

Research on the Impact of Green Credit Policy on Green Technology Innovation of Listed Enterprises in Strategic Emerging Industries

Shibo Wang*

School of Finance, Anhui University of Finance and Economics, Bengbu, China

*Corresponding author: Shibo Wang (Email: wsb0511@126.com)

Abstract: Green finance is essential to achieve the goal of "Emission peak and Carbon neutrality" and high-quality economic development. In the context of the "Dual Carbon" target, this paper examines the impact of the implementation of the "Green Credit Guidelines" on the green technology innovation of listed companies in strategic emerging industries using the Difference-in-Differences (DID) model. We find that the implementation of green credit policy has a significant effect on the "width" and "depth" of green innovation of listed enterprises in strategic emerging industries. After a series of robustness checks, the results still hold. The heterogeneity analysis shows that the implementation of green credit policy has a stronger incentive effect on green innovation of non-polluting enterprises than that of heavily polluting enterprises, and that the intensity of the incentive effect of green credit policy on green innovation shows a decreasing phenomenon of "high middle and low" in the Eastern, Middle and Western regions. The results of the study are important for the improvement of the green financial policy system and the development of green technology innovation.

Keywords: Green finance, Green credit policy, Strategic emerging industries, Green technology innovation.

1. Introductory

In September 2020, President Xi proposed a "emission peak" and "carbon neutrality" target. Against the backdrop of the problematic global environmental situation, the "dual carbon" target highlights China's determination to achieve green and low-carbon economic transformation, sustainable development and high-quality growth. The report of the 20th National Congress of the CPC further proposes to synergize carbon reduction, pollution reduction, green expansion and growth, promote ecological priority, green and low-carbon development, and actively and steadily push forward carbon peaking and carbon neutrality. Green finance is an important policy tool for environmental governance, with both "green" and "financial" attributes [1]. Achieving the goal of "dual carbon" requires not only the government-oriented mechanism, but also the market-driven mechanism [2]. The development of green finance will use its dual characteristics to achieve environmental regulation and economic development, thereby supporting high-quality economic development.

Green innovation also has the dual attributes of "green" and "innovation", and is an important means of promoting economic growth and quality improvement. The main body of green innovation is mainly enterprises, especially listed enterprises. Among the large number of listed enterprises, the degree of active fulfillment of social responsibility varies among different industries. Strategic emerging industries are the key industries that China supports and cultivates, and as the key to achieving technological catch-up and becoming an innovative powerhouse [3], they should be the leaders in actively fulfilling their social responsibilities.

Due to the imperfection of China's information disclosure system, the data availability of green financial products is limited. And the "Green Credit Guidelines" (the Guidelines) issued by the former CBRC in 2012 is a research angle for

many scholars to study green credit policy. Therefore, this paper uses the implementation of the Guidelines as a quasi-natural experiment and adopts the DID model to explore the impact of green credit policy on the green technology innovation of listed companies in strategic emerging industries.

The rest of the structure is organized as follows: the second part is a literature review; the third part is the research data and model setting; the fourth part is an analysis of the empirical results; and the fifth part is the conclusions and insights.

2. Literature Review

Under the "dual carbon" goal, green credit is an important financial tool for promoting the development of a green economy in China, as it reduces pollution and carbon emissions and eases financing constraints. At the same time, green technology innovation is also a key factor in coordinating economic growth and environmental improvement. Organized part of the literature, this paper will review the literature from the micro impacts of green credit policy and the influence factors of green technology innovation in enterprises.

