The Impact of Green Finance on the Eco-friendly Transformation and Innovation of Heavily Polluting Enterprises

Chishing Lam[1], Lihang Xiong[2, *], Zihan Zhou[3], Zheyan Zhang[4]

[1]Progress Education, Zhongshan, China

[2]School of Environmental and Chemical Engineering, Zhaoqing University, Zhaoqing, China Hefei

[3]No.1 High School, Hefei, China

[4]Faculty of Art and Social Sciences, Simon Fraser University, Vancouver, Canada

*Corresponding author: 202024123235@stu.zqu.edu.cn

Abstract. As environmental concerns continue to escalate, green finance has become a pivotal instrument for fostering sustainable economic growth, attracting heightened attention. This article, by reviewing literature and empirical analyses from 2018 to 2024, explores the mechanism by which green finance influences heavily polluting enterprises to promote green transformation and innovation. The results of research confirm that green finance will intensify the financing constraints and pressures on heavily polluting enterprises, thereby motivating them to accelerate transformation or innovation; at the same time, green finance also advances the improvement of market regulation, bringing green talent flow; in addition, green credit, as the main proportion of green finance, is also gradually playing its positive role in a larger range. Through the literature research, this article believes that green finance policies provide a variety of choices, which strongly foster the development of green industries and stimulate enterprises to undergo autonomous transformation and innovation; it also provides relevant suggestions for the green transformation of heavily polluting enterprises in various industries.

Keywords: Green finance; Transformation; Innovation; Green credit.

1. Introduction

Since the 19th National Congress of the Communist Party of China, the principle of "Lucid waters and lush mountains are invaluable assets" has been incorporated into the Party Constitution, emphasizing the importance of environmental protection and eco-friendliness in corporate transformation. Furthermore, the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China elevated "green" to a national strategic level, positioning it alongside "innovation, coordination, openness, and sharing" as one of the five key development concepts [1].
The emergence of green finance concepts such as green mergers and acquisitions and green credit has, to a certain extent, alleviated the issue of environmental protection funding by guiding capital flows. It has also generated positive effects on economic growth and corporate development, spurring enterprises to accelerate their transformation, upgrading, and self-investment.

Today, research on green finance by scholars both domestically and internationally has matured significantly. There is a general consensus that green finance policies can reduce excessive corporate investment, enhance resource allocation capabilities, and optimize resource allocation efficiency. As the concept of green development gradually permeates into enterprises, most heavily polluting companies have begun to actively respond and embark on the path of green transformation [2-5]. However, existing research primarily focuses on the macro-level impacts outside the enterprise or the enhancement of internal competitiveness within the enterprise, with relatively few studies examining how green finance specifically promotes the transformation and innovation of heavily polluting enterprises.

This paper aims to shift the perspective to the micro-level impacts of green finance within enterprises, analyzing the outcome of green finance on the transformation and innovation of heavily polluting enterprises from three angles: their internal financing constraints and pressures, external

talent mobility and market regulation, and green credit policies. By dissecting the mechanisms of the green finance, it may provide a theoretical explanation for the majority of heavily, and even slightly, polluting enterprises, illuminating the direction and requirements of the currently advocated green economy for their corporate improvement. It concludes that the current green finance policies encourage enterprises to embark on innovation and transformation voluntarily rather than passively, by highlighting how current green finance policies intensify financing constraints, facilitate market regulation and talent mobility, and provide financial support through credit and other means. Based on current research, this paper concludes with reasonable suggestions.

2. Green Finance Intensifies Financing Constraints and Pressure

With the growing emphasis on environmental protection and the ongoing refinement of environmental policies, green finance, as a pivotal financial instrument, exerts a substantial influence on the financing landscape for heavily polluting enterprises. Throughout the process of facilitating the transition of such enterprises, there exists significant interplay between financing constraints and pressures. An alternative financing scheme can effectively alleviate the financial burden on enterprises, expedite the transformation process, and enhance both the success rate and efficiency of transformation [6]. Conversely, financing pressure serves as an external impetus that compels enterprises to hasten their transformation pace through its coercive mechanism in response to increasingly stringent environmental regulations and market demands.

