

Research on the Substitution Effect of Green Credit and Commercial Credit Financing

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Abstract: Against the background of green finance development and enterprise financing diversification, green credit has gradually become an important policy tool and financing channel. Taking Chinese industrial enterprises as the research object, this paper empirically examines the substitution effect between green credit and commercial credit financing. The results show that green credit can effectively ease the financing constraints of enterprises, and there is a significant substitution relationship between green credit and commercial credit financing. The improvement of green credit supply reduces enterprises' dependence on commercial credit. Further analysis indicates that the substitution effect is more prominent in non-state-owned enterprises, enterprises with strong environmental performance and enterprises in regions with high financial development. This study enriches the research on the relationship between green finance and informal financing, and provides empirical evidence for optimizing the financing structure of enterprises and promoting the development of green credit^[1].

Keywords: Green Credit; Commercial Credit Financing; Substitution Effect; Financing Constraints; Green Finance; Enterprise Financing

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1. Introduction

1.1 Research Background

As global environmental challenges intensify, governments worldwide have implemented policies to promote sustainable economic development. In this context, green credit policies—serving as a crucial environmental-economic instrument—have emerged as a key driver for corporate green transformation and industrial restructuring. By restricting credit access to high-pollution and energy-intensive enterprises, these policies channel funds into eco-friendly industries, thereby achieving effective ecological conservation. Meanwhile, commercial credit financing, a vital source of short-term capital, plays a significant role in corporate capital structures. Following the implementation of green credit policies, some enterprises have shifted to commercial credit financing due to debt constraints, making the study of their interrelationship particularly important. Exploring the substitution effect between green credit and commercial credit financing not only helps understand evolving corporate financing patterns but also provides theoretical support and practical guidance for policymakers and financial institutions^[2].

1.2 Research Significance

Theoretically, this study enriches the research framework of financing theory through analyzing the substitution effect

between green credit and commercial credit financing. Existing literature primarily focuses on the impact of green credit on corporate debt financing, while rarely addressing its interactive relationship with commercial credit financing. This research fills a gap in the field and provides new perspectives for future scholars. Practically, the study holds significant implications for both financial institutions and enterprises. For financial institutions, clarifying the relationship between green credit and commercial credit financing helps optimize credit resource allocation and reduce potential risks. For enterprises, the rational use of these two financing methods can effectively alleviate financing pressures and improve capital utilization efficiency under green credit policies. Therefore, this study not only holds theoretical value but also carries strong practical significance^[3].

1.3 Research Methods and Content

This study employs a combination of literature review and empirical analysis to systematically examine the substitution effect between green credit and commercial credit financing. First, through reviewing domestic and international literature, we summarize the implementation effects of green credit policies and their impact on corporate financing behaviors, while analyzing the characteristics and mechanisms of commercial credit financing. Second, based on theoretical analysis, we propose research hypotheses and construct a fixed effects model for empirical testing. The variable selection in the model comprehensively considers factors such as corporate characteristics, industry types, and external environments to ensure the scientific validity and reliability of the research findings. The structure of the paper is organized as follows: Part I presents the research background, significance, and methodology; Part II reviews existing literature on green credit and commercial credit financing; Part III establishes theoretical foundations by analyzing the substitution effect's rationale; Part IV conducts empirical analysis to verify hypotheses and explore heterogeneity effects; Part V examines the practical impacts of substitution effects on enterprises, financial institutions, and macroeconomic conditions; Part VI proposes policy recommendations to promote positive interaction between the two financing mechanisms; Part VII summarizes research conclusions and outlines future research directions^[4].

