

Carbon Trading Policy, Institutional Pressure Heterogeneity, and Enterprise Total Factor Productivity: Empirical Evidence from a Multi-Period Difference-in-Differences Approach

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Abstract: As China advances its green transition, increasing attention has been paid to whether carbon emissions trading policies can improve both environmental performance and economic efficiency. Using panel data for Chinese listed companies from 2010 to 2024, this study applies a multi-period difference-in-differences (DID) model to examine the effect of the carbon emissions trading system on firms' total factor productivity (TFP). The results indicate that the carbon trading policy is associated with a significant increase in enterprise TFP. Further analysis shows that different policy arrangements during quota accounting, quota allocation, and quota trading affect firms in different ways. In particular, baseline-based accounting methods, paid quota allocation, and higher carbon prices are found to have positive effects on TFP. The heterogeneity analysis further suggests that the positive effect of the carbon trading policy is more evident among non-state-owned enterprises and firms outside high-carbon and heavily polluting industries.

Keywords: Carbon emissions trading mechanism; Carbon quotas; Total factor productivity; High-quality development

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1. Introduction

The report of the 20th National Congress of the Communist Party of China emphasized high-quality development and highlighted the importance of improving total factor productivity^[1]. As the main actors in economic activity, enterprises play an important role in promoting high-quality economic development through improvements in total factor productivity. Against the background of increasing environmental pressure and China's "dual carbon" goals, the carbon emissions trading pilot policy was gradually introduced. Due to its flexibility and relatively low emission reduction costs, the carbon emissions trading market has become an important policy tool for addressing climate change and promoting low-carbon development^[2]. In March 2026, the Ecological and Environmental Code of the People's Republic of China officially came into effect, indicating

a further step toward a more standardized and unified national carbon market ^[3]. Improving factor allocation efficiency through institutional reform and promoting coordinated development between green transformation and economic growth have become important goals of China's high-quality economic development ^[4].

Existing studies on carbon emissions trading policies mainly examine their effects on carbon emissions, emission intensity, and firm value. For instance, Zhang *et al.* ^[5] find that the pilot policy is associated with a reduction in carbon emission growth in regulated regions. Zhang *et al.* ^[6] discuss how a nationwide trading system might work under different policy settings. Other work suggests that while carbon trading may improve firms' short-term value, its long-term impact is less clear ^[7]. There is also a line of research focusing on innovation and firm performance ^[8-10], but most of it tends to emphasize emissions reduction or financial outcomes. Compared with these studies, less attention has been paid to productivity measured at the firm level.

This paper tries to look at the issue from a slightly different angle. It uses total factor productivity (TFP) as the main outcome variable to examine firm-level effects of carbon trading. Instead of treating the policy as a single unified mechanism, it separates the quota system into four parts—accounting, allocation, trading, and compliance—and looks at how these different stages may matter for firms. The paper also checks whether the effects differ across firms with different ownership types and pollution levels. Overall, the results provide some additional evidence on how the carbon trading system works at the firm level in China.

2. Theoretical framework and research hypotheses

2.1. Impact of carbon emissions trading policy on enterprise productivity

The carbon emissions trading system may have an impact on firm productivity through several interconnected channels. One basic channel is related to technological change. When firms operate under emission constraints, they are often pushed to adjust how production is organized. This does not happen in a single step. In practice, firms may make a series of gradual changes, such as improving energy use, updating parts of the production process, or shifting internal resources toward more efficient activities. These small adjustments can accumulate over time and may eventually lead to improvements in overall efficiency and productivity.

Another related explanation is that environmental regulation may also influence firms through how they are perceived by outside actors. In a carbon trading system, firms' emissions and compliance behavior become observable signals. Investors, regulators, and other stakeholders may infer a firm's environmental performance from these signals. As a result, firms may feel pressure not only from formal regulation but also from this external visibility.

Under such pressure, some firms may choose to adopt cleaner technologies or modify their production decisions. However, this response is not uniform. For some firms, technological upgrading may mainly be a way to reduce compliance costs, while for others it may also bring additional efficiency gains. The literature often refers to this as a possible "innovation compensation" effect ^[11], although its strength may differ across firms.

