

Analysis of the Role Path of Green Credit Policies in Influencing Enterprises' Green Transformation through Bank Credit Allocation

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Abstract. Green credit policy is the subject of study in this paper, which explores how it exerts influence on the green transformation of enterprises through bank credit allocation. As China's ecological civilization construction continues to deepen, green credit plays an important role in financial support for green development, and the effects and transmission mechanisms of related policies have attracted increasing attention. This study first reviews the development process and theoretical basis of green credit policies at home and abroad and analyzes the evolution characteristics and institutional framework of China's green credit policies. Then it constructs a theoretical model of the impact of green credit policies on the green transformation of enterprises and systematically dissects the three main channels of policy transmission from the perspective of bank credit allocation: First, use differentiated credit pricing mechanisms to direct funds to environmentally friendly enterprises. Second, by taking advantage of the requirements of environmental risk management, banks can adjust their credit structure, thereby indirectly forcing high-pollution enterprises to transform. Third, provide financial guarantees for green technological innovation and clean production through the support of green project financing. Empirical analysis shows that green credit policies have significantly increased banks' credit support for green industries, reduced the financing convenience for highly polluting enterprises, and led enterprises to independently carry out green transformation through the differentiation of funding costs. However, the study also noticed regional differences and insufficient policy coordination during the policy implementation period. In response to these problems, this paper presents policy proposals such as improving the green credit standard system, strengthening the bank green credit incentive and restraint mechanism, and building a diversified green financial product system in order to make the green credit policy more efficient in promoting the green transformation of enterprises, Boost the sustainable development of China's economy and society.

Keywords: Green credit policy; Bank credit allocation; Corporate green transformation; Pathways of action; Environmental Risk management.

1. Introduction

The growing global environmental problems have made green development a global consensus, and green credit, as a key tool for financial support of green development, plays an irreplaceable role in promoting economic structural adjustment and industrial transformation and upgrading. As China is the world's largest developing country, the strategic position of green credit policy becomes even more important when advancing ecological civilization and achieving the "dual carbon" goals. According to statistics from the China Banking and Insurance Regulatory Commission, by the end of 2022, the balance of green loans of 21 major domestic banks reached 19.55 trillion yuan, an increase of 38.5% year-on-year, much higher than the growth rate of other loans during the same period.

The allocation of bank credit is being adjusted by the green credit policy, which has a profound impact on the green transformation of enterprises. On the one hand, the green credit policy has a differentiated pricing mechanism that gives environmental protection enterprises more preferential financing to guide funds to green industries. On the other hand, it strictly conducts environmental risk assessment and restricts credit access for high-pollution and high-emission enterprises. The People's Bank of China's "2022 Green Finance Development Report" shows that by the end of 2022, the non-performing loan ratio of green loans in China was only 0.15%, while the overall non-performing loan ratio of commercial banks was much higher, indicating that green credit not only has good environmental benefits but also relatively stable economic returns. [1] [2]

There are still many challenges in the implementation process of the green credit policy. The imperfect green credit standard system, the lack of internal incentive mechanisms in banks, and the insufficient innovation of green credit products have limited the effect of the policy. Against the backdrop of unbalanced development in specific regions, There are significant differences in the implementation of green credit policies by banks in different regions, especially in the less developed western regions where the penetration rate of green credit lags far behind that in the developed eastern regions. The study shows that in 2022, the proportion of green credit in the eastern and western regions was 18.6% and 9.7% respectively.

This study aims to explore the pathways by which green credit policies affect corporate green transformation through bank credit allocation and to analyze the key elements and optimization strategies during policy implementation. By constructing theoretical models and conducting empirical analyses, it systematically sorts out the transmission mechanism of green credit policies and reveals the moderating role of bank credit allocation as a mediating variable in policy implementation. To provide a theoretical basis and practical reference for improving the green credit policy system and enhancing the policy implementation effect to better promote the green transformation of enterprises and sustainable economic development.

2. The theoretical framework and practical status of green credit policies

2.1 The theoretical basis of green credit policy

The theoretical basis of green credit policy is mainly based on environmental economics and sustainable finance theory. From the perspective of environmental economics, there is a situation of "market failure" in resource allocation in the market. The environmental externalities generated by enterprises during production cannot be internalized by the market mechanism itself, which leads to negative externalities such as environmental pollution. Green credit, as a type of financial policy tool, helps internalize environmental externalities by regulating the flow of funds and incorporating environmental factors into credit choices to correct market failures. When banks incorporate environmental risks into the credit assessment system, environmentally friendly enterprises can obtain more benefits, while highly polluting enterprises face higher financing costs. Such differentiated pricing mechanisms can strongly guide enterprises to proactively undertake green transformation[3].

