



Research on Study on the Impact of Green Credit on Environmental Performance from the Perspective of Environmental Regulation

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Abstract. Green finance is an inevitable requirement for promoting high-quality economic development and an important measure to practice the “two Mountains theory”. This paper takes the Green Credit Guidelines implemented in 2012 as the research object to construct A quasi-natural experiment, based on the data of China’s A-share listed companies from 2008 to 2019, and combined with the government’s environmental supervision to construct corporate environmental performance indicators, and then investigate the impact of green credit policies on the environmental performance of heavily polluting enterprises. The research shows that the implementation of green credit policies can help strengthen the environmental performance of enterprises and promote the improvement of corporate environmental performance, which is transmitted through the signal transmission mechanism and the capital formation mechanism.

Keywords: green credit · environmental performance · PSM-DID · green finance

1 Introduction

To achieve the targets of carbon peaking and carbon neutrality, the 2022 government report points out that we should strengthen the synergistic control of multiple pollutants in the atmosphere and regional synergistic control, and improve incentive and restraint policies to reduce pollution and carbon. With the introduction of the “Green Credit Guidelines” in 2012, it not only enhance China’s green financial policy system, but also environmental governance, address the increasingly serious environmental pollution problem, foster the growth of the green economy and circular economy, and upgrade and transform the country’s economic development model. However, in the face of the “double carbon” target, how to accurately grasp the carbon peak carbon neutral process to better develop green finance, which has become a new opportunity for the development of green finance.

Although the relevant authorities in China have issued a series of policy documents on green finance and environmental protection, hoping to urge enterprises to better assume

social and environmental responsibility by disclosing environmental information to the public, the issue of how green finance can be improved to enhance the environmental performance of enterprises in the context of carbon peaking and carbon neutrality is in the exploration stage. At the same time, there is a dearth of literature in this field. In terms of enterprises, some scholars have focused on the impact of green credit on environmental information disclosure (Qiu, Shaukat, & Tharyan, 2016)[1], the innovation of low-carbon technologies(Guo, Zhou, Liu, & Wang, 2019)[2], corporate social responsibility(Zhou, Sun, Luo, & Liao, 2021)[3], economic performance(Yao, Pan, Sensoy, Uddin, & Cheng, 2021)[4], and the corresponding economic consequences. For financial institutions such as banks, some scholars have focused on the business risks and financial performance of commercial banks(Lian, Gao, & Ye, 2022)[5], the impact of green credit policy on the competitiveness of commercial banks(Zhou, Caldecott, Hoepner & Wang, 2022; Yin, Zhu, Kirkulak-Uludag, & Zhu, 2021)[6, 7] and the impact of green credit policy on the cost and performance of banks(Umar, Ji, Mirza, & Naqvi, 2021)[8]. Based on the above analysis, The majority of academics have examined the economic effects of the introduction of the Green Credit Guidelines from the perspective of corporate and commercial banks. However, few have empirically explored the impact of green credit policies on the environmental performance of enterprises from a microscopic perspective. In the current “dual carbon” context, it is necessary to further discuss the impact of green credit policies on environmental performance.

Compared with the existing research, the innovation points of this paper are as follows: First, it constructs a quasi-natural experiment based on the Green Credit Guidelines implemented in 2012, focusing on testing the policy impact of green credit on heavily polluting enterprises, providing enterprises with an innovation path for sustainable development, and providing a reference for achieving high-quality economic development; Second, emphasis is placed on “environmental performance” as an important indicator to test the effect of policies. Few existing literatures discuss the economic effect of green credit policies from the perspective of environmental performance.

2 Influence Mechanisms and Theoretical Hypotheses

Enterprises, particularly major polluters, are dealing with a number of challenges as a result of the implementation of the green credit policy, including how to properly manage environmental risks and lower the likelihood of bankruptcy and reputational damage. How can we demonstrate strong environmental performance to the outer world while starting a solid capital cycle? It is found that the impact of green credit on environmental performance is mainly signaling mechanism and capital formation mechanism.