2.1. Micro impacts of green credit policy

Green finance is an economic behavior that takes financial business as a springboard to carry out credit, insurance, securities, carbon finance and so on in the principle of environmental protection [4], which can be classified into financial instruments such as green credit, green bond, green insurance and green fund. As a green financial instrument, green credit mainly plays the role of environmental governance by guiding the allocation of funds [5]. In previous studies, some scholars focused on the policy effect of green credit and analyzed its policy role. For example, Wang Yanli et al. (2021) empirical test concludes that the green credit

policy improves the tendency of underinvestment of enterprises while suppressing the overinvestment motivation of heavily polluting enterprises and improves the investment efficiency of heavily polluting enterprises [6]. One study finds that the implementation of the Guidelines suppresses the new investment of state-owned and large heavily polluting enterprises by suppressing corporate credit financing, especially long-term loans, but promotes the green transformation of heavily polluting enterprises that actively fulfill their social responsibilities [7, 8]. Similarly, green credit-restricted industries show more active green innovation performance than non-green credit-restricted industries [5]. Based on the perspectives of external constraints and internal concerns, Si Lijuan and Cao Haoyu (2022) found that green credit policy can significantly improve corporate environmental social responsibility [1]. The above literature mainly focuses on the policy effects of green credit, while some scholars also focus on the economic effect of green credit. For example, Xie Tingting and Liu Jinhua (2019) based on the panel data of 30 provincial-level regions in China, using the GMM method, found that green credit can enhance green economic growth by promoting the upgrading of industrial structure [9]. Green credit also increases the cost efficiency of commercial banks thereby improving the credit risk of commercial banks [10, 11]. In general, the policy effects and economic effects of green credit are mostly positive for enterprises. However, different types of enterprises will have different impacts of green credit, and in the context of high-quality economic development, it is also necessary to study the impact of green credit on different enterprises in depth. Therefore, the impact of green credit on listed enterprises in strategic emerging industries needs to be studied.

2.2. Influencing factors of green technology innovation in enterprises

Green technology innovation is an innovative activity to address the problem of environmental degradation, achieve specific environmental protection goals and realize sustainable development. The green innovation of enterprises refers to the enterprise green product design and process innovation in energy saving, pollution prevention and waste utilization. A large number of studies have analyzed the influencing factors of corporate green innovation. Generally speaking, according to Porter's hypothesis, reasonable and strict environmental regulation can encourage enterprises to engage in more innovative activities to enhance their productivity and competitiveness. Scholars in China have studied the role of environmental regulation from various perspectives and found that environmental regulation can force enterprises to engage in green innovation activities [12, 13, 14, 15]. Specifically, Chai Juanjuan et al. (2022) found that venture capital helps to enhance the capacity of green technology innovation in China [16]. Due to the characteristics of high input and long return cycle of green technology innovation, traditional investment methods are not attractive to it, and the cost of enterprise financing is very high. Wang Xin and Wang Ying (2021) found that the green credit policy will reduce the cost of corporate financing, thus improving the level of corporate green innovation [5]. Lin et al. (2014) concluded that political capital has a significant inhibitory effect in the green product and process innovation of enterprises. And both regulations and suppliers can effectively promote green product and process innovation

[17]. Wang Hui et al. (2016) found that market environment, government funding, and industrial agglomeration are all significantly and positively related to the green innovation efficiency of high-tech industries, while the influence of labor quality is not obvious [18]. Li Rong and Liu Luxi (2021) analyzed the green patent data of Chinese A-share listed companies in Shanghai and Shenzhen stock exchange from 2012 to 2019 and found that green financial reform and innovation pilot zones have a significant role in promoting green innovation of enterprises [19]. The above literature investigates the effect of green innovation being promoted by different factors from different perspectives, and the development of green innovation will promote green transformation and increase corporate performance. Xie Xuemei and Zhu Qiwei (2021) used the content analysis method to conclude that both green process innovation and green product innovation can promote the sustainable development performance of enterprises [20]. Unlike the above literature, corporate financial investment, which is a short-sighted behavior of managers and investment profit-seeking means, will inhibit the input and output of corporate technology innovation, and the financialization of real enterprises also suppresses corporate innovation [21, 22]. Listed enterprises in strategic emerging industries, as leaders in corporate innovation, need to take the lead in assuming environmental social responsibility and innovation social responsibility. Therefore, this paper conducts an in-depth exploration of green credit and green technology innovation to analyze the impact of green credit policy on green technology innovation of listed companies in strategic emerging industries.