From the perspective of sustainable finance theory, green credit is an important means for the financial system to develop sustainably, because the traditional financial system attaches too much importance to short-term economic returns and neglects long-term environmental risks. Therefore, the concept of green finance emphasizes the inclusion of environmental, social and governance (ESG) factors in the financial decision-making process, Research by the Bank for International Settlements (BIS) shows that if financial institutions can reasonably assess and manage environmental risks, they can not only reduce potential credit losses but also obtain long-term stable returns. Research by Chinese scholar Xu Luode (2021) shows that green credit is not only a means to deal with climate change, but also an inevitable choice for banks to control systemic risks and achieve sustainable development.

2.2 The development Process of China's Green Credit Policy

The development process of China's green credit policy can be divided into three major stages. The first stage (2007 to 2012) was the initial stage of the policy. In 2007, the former State Environmental Protection Administration, the People's Bank of China and the China Banking Regulatory Commission jointly issued the "Opinions on Implementing Environmental Protection Policies and Regulations and Preventing Credit Risks", which for the first time incorporated environmental factors into the credit approval process. The framework of China's green credit policy was initially formed in 2012, and the China Banking Regulatory Commission issued the Green Credit Guidelines. This stage mainly relied on administrative measures such as the "one-vote veto for

environmental protection" to restrict credit access for highly polluting enterprises, and the policy orientation was dominated[4] by "restrictions".

From 2013 to 2017 was a period of policy refinement. In the second stage, in 2015, the People's Bank of China released the Catalogue of Green Bond-supported projects. By 2016, the seven ministries jointly issued the "Guiding Opinions on Building a Green Financial System", which changed the green credit policy from a single restriction to a "restriction + incentive" dual approach with more diverse policy tools, and in 2016, China included green finance in the G20 Hangzhou Summit communique, demonstrating China's leading role in global green finance. During this period, the scale of green credit grew rapidly. By the end of 2017, China's green credit balance reached 8.53 trillion yuan, an increase of 19% year-on-year.

The third stage, the policy deepening period, began in 2018 when the China Banking and Insurance Regulatory Commission included green credit in the macroprudential assessment (MPA) system. After the carbon peaking and carbon neutrality goals were proposed in 2020, green credit was regarded as an important financial tool to support the "dual carbon" goals. In 2021, the People's Bank of China introduced a carbon reduction support tool to lead financial institutions to increase support for key areas of carbon reduction. In 2023, the "Work Plan on Financial Support for High-Quality Joint Construction of the Belt and Road Initiative" once again emphasized the importance of green finance in the construction of the Belt and Road Initiative. At present, China's green credit policy has established a relatively complete system. It covers many aspects such as standard setting, regulatory evaluation and incentives and constraints.

2.3 Current status and challenges of green credit implementation

Green credit in China is developing rapidly and facing many practical challenges. The current situation of its implementation is that the scale has been expanding and the structure has been continuously optimized. Data from the China Banking and Insurance Regulatory Commission shows that by the end of 2022, the balance of green loans in China was close to 20 trillion yuan, accounting for 12.7% of all loans and with an average annual growth rate of more than 35%. In terms of industry distribution, clean energy, green transportation and energy conservation and environmental protection accounted for the highest proportion and combined more than 70%, especially in the clean energy sector, which saw new loans increase by 91% year-on-year in 2022. This reflects the positive response of financial institutions to the "dual carbon" goals. In terms of regional distribution, green credit development is leading in the eastern region, while the growth rate in the central and western regions is accelerating, indicating that the policy coverage is expanding. Additionally, the overall quality of green credit assets is good, and the non-performing loan ratio of major banks' green loans is mostly below 1%[5].