From the perspective of financing constraints, scholars have employed a two-way fixed effects model and, based on the viewpoint of heterogeneous environmental regulation, empirically demonstrated that green finance policies impose financing constraints on heavily polluting enterprises as a means rather than an end. The original intention is to compel these enterprises to undergo green transformation by increasing their financing constraints. Additionally, some scholars have shown through mechanism testing that financing constraints serve as an effective channel for green finance policies to promote innovation. The promotion effect of green finance policies on the green innovation of heavily polluting enterprises mainly occurs in companies with higher financing constraints. Green finance policies exacerbate the financing constraints of heavily polluting enterprises on the existing basis and utilize higher financing constraints to compel innovative intentions, thereby providing reverse incentives for engaging in green innovation activities [7,8].

In terms of financing pressure, the implementation of a series of relevant green finance policies will have heavy pollution enterprise financing punishment effect and investment inhibition effect. For example, once banks and other financial institutions are guided to take resource conservation, pollution control, factors such as environmental protection as the important basis of credit decision, heavily polluting enterprises may face higher costs and stricter conditions in the financing process [9]. Through the analysis of the difference model constructed by Dai Yunhao, Zhao Yuhang and Lei Yiwen, the current green finance pilot policy will steadily increase the financing cost of enterprises, and then lead to a significant decline in interest-bearing debt financing, liquid debt and long-term debt financing of these enterprises [9,10]. This pressure forces heavy polluting enterprises to consider transformation to improve their environmental performance and market image, forcing them to transform to obtain more financing support.

3. Green Finance Promotes Market Supervision and Talent Flow

Due to the growing national awareness of social and environmental issues as well as the increasing prominence of climate issues, green finance is a crucial tool for promoting heavy enterprises' green transformation and innovation, directing funds toward the environmental protection sector, and encouraging the adoption of low-carbon practices. Talent flow and market oversight are crucial for significantly polluting businesses looking to go green.

In terms of market supervision, through the introduction of relevant environmental regulations and policy measures. Increasing the costs for high-polluting industries has effectively encouraged their transition to green production. By using the double differential method (DID) and using heavy pollution enterprises as the starting point, researchers Liu Jianjiang and colleagues created a benchmark model by empirically examining the effects, mechanisms, and heterogeneity of the new Environmental Protection Law on the upgrading and transformation of enterprises. It is concluded that the introduction of the new Environmental Protection Law has significantly promoted the transformation and upgrading of heavy pollution enterprises marked by the improvement of the value chain and the increase of added value [11].

In terms of talent flow, green total factor productivity takes into account energy loss and pollution emissions in the production process. The increase in its value reflects the increase of expected output such as economic growth and the reduction of unexpected output such as pollution emissions under established input. Therefore, it is in line with the green development concept of "win-win" economic growth and environmental protection repeatedly advocated in the new era, and can be used as a reasonable evaluation indicator for high-quality economic development. Therefore, scientific measurement of green total factor productivity and in-depth exploration of its potential influencing factors have indispensable profound implications for guiding the green transformation of the economy and society and enabling high-quality development. Over time, green total factor productivity has supplanted total factor productivity and emerged as a prominent area of research. Studies have demonstrated that productivity gains from green total factors are mostly dependent on human capital, and that there are clear "threshold value" relationships between the two variables [12]. The study found that the overall change of green total factor productivity in China is on the rise, and the contribution rate of technological progress is relatively large. Human capital has a significant driving effect on the improvement of green total factor productivity. High-level human capital contributes more to green total factor productivity than low- and medium-level human capital [13,14].