At the same time, carbon trading also creates a more direct market-based incentive. Firms that emit less than their quota can sell unused allowances, but the actual benefit they receive is not fixed and depends on market conditions and trading activity. In some cases, this channel may provide extra financial room for firms to invest in improvements, while in other cases, the effect may be limited.

There are also regional differences to consider. Some local governments provide additional support for emission reduction activities, which may ease financial pressure for firms. However, such support is not

uniform across regions, and its influence may vary depending on local implementation.

Based on the above analysis, Hypothesis H1 is proposed: The carbon emissions trading policy improves enterprise total factor productivity.

2.2. Impact of quota institutional pressure on enterprise productivity

The carbon emissions trading policy increases regulatory pressure on enterprises through the entire quota management process—accounting, allocation, trading, and compliance^[12]. For firms covered by the pilot scheme, this means they must meet regulatory requirements at each stage. When regulatory targets are clear, supporting incentives are well in place, and the policy is long-term and stable, these firms are more likely to make proactive adjustments, which in turn can improve production efficiency^[13].

- (1) Government role: The policy constrains firms’ carbon emissions through quota accounting and allocation rules. When firms face quota shortages or surpluses, they can purchase allowances through market transactions to fulfill compliance obligations or sell surplus quotas for additional revenue. Meanwhile, the government establishes clear penalty provisions for non-compliance, thereby increasing the cost of non-compliance^[14].
- (2) Market role: Carbon prices reflect the economic cost of carbon emissions and influence firms’ expected returns from emission reduction investments^[15,16]. When carbon prices are low, firms anticipate limited returns from abatement activities, which weakens firms’ incentives to invest in emission reduction activities. Higher compliance costs and carbon prices may strengthen the Porter effect among regulated firms and encourage firms to adopt low-carbon technologies that improve productivity.

Based on the above analysis, Hypothesis H2 is proposed: The carbon emissions trading policy improves enterprise productivity by increasing regulatory pressure.

Figure 1 summarizes the mechanism through which the carbon trading policy may affect enterprise productivity.

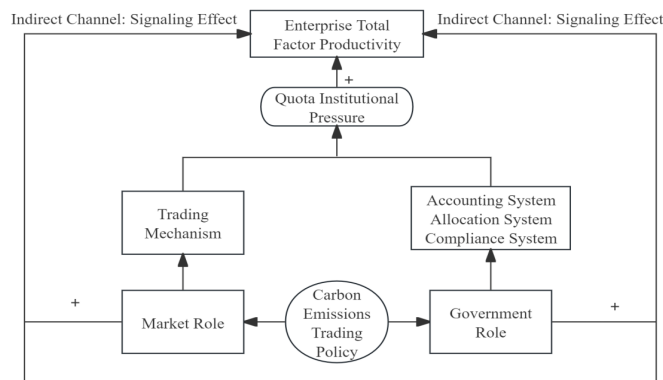


Figure 1. Mechanism diagram

3. Research design

3.1. Sample and data

This study focuses on the eight carbon trading pilot regions that were established earlier in China. The initial

sample consists of all A-share listed companies on the Shanghai and Shenzhen stock exchanges from 2010 to 2024. Information on regulated enterprises and policy rules was manually collected from publicly available information released by the Development and Reform Commissions and Ecology and Environment Bureaus of the respective pilot regions. Firm-level financial data were primarily obtained from the CSMAR database. Before the empirical analysis, the following sample screening procedures were applied: (1) firms with abnormal financial conditions were excluded; (2) exclusion of firms under ST or *ST status in the current year; (3) exclusion of listed financial and insurance companies. After these treatments, the final sample consists of 45,305 firm-year observations.

3.2. Model specification and variable definitions

Given that China’s carbon emissions trading mechanism was implemented through phased regional piloting, this study uses this quasi-natural experiment and applies a multi-period difference-in-differences (DID) model for empirical analysis. The specific model is specified as follows:

$$TFP_{it} = a_0 + a_1CTS_Post_{it} + a_2Controls_{it} + FixedEffects_{it} + \varepsilon_{it} \quad (1)$$

In Equation (1), *i* and *t* denote firm and year, respectively. The dependent variable TFP_{it} is the total factor productivity (TFP) of firm *i* in year *t*. Following Hu *et al.*^[17], this study uses an improved OLS method to estimate firm TFP.