Despite the remarkable achievements, the implementation of green credit still faces many challenges. First of all, the green credit standard system is not yet complete. Currently in China, green credit is mainly determined through the environmental benefit law, and there is a lack of clear "brown asset" identification standards, which can easily lead to "greenbleaching". Secondly, there are differences in the implementation of green credit policies in different regions. In 2022, the proportion of green credit in the Yangtze River Delta and Pearl River Delta regions exceeded 15%, while in some provinces in the northwest and northeast, it was less than 8%. Therefore, the inclusiveness of the policies needs to be further enhanced. Third, the internal incentive and restraint mechanisms of banks are insufficient. Most banks still view green credit as a policy task rather than a business opportunity and lack long-term strategic planning for related businesses[6].

Green credit has a prominent lack of ability in risk identification and management. Given the long-term and external nature of environmental risks, traditional risk control methods of banks are difficult to conduct effective assessment of them. About 70% of banks admit that they lack professional environmental risk assessment tools. Finally, the insufficient coordination of green credit with other policies and the incomplete development of market-based mechanisms such as carbon markets and

environmental tax have weakened the leverage effect of green credit policies. These challenges collectively restrict the effectiveness of green credit policies, and measures such as improving the standard system, strengthening policy coordination, and enhancing the professional capabilities of banks are needed to address them.

3. Analysis of the Adjustment Mechanism of Bank Credit Allocation

3.1 Trends in the Structure of Credit allocation

Influenced by green credit policies over the past five years, the credit allocation structure of banks in China has shifted significantly in a green direction. In terms of industry distribution, the credit share of traditional high energy consumption and high emission industries has been continuously decreasing, while the credit share of green and low-carbon industries has gradually increased. Data from the China Banking Association shows that from 2018 to 2022, The average annual growth rate of loans in high energy-consuming industries such as steel, cement and electrolytic aluminum was only 3.2%, while the average annual growth rate of loans in green industries such as renewable energy and energy conservation and environmental protection was 28.5% at that time. By the end of 2022, the loan share of the six high energy-consuming industries had dropped from 8.7% in 2018 to 5.9%. Green industry loans rose from 9.2% to 12.7%, with credit resources significantly biased towards the green and low-carbon sector.

In terms of credit conditions, the gap in financing costs between environmentally friendly and highly polluting enterprises continues to widen, according to A 2022 questionnaire survey by the People's Bank of China, the average loan interest rate for A-level environmental protection enterprises is 0.3 to 0.5 percentage points lower than the benchmark interest rate. The average loan rate for environmentally compliant enterprises is 0.5 to 1 percentage point higher than the benchmark rate, and for every level of environmental credit rating reduction, the average financing cost increases by 0.2 percentage points. This differentiated pricing mechanism effectively raises the environmental compliance cost for highly polluting enterprises, thereby encouraging them to take the initiative to reduce emissions and transform. In addition, banks offer more lenient credit lines and terms to green enterprises, with an average credit period of 1 to 2 years longer than regular loans, which is helpful for meeting the long-term investment needs of green projects. Overall, the adjustment of bank credit allocation structure has a "two-way effort" feature, that is, not only increasing credit support for green industries, but also restricting capital input to high-pollution industries. This leads to an effective incentive mechanism[7] that promotes the green transformation of enterprises.

3.2 Green credit risk assessment system

The green credit risk assessment system of banks is a key link in the optimal allocation of credit resources and has shown a trend of comprehensive, refined and digital development in recent years. Currently, mainstream commercial banks have established a "double E" assessment system covering environmental and social risks. Integrating the traditional Economic Risk assessment with the Environmental Risk assessment, which mainly covers compliance risk, reputation risk and credit risk. Compliance risk assesses whether the enterprise complies with environmental regulations, reputation risk focuses on the potential impact of the enterprise's environmental behavior on the bank's image, and credit risk assesses how environmental factors affect the enterprise's debt-paying ability and asset value.

In terms of assessment methods, most banks in China use the "environmental risk classification management" model to conduct differentiated credit business based on the environmental risk level of customers. For example, ICBC divides customers into four environmental risk levels and implements "environmental veto" for high-risk customers, while CCB uses the ESG+ rating system and incorporates environmental performance into the comprehensive rating of enterprises. The China Development Bank has also developed a specialized "green credit rating system" to quantitatively

score the environmental benefits of projects. These assessment systems can effectively convert environmental risks into quantifiable credit decision-making basis[8].