4. Green Credit Policy Encourages Green Transformation and Innovation of Heavy Polluting Enterprises

Green credit, as an important part of green finance, has a significant impact on the transformation and innovation of heavy polluting enterprises. This impact is mainly reflected in the aspects of market orientation, technological innovation and policy preference. From the perspective of market orientation, green credit policies steer the market towards a sustainable, environmentally friendly direction by regulating fund flows and optimizing resource allocation. This policy focus has facilitated the evolution of green finance. As depicted in Figure 1 illustrating the transformation of Chinese commercial banks' green finance initiatives, the issuance scale of green bonds has consistently increased since the introduction of "green bonds," providing financial backing for global environmental development [15]. Global green bond issuance has experienced rapid growth, surging from $440 million in 2012 to $541 billion in 2021, representing a compound annual growth rate of 120%.

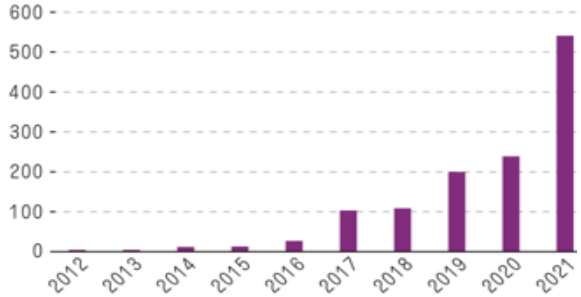

Fig. 1 Size of green bond issuance from 2012 to 2021

In terms of the perspective of technological innovation, green credit extends beyond providing financial support to encompass a focus on technological advancement and enterprise upgrading.

Financial institutions are inclined to back enterprises that demonstrate innovative prowess in green technology, offering not only financial investment but also technical guidance and management consulting services aimed at facilitating the development of new technologies, streamlining production processes, and enhancing resource efficiency. Technological progress stands as the pivotal driving force behind propelling enterprise transformation and upgrading, with green credit achieving its objectives through the promotion of technological advancement. The model discussed in research on the promotion of green innovation through green credit policy reveals that green finance serves as a significant catalyst for fostering green innovation and realizing sustainable development while also constituting an integral component of technological innovation [16].

From the perspective of environmental protection, green credit has also made breakthroughs in the innovation research of heavily polluting enterprises. Through the model cited by Chen, the benchmark regression of green credit policy on green innovation of heavily polluting enterprises is calculated by using the mediating effect model [17]. The results show that green credit is stimulating enterprises to pay attention to heavy pollution and promoting innovation.

In conclusion, green credit not only offers financial assistance to heavily polluting enterprises, but also facilitates their transformation and innovation through various channels such as market orientation and technological advancement. This financial tool not only contributes to addressing environmental issues, but also fosters the green and sustainable development of the economy. In the future, with the continuous enhancement and deepening of the green financial system, green credit will play a more extensive positive role and make greater contributions to promoting the construction of ecological civilization and sustainable development.

5. Conclusion

This paper analyzes the influencing mechanism of the green finance on the green transformation and innovation of heavily polluting enterprises from three aspects: financing, market and policy, and draws the following conclusions: First, green finance policies encourage enterprises to accelerate changes to adapt to increasingly strict environmental protection requirements and market demand by aggravating the financing constraints and pressure of polluting enterprises, and force enterprises to consider green transformation to improve their environmental protection performance and market image, so as to obtain more financing support. Secondly, in terms of market supervision, relevant environmental regulations, policies and measures have been introduced to increase the emission costs of heavy polluting enterprises and effectively bring the green changes of enterprises, in terms of talent flow, human capital exerts a notable driving effect on enhancing green TFP, and the promotion effect of high-level human capital on green TFP is stronger. Third, Although the new green credit policies can have an inhibitory effect on factories, especially more pronounced in small-scale private enterprises, for heavy polluting enterprises with good environmental responsibility performance or that receive government environmental subsidies, green credit policy can actually encourage them to engage in more green innovation activities. This provides an important reference for formulating more scientific and reasonable green credit policies in the future.

