

A Study on the Impact of Low Carbon Transition on Green Performance of Industrial Enterprises Quasi-natural experiments based on "low carbon city pilot"

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Abstract. The current environmental situation in China is severe, low-carbon transformation is imminent, and the government implements the low-carbon city pilot policy to promote greening of economic and social development. To further improve this environmental policy, a multi-period double difference model is used to investigate in depth the impact of the low-carbon city pilot policy on the green performance of enterprises based on panel data of industrial listed enterprises in China from 2010-2021, using the implementation of the low-carbon city pilot policy as a quasi-natural experiment. It is found that the low-carbon city pilot policy significantly reduces the green performance of industrial firms within the pilot city, and the propensity score matching-double difference (PSM-DID) model estimation results are consistent with the findings of the multi-period DID model, and the above results are robust. In view of this, the government should control the intensity and manner of policy implementation, and implement the low-carbon city pilot policy in a gradual and localized manner.

Keywords: low carbon city pilot policy, corporate green performance, multi-period double difference.

1. Introduction

The 20th Party Congress report proposed that "promoting green and low-carbon economic and social development is a key link to achieving high-quality development." China's environmental performance index ranks 120th out of 180 countries and regions included in the Global Environmental Performance Index 2020 report, and there is an urgent need to find a solution to accelerate the green and low-carbon transformation of the economy and society. In order to achieve the unification of economic and social development and ecological environmental protection, the government first launched the low-carbon city pilot policy in 2010 and announced the first batch of low-carbon pilot cities, and launched the second and third batches of low-carbon pilot cities successively in 2012 and 2017, with the policy's influence gradually expanding, and as of 2021, a total of 81 cities in six provinces and regions have been included in the low-carbon city pilot list [1]. However, the response of enterprises, especially industrial manufacturing enterprises, as important economic agents in pollution generation and prevention, in the face of the low-carbon city pilot policy is pivotal to the actual implementation effect of the policy. Therefore, it is important to explore the policy effects of low carbon city construction by taking micro industrial enterprises as the landing point for further improving this environmental policy.

Current studies on the effects of low-carbon pilot policy implementation have focused on the macro-city level and meso-industry level, with little literature analyzing from the micro-firm perspective. City level: Cheng et al. (2019) argue that the low-carbon city pilot policy has an economy-of-scale effect on the development level of cities, and this effect varies by region. [2] The implementation of this policy can not only significantly improve the total factor energy efficiency and productivity level of cities, but also promote the upgrading of the local industrial structure of low-carbon city construction and improve the quality of FBI, thus realizing the green transformation of urban economic development. [3-5] In addition, Wang Qiao and She Shuo (2020) used an asymptotic double difference model to verify that low-carbon city pilot policies significantly accelerate green growth in pilot cities and promote the improvement of urban ecological environment.

[6] Gehrsitz (2017) found that low-carbon pilot zone policies reduced the level of fine particulate matter in local air and significantly improved air quality. [7] Corporate level: scholars have mostly studied the innovation, economic, and environmental dimensions. Xu Jia and Cui Jingbo (2020) argued that low-carbon policies promoted corporate technological innovation. [8] Xiong Guangqin et al. (2020) assessed the impact of low-carbon city construction on green technological innovation of high-carbon emission enterprises using the triple difference method. [9] Zhao Zhenzhi et al. (2021) found that the policy can improve the total factor productivity of firms, but significantly reduces the total factor productivity of firms in high carbon emission industries. [10] Using a double difference model consideration, Wang Zhi et al. (2023) found that the low-carbon pilot policy could improve the ESG performance of enterprises, especially state-owned enterprises and heavy polluting enterprises.[11]

Low carbon pilot policy is considered as a comprehensive environmental regulation policy, and its effective evaluation is a hot topic of current research, and the effectiveness of this policy is reflected in whether it can promote green development. At present, there is no clear definition of the concept of green development. Hou Weili (2004) first elaborated the concept of green development in his article "Research on Green Development in China in the 20th Century": to replace natural and environmental capital with human-created capital to the maximum extent possible, and to achieve economic growth with the lowest material and energy consumption. [12] Kong Lingying et al. (2022) argued that the connotation of green performance has not been unified, but it can be described in three aspects: green characteristics, green behaviors, and green results.[13]