3. Research Data and Model Setting

3.1. Sample selection and data sources

The data of Chinese A-share listed companies during the period of 2007-2020 are selected, and the data are treated as follows: (1) ST and *ST listed companies are excluded; (2) Listed companies in the financial and insurance industry are excluded; (3) Listed companies with only one year of observations are excluded; and (4) Main continuous variables are subjected to 1% shrinkage.

The data in this paper include enterprise green patent data and company characteristic data. The classification numbers of invention patents and utility model patents of A-share listed companies are obtained from the China Research Data Service (CNRDS), and matched with the "Green List of International Patent Classification" standard issued by WIPO, thus obtaining green patents, green invention patents and green utility model patents of enterprises. The company's characteristic data mainly obtained from the China Stock Market & Accounting Research Database (CSMAR). After the above steps, 27201 annual observations are finally obtained.

3.2. Empirical Model and Definition of Variables

This paper adopts the relevant data of Chinese A-share listed companies from 2007 to 2020, takes green innovation as the explanatory variable, the difference-in-difference term as the core explanatory variable, controls other influential variables, and empirically analyzes using the DID model. The model is set as follows:

$$\text{Patent}_{i,t} = \alpha_0 + \alpha_1 + \beta_1 \cdot \text{Policy}_t + \beta_2 \cdot \text{SEI}_i + \beta_3 \cdot \text{Policy}_t \cdot \text{SEI}_i +$$

$$\gamma \cdot X_{i,t} + \text{Corporate}_i + T_t + \varepsilon_{i,t}$$

Where the subscripts i and t denote enterprises and year, respectively, and $\varepsilon_{i,t}$ is the residual term. Patent denotes enterprises' green technology innovation, as measured by the number of green patent applications. Policy is a dummy variable before and after the implementation of the Guidelines, which takes the value of 1 in the post-implementation period (2012 and later), and 0 in the reverse direction. SEI is a dummy variable for whether a company is in a strategic emerging industry or not, taking the value of 1 if it is and 0 otherwise. X denotes the set of control variables, and Corporate and T denote firm and time fixed effects, respectively.

The explanatory variable is enterprise green technology innovation (Patent). Referring to the previous research [5, 23], this paper uses the green patent application volume (Inva) to characterize the quality of green innovation, and the green utility model patent application volume (Uma) to characterize the quantity of green innovation, and adds up the green patent application volume and the green utility model patent

application volume to get the total amount of green innovation (Total). Inva reflects the "depth" of green technology innovation, while Uma reflects the "width" and is used as a comparative indicator of Inva. The above three variables are processed by adding 1 and taking the natural logarithm.

The core explanatory variable is the difference-in-difference term Policy·SEI. Which represents the impact on green technology innovation of listed companies in strategic emerging industries before and after the implementation of the Guidelines. β_3 is the coefficient of main concern, if it is significantly positive, it indicates that the implementation of the Guidelines can promote the level of green technology innovation of listed companies in strategic emerging industries, and vice versa.

The set of other control variables is X . Referring to the practice of existing literature [5, 12, 24], some control variables are selected, and the variable names as well as the description of variables are shown in Table 1.

Table 1. Meaning of control variables

Variable symbol	Variable name	Description of variables
Age	Age of enterprise	Natural logarithm of the length of time an enterprise has been on the market
Emp	Employee size	The number of employees in the enterprise is taken as the natural logarithm
Lev	Leverage	Ratio of total liabilities to total assets
Roa	Return on total assets	Ratio of net profit to total assets
Pfa	Proportion of fixed assets	Ratio of total fixed assets to total assets
Cash	Cash ratio	Ratio of cash to total assets
Btm	Book-to-market	Ratio of owner's equity to market value
Inst	Institutional investment shareholding	Shareholding ratio of institutional investors
Ind	Proportion of independent directors	Proportion of independent directors
Dual	Duality	Dummy variable, whether the chairman of the board and the general manager are the same person, if yes, takes the value of 1; vice versa, 0
Big	The biggest shareholder	Proportion of the biggest shareholder
TQ	Tobin's Q	Ratio of market value to total asset value, and keep an integer