The TFP estimation model is as follows:

$$Y_{it} = \chi_0 + \gamma_1 L_{it} + g_2 K_{it} + g_3 M_{it} + \varepsilon_{it} \quad (2)$$

In Equation (2), *Y* is the natural logarithm of operating revenue of firm *i* in year *t*, *L* is the natural logarithm of the total number of employees, *K* is the natural logarithm of total assets, and *M* is the natural logarithm of intermediate inputs (such as purchases of goods and labor services). The model is estimated separately by year and industry, and the residuals are used as the measure of firm total factor productivity, denoted as TFP.

In Equation (1), *CTS* indicates whether a listed company is a regulated entity in the carbon market. Following the approach of Shen and Huang^[18], this study manually matches the official lists of regulated enterprises in each pilot carbon market with A-share listed companies. If a firm is a regulated entity, *CTS* is assigned a value of 1; otherwise, it is assigned 0 and placed in the control group. The interaction term *CTS_Post* is used to capture the policy effect. It is assigned a value of 1 for regulated firms in the post-pilot period and 0 otherwise.

Controls represents a set of control variables. Following previous studies^[19,20], the following variables are included in Model (1): (1) firm size (*Size*); (2) financial leverage (*Lev*); (3) return on assets (*ROA*). Additional controls include institutional investor ownership (*Inst*), listing age (*ListAge*), CEO-chairman duality (*Dual*), market competition intensity (*HHI*), fixed asset investment (*Fixed*), and financial constraints (*SA index*). All regressions control for year, industry, and city-year fixed effects.

Table 1 reports the descriptive statistics of the main variables.

Table 1. Descriptive statistics

Variable name	Symbol	Observations	Mean	Std. Dev.	Min	Max
Total Factor Productivity	TFP	45305	10.619	1.255	6.128	15.275
Carbon Emissions Trading	CTS_Post	45305	0.359	0.480	0.000	1.000

Firm Size	Size	45305	22.183	1.288	19.525	26.452
Financial Leverage	Lev	45305	0.408	0.205	0.028	0.910
Return on Assets	ROA	45305	0.037	0.063	-0.556	0.222
Institutional Ownership	Inst	45305	0.428	0.250	0.001	0.923
Listing Age	ListAge	45305	1.993	0.960	0.000	3.555
CEO-Chairman Duality	Dual	45305	0.313	0.464	0.000	1.000
Market Competition (HHI)	HHI	45305	0.085	0.093	0.013	0.797
Fixed Asset Investment	Fixed	45305	0.204	0.152	0.001	0.734
Financial Constraints	SA Index	45305	-3.852	0.271	-4.698	-3.030

4. Empirical results

4.1. Baseline regression

This study uses a multi-period DID model to estimate Equation (1), and robust standard errors clustered at the firm level are reported in all regressions. The baseline regression results are shown in **Table 2**. Column (1) includes only fixed effects. The coefficient of the core explanatory variable, CTS_Post, is 0.085 and significantly positive at the 5% level, indicating that the carbon trading policy improves firm productivity. This result is consistent with Hypothesis H1.

Column (2) further adds firm-level control variables. The coefficient of CTS_Post remains significantly positive after controlling for firm characteristics, industry competition, and regional factors. The results suggest that the positive effect of the carbon trading policy on firm productivity is relatively robust.

Table 2. The impact of carbon trading policy on enterprise productivity

Variable	(1)TFP	(2)TFP
CTS_Post	0.085**(0.036)	0.038**(0.017)
Size		0.776***(0.007)
Lev		1.014***(0.041)
ROA		2.831***(0.088)
Inst		0.114***(0.024)
ListAge		0.024***(0.008)
Dual		-0.034***(0.010)
HHI		0.124(0.108)
Fixed		-0.321***(0.052)
SA Index		0.015(0.027)
Constant	10.598***(0.021)	-7.104***(0.185)
Firm/Year/City-Year FE	YES	YES
N	46415	45304
Adj R ²	0.224	0.853

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors clustered at the firm level are reported in parentheses. The same applies below.