There are currently the following views on the impact of environmental regulation policy on the green performance of enterprises: first, environmental regulation policy will enhance the green performance of enterprises, and Wang Lixia et al. (2018) argue that environmental regulation policy can significantly improve the green development performance of enterprises through energy intensity.[14] Abrell and Rausch argue that the strict implementation of environmental regulation policy can reduce costs, by promoting green innovation of enterprises, and The effect of strict environmental regulation policies can reduce costs and increase firms' revenue by promoting green innovation, which in turn can contribute to firms' green development. [15] Second, environmental regulation policies can inhibit firms' green performance. Scholars who hold this view argue that under the pressure of government environmental regulation, firms' costs will increase, productivity will decrease, and it will lead to a lack of capital to invest in other profitable projects, resulting in potential profit loss, thus inhibiting firms' green performance. [16] Thus, the findings on the impact of environmental regulation policies on firms' green performance are not uniform and need to be further verified.

The above-mentioned studies by domestic and foreign scholars provide useful references for understanding the implementation effects of low-carbon city pilot policy. At present, scholars have mostly explored the effects of low-carbon city pilot policy at the city level, while fewer studies have been conducted at the firm level, and most of them have focused on examining the effects of policies on indicators such as technological innovation and total factor productivity of firms, without considering the dimension of achieving green transformation of firms in the context of the current Chinese situation. In addition, there is no unified view on the impact of environmental regulation policies on the green performance of enterprises, and there are few papers which start from the low-carbon pilot policy as an environmental regulation policy and integrate the low-carbon city pilot policy and green performance into a unified framework. In the context of low-carbon green transformation of China's economy, it is important to explore the impact of low-carbon city pilot policies on firms' green performance. Taking the green development of micro enterprises as the landing point, this paper selects a multi-period double difference model to test the impact of low-carbon city pilot policies on the green development performance of enterprises based on the panel data of industrial listed companies in China from 2010-2021, with a view to making suggestions for further improving low-carbon pilot policies.

2. Theoretical analysis and research hypothesis

On the one hand, policy regulation is an important institutional guarantee to solve environmental pollution problems, and when there is a market failure, the government needs to curb corporate pollution behavior through a coercive system to induce enterprises to improve their green performance. [17] Low-carbon city pilot policy is a kind of environmental regulation policy, and there are few and unified studies on the policy effects of low-carbon pilot policy on micro-firm level in China, so it is very necessary to analyze and further explore it in depth.

First, the construction of low-carbon cities can accelerate the green technological innovation of industrial enterprises, which in turn can promote the development of green performance. The Porter hypothesis argues that appropriate environmental regulation can increase firms' innovation activities and thus have an impact on their competitiveness. [18] Subsequently, a large number of studies have continued to enrich the findings of Porter's hypothesis, and Xu Jia and Cui Jingbo (2020) demonstrate that low-carbon city pilot policies can induce green technological innovation at the overall firm level to a certain extent. [8] Hu Qiguang et al. (2022) confirmed from a value chain perspective that the implementation of low-carbon city pilot policies effectively promoted the efficiency of green technological innovation at two stages: green science and technology research and development and green results transformation. [19] According to the theory of technological innovation proposed by Schumpeter, it is known that technological innovation is the core driving force of enterprise's development, especially the innovation of green technology. Kaijie Li et al. (2020) found that green technological innovation can improve the environmental performance of enterprises. [20] Therefore, low-carbon pilot policies provide multifaceted support for green technological innovation and reduce the innovation risk of enterprises, While the results of green technological innovation can improve the economic efficiency of enterprises, inject vitality and strength into the development of enterprises, and accelerate the green and low-carbon transformation of enterprises.[21]

Secondly, under the low-carbon pilot policy of "adjusting industrial structure, optimizing energy structure, and reducing energy consumption", local governments in the pilot areas require industrial enterprises, which are the main emitters, to take measures to reduce pollution, which is conducive to enterprises' fulfillment of their social responsibility and improve their ESG performance, thus promoting their green development. [11] The fulfillment of social responsibility can improve the reputation of enterprises, and Sun Junhua et al. (2009) suggest that a good reputation can help enterprises obtain social capital by sending "signals". [21] The government, as one of the stakeholders, will be more inclined to invest resources in the enterprise after receiving a good signal from the enterprise, thus improving the performance of the enterprise and realizing the benign cooperation between the government and the enterprise. Therefore, this environmental regulation system will promote enterprises to take actions to improve their environmental performance, establish the concept of sustainable development, enhance their sustainable development performance, and achieve green development. Based on the above analysis, this paper proposes that:

H1: Low carbon pilot policy has a positive contribution to the green performance of industrial enterprises.

