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The Impact and Enlightenment of Green Finance on Enterprise Innovation

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Abstract: With the proposal and improvement of China's carbon neutrality strategy, as well as the adjusting of industrial structure and optimizing of energy structure, green finance is gradually playing a significant role in enterprise innovation. Green credit, as an important constituent part of the green financial system, carries a profound influence on the innovation and growth of enterprises. Taking green credit as the starting point, in accordance with the "Green Credit Guidelines" and subsequent plans, and by studying the cash dividend distribution and operating cash flow data of new energy concept stock companies listed in the A-share market from 2018 to 2021, the growth of green finance is studied and analyzed for its impact on enterprise innovation, scale, and fund allocation obtained by different levels of pollution. The conclusion is drawn as follows: firstly, Green finance has a regional heterogeneity impact on enterprises, with the eastern region having the highest significance. Secondly, green credit plays a role in guiding resource allocation and promoting green transition of polluting enterprises, proposing suggestions to improve the green credit policy system, strengthen supervision, and promote the transition and upgrading of enterprise autonomy.

Keywords: Green credit, enterprise green innovation, green financial system, resource allocation

1. Introduction

With the intensification of global climate issues, how to effectively reduce carbon dioxide emissions has become a common issue faced by all humanity. China actively assumes the responsibility of a major country, adheres to carrying forward the construction of a community of the shared future for mankind and promoting sustainable development, and actively addresses climate change issue. In September 2020, a "dual carbon policy" is put forward explicitly by China , aiming at reaching a target in carbon dioxide emission reduction peak by 2030 and achieving the goal of carbon neutrality by 2060, showing China's determination to keep to the green and low-carbon path of development and protect the ecological environment. The "dual carbon policy" aims to accelerate ecological construction, achieve high-quality development, implement new development concepts and innovation driven development strategies, cut down on carbon emissions, promote green transition of traditional economic structure, and achieve economic development of high-quality . However, achieving the "dual carbon" target is not an easy task. It requires an organic combination of economic structure transformation, production mode transformation, and green lifestyle promotion not only to

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satisfy the growing needs of people for a better life, but also to promote environmental quality improvement and industrial structure optimization and upgrading, and achieve economic development of high-quality. From an analysis at the micro-level, as the main body of the micro economy, studying the implications for green finance on the innovation of enterprises can reveal the merit and demerit of existing green innovation mechanisms, which plays a significant guiding part in the subsequent extension and growth of green finance as well as the direction of enterprise transition and upgrading. Around the direction of this research, Li Rong and Liu Luxi studied the function of green finance in the heterogeneity of enterprise characteristics [1]. Yu Bo, Cao Yanqiu, Zhang Cuiyan, Yang Xue, and others found that green credit policies cause some inhibitory influence on the innovation of heavily polluting enterprises [2, 3]. Xie Qiaoxin and Zhang Yu provided decision-making support for green credit policies and enterprise innovation transformation [4, 5]. Wang Xin and Wang Ying delved into how to effectively achieve the combination between green finance and green innovation through the dual decomposition (DID) method, thereby improving works on the ecological civilization construction [6]. Shen Lu and Liao Xianchun found through research that establishing a green finance experimental zone for all-round reform and innovation can effectively promote enterprises to carry out their corresponding social responsibilities and alleviate their own financing constraints [7]. Gao Jinjie analyzed the implications for green finance on economic growth as well as regional heterogeneity of China through the construction of mathematical models and the rational use of various empirical models, and provided valuable policy recommendations [8]. Wang Xiuhua, Liu Jinhua, and Zhao Yaxiong explored the differences and mechanisms of green finance pilot policies between polluting enterprises and green enterprises from a micro perspective, thereby enriching relevant research on the micro economic aspects in green finance pilot policies [9]. Wei Lili and Yang Ying conducted a detailed study on the development logic, theoretical decipherment, and future growth of green finance, and constructed a four party framework for green finance growth [10]. Hou Xiaohui and Wang Bo discussed the interrelationship between the green finance growth and the structural reform of the financial supply side, and proposed policy recommendations for further accelerating the green finance growth [11]. New energy enterprises play a strong part in promoting the transformation of energy structure. However, there are also problems such as high costs and difficulties. Therefore, Wang Yu specifically studied the influence of green finance growth on financing constraints from the perspective of new energy enterprises, and proposed corresponding suggestions, advocating for the government to introduce more policy support, guide and supervise green innovation and green projects, and promote regional coordinated development [12]. However, previous studies have mostly focused on a single point in green innovation, thus conducting detailed research, while there are few articles that comprehensively study the influence of green finance growth on the innovation of enterprise. Based on the above findings of the research, this article will systematically summarize and take green credit as the breakthrough point to further systematically investigate the influence and inspiration of green finance growth on enterprise innovation. Therefore, this article has certain significance for promoting the green finance growth as well as the green transition in enterprises.