2.1 Signaling Mechanism

Through a diverse range of financial instruments that have varying degrees of business incentives and constraints, green finance broadcasts signals of green development to the outer world. Based on the signal theory, environmental information can not only alleviate the information asymmetry between investors and enterprises, show the good image of enterprises and enhance investors' trust, but also investors will be influenced

by environmental information. If enterprises disclose high-quality environmental information to the outside world, it will boost investors' optimism (Dhaliwal, Li, Tsang, & Yang, 2011)[9], thus reducing the financing cost(Xie, Nozawa, Yagi, Fujii, & Managi, 2019)[10]. Disclosure of environmental information and hence environmental performance is moving from legitimacy to informing corporate problem-solving and decision making (Qian & Schaltegger, 2017)[11].

Signaling theory is primarily concerned with explaining the role of signals in reducing information on both sides of the signal sender and the signal receiver. Asymmetry and financial issues play a significant part in the process (Tanaka, Eldar, Ortega, & Cheung, 2020)[12]. The process consists of three main aspects: the signal sender, the signal, and the signal receiver. Considering the positive correlation between environmental information disclosure and environmental performance, enterprises will transmit their good environmental information disclosure to the outside world through media publicity and philanthropy, which will help to promote the environmental performance and reduce the information issue.

Hypothesis 1: The enactment of green credit policies helps to improve environmental performance.

2.2 Capital Formation Mechanism

There are financial realization mechanisms and financial realization mechanisms for capital formation, and capital, as a key element in the production, operation, marketing and after-sales processes of enterprises, is primarily used by enterprises to innovate or expand reproduction through external financing when they are facing financial problems. This will create different degrees of incentives and limitations on the capital formation of different types of enterprises. Therefore, in order to increase their chances of getting bank loans and to demonstrate their good environmental performance, enterprises tend to make environmental disclosures to the public. This gives them a competitive advantage in the capital lending market. As a result, hypothesis 2 is proposed in this paper.

Hypothesis 2: Green credit policies may improve the environmental performance of firms by alleviating financing constraints.

2.3 Data Sources

China's A-share listed companies from 2008 to 2019 were chosen as the research sample for this paper. Among them, the criteria for dividing the heavily polluting enterprises and non-heavily polluting enterprises are based on the pollution emission data of each industry regarding three categories of exhaust gas, wastewater and solid waste from 2011–2015, Environmental performance data are obtained from the CSMAR database, green credit data are obtained from the China Industrial Statistics Yearbook manually, and control variable data are obtained from the CSMAR database and Wind database data.

2.4 Indicator Construction

1. Environmental Performance

Environmental performance is one of the sources of competitive advantage for companies in the context of the goal of green economic development and high-quality development (Orazalin & Baydauletov, 2020)[13]. Currently, domestic scholars use the following two methods to measure environmental performance: First, quantitative environmental indicators, such as sewage charges, environmental protection investment and other single indicators. The second is to evaluate the behavior of enterprises in environmental aspects to be judged. This paper, referring to the studies of scholars such as Omran, Zaid, and Dwekat (2021)[14], We use the scoring assignment method and use the data related to environmental governance and disclosure in CSMAR, which involves three aspects of environmental protection system, environmental protection objectives, and government rewards and punishments with a total of 15 indicators data into the total score.

2. Green Credit

The four most widely used green credit measures in academia right now are the percentage of green credit, the percentage of loans for energy conservation and environmental protection projects, the “bank loans” in industrial pollution control investments, and the percentage of interest expenses in six high-energy-consuming industries. The data on the percentage of green credit and the percentage of loans for energy conservation and environmental protection projects are obtained from the Social Responsibility Reports of five large commercial banks and some joint-stock banks in China, but due to the lack of provincial data on loan balances and the fact that they have not been updated since 2010. Therefore, considering the uniformity and availability of data, scholars mostly use the interest expenditure share of six high-energy-consuming industries (Xie, & Liu, 2019)[15] or interest expenditure of non-six high-energy-consuming industries to measure the level of green credit.

3. Control variables

At the micro-firm level, given that factors such as firm size, age, nature of ownership, financial performance, and corporate governance have important effects on the environmental performance of firms, the logarithm of total assets, total liabilities as a percentage of total assets, time on market, and net profit as a percentage of main business revenue are selected to measure these factors, respectively, and the specific core variables are defined in Table 1. In addition, region and year effects are controlled for.