On the other hand, different types of policy instruments have different impacts on the green performance of enterprises. Some studies have shown that command-based environmental regulation instruments significantly promote the green development of enterprises, and voluntary environmental regulation instruments inhibit the green development of enterprises. [22] As a comprehensive environmental regulation policy that combines the characteristics of command-based tools, market-based tools and voluntary tools, the low-carbon city pilot policy is still in the exploration stage. The policy has weak constraint and weak incentive, and the national level does not set corresponding goals, but relies on local governments to implement corresponding measures to promote low-carbon work according to local conditions. [8] Therefore, it remains to be verified whether the pilot low-carbon city policy can effectively promote the green and low-carbon development of enterprises.

The effect of low-carbon pilot city policies at the micro-enterprise level needs to be implemented for a period of time before it can be seen. In the short term, enterprises will increase their initial

investment in order to reduce their own pollution emissions leading to a shortage of funds and intensifying their short-sighted behavior. Tian Shuying et al. (2022) argue that the development of a low-carbon economy by enterprises will increase technological innovation investment and increase environmental costs, while higher costs will raise the threshold for enterprises to participate in low-carbon green development. [1] Wang, Zhi et al. (2023) tested that when financial risks are high, firms are more willing to invest in projects with short-term obtainable returns rather than environmental governance investment projects with insufficient economic benefits, and firms have insufficient incentives to invest in environmental governance. [11] Therefore, under the pressure of environmental regulation policies, financial constraints, and financial risks, enterprises can hardly bear the environmental protection costs of low-carbon development and tend to reduce R&D investment to ensure profits, then environmental regulation cannot promote green technological progress, resulting in poor performance of green development. In addition, Wang, Lixia et al. (2017) found that environmental regulation policy has an inverted "U" shape effect on the green development performance of enterprises, and when the intensity of environmental regulation exceeds a certain value, environmental regulation policy has a negative inhibitory effect on the green development performance of enterprises. [14] Therefore, the policy effect of low-carbon city construction may be at the stage of inhibiting the green performance of enterprises. Based on the analysis of related literature, this paper proposes that:

H2: Low carbon pilot policy has a negative inhibitory effect on the green performance of industrial firms.

3. Study Design

3.1. Sample selection and data sources

This paper takes industrial listed companies in China from 2010-2021 as the research sample. Industrial enterprises are classified according to the industry classification in the National Economic Classification of Industries revised in 2017, and 4080 observations are finally obtained after deleting the missing data and data abnormal samples, deleting the delisted samples, and deleting the listed samples after 2010. All the data in this paper are obtained from the Cathay Capital database (CSMAR), in which the missing data in the green performance section are collected and compiled manually from the annual reports of enterprises. The measurement software used for data analysis is Stata17.

3.2. Model Setting and Variable Definition

3.2.1. Model Setting

In this paper, we refer to Jia Xu and Jingbo Cui (2020) to verify the impact of low-carbon city pilot policy on firms' green performance, and use a multi-period did method to develop the study and construct the model as follows:

$$GTE_{it} = \beta_0 + \beta_1 Pilot_i * Post_t + \rho X_{it} + \delta_t + \mu_i + \varepsilon_{it} \quad (1)$$

Where GTE_{it} denotes the green performance of industrial listed company i in year t . $Pilot_i$ is a policy dummy variable, set as the experimental group if the firm's registered location is in one of the announced pilot regions, when $Pilot_i$ takes the value of 1, otherwise it takes the value of 0. $Post_t$ is a time dummy variable, if the year of observation is in the year after the policy shock then $Post_t$ takes the value of 1 if the year of the observation is after the year of the policy shock, otherwise it takes the value of 0. X_{it} is the selected set of control variables, and ε_{it} is the random disturbance term, in addition, this paper also controls for time fixed effects δ_t and individual fixed effects μ_i . In addition, we control for time fixed effects and individual fixed effects.