4.2. Robustness tests

4.2.1. Parallel trends test

The validity of the DID model depends on the parallel trends assumption. To verify this, the following model is constructed:

$$TFP_{it} = a_0 + \sum_{k=-4}^{-2} a_k CTS_Before_{it}^k + \sum_{k=0}^7 a_k CTS_Post_{it}^k + a_i Controls_{it} + FixedEffects_{it} + \varepsilon_{it} \quad (3)$$

In Equation (3), CTS_Before represents the dummy variables for the pre-policy periods, taking the value of 1 for the k years before firm i was included in the carbon trading pilot, and 0 otherwise. CTS_Post represents the post-policy time dummies, taking the value of 1 for the k years after firm i joined the pilot, and 0 otherwise. The definitions of the remaining variables are consistent with Equation (1).

The year immediately before policy implementation is used as the reference period. As shown in **Figure 2**, prior to the introduction of the carbon emissions trading pilot policy, there were no significant differences in total factor productivity trends between the treatment and control groups, indicating that the parallel trends assumption is satisfied.

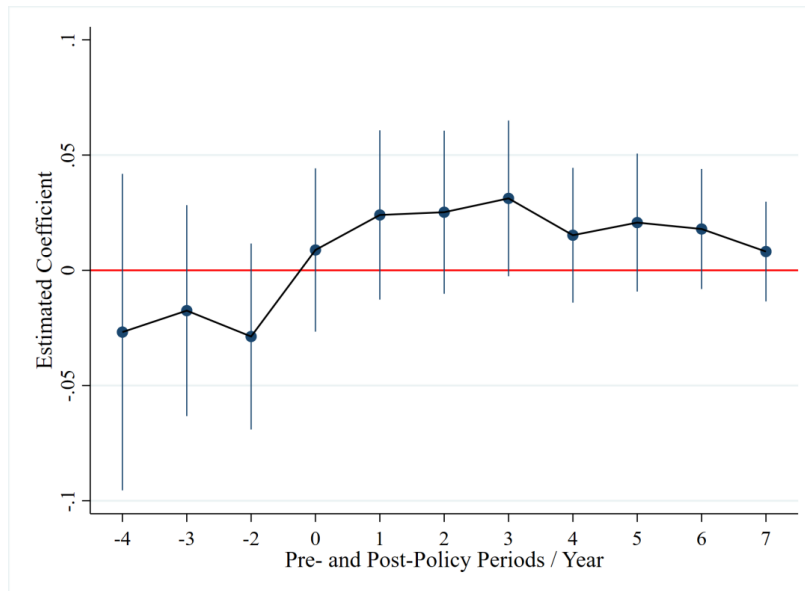


Figure 2. Parallel trends test

4.2.2. Placebo test

To further test the robustness of the results, this study follows Chen ^[21] and conducts 500 placebo regressions using randomly generated treatment variables. Figure 3 shows that the actual treatment effect estimate (represented by the vertical solid line) is located in the far right tail of the placebo distribution, while the placebo coefficients are approximately centered around 0. This result supports the validity of the identification strategy and suggests that the main findings are unlikely to be driven by unobserved factors.

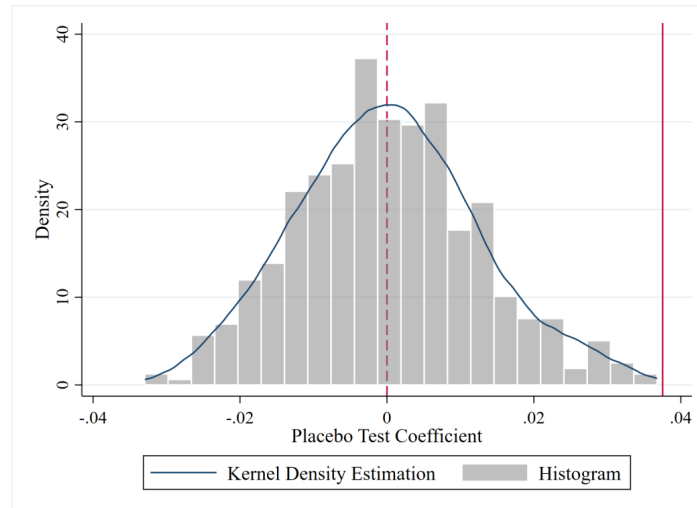


Figure 3. Placebo test

4.2.3. Changing the time window

The regional carbon pilot markets were launched in batches starting in 2013, while the national unified carbon market began trading in 2021. The two systems operated independently during the sample period. To exclude the potential influence of the national carbon market, this study shortens the sample time window to 2020.