2. Method

2.1. The Effect of “Green Credit Guidelines” on Enterprise Green Innovation

Green finance mainly includes some green financial products, like green credit, green funds, and green bonds, as well as corresponding services. Green credit, is known as sustainable financing or environmental financing. Unlike the current mandatory regulatory policies and market-based regulatory policies, green credit makes a contribution ecological environment management by guiding fund allocation. To be specific, green credit internalizes the negative externalities generated

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by enterprise pollution emissions, adjusting the opportunity cost in environment pollution dynamically. The goal of increasing clean investment can be achieved through credit channels while reducing polluting investment, and utilizing capital allocation to lead to industrial clean transition and green development. The incentive function of green credit on clean investment can be embodied in the relative advantages of accessibility and convenience as enterprises obtain credit financing, whereas the constraint effects of green credit on polluting investment are embodied in the higher entry barriers and transaction costs which enterprises face while obtaining credit financing [6]. Green credit mainly achieves its incentive and constraint effects through two channels: the redistribution of capital elements and the green transition of polluting enterprises.

2.2. Data Construction and Analysis

For the sake of studying the influence of green finance growth upon financing constraints of renewable-energy enterprises, this research uses new energy concept stocks listed in A-share market as the research sample, the local green finance growth standard index of the sample enterprises from 2018 to 2021 as the explanatory variable. The standard of financing constraints confronted by new energy enterprises is the dependent variable. An indicator system for the degree of enterprise financing constraints can be constructed on the basis of the indicators such as announced cash holdings, cash dividends, and operating cash flows. Calculating the level of financing constraints faced by the enterprise in different years, and adding control variables such as return on equity, institutional shareholding ratio, and asset liability ratio to construct a regression model [12]. And the evaluation model of financing constraint degree is:

$$KZ_{i,t}=-5.486\ C_{i,t}/A_{i,t-1}+0.055LEV_{i,t}-32.945DIV_{i,t}/A_{i,t-1}+0.218\text{Tobin's }Q_{i,t}-12.794CF_{i,t}/Ai,t-1$$

Construct individual fixed effect model:

$$KZi,t=\alpha o+\beta 1Indexi,t+\beta 2Growthi,t+\beta 3ISRi,t+\beta 4ROAi,t+\beta 5D/Ai,t+\varepsilon i$$

$KZ_{i,t}$ is the degree of financing constraints faced by sample firm i in the study year t; Indexi,t is the development level of green finance in the region where enterprise sample i is located in t years. The logarithm of the regional green finance development index is calculated according to the entropy method. Growth, ISR, ROA and D/A are control variables, which are respectively Growth, institutional investor shareholding ratio (ISR), profitability (ROA, expressed by net profit over total assets) and asset-liability ratio (D/A). ε is an individual fixed effect [12].

2.2.1. Analysis of Regional Heterogeneity

Regional growth in China is to some extent unbalanced. In comparison, the eastern area has grown more quickly and early because of things like easy access to transportation, an ideal climate, a superior geographic setting, and fewer natural disasters. The development of politics, economy, culture, finance, and other aspects in the eastern part has been fueled by the superior educational resources and backing from reform and opening up programs. Other areas, like the western area, were, however, later developed. There is a discrepancy in the growth level and effect of green finance in different areas due to variances in fundamental level, green finance policy initiatives, and implementation efforts.

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Table 1: Results of grouping regression by region [12]

	KZ (the eastern part)	KZ (the central part)	KZ (the western part)	KZ (the northeast part)	Overall
Index	-0.917*** (0.288)	-0.632 (0.472)	-0.840*** (0.335)	-0.273 (0.420)	-0.796*** (-4.39)
Growth	-0.089 (0.292)	1.798* (0.898)	-1.201*** (0.447)	0.334 (0.986)	-0.208* (-0.87)
ROE	-0.053*** (0.013)	-0.098*** (0.034)	-0.039** (0.018)	0.050 (0.042)	-0.050*** (-4.81)
DA	1.821*** (0.485)	-1.972 (1.489)	2.245*** (0.844)	6.359** (2.165)	1.712*** (3.53)
ISR	-5.358*** (1.273)	-4.937 (3.498)	-3.134* (1.853)	-8.893* (4.626)	-4.703*** (-3.13)
r2	0.209	0.184	0.297	0.671	0.202

Standard errors given in parentheses: *p<0.1, **p<0.05, ***p<0.01.