3.3. Descriptive statistics

The descriptive statistics of the variables are shown in

Table 2.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max.
Total	27,201	0.4500	0.9021	0.0000	7.3421
Inva	27,201	0.3117	0.7425	0.0000	7.2277
Uma	27,201	0.2716	0.6590	0.0000	6.0450
DID	27,201	0.2263	0.4184	0.0000	1.0000
Policy	27,201	0.7723	0.4194	0.0000	1.0000
SEI	27,201	0.2926	0.4550	0.0000	1.0000
Age	27,201	2.1361	0.7427	0.6931	3.2581
Emp	27,201	7.7677	1.2494	4.7536	11.1865
Lev	27,201	0.4388	0.2026	0.0568	0.8837
Roa	27,201	0.0393	0.0606	-0.2601	0.1967
Pfa	27,201	0.2225	0.1660	0.0023	0.7162
Cash	27,201	0.1600	0.1218	0.0108	0.5983
Btm	27,201	0.2954	0.1526	0.0411	0.7595
Inst	27,201	0.4596	0.2446	0.0039	0.9106
Ind	27,201	0.3762	0.0627	0.2500	0.5833
Dual	27,201	0.2532	0.4348	0.0000	1.0000
Big	27,201	0.3517	0.1504	0.0894	0.7496
TQ	27,201	1.9759	1.2925	1.0000	8.0000

Among them, the mean value of total green innovation (Total) is 0.4500, and the standard deviation is 0.9021,

indicating a large gap in green patent applications between enterprises. The mean value of green innovation quality (Inva)

is 0.3117, and the standard deviation is 0.7425, which also indicates a large gap in green invention patent applications between enterprises. The mean value of green innovation quantity (Uma) is 0.2716, and the standard deviation is 0.6590, which is smaller than Inva. Overall, there is a significant gap in the level of green innovation among enterprises, and a large number of green patent applications are distributed among a small number of enterprises.

4. Analysis of Empirical Results

4.1. Parallel trend and policy time uniqueness test

4.1.1. Parallel trend test

The results of the parallel trend test are shown in Figure 1,

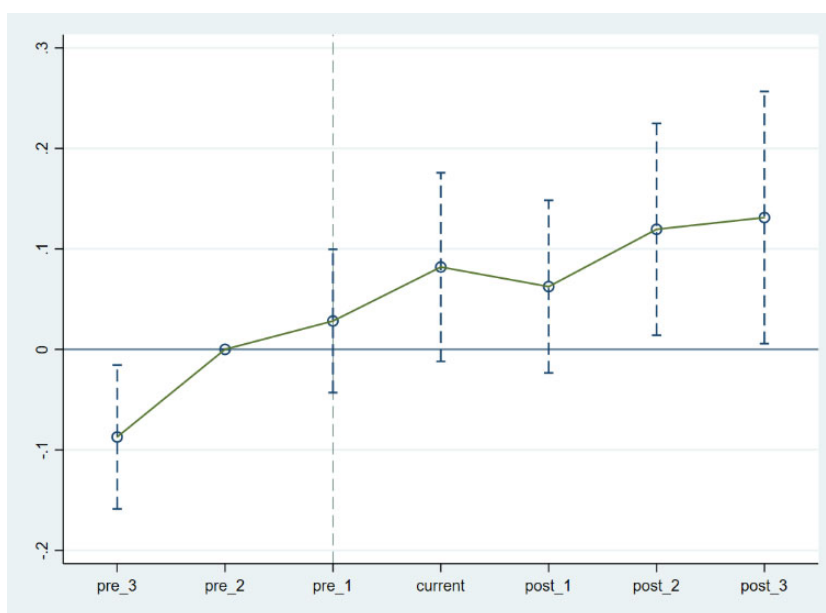


Figure 1. Parallel trend test

4.1.2. Policy time uniqueness test

To ensure that the uniqueness of the policy time point holds, this paper deletes the sample data after the start of the policy and retains the sample data before the start of the policy and before 2012. The policy implementation time point is advanced by 3 and 4 years (2009 and 2008), respectively, and the regressions are re-run. The estimation results are shown in Table 3.

with the horizontal axis showing the three years before and after the implementation of the Guidelines as well as the point in time when the policy was implemented (2012), and the vertical axis showing the dynamic effects of the policy. Showing the estimated coefficients and their 95% confidence intervals, the estimated coefficients of the interaction terms are not significant before the policy implementation, and the estimated coefficients of the interaction terms are significant one year after the policy implementation, which satisfies the assumption of parallel trend.