4.2.4. Winsorization test

Following Cao and Su ^[22], all continuous variables are winsorized at the 1% and 99% levels to reduce the influence of extreme values. As shown in Column (2) of **Table 3**, the coefficient of CTS_Post remains significantly positive, indicating that the main results remain robust.

4.2.5. Alternative measurement of the dependent variable

Although the improved OLS method is used to estimate firm TFP, potential estimation bias may still exist. Therefore, this study re-estimates TFP using the Levinsohn-Petrin (LP) method. Column (3) of **Table 3** shows that regardless of whether TFP is measured by the OLS or LP method, the carbon emissions trading pilot policy continues to show a significant positive effect on firm TFP.

4.2.6. Controlling for other policy interference

Following the approach of Cao and Qiu ^[12], a dummy variable for the low-carbon city policy (City) is included to control for the potential influence of the low-carbon city policy. City is assigned a value of 1 if the firm's city is included in the low-carbon city pilot and the observation is in the implementation year or thereafter; otherwise, it is assigned 0. The coefficient of CTS_Post increases slightly from 0.038 to 0.040 and remains significantly positive, further supporting the robustness of the main findings.

Table 3. Robustness tests

Variable	Changing time window	Winsorization	Total factor productivity of enterprises: LP method	Excluding low-carbon city policy
	(1)TFP	(2)TFP	(3)TFP	(4)TFP
CTS_Post	0.048***(0.016)	0.034**(0.017)	0.039**(0.017)	0.040**(0.017)
City				-0.021(0.013)
Constant	-7.268***(0.231)	-6.847***(0.181)	-5.485***(0.187)	-7.089***(0.185)
Control Variables	YES	YES	YES	YES
Firm/Year/City-Year FE	YES	YES	YES	YES
<i>N</i>	27433	45304	45304	45304
Adj R ²	0.844	0.856	0.809	0.853

4.2.7. Instrumental variable approach

To further address potential endogeneity concerns, this study follows Cao and Su ^[22] and uses the interaction between the average green coverage rate of built-up areas in pilot cities during 2010–2013 and the year variable as an instrumental variable (IV).

This instrument satisfies both relevance and exogeneity: (1) Relevance: Higher green coverage may reflect stronger local government attention to environmental governance, and may therefore be associated with a greater likelihood of being selected as a carbon trading pilot region. (2) Exogeneity: Urban green space planning is determined at the local government level and is unlikely to be directly related to firms' production decisions and does not directly affect firm productivity. Column (2) of **Table 4** further shows that the carbon emissions trading policy has a significantly positive effect on enterprise productivity.

Table 4. Instrumental variable estimation

Variable	(1) First stage: CTS_Post	(2) Second stage: TFP
IV	0.003***(0.000)	
CTS_Post		0.038**(0.017)
Control Variables	YES	YES
Firm/Year/City-Year FE	YES	YES
<i>N</i>	45011	45304

5. Further analysis

5.1. Mechanism test

The baseline results show that the carbon trading policy seems to improve firm productivity overall. Firms under this system face emission limits and compliance requirements, which naturally create pressure. In response, some firms may adjust production processes, upgrade technology, or reorganize internal resources. These changes are not always systematic, but over time, they may still contribute to productivity improvement.

To further understand the mechanism, it is useful to look at how the carbon trading system is designed in China.

In quota accounting, there are mainly two methods: the historical emission method and the baseline method. The historical method is relatively easy to implement, but it may disadvantage firms that were already efficient in the past, sometimes referred to as “punishing the efficient”^[23]. The baseline method relies more on industry benchmarks and usually imposes stronger emission reduction pressure on firms^[23].

For quota allocation, some firms receive allowances for free, while others need to pay for part of them. When payment is required, firms face higher compliance costs, which may increase their incentive to reduce emissions.

During the trading stage, carbon prices affect how costly emissions are. But firms do not always react in the same way. Some respond quickly, while others adjust more slowly depending on their internal situation and capacity.

At the compliance stage, penalty intensity also matters. If penalties are relatively weak, firms may not feel strong pressure to change behavior. In that case, the policy effect may be limited, as discussed in previous studies^[12].