The development of digital technology has led to a trend towards intelligent green credit risk assessment for banks. By 2022, 15 banks in China began to use technologies such as satellite remote sensing and Internet of Things to monitor the environmental performance of enterprises. For instance, Industrial Bank has collaborated with the Ministry of Ecology and Environment to access environmental monitoring data of enterprises to achieve real-time monitoring of environmental risks. Icbc has also used big data technology to build a corporate carbon emission measurement model to provide a basis for carbon reduction loans. These innovations have made environmental risk assessment more accurate and efficient, providing strong support for banks' green credit decisions.

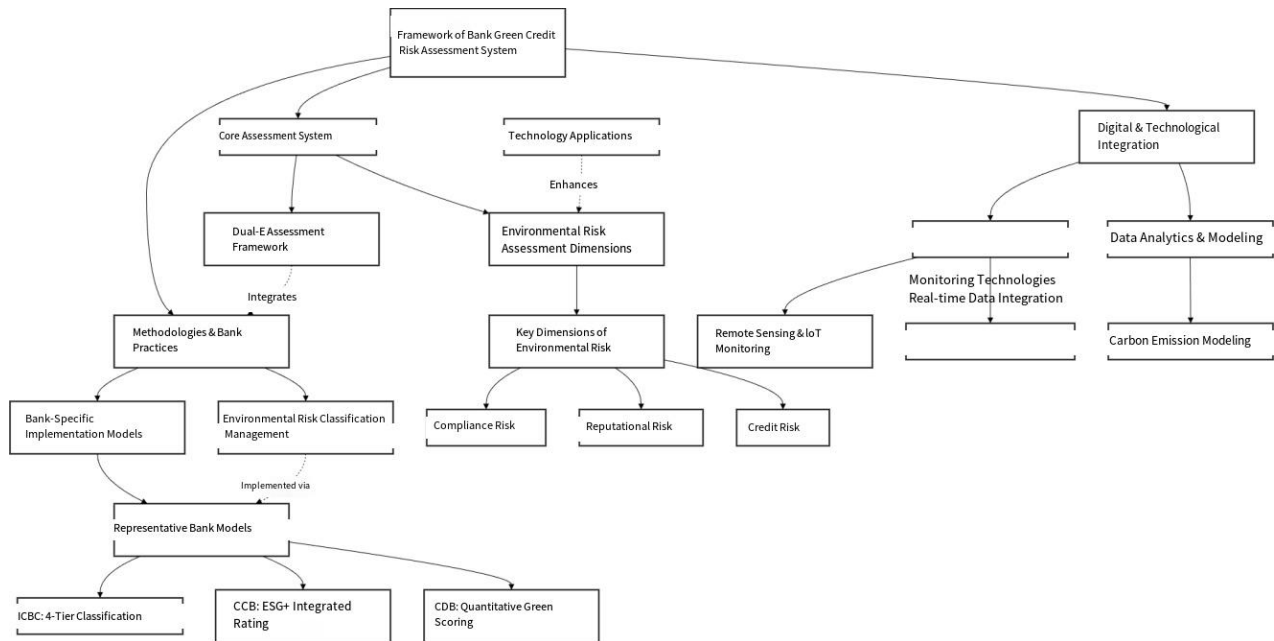


Figure 1. Framework of the bank's green credit risk assessment system

3.3 The realization path of Optimal Allocation of Credit Resources

There are mainly three paths for banks to achieve the green and optimal allocation of credit resources, namely differentiated credit policies, internal incentive mechanism reform, and financial product innovation. Among them, differentiated credit policies, as the most direct regulatory means, will implement the "five optimizations" policy for green enterprises. For high-pollution enterprises, the "three limits" policy, namely, restrictions on access, scale and term, will be implemented. Statistics show that in 2022, major domestic banks offered an average interest rate discount of 0.3 to 0.5 percentage points on green project loans, and the approval time was reduced by more than 30 percent, effectively enhancing the availability of financing for green projects.

The green allocation of credit resources is guaranteed by the internal incentive mechanism reform. Advanced banks incorporate green credit into the KPI assessment system and have differentiated performance evaluations for green credit business. China Merchants Bank offers preferential FTP internal fund transfer prices for green credit business and 20% discount on risk asset measurement to boost the enthusiasm of branches to develop green credit. Icbc has set up a special incentive fund to allocate resources to branches with outstanding green credit performance, thus forming an effective positive incentive mechanism[9].