3.2.2. Variable Definition

(1) Explained variables

In this paper, green performance (GTE) is chosen as the explanatory variable. As the indicators related to green development of micro enterprises are not easily available, and there are large missing data and ununified metrics. This paper draws on Kedi Wang (2020) to measure the green performance of enterprises in terms of their environmental capital expenditure. At the same time, environmental capital expenditure is standardized using the amount of total assets of enterprises, and because environmental capital expenditure accounts for a relatively small amount of total assets, the standardized data is multiplied by 10000 and then taken as the logarithm to obtain the green performance metrics of enterprises in order to avoid small values.

(2) Core explanatory variables

The core explanatory variable in this paper is the implementation of low-carbon pilot policy. $Pilot_i * Post_t$ A dummy variable reflecting whether a low-carbon city pilot was implemented in year t in the city where firm i is located. Referring to the study of Xu Jia and Cui Jingbo (2020), the first batch of pilot cities announced in 2010 are incorporated into 2012 when the pilot scope is expanded, and 2012 and 2017 are taken as the time nodes of low-carbon pilot policy implementation because 2010 is the early stage of policy implementation and there may be problems such as insufficient implementation and low impact.

(3) Control variables

Drawing on relevant literature, seven firm-level indicators of corporate debt, market capitalization, corporate growth, return on assets, proportion of fixed assets, percentage of independent directors, and shareholding ratio of the largest shareholder are selected as control variables in this paper, along with two city-level indicators of regional GDP and industrial structure, while controlling for time fixed effects, individual fixed effects, and random disturbance terms.

Table 1. Variable definitions and descriptions

Variable Type	Variable Name	Variable Symbols	Variable Description
Explained variables	Green Performance	GTE	Corporate environmental capital expenditure/total assets*10000
		lnGTE	Corporate environmental capital expenditure / total assets * 10000 taken as logarithm
Core explanatory variables	Low Carbon Pilot Policy	Pilot*Post	The city where the enterprise is located becomes a pilot city in the period, "Yes" takes 1, "No" takes 0
Control variables	Corporate Liabilities	Debts	Liabilities / Total Assets
	Corporate Market Capitalization	TobinQ	Market value / total assets
	Business Growth	Growth	Growth in total corporate assets
	Return on Assets	ROA	Net profit/total assets
	Percentage of fixed assets	Fixed	Fixed Assets / Business Assets
	Percentage of independent directors	Indboard	Number of independent directors as a percentage of the total number of board of directors
	Percentage of shareholding of the largest shareholder	Top1	Top1 Shareholding of the first largest shareholder as a percentage of total share capital
	Gross Regional Product	LnGDP	City GDP Logged
	Industry Structure	Industry	Share of secondary sector in GDP at city level

4. Empirical analysis

4.1. Descriptive Statistics

Table 2 shows the descriptive statistics of the main variables in this paper. It can be seen that the mean value of green performance of industrial listed companies during the sample period is 15.915, the standard deviation is 99.516, the maximum value is 4815.488, and the minimum value is -0.371, which indicates that there is a large difference in green performance among enterprises from 2010 to 2021. In terms of other variables, the descriptive statistics of variables such as corporate debt, corporate market capitalization, and corporate growth are within the normal range, similar to the relevant literature.

Table 2. Descriptive statistics of the main variables

Variables	Observations	Average value	Standard deviation	Minimum value	Maximum value
GTE	4,080.000	15.915	99.516	-0.371	4,815.488
LnGTE	4,078.000	1.387	1.632	-8.774	8.480
Debts	4,080.000	0.476	0.221	0.008	3.087
TobinQ	4,080.000	1.734	1.466	0.000	26.635
Growth	4,080.000	0.124	0.354	-0.972	8.538
ROA	4,080.000	-0.007	1.615	-72.146	16.889
Fixed	4,080.000	0.307	0.170	0.000	0.902
Indboard	4,080.000	37.111	5.285	18.180	75.000
Top1	4,080.000	37.973	15.473	2.100	89.990
LnGDP	4,080.000	10.293	0.819	6.229	11.731
Industry	4,080.000	43.943	8.137	15.800	59.000

4.2. Baseline regression

The results of the baseline regression are shown in Table 3. Column (1) controls for Pilot*Post, time fixed effects, and individual fixed effects, where the coefficient of Pilot*Post is -0.172 and is significantly negative at the 5% level. Column (2) controls for all variables, and the coefficient of Pilot*Post in this column is -0.261 and significantly negative at the 1% level, indicating that the green performance of firms in low-carbon pilot cities is reduced by 26.1% on average compared to firms not in low-carbon pilot cities, and hypothesis H2 is verified.