Based on the above analysis, this study further examines the causal channels through which the carbon trading system affects enterprise productivity. Following existing literature^[12], a regression model is specified as follows:

$$TFP_{it} = a_0 + a_1CTS_Post_{it_L_{it}} + a_2CTS_Post_{it_H_{it}} + a_3Controls_{it} + FixedEffects_{it} + \varepsilon_{it} \quad (4)$$

Equation (4) uses two alternative measures of the main policy variable, CTS_Post_L for low institutional pressure and CTS_Post_H for high pressure. This is intended to check whether the policy effect varies with the strength of institutional constraints. To further explore institutional heterogeneity, the carbon quota system is split into four stages—accounting, allocation, trading, and compliance—and a set of grouping variables is constructed accordingly.

First, for the quota accounting method, CTS_Post_LHis refers to regions using the historical emission approach, while CTS_Post_HBen refers to those using the baseline method. In general, the baseline method is considered more stringent for firms, so it is treated here as a higher-pressure case.

Second, for quota allocation, CTS_Post_LFree refers to regions mainly relying on free allocation, while CTS_Post_HPay captures regions where paid allocation or auctioning is also partially introduced. In practice, Shanghai, Chongqing, Hubei, and Fujian mostly fall into the free allocation group, whereas other pilot regions include different degrees of paid allocation.

Third, for the trading stage, CTS_Post_Hprice and CTS_Post_Lprice are used to distinguish carbon price levels. Firms are assigned to the high-price group if the average carbon price in their pilot region is above the post-policy cross-pilot average; otherwise, they are placed in the low-price group.

Finally, for compliance, CTS_Post_Hpunish and CTS_Post_Lpunish capture differences in penalty intensity. Beijing and Shenzhen are classified as high-penalty regions due to stricter enforcement, while Tianjin, Guangdong, Shanghai, Chongqing, Fujian, and Hubei are treated as relatively low-penalty regions.

Table 5 reports the estimated effects of institutional pressure across the four stages of quota management, including accounting, allocation, trading, and compliance. Overall, the results show that there are differences in how these institutional arrangements affect enterprise productivity. For quota accounting methods, the baseline approach seems to have a relatively stronger effect on improving firm efficiency. Compared with the historical emission method, the baseline-based method may provide stronger incentives for firms to carry out energy-saving and emission-reduction activities in practice. In this sense, part of the efficiency improvement may come

from actual emission reduction behavior ^[24]. At the same time, this method is usually accompanied by stricter compliance requirements, which means firms face more binding institutional constraints ^[23].

Turning to quota allocation methods, the coefficient is not significant under the free allocation regime, but it becomes positive and significant when paid allocation is introduced. This indicates that paid allocation may be more helpful in encouraging productivity improvements. At the trading stage, higher carbon prices are found to be associated with higher productivity. This result is generally in line with expectations and can also be seen in **Table 5**. One simple interpretation is that higher carbon prices increase the cost of emissions, so firms may feel stronger pressure to adjust their production and reduce emissions, which could in turn support efficiency improvements. For compliance enforcement, the results show no significant difference between high and low penalty regions. This suggests that penalty intensity alone may not have a clear effect on productivity.

A possible reason is that the carbon market in China is still evolving. In some regions with relatively low penalties, enforcement may not be strong enough to create real pressure. In other regions with higher penalties, implementation may not fully match the formal policy design, due to differences in local enforcement capacity and execution details. As a result, the overall effect of penalty differences is not very obvious.

Table 5. Mechanism analysis

Variable	Accounting	Allocation	Trading	Compliance
	(1)TFP	(2)TFP	(3)TFP	(4)TFP
CTS_Post_LHis	0.026(0.018)			
CTS_Post_HBen	0.061*(0.036)			
CTS_Post_LFree		0.017(0.025)		
CTS_Post_HPay		0.048**(0.021)		
CTS_Post_Lprice			0.012(0.021)	
CTS_Post_Hprice			0.045**(0.018)	
CTS_Post_Lpunish				0.025(0.019)
CTS_Post_Hpunish				0.010(0.024)
Constant	-7.142***(0.186)	-7.148***(0.186)	-7.142***(0.186)	-7.143***(0.186)
Firm/Year/City-Year FE	YES	YES	YES	YES
N	45304	45304	45304	45304
Adj R ²	0.851	0.851	0.851	0.851

5.2. Heterogeneity analysis

Although this study has demonstrated the effectiveness of the pilot policy for carbon emissions trading, it remains unclear whether different types of enterprises respond to this policy in distinct ways. Consequently, this study further investigates the issue of heterogeneity from two perspectives: ownership structure and pollution intensity, specifically, differences in ownership structure and differences in the intensity of pollution emissions.