The results in Table 3 show that the coefficients of the difference-in-difference terms are mostly insignificant after advancing the time of policy implementation by 3 and 4 years, indicating that the "spurious" time of implementation of the Guidelines does not have a significant effect on the green innovations of listed companies in the strategic emerging industries, and thus suggesting that the year 2012 as the time of the policy is reasonable.

Table 3. Results of the policy time uniqueness test

	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Inva	Uma	Total	Inva	Uma
DID2009	0.8264 (0.9564)	0.2263 (0.7209)	0.6001* (0.3443)			
DID2008				0.7690 (0.7699)	0.2768 (0.5341)	0.4922 (0.3332)
N	5773	5773	5773	5773	5773	5773
R ²	0.7495	0.7627	0.6708	0.7495	0.7627	0.6699

Note: Values in parentheses are standard errors; *, **, and *** represent $P < 0.1$, $P < 0.05$, and $P < 0.01$, respectively. The following tables are the same.

4.2. Benchmark regression

Table 4 shows the results of the benchmark regression. In particular, columns (1) (3) (5) present the results of the regressions without the inclusion of control variables, and columns (2) (4) (6) present the results of the regressions with

the inclusion of control variables. The benchmark regressions all control for firm fixed effects and time fixed effects. The results indicate that the implementation of green credit policy has a significant effect on promoting green innovation of listed companies in strategic emerging industries. Specifically, green credit policy significantly increases the number of

green invention patent applications and green utility model patent applications of listed companies. The coefficients of the difference-in-difference terms in columns (4) and (6) are 0.1864 and 0.0653 respectively, which are significantly positive at the 5% and 1% levels, indicating that the implementation of the green credit policy increases the

number of green invention patent applications and the number of green utility model patent applications by 18.64% and 6.53% respectively, which means that the implementation of the Guidelines significantly enhances the green innovation output of the listed enterprises in strategic emerging industries.

Table 4. Benchmark regression results

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Total	Inva	Inva	Uma	Uma
DID	0.3439*** (0.0340)	0.1727*** (0.0355)	0.3192*** (0.0313)	0.1864*** (0.0328)	0.1670*** (0.0254)	0.0653** (0.0266)
Age		-0.0008 (0.0274)		-0.0049 (0.0241)		0.0074 (0.0214)
Emp		0.0563*** (0.0112)		0.0451*** (0.0096)		0.0340*** (0.0083)
Lev		-0.0201 (0.0547)		0.0083 (0.0475)		-0.0055 (0.0401)
Roa		0.1855** (0.0802)		0.1556** (0.0660)		0.1598** (0.0623)
Pfa		0.0755 (0.0654)		0.0653 (0.0519)		0.0711 (0.0496)
Cash		0.0945* (0.0537)		0.1007** (0.0455)		0.0758* (0.0418)
Btm		-0.0297 (0.0559)		-0.0481 (0.0477)		0.0034 (0.0426)
Inst		-0.1246** (0.0541)		-0.0960** (0.0459)		-0.0502 (0.0407)
Ind		-0.0006 (0.0820)		-0.0135 (0.0698)		0.0260 (0.0642)
Dual		-0.0040 (0.0157)		0.0014 (0.0141)		-0.0111 (0.0120)
Big		-0.0417 (0.0925)		0.0304 (0.0781)		-0.0660 (0.0731)
TQ		-0.0051 (0.0052)		-0.0039 (0.0045)		-0.0032 (0.0037)
_cons	0.3722*** (0.0077)	-0.7046* (0.3790)	0.2395*** (0.0071)	-0.7129** (0.3627)	0.2338*** (0.0058)	-0.3933** (0.1909)
N	27,201	27,201	27,201	27,201	27,201	27,201
R ²	0.0210	0.0581	0.0253	0.0587	0.0082	0.0322

4.3. Robustness Checks

4.4.1. PSM-DID corrects for the problem of inter-sample variability

Referring to the method of Wang Xiuhua et al. (2021), the

control variables were matched as covariates for neighborhoods year by year [25]. And regression analyses were performed using PSM-DID, and the regression results are shown in Table 5.