Table 3. Baseline regression results

Variables	(1)	(2)
	LnGTE	LnGTE
Pilot*Post	-0.172** (0.078)	-0.261*** (0.078)
Top1		-0.003 (0.002)
Indboard		-0.002 (0.005)
Debts		0.042 (0.130)
LnGDP		0.965*** (0.235)
Industry		0.026** (0.010)
TobinQ		0.067*** (0.016)
Growth		-0.190*** (0.053)
Fixed		0.436** (0.181)
ROA		-0.003 (0.011)
Constant term	1.716*** (0.060)	-8.988*** (2.080)
Time fixed effects	YES	YES
Individual fixed effects	YES	YES
Observations	4,078	4,078
R2	0.042	0.066
Number of companies	340	340

Note: *, ** and *** indicate significance levels of 10%, 5% and 1%, respectively.

4.3. Robustness tests

4.3.1. Equilibrium trend test

An important prerequisite assumption of the multi-period DID model is that the experimental and control groups satisfy the equilibrium trend. As shown in Figure 1, there is no significant difference between the green performance of the experimental group and the control group before the implementation of the low-carbon pilot policy, and after the implementation of the low-carbon pilot policy, the green performance of the two groups begins to show significant differences and the policy effect gradually appears, which satisfies the hypothesis of parallel trend and proves that the above test results are stable. In addition, the coefficient of the policy effect in the second year of the low carbon city pilot started to be significant and gradually moved away from the "0" axis, indicating that there may be a one-year lag in the impact of the low carbon city pilot on the green performance of industrial enterprises.