Table 1 shows how the standard of green finance growth in various locations affects the financing challenges faced by new energy firms in that area. According to data, the degree of green finance growth in the eastern and western areas has a major impact on easing the region's financial restraints on new energy firms.

At the 1% and 5% levels, the influence is negatively associated. The extent of financial constraints confronted by new energy enterprises in the area is inversely correlated with the standard of green finance growth in the eastern areas as well as western areas. The center and northeastern areas, however, showed no real correlation. On the one hand, this could be because the eastern area has a relatively higher degree of comprehensive development and substantial economic and financial resources, which makes it easier for green finance policies to be implemented in the market [12]. However, this is also connected to the industrial structure and regional reliance on financial development. The center and northeastern areas have a lot of traditional energy infrastructure, including coal mines and oil. The center and northeastern areas confront more financial challenges than the eastern areas since changing the energy structure there is more challenging.

2.2.2. The Growth Standard and Financing Constraints of Green Finance

Table 2: Correlation coefficient of main variables [12]

	KZ	Index	ROE	Growth	DA	ISR
KZ	1					
Index	-0.072*	1				
ROE	-0.369***	0.153***	1			
Growth	-0.094*	0.109***	0.379***	1		
DA	0.620***	-0.078*	-0.108***	0.0530	1	
ISR	-0.0250*	-0.0110	0.082**	0.00200	0.136***	1

Standard errors given in parentheses: *p<0.1, **p<0.05, ***p<0.01.

Table 2 reveals that the amount of the development of green finance in the area where the firm is located is inversely connected with the funding constraints it receives at the 10% level. This means the higher the area's green finance growth index, that is, the greater the standard of green finance growth, the less funding constraints the firm receives. This indicates that increasing the level of the

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green finance growth is advantageous for reducing the financing limitations faced by new energy firms. Besides, there is a significant negative relationship between the extent of financing constraints and the net asset profit margin of enterprises, indicating that the improvement of the profitability level of new energy enterprises can effectively alleviate their financing constraints to a certain degree. The degree of financing constraints is significantly positively correlated with the asset liability ratio of enterprises, indicating that a good and safe capital structure plays an important part in the smooth financing of new energy enterprises. The degree of financing constraints faced by a company is negatively correlated with its growth potential and institutional shareholding ratio at the 10% level, indicating that the greater the company's growth potential, the more likely the future investment recovery, and investors are more willing to invest in it [12].

3. Conclusion

By studying and analyzing the effect of green finance growth on financing constraints of new energy enterprises, the following conclusions can be drawn: In the first place, green finance has a regional heterogeneity influence on enterprises, with the eastern area having the highest significance. Secondly, green credit plays a part in guiding resource allocation and promoting green transition of polluting enterprises. Accordingly, in the western and other areas, the government should accelerate the promotion of regional coordinated development, enhance the growth level of green finance, strengthen government subsidies and policy guidance, and fully leverage the incentive function of green credit on firm innovation, transformation, and green production, thereby reducing regional development differences, promoting enterprise transformation and upgrading, and helping to achieve the dual carbon strategy. In the meantime, the government should also strengthen monitoring provided on the implement of green credit, improve its positive incentive mechanism and risk prevention mechanism. The protection of green intellectual property should also be strengthened. For enterprises in the new energy sector, they should further adhere to the concept of green growth, strengthen corporate governance, raising green production efficiency, and expand their competitive advantage and discourse power in the economic market. Heavy polluting enterprises and enterprises with a traditional energy structure as the main focus should accelerate the transition and upgrading of their energy structure, improve the efficiency of traditional energy use, actively introduce new energy production technologies, optimize industrial structure and production methods, and thus accelerate the realization of green transformation. In the meantime, enterprises should actively seek policy support and financial subsidies, accelerate the construction of their internal green financial systems and technological innovation, adhere to the unity of social responsibility and economic benefits, thereby improving their own situation, reducing polluting investment and construction, contributing to the construction of green ecology, and advancing the high-quality growth of the green financial system.

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