Table 5. PSM-DID regression results

Variables	(1)	(2)	(3)
	Total	Inva	Uma
DID	0.1613*** (0.0440)	0.1788*** (0.0459)	0.0586* (0.0334)
N	26985	26985	26985
R ²	0.7219	0.706	0.6758

As can be seen from the table, the coefficients DID of Total, Inva and Uma are all significantly positive, indicating that the implementation of the Guidelines can significantly increase the number of green patent applications of listed companies in the strategic emerging industries and significantly promote their green technology innovation level.

4.3.2. Exclusion of other policy effects

4.3.2.1 Environmental Protection Law

The Environmental Protection Law of the People's Republic of China (EPL) was officially implemented in 2015, which may have an impact on the green technology innovation of enterprises. Therefore, this paper introduces dummy variables after 2015 to eliminate the impact of the Environmental Protection Law. The results are shown in Table 6.

Table 6. Regression results

Variables	(1)	(2)	(3)
	Total	Inva	Uma
DID	0.1615*** (0.0443)	0.1788*** (0.0460)	0.0588* (0.0336)
EPL	0.0266* (0.0141)	0.0382*** (0.0119)	-0.0037 (0.0108)
N	26985	26985	26985
R ²	0.7208	0.7049	0.6749

As can be seen from the table, the coefficients of DID after the introduction of the dummy variable after 2015 are 0.1615, 0.1788, and 0.0588 respectively, and all of them are significantly positive. This indicates that the impact of green credit policy on listed companies in strategic emerging industries is not affected by the Environmental Protection Law.

4.3.3.2 Green Finance Reform and Innovation Pilot Zone
The green financial development in the green financial reform and innovation pilot zones will be affected by policies, so this paper tries to eliminate the policy impact of the pilot zones by eliminating the sample of provinces in the pilot zones. The results are shown in Table 7.

Table 7. Regression results

Variables	(1)	(2)	(3)
	Total	Inva	Uma
DID	0.1708*** (0.0640)	0.2058*** (0.0658)	0.0539 (0.0486)
N	18178	18178	18178
R ²	0.7172	0.7012	0.6708

As can be seen from the table, the coefficients of DID on green patent applications and green invention patent applications after excluding the provincial samples of green financial reform and innovation pilot zones are 0.1708 and 0.2058 respectively, and are significant at 1% level, but the coefficients on green utility model patent applications are not significant.

4.4. Heterogeneity test

4.4.1. Enterprise character

To further ensure the robustness of the regression results, this paper examines the impact of different ownership of enterprises on the regression results. Specifically, this paper categorizes enterprises into state-owned enterprises (SOEs) and non-state-owned enterprises (NSOEs) and conducts group regression. The regression results are shown in Table 8.

Table 8. Regression results

Variables	SOEs			NSOEs		
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Inva	Uma	Total	Inva	Uma
DID	0.1942*** (0.0668)	0.2130*** (0.0687)	0.0664 (0.0492)	0.1020*** (0.0379)	0.1024*** (0.0358)	0.0554* (0.0305)
N	10707	10707	10707	15777	15777	15777
R ²	0.7521	0.7418	0.6989	0.7060	0.6850	0.6688

From the table, it can be seen that after carrying out the regression of enterprise ownership grouping, the implementation of green credit policy has a positive promotion effect on green patent applications in both SOEs and NSOEs samples. However, the coefficients of DID in the sample of SOEs are 0.1942, 0.2130, and 0.0664 respectively, and the coefficients of DID in the sample of NSOEs are 0.1020, 0.1024, and 0.0554 respectively, which indicates that the green credit policy has a greater promotional effect on the sample of SOEs, which is consistent with the previous

research results that environmental regulation will have a stronger incentive effect on innovation in industries with a high degree of nationalization [12, 26].

