China still have space for progress. The world's largest emerging economy and one of its major developing countries, China, is getting a lot of attention as it continues to advance. Thus, it is important both conceptually and practically to research the variables affecting ESG performance in China. In particular, focusing on a specific Trade Integration (TI) policy offers insightful information for building a solid ESG framework and promoting sustainable development.

The main conclusions of this study are as follows: Based on panel data of Chinese A-share listed companies from 2010 to 2021, we determined and verified a significant positive correlation between tax incentives, particularly the accelerated depreciation policy for fixed assets, and corporate ESG performance. Our analysis of financial mechanisms and research and development mechanisms reveals that these incentives can alleviate financing constraints, improve financial performance, increase R&D intensity, and promote green innovation output.

Furthermore, we observed that due to the existence of governance synergies, the positive impact of tax incentives on ESG performance is more pronounced in companies with common institutional ownership. Implications.

The impact of relevant policies and regulations on corporate ESG performance is more significant in emerging markets (Lozano & Martínez-Ferrero, 2022). Given the high demand for sustainable development, governments can go beyond regulating ESG reporting and assessment standards by considering the introduction of corresponding fiscal and tax policies. Such policies would incentivize companies to actively engage in ESG activities, contributing to genuine high-quality sustainable development. Additionally, as crucial stakeholders, institutional investors can establish information-sharing channels for

commonly held companies. By leveraging governance and synergistic effects, they can reduce information asymmetry, provide companies with informational advantages, and achieve high ESG performance.

Against this backdrop, companies should prioritize communication and interaction with institutional investors, especially those who are common owners of equity in other companies. Learning from successful experiences of peer companies in the same industry can be valuable. Furthermore, regulatory bodies should emphasize the role of institutional investors in driving positive corporate change and actively safeguarding market competition, thereby reducing the occurrence of collusion and fraud.

Finally, the impact of tax incentive policies on promoting ESG performance is notable in state-owned enterprises, those with low leverage, and high-pollution industries. Therefore, non-state-owned enterprises should heighten sensitivity to relevant policies and regulations, enjoy policy dividends, and enhance their levels of sustainable development. Companies with high leverage should first improve their operations before considering subsequent sustainable development. For industries with low pollution, adequate attention to social responsibility and corporate governance, combined with strategic development, can maximize the benefits of relevant preferential policies.

5.1 | Limitations

Firstly, this study focuses on China, representative of emerging markets, to investigate the impact of tax incentives on corporate ESG performance. Whether the conclusions drawn from this study are applicable in developed markets remains unknown, providing a potential avenue for future research. Additionally, due to constraints in length, this paper specifically discusses tax incentives related to deferred taxation, inherent to the manufacturing industry. It is important to note that the effectiveness of other types of incentive policies, such as tax rate reductions or tax exemptions, needs further validation and exploration.

AUTHOR CONTRIBUTIONS

Conceptualization: [Chengjie Huang[1]]; Methodology: [Chengjie Huang[1],Hang Zhou[2*]]; Formal analysis and investigation: [Chengjie Huang[1]]; Writing—original draft preparation: [Chengjie Huang[1]]; Writing—review and editing: [Hang Zhou[2*], Wan Ahmad Norhayati[1],Ram Al Jaffri Saad[1]]; Resources: [Chengjie Huang[1],Hang Zhou[2*]];Revision: [Chengjie Huang[1], Wan Ahmad Norhayati[1],Ram Al Jaffri Saad[1],Xinrui Zhang[1]];All authors read and approved the final manuscript.

CONFLICT OF INTEREST STATEMENT

The authors have no relevant financial or non-financial interests to disclose.

DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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APPENDIX: VARIABLE DEFINITION TABLE A

Variables	Definition
ESG	The ESG composite ratings of Chinese listed companies from 2010 to 2021, as published by Bloomberg
Treat×post	Corporates benefiting from tax incentives (TI)
Size	The size of a company is calculated based on the natural logarithm of its total assets at the end of the fiscal year
Lev	The leverage ratio of a company is calculated by taking the natural logarithm of the year-end total liabilities divided by the total assets
ROA	The return on total assets is calculated by dividing the net profit by the average balance of total assets.
Growth	The growth rate of operating revenue is calculated as the current year's operating revenue divided by the previous year's operating revenue, minus 1
Dual	The indicator for the combination of chairman and CEO positions is represented as 1 if the roles of chairman and CEO are held by the same person, and 0 otherwise.
Top1	The shareholding of the largest shareholder is calculated as the number of shares held by the largest shareholder divided by the total number of shares.
Tobin Q	Tobin's Q ratio, the formula you provided calculates the ratio of (market value of outstanding shares + number of non-tradable shares multiplied by net asset value per share + book value of liabilities) to total assets.
List age	The listing age is determined by taking the natural logarithm of the current year minus the year of listing, plus 1.
Opinion	The audit opinion is represented as 1 if the company's financial report for the current year receives a standard audit opinion; otherwise, it is represented as 0.
Zwr	The designation of a company as a high-pollution enterprise is indicated by 1 if it meets the criteria for being classified as such, and 0 otherwise.
SOE	If it is a state-owned enterprise, assign the value 1; otherwise, assign the value 0.
SA	The measurement of financial constraints, SA = -0.737*Size+0.043*Size^2–0.040*Ag
RD	R&D investment/revenue for the year period's depreciation on fixed assets.
GP	The number of green invention patents held by a company.
ROE	The return on equity is calculated by dividing the net profit by the average shareholder's equity balance.
ESG_0	The ESG composite scores of Chinese listed companies from 2010 to 2021, as published by Huazheng ratings.
ESG_1	The ESG composite scores of Chinese listed companies from 2010 to 2021, as published by Huazheng ratings, with a one-period lag.
ESG_2	The ESG composite scores of Chinese listed companies from 2010 to 2021, as published by Huazheng ratings, with a two-period lag
ROA_{t+1}	The lagged one-period total asset turnover ratio
ROE_{t+1}	The lagged one-period return on equity.