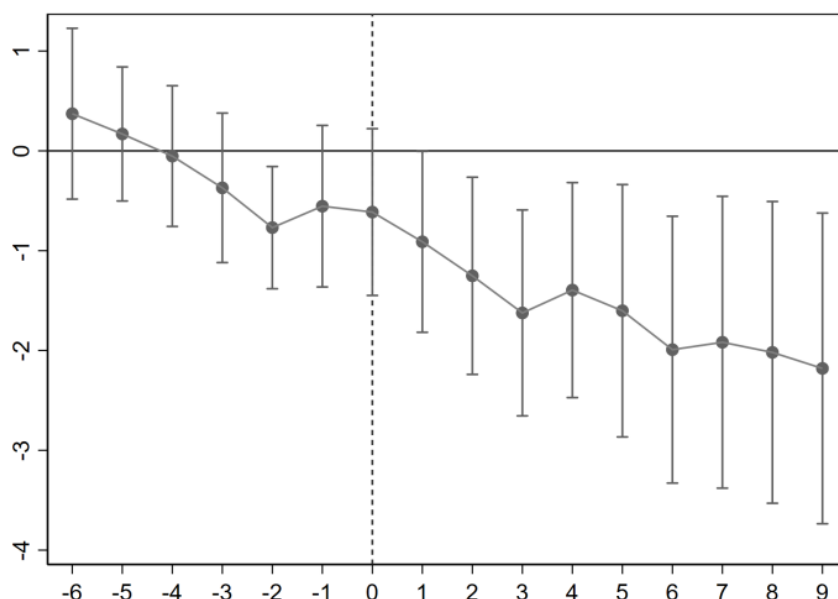


Figure 1. Parallel trend test

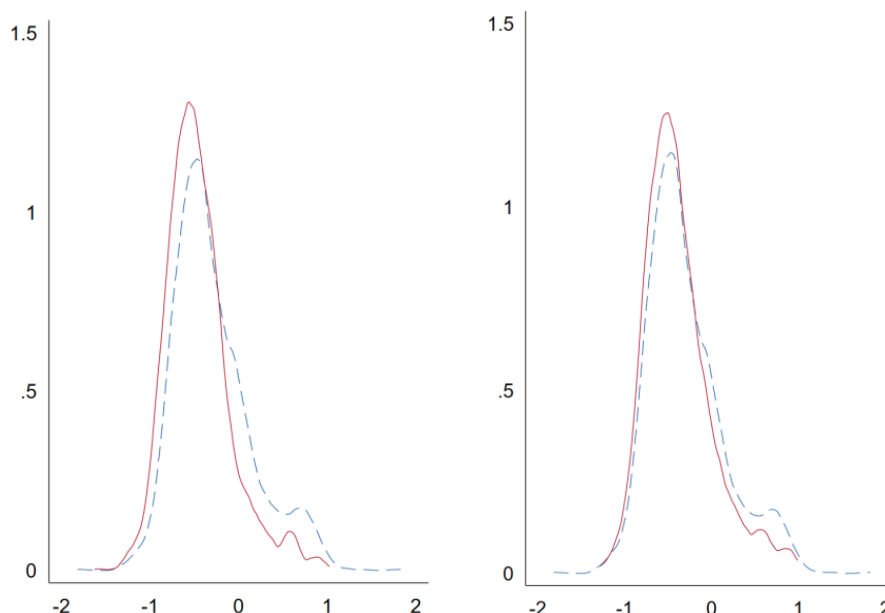
4.3.2. Based on PSM-DID regression analysis

In order to eliminate the possible selectivity bias brought by the DID model, this paper chooses PSM-DID to study the impact of low carbon pilot policy on the green performance of industrial enterprises to ensure the robustness of the above results. Firstly, the propensity score matching between the experimental group and the control group was performed with the above control variables, and then the results were double-differenced. Table 4 shows the propensity score values and the degree of deviation of each variable before and after PSM matching; before matching, some of the variables are significantly different, and after conducting propensity score matching, all variables are not significantly different, which proves that this matching process is effective.

Table 4. Comparison of sample characteristics before and after PSM matching

Variables	U (unmatched)	Mean		%bias	%reductbias	t-test		V(T)/V(C)
	M (Matching)	Treated	Control			t	p>t	
Pilot*Post	U	1.2921	1.4514	-9.8		-3.06	0.002	0.84*
	M	1.2985	1.2736	1.5	84.4	0.43	0.666	0.77*
Top1	U	38.563	37.582	6.4		1.99	0.047	0.94
	M	8.586	39.6	-6.6	-3.4	-1.84	0.067	0.85*
Indboard	U	37.07	37.142	-1.4		-0.43	0.669	0.88*
	M	37.066	37.254	-3.6	-160.7	-1.00	0.317	0.80*
Debts	U	.47612	.47605	0.0		0.01	0.991	0.95
	M	.47599	.48185	-2.7	-7630.7	-0.78	0.438	1.02
LnGDP	U	10.221	10.343	-14.5		-4.67	0.000	1.71*
	M	10.224	10.26	-4.3	70.6	-1.22	0.223	1.63*
Industry	U	42.425	44.984	-31.3		-9.98	0.000	1.45*
	M	42.484	42.477	0.1	99.7	0.02	0.982	1.01
TobinQ	U	1.6967	1.7599	-4.4		-1.35	0.176	0.70*
	M	1.688	1.651	2.6	41.6	0.85	0.395	1.12*
Growth	U	.14102	.11271	7.6		2.51	0.012	2.83*
	M	.1337	.1399	-1.7	78.1	-0.50	0.616	1.65*
Fixed	U	.28947	.31878	-17.3		-5.41	0.000	1.00
	M	.28996	.28778	1.3	92.6	0.37	0.708	1.06
ROA	U	.01431	-.02152	2.4		0.70	0.487	0.11*
	M	.01512	.03826	-1.5	35.4	-0.65	0.514	0.27*

Figure 2 shows the kernel density plot of propensity matching score values, and it can be seen that the difference between the experimental group and the control group before matching is significantly larger than the difference after matching, and after matching, the probability density of propensity score values of the two groups is more similar.