Financial product innovation provides diversified means for optimizing the allocation of credit resources. In recent years, banks have vigorously developed innovative products such as carbon emission reduction loans, green supply chain financing, and green bonds to meet the financing needs of various green enterprises, especially through the assessment of the environmental performance of core enterprises in the industrial chain. Green supply chain financing drives small and medium-sized

enterprises upstream and downstream to jointly improve environmental behavior. By the end of 2022, domestic banks had more than 300 green financial products, including loans, bonds, leases and other forms to provide comprehensive financial support for the green transformation of enterprises. Under the synergy of these three paths, bank credit resources are gradually shifting from high-pollution industries to green and low-carbon industries, strongly supporting the process of enterprises' green transformation.

4. The multi-dimensional impact mechanism of enterprise green transformation

4.1 The impact of capital cost and availability on corporate decision-making

After the implementation of green credit policies, the extent to which banks pay attention to corporate environmental performance has a direct impact on the cost and availability of funds for corporate financing and is also crucial[10] to corporate green transformation decisions. Data released by the China Banking and Insurance Regulatory Commission showed that by the end of 2022, the weighted average interest rate of green loans at 21 major domestic banking financial institutions was 4.1%, 0.3 percentage points lower than the average interest rate of ordinary loans during the same period. This differentiated pricing mechanism enables environmentally friendly enterprises to enjoy preferential financing costs. The economic driving force for the green transformation of enterprises has been enhanced.

On the other hand, banks have imposed stricter credit restrictions on high-pollution and high-emission enterprises. Data in 2021 showed that the proportion of loans to high energy consumption, high pollution and overcapacity industries in China's banking sector dropped from 13.6% in 2017 to 9.3%, a decrease of more than one percentage point per year on average. The significant disparity in the availability of funds has led to financing constraints for enterprises with poor environmental performance, prompting them to re-examine their production processes and energy structures, actively carry out technological upgrades and invest in environmental governance to improve environmental performance and obtain more financing opportunities. This has formed an external driving force for the green transformation of enterprises.

4.2 Facilitation of green technological innovation

The effective improvement of enterprises' green innovation capabilities benefits from the support of green credit policies for enterprises' research and application of green technologies, according to the China Green Technology Innovation Development Report (2021), in 2020, the number of patent applications related to green development among the national invention patent applications reached 468,000, an increase of 32.6% compared with 2016. The continuous and stable financial support from the inflow of green credit funds for enterprises' green technology research and development has greatly reduced the financial risks of green technology innovation, allowing enterprises to focus more on the development[11] of environmental protection technologies and applications.

The differentiated policy orientation of green credit has led to a "spillover effect" in corporate green innovation. According to statistics, during the period from 2018 to 2022, the average R&D investment of enterprises supported by green credit was 18.4% higher than that of enterprises not supported, and the growth rate of green patent applications was 23.7% higher than that of the latter. This technological innovation is not only reflected in terminal governance technologies, but also goes deeper into source control of production processes and energy conservation and emission reduction throughout the entire process, thereby promoting technological upgrading and the improvement of green development levels in the entire industry. Green technology innovation has become the core driving force for enterprises to achieve green transformation, providing them with more diverse transformation paths to choose from.