5.2.1. Ownership heterogeneity

Existing studies suggest that environmental regulation may have different effects on state-owned and non-state-owned enterprises. Based on this, the sample is divided into SOEs and non-SOEs, and the model is estimated separately for the two groups. The results show that the carbon emissions trading policy does not have a statistically significant effect on SOEs, but it has a positive and significant effect on non-SOEs. One possible

reason is that SOEs are not mainly driven by profit maximization. Their response to environmental regulation may therefore be weaker or slower. For non-SOEs, the situation is different. They face stronger financial pressure, so increases in compliance costs are more likely to affect their behavior directly. In response, they may invest more in cleaner technologies and try to improve production efficiency^[25]. In addition, non-SOEs are usually more flexible in their operations. When facing environmental pressure, they can adjust inputs and production decisions more quickly, which may help improve efficiency to some extent^[26].

5.2.2. Pollution intensity heterogeneity

High-carbon, heavily polluting industries are the main regulated sectors under the carbon emissions trading policy. Referring to Tang’s research^[27], the sample is divided into high-carbon heavily polluting firms and non-high-carbon heavily polluting firms based on their pollution intensity. The results in Columns (3) and (4) of **Table 6** show that the policy has a significantly positive effect on non-high-carbon heavily polluting firms, while no significant effect is found for high-carbon heavily polluting firms. Overall, the effect seems to be stronger for less carbon-intensive firms.

A possible reason is that high-carbon industries already face relatively high production and environmental costs. In these sectors, a large part of resources may be used for emission control, and this could limit other types of investment, including productivity-related activities. But this is not always very clear in practice, and the effect may vary across firms. For non-high-carbon, heavily polluting firms, production costs are relatively lower. They may therefore have more room to adjust their production process or invest in efficiency-related improvements. This could be one reason why productivity gains are more visible in these firms^[28].

Table 6. Heterogeneity analysis

Variable	(1)	(2)	(3)	(4)
	SOEs	Non-SOEs	High-carbon polluting	Non-high-carbon polluting
CTS_Post	-0.006 (0.026)	0.076*** (0.022)	-0.038 (0.042)	0.055*** (0.019)
Constant	-7.173*** (0.405)	-7.152*** (0.195)	-6.970*** (0.530)	-7.105*** (0.195)
Control Variables	YES	YES	YES	YES
Firm/Year/City-Year FE	YES	YES	YES	YES
<i>N</i>	14475	30827	7316	37988
Adj R ²	0.857	0.833	0.864	0.851

6. Conclusion and policy implications

This paper uses data from A-share listed firms between 2010 and 2024 and a DID approach to look at the effect of China’s carbon emissions trading pilot on firm productivity. The results suggest that the policy does improve productivity on average, but this effect is not very uniform. It really depends on how the quota system is designed in different places and at different stages, including accounting, allocation, trading, and compliance.

In general, stricter settings like baseline-based accounting, paid allocation, and higher carbon prices tend to be linked with better productivity outcomes. But it is probably not the same mechanism in every case, and firms may respond in different ways. The results also show differences between firms. Non-state-owned firms and

less polluting industries respond more strongly, while state-owned firms and high-polluting firms do not show the same pattern. This may just reflect that different firms face different constraints or react differently when pressure increases.

For policy, the main message is not really that “everything should be tightened,” but more that design matters. Some parts of the system could move toward baseline accounting and more paid allocation, but this probably needs to happen slowly rather than all at once. Carbon prices are also important, but when prices move too much, firms may not respond smoothly. Some basic stabilizing mechanism might help, although how exactly to do that is not very clear. Information disclosure still matters, especially if data quality is improved, but again, the effect likely depends on how it is implemented locally. Overall, the carbon market seems to work, but more in a mixed and uneven way rather than through a single clear channel.

Disclosure statement

The author declares no conflict of interest.

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