(The vertical axis is 'kernel density'; The horizontal axis represents the "propensity score value")

Figure 2. Propensity score density function

Table 5. PSM-DID regression results

Variables	(1)	(2)
	LnGTE	LnGTE
Pilot*Post	-0.164** (0.078)	-0.251*** (0.078)
Top1		-0.003 (0.002)
Indboard		-0.003 (0.005)
Debts		0.036 (0.130)
LnGDP		0.963*** (0.235)
Industry		0.026*** (0.010)
TobinQ		0.069*** (0.016)
Growth		-0.188*** (0.058)
Fixed		0.457** (0.182)
ROA		-0.003 (0.011)
Time fixed effects	YES	YES
Individual fixed effects	YES	YES
Constant term	2.922*** (0.324)	-7.770*** (2.059)
Observed value	4,071	4,071
R2	0.584	0.594

Table 5 shows the results of the PSM-DID-based regressions of the effects of low-carbon city pilot policy on firms' green performance. Column (1) shows the regression results with the inclusion of only time fixed effects and individual fixed effects. Column (2) adds control variables, individual fixed effects and time-fixed effects at the same time, and the regression result coefficient is -0.251, which is significantly negative at the 10% level. This is consistent with the regression results of applying the multi-period DID model described above.

4.3.3. Change the setting of low-carbon city pilot policy

Since the first batch of pilot cities may be selected from the regions with more developed economic levels, and this paper only considers the time interval of 2010-2021, the green performance of the first batch of pilot cities before the occurrence of the policy was not observed, so the consideration is given to exclude the sample of five provinces as well as eight cities from the batch, and only the second and third batches of announced low-carbon pilot cities are considered. The regression results are shown in Table 6, with a coefficient of -0.369, which is significantly positive at the 1% level, and the study findings remain robust.

Table 6. Change low carbon pilot policy setting

Variables	(1)
	LnGTE
Pilot*Post	-0.369*** (0.092)
Constant	-10.433*** (2.596)
Control variables	Control
Observed value	3,430
R2	0.591
Time fixed effects	YES
Individual fixed effects	YES

5. Conclusions and Policy Recommendations

This paper empirically investigates the relationship between low-carbon city pilot policy and green performance of industrial enterprises using a multi-period did method with a sample of 340 listed enterprises from 2010-2021, and uses the implementation of low-carbon city pilot policies as a quasi-natural experiment. The results show that the low-carbon city pilot policy does not significantly increase the investment in environmental protection of industrial enterprises, but decreases their investment and reduces their green performance.

After the robustness test of PSM-DID regression analysis, the conclusion is still valid, indicating that the implementation of the pilot policy of low-carbon cities has a negative effect on the green performance of industrial enterprises.

Based on the above findings, the following recommendations are made to better promote the implementation of the low-carbon city pilot policy and accelerate the pace of green energy-saving transformation and upgrading of enterprises:

Firstly, step by step, take actions that suit local circumstances. The cities in each region of China have obvious differences and very different development situations. Therefore, in the process of formulating low-carbon policies, the government should fully consider the characteristics of cities and the development of industrial enterprises in each region, combine with the actual situation, innovatively and flexibly set differentiated indicators, and systematically promote the implementation of national low-carbon policies. And find the right city positioning, comprehensive consideration of economic, energy, carbon emissions and other factors, timely research and development of appropriate environmental regulatory policies to promote the transformation of enterprises to green low-carbon development.

Secondly, control the intensity and manner of implementing low-carbon pilot policies. Different types of policy tools have different effects, and low-carbon pilot policies, as comprehensive environmental pilot policies, should be implemented by the government in combination with the characteristics of each tool and optimize the path of tool selection when applying them. Appropriately increase command-based policies and develop a sound legal system for resource and environmental protection, while play the role of market-based policies to motivate industrial enterprises to actively and positively engage in green innovation through prices, taxes. With a reasonable intensity of policy implementation, we can further promote the low carbonization of enterprises and achieve a "win-win" situation for both the economy and the environment.

Thirdly, the government and enterprises should realize healthy cooperation and effective communication. The implementation of low-carbon policies should combine government leadership and enterprise implementation. Government departments should attach great importance to the reasonable demands and suggestions of enterprises, and enterprises should take the initiative to take measures to implement energy saving and emission reduction. At the same time, the government and enterprises should strengthen communication, jointly explore the pilot of low-carbon policy, create a new model of "environmental governance + enterprise development", and realize the positive interaction between energy saving and emission reduction and enterprise development, and realize the positive interaction between the mutual promotion of energy saving and emission reduction and government work.

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