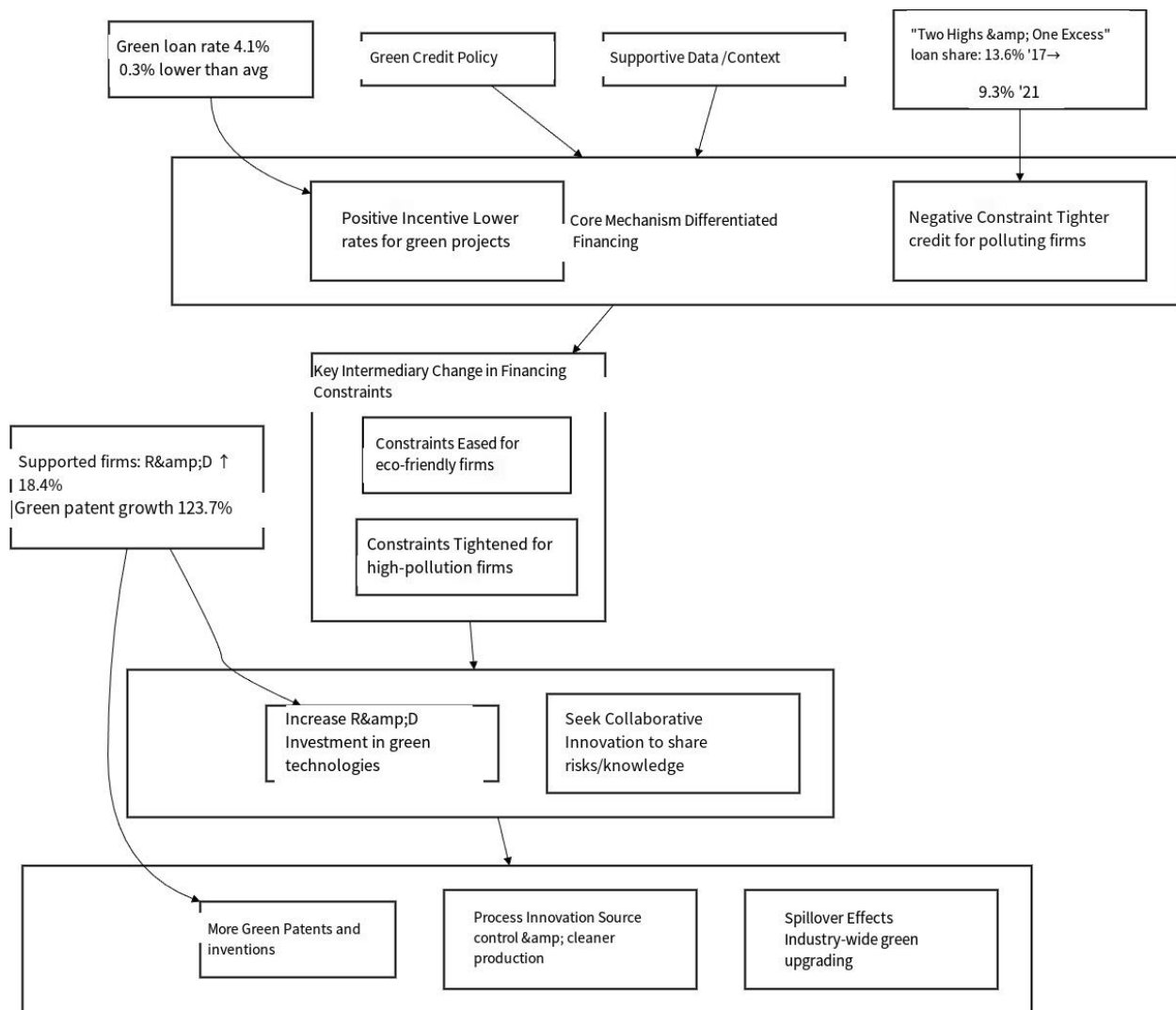


Figure 2. Path Diagram of the impact of Green Credit Policies on the green technology innovation mechanism of enterprises

4.3 Path to Enhancing Environmental Governance Capacity of enterprises

The improvement of corporate environmental governance capacity is at the core of the green transformation. Green credit policies have promoted the systematic improvement of this capacity through many means. First, enterprises are required by the green credit assessment system to build a complete environmental risk control mechanism. This situation prompts enterprises to strengthen environmental protection management at the organizational structure level and establish dedicated environmental management institutions. In order to meet the banks' requirements for environmental information disclosure, enterprises have gradually improved their environmental monitoring and data collection systems and enhanced the level of refined management of pollutant emissions. According to the environmental protection department, the proportion of enterprises above designated size in key industries reached 62.3% in 2021, up 15.8 percentage points from 2017, and the proportion of enterprises that established ISO14000 environmental management system certification and issued environmental social responsibility reports reached 57.6%, up 21.4 percentage points from 2017. This reflects a significant improvement in the environmental governance capacity and transparency of environmental information of enterprises.

4.4 Case Studies

In the green transformation of China's steel industry, Baoshan Iron & Steel Co., Ltd. is a model. Driven by the green credit policy, in 2019, Industrial and Commercial Bank of China provided

Baosteel with 5 billion yuan of green credit support for ultra-low emission transformation and energy-saving technology upgrade projects. With this money, Baosteel implemented the integrated technology transformation of desulfurization and denitrification of sintering machines and built a comprehensive utilization base of steel slag. This led to a 65% reduction in sulfur dioxide emissions and a 12% reduction in energy consumption. More importantly, taking this opportunity, Baosteel established and improved its environmental management system, shifting from "end-of-pipe treatment" to "whole-process control". Due to the improved environmental performance, it received more green financial support and formed a virtuous cycle. In 2022, the interest rate on its green bonds was 0.4 percentage points lower than that of ordinary bonds during the same period, significantly reducing the company's financing costs.