2.5 Model Design

1. Difference-in-difference

Verify the relationship between green credit and environmental performance, and construct a difference-in-difference model.

$$EP_{it} = \alpha_0 + \alpha_1 Treat + \alpha_2 After + \alpha_3 Treat \times After + \alpha_4 Gpl_{it} + \gamma Controls_{it} + \varepsilon_{it} \quad (1)$$

where: i, t denote firm and year, respectively.

EP explanatory variables are environmental performance measures;

Table 1. Descriptive statistics

variable	Variable Name	N	mean	min	sd	p50	max
EP	Environmental Performance	15751	2.792	-2	2.094	2	11
Treat	Company dummy	15751	0.560	0	0.496	1	1
After	Policy dummy	15751	0.888	0	0.316	1	1
Gpl	Green Credit	15751	0.574	0.0940	0.129	0.604	0.972
Size	Company Size	15751	22.12	17.64	1.266	21.95	28.64
Lev	Gearing ratio	15751	0.417	0.00797	0.202	0.410	1.758
ROA	Return on Assets	15751	0.0397	-1.146	0.0737	0.0377	0.517
Top1	Percentage of shareholding of the largest shareholder	15751	0.346	0.00290	0.148	0.327	0.900
TobinQ	Tobin's Q-factor	15751	2.147	0.153	2.389	1.665	122.2
ListAge	Years on the market	15751	2.131	0.693	0.748	2.197	3.401

Gpl is the corresponding indicator of green credit, and the empirical process uses $Gpl = 1 - \text{interest expenditure of the six high-energy-consuming industries} / \text{total interest expenditure of industrial industries}$;

Controls are the control variables and ε is the random disturbance term;

3 Empirical Results and Analysis

3.1 Descriptive Statistics

The results of the descriptive statistics are shown in Table 1, which focuses on the data before standardization. The minimum value of our environmental performance is -2 and the maximum value is 11, while the sample mean is 2.733, indicating a slight variation and an overall low level of companies in the study sample. The standard deviations of the mediating and moderating variables are relatively small, and the control variables Lev, Top1, and TobinQ have large differences between different enterprises. Therefore, it is necessary to perform propensity scoring matching treatment.

3.2 Baseline Regression Analysis

Table 2 presents the regression results of the level of green credit on environmental performance, which we regress using a logit model and controlling for time and industry effects is calculated by Formula 1. The results of (1) and (2) show that the coefficient of the effect of green credit policy on environmental performance is significantly positive at the

Table 2. Baseline regression results

	(1)	(2)	(3)	(4)	(5)
	EP	EP	EP	EP	EP
Treat × After			0.297***	0.195***	0.345***
			(8.521)	(3.072)	(8.179)
Gpl	0.181**	0.330**	0.379***	0.304	0.633***
	(1.421)	(2.418)	(2.767)	(1.341)	(3.504)
Contrl	N	Y	Y	Y	Y
Constant	0.399***	-10.532***	-10.384***	-12.038***	-8.871***
	(5.344)	(-24.179)	(-23.756)	(-17.327)	(-15.130)
Observations	15,751	15,751	15,751	5,460	10,291

5% statistical level, both before and after the inclusion of control variables, indicating that the implementation of green credit policy promoted the management of environmental performance and increased the sewage level of the enterprise. Column (3) after adding the interaction term of the dummy variable for heavy polluters and the policy dummy variable shows that the level of green credit is positive and significant at the 1% statistical level, further indicating that the implementation of green credit policy has a significant impact on the environmental performance of firms. From this, it can be tentatively concluded that green credit policy is promoting the environmental performance of enterprises at an overall level, and thus hypothesis 1 is verified.

4 Conclusions

This study uses TOPSIS, and the intermediary model to assess the policy implications of the implemented Green Credit Guidelines in 2012. Corporate environmental performance is not only an important indicator to effectively measure corporate awareness of green development and environmental responsibility, but also a manifestation of corporate fulfillment of social responsibility.

When compared to green firms, it has been discovered that heavy-polluting enterprises' environmental performance has improved somewhat as a result of the adoption of the green credit policy. Green credit policy is found to transmit signals of green development to the outside world, generate varying degrees of incentives or constraints for businesses, and ultimately positively contribute to the improvement of their environmental performance. It is also discovered that capital formation financing activities, as a mediating variable, significantly contribute to the improvement of businesses' environmental performance.

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