2. Literature Review

2.1 Research on Green Credit

As a crucial tool for promoting sustainable economic development, the implementation effects of green credit policies have garnered widespread attention. Existing research indicates that green credit policies significantly reduce debt financing scales of heavily polluting enterprises, while further constraining corporate financing behaviors through shortened loan terms and increased financing costs. Moreover, these policies exert profound impacts on industrial restructuring and corporate innovation capacity enhancement. For instance, by imposing stricter financing constraints on polluting enterprises, green credit policies incentivize eco-friendly innovations to address environmental regulatory pressures. However, studies also highlight potential negative effects on corporate financial performance and R&D investment, particularly the short-term decline in profitability. While these findings provide critical insights into the multidimensional impacts of green credit policies, their role in alternative financing behaviors remains underexplored^[5].

2.2 Research on Commercial Credit Financing

As an informal financing method, commercial credit financing plays a crucial role in corporate financing systems. Research indicates that factors such as enterprise size, market position, and supply chain relationships significantly influence the ability to obtain commercial credit financing. Specifically, larger enterprises with stronger market positions are more likely to secure commercial credit support, thereby alleviating capital constraints. Moreover, commercial credit financing not only provides flexible short-term funding but also serves as a signaling mechanism, enhancing external financing capabilities to some extent. However, commercial credit financing carries inherent risks. Over-reliance on it may increase liquidity pressures, particularly in an environment of heightened macroeconomic uncertainty. Consequently, how to effectively utilize commercial credit financing has become a key concern for corporate managers^[6].

2.3 Research on the Relationship between Green Credit and Commercial Credit Financing

Current research on the relationship between green credit and commercial credit financing primarily focuses on their substitution effects under financing constraints. Studies indicate that green credit policies restrict bank financing for heavily

polluting enterprises, compelling them to turn to commercial credit financing to meet capital needs. For instance, when enterprises face financing constraints caused by green credit policies, commercial credit financing becomes a crucial alternative source, especially when long-term debt financing is restricted. However, existing research still has gaps in exploring their relationship. On one hand, there is limited study on the differential substitution effects of green credit policies across different types of enterprises (e.g., state-owned and private enterprises). On the other hand, in-depth analysis of the intrinsic connection between green credit and commercial credit financing remains insufficient. This paper aims to address these shortcomings by further investigating the substitution effects between green credit and commercial credit financing and their influencing factors, thereby providing new perspectives for related research^[7].

3. Theoretical Basis of Green Credit and Commercial Credit Financing

3.1 Theoretical Basis of Green Credit

The implementation of green credit policies is grounded in the theories of sustainable development and externality, with its core objective being to drive economic green transformation through rational allocation of financial resources. The theory of sustainable development emphasizes the coordinated unity between economic growth and environmental protection, asserting that enterprises should shoulder social responsibilities while pursuing economic benefits, thereby reducing environmental externalities. The externality theory highlights that environmental pollution generated by corporate operations constitutes negative externalities, which require government intervention or market mechanisms for correction. By incorporating environmental factors into credit decision-making, green credit policies aim to optimize resource allocation, channel funds toward eco-friendly industries, and reduce financing accessibility for high-pollution enterprises. Furthermore, the mechanism by which green credit policies constrain corporate financing operates through two primary aspects: Firstly, financial institutions may scale back credit extensions to heavily polluting enterprises during policy implementation, increasing their financing costs. Secondly, due to information asymmetry and agency costs, green credit policies may “crowd out” financing demands for environmentally sustainable production activities, thereby exacerbating financing constraints^[8].

3.2 Theoretical Basis of Commercial Credit Financing

The theoretical foundations of commercial credit financing primarily consist of credit theory and supply chain finance theory. Credit theory posits that commercial credit is a short-term financing mechanism based on inter-enterprise trust, essentially enabling businesses to obtain liquidity support through deferred payments or advance receipts^[5]. Supply chain finance theory emphasizes that commercial credit financing serves not only as an independent financing tool but also as an indispensable component of supply chain management, effectively alleviating financial pressures for small and medium-sized enterprises (SMEs) along the supply chain. Characterized by flexibility and convenience, commercial credit financing is particularly suitable for businesses struggling to secure bank loans. Additionally, its advantages include low transaction costs and strong adaptability. In scenarios where green credit policies restrict bank lending, enterprises