Yingli Green Energy Holdings Limited, a typical leading enterprise in the photovoltaic manufacturing sector, successfully developed a new generation of N-type TOPCon cell technology in 2020 with the support of a 3 billion yuan green credit line from the Bank of China for the research and development of high-efficiency photovoltaic cell technology and capacity expansion. It has increased the photoelectric conversion rate by 2.1 percentage points and reduced harmful substances used in production, demonstrating how green credit promotes green technological innovation in enterprises and drives the green upgrade of the entire industrial chain through technological progress to create both environmental and economic value. This shows that green credit meets both Yingli's short-term transformation needs and lays the foundation for its long-term sustainable development.

5. Conclusions

This study systematically dissects the pathways through which green credit policy affects corporate green transformation, which is achieved through bank credit allocation, and also reveals three main transmission mechanisms: cost of funds differentiation, environmental risk management, and financing support for green projects. The study shows that green credit policy has become a key financial means to drive corporate green transformation. The mechanism of action is as follows: on the one hand, it builds external constraints and incentives by regulating the availability and cost of funds; on the other hand, it promotes the formation of endogenous transformation momentum in enterprises by supporting green technological innovation and the construction of environmental governance capabilities. Policy effects vary across regions and industries, and there is a non-linear correlation between financial support and environmental governance.

The concept of green development is deeply rooted and green credit policies are constantly improving, which will further enhance the guiding role of bank credit allocation in the green transformation of enterprises in the future. However, it should be noted that the green credit standard system needs to be unified, the policy incentive and restraint mechanism needs to be strengthened, and the diversified green financial product system has not yet been established. Therefore, the synergy of financial policies, industrial policies and environmental policies is necessary to better promote the green transformation of enterprises and facilitate China's ecological civilization construction and high-quality development. Future research can focus more on the long-term effect assessment of green credit policies, differentiated implementation strategies and the synergy mechanism with other green financial tools such as carbon emissions trading.

1. References

- [1] Qinying Li, Xuesong Gu. The impact of green credit on the financial performance of green transformation enterprises: Based on the chain mediation effect of ESG[J]. *International Review of Economics and Finance*, 25,103.
- [2] Huiying Cui. Green Credit and Green Transformation of High-Polluting Enterprises: “Extrusion Effect” or “Porter Effect”? [J]. *SAGE Open*,2025,15(3).
- [3] Huaixin Lu, Yong Pan, Rujie Fan, Wei Guan. Green credit policy and heavily polluting enterprises' green transition[J]. *International Review of Financial Analysis*,2025,103.

- [4] Cheng Jiayi. The Impact and Realistic Challenges of Green Credit on Enterprise Green Transformation[J].SHS Web of Conferences, 2025225.
- [5] Mengna Wang, Xingchao Ma. Does green finance promote the transformation and upgrading of manufacturing enterprises? Empirical research based on micro survey data in China[J]. Finance Research Letters, 24,69(PB).
- [6] WeijieTan, Edward HengzhouYan, Wai SzeYip. Go green: How does Green Credit Policy promote corporate green transformation in China[J]. Journal of International Financial Management & amp; Accounting, 2024, 4 (1).
- [7] Zhang Shujing, Dong Rui, Jiang Jinxing, Yang Shuyu, Cifuentes-Faura Javier, Peng Sihan, Feng Yanchao. Whether the green credit policy effectively promote green transition of enterprises in China? Empirical analysis and mechanism verification[J]. Environmental Research, 24,244.
- [8] Shining Tian, Hongli Zhang, Guangping Xu. The Effect of Green Credit on Enterprises' Green Transformation under Sustainable Development: Evidence from Green Innovation in High-Pollution Enterprises in China[J]. Sustainability, 2023, 16(1).
- [9] Li Yali. Research on the Impact of Green Credit Policy on the Green Transformation of Enterprises [D]. Liaoning University,2023.
- [10] Jian Guanqun; Zheng Xiya; "Punishment" or "motivation"? - Research on the Green Innovation Effect of Green Credit Policy [J]. Journal of Finance and Economics,2024(05):55-66.
- [11] Yu Haiting; Can green credit policies promote green innovation in heavily Polluting enterprises [J]. North China Finance,2022(08):41-52.