4.4.2. Polluted situation

In this paper, we follow the method of Ma Yongqiang et al. (2021) to group regress the firms into heavily polluting enterprises and non-heavily polluting enterprises according to the industry code [27]. Table 9 shows the results of the grouping regression of pollution situation.

Table 9. Regression results

Variables	heavily polluting			non-heavily polluting		
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Inva	Uma	Total	Inva	Uma
DID	0.0232 (0.0648)	0.0233 (0.0626)	-0.0076 (0.0410)	0.2210*** (0.0504)	0.2368*** (0.0521)	0.0905** (0.0405)
N	7722	7722	7722	19211	19211	19211
R ²	0.6878	0.6982	0.6436	0.7357	0.7117	0.6877

As can be seen from the table, the regression coefficients of the sample of non-heavily polluting enterprises are all

significantly positive relative to the sample of heavily polluting enterprises, while none of the coefficients of the sample of heavily polluting enterprises are significant, which suggests that the implementation of the green credit policy promotes the level of green innovation in the sample of non-heavily polluting enterprises. Non-heavily polluting enterprises face relatively lighter environmental regulations and financing constraints, and have more funds for green technology innovation. Heavily polluting enterprises, on the other hand, face more severe environmental regulations and have more financial constraints, and their green technology

innovations lead to more environmental costs.

4.4.3. Heterogeneity in the Eastern, Middle and Western regions.

China still exists in the phenomenon of unbalanced regional development, so this paper in accordance with the "seventh five" plan to determine the division of the three major economic regions of the East, Central and West, and group regression. The regression results are shown in Table 10.

Table 10. Regression results

Variables	Eastern			Middle			Western		
	(1) Total	(2) Inva	(3) Uma	(4) Total	(5) Inva	(6) Uma	(7) Total	(8) Inva	(9) Uma
DID	0.1649*** (0.0428)	0.1647*** (0.0429)	0.0560* (0.0327)	0.2117* (0.1115)	0.2785** (0.1206)	0.0893 (0.0808)	0.1295 (0.0850)	0.1571** (0.0764)	0.0505 (0.0660)
N	18617	18617	18617	4596	4596	4596	3754	3754	3754
R ²	0.7373	0.7244	0.6944	0.6922	0.6595	0.6310	0.6897	0.6632	0.6566

From the table, it can be seen that the DID coefficients of the samples of enterprises in the eastern region are all significantly positive, while two of the DID coefficients of the samples of enterprises in the central region are significantly positive and only one of the DID coefficients of the samples of enterprises in the western region is significantly positive. This indicates that the green credit policy has a greater role in stimulating innovation in the eastern region of China, followed by the central region, while the policy has the least role in stimulating innovation in the western region.

5. Conclusions and Outlook

In order to investigate the impact of green credit policy on the green technology innovation of listed companies in strategic emerging industries, this paper selects the data of Chinese A-share listed companies during 2007-2020, and conducts an empirical test using the difference-in-difference model. It is found that the implementation of green credit policy has a significant effect on the "width" and "depth" of green innovation of listed companies in strategic emerging industries. After a series of robustness checks, the results still hold. Heterogeneity analysis reveals that the implementation of green credit policy has a stronger incentive effect on green innovation for non-heavily polluting enterprises than that for heavily polluting enterprises, and that the intensity of the incentive effect of green credit policy on green innovation shows a decreasing phenomenon of "high middle and low" in the Eastern, Middle and Western regions.

Based on the conclusions of the above study, the following insights can be obtained:

(1) The relevant policies of green finance should be improved, a multi-level green financing model should be established in order to reduce the R&D cost of green technological innovation;

(2) Give full play to the advantages of strategic emerging industries and play an exemplary role. At the same time, the government should increase its support for strategic emerging industries so that they can also play an influential role in the international arena;

(3) It is necessary to alleviate the problem of unbalanced regional development and give more support to the relatively lagging western region.

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