Based on the above conclusions, in order to better play the role of green finance in promoting the green transformation and innovation of heavily polluting enterprises, this paper proposes the following suggestions: First of all, heavy polluting enterprises should pay attention to the environmental information of the current situation, enhance their awareness of environmental protection responsibilities and formulate corresponding management measures to better carry out green transformation or green innovation, such as strengthening communication and cooperation with government departments and establishing perfect internal systems, so as to respond to the national green finance policy. At the same time, the review procedure should be improved for financing constraints, and the phenomenon of total negation should be eliminated. For example, when a certain index slightly exceeds the index, we should observe whether it can improve the review of other indicators to make up for the slight defect of this index.

In addition, this paper only analyzes the influencing mechanism of green finance on the green transformation and innovation of heavily polluting factories on three aspects: financing constraints and pressure, market regulation and talent flow, and green credit policy, Therefore, in the subsequent research, it can be analyzed from more aspects such as internal supervision of enterprises.

Author Contributions

All the authors contributed equally and their names were listed in alphabetical order.

References

[1] Wang X, Wang Y. Green credit policy promotes green innovation research. Managing the World, 2021, 37(6): 173-188.

[2] Su Dongwei, Lian Lili. Does green credit affect the investment and financing behavior of heavily polluting enterprises? Economic Research Guide, 2018, 12(2018): 123-137.

[3] Wang Yanli, Lei Xiaodong, Long Ruyin. Does green credit policy improve the investment efficiency of enterprises? --From the perspective of financial resource allocation of heavily polluting enterprises. China's population, resources and environment, 2021, 31(1): 123-133.

[4] Li Yajin. Research on the influence of green finance on corporate investment efficiency. Operations Research and Fuzziness, 2023,13(5): 5396-5410.

[5] Fu Lin. The impact of green M&A on green innovation of heavy polluting enterprises. Advances in Applied Mathematics, 2023, 12(4): 1375-1381.

[6] Yu X L, Zhou Y. Green credit policy and green transformation of high-polluting enterprises: from the perspective of emission reduction and development. Quantitative economics and technical economics, 2023, 40(7):179-200.

[7] Huang, X. Research on the Impact of Green Finance on Corporate green transformation, Chongqing Technology and Business University, 2023.

[8] Ye, L. The Impact of green finance policy on corporate green innovation and its mechanism. Nanjing University of Science and Technology, 2023.

[9] Li Linghao. Whether Green Credit affects the investment and financing behavior of heavy polluting enterprises, International Institute of Green Finance, Central University of Finance and Economics, 2024.

[10] Dai Yunhao, Zhao Yuhang, Lei Yiwen. Ipo and corporate growth. Securities Market Herald, 2023.

[11] Liu Jianjiang, Xiong Zhiqiao, & Shi Daqian. Does the implementation of the new Environmental Protection Law force the transformation and upgrading of heavy polluting enterprises? School of Economics and Management, Changsha University of Science and Technology, and School of Economics, Wuhan University of Technology, 2022.

[12] Financial crash record. Research on green TFP measurement in the perspective of high-quality development, Journal of Finance and Economics, 2022. Retrieved from https://baijiahao.baidu.com/s?id=1751549649529050523&wfr=spider&for=pc

[13] Rice Sprout Finance and Economics. Does the Environment Affect Manpower? What is the impact of environmental regulation on human capital of heavy polluting enterprises? 2022. Retrieved from https://baijiahao.baidu.com/s?id=1778260539799567690&wfr=spider&for=pc

[14] Li Yang, Deng Ziyi. The impact of human capital on green total factor productivity. Statistics and Decision making, 2023,39(01):158-162.

[15] Nenavath, S. Impact of fintech and green finance on environmental quality protection in India: By applying the semi-parametric difference-in-differences (SDID). Renew. Energy 2022, 193: 913-919.

[16] Xi, B., Wang, Y. & Yang, M. Green credit, green reputation, and corporate financial performance: evidence from China. Environ Sci Pollut Res, 2022, 29: 2401-2419.

[17] Liu, F., Tan, D., Deng, P. et al. How does green credit reduce carbon emissions? Dynamic spatial interactions and regional disparities. Environ Sci Pollut Res, 2023, 30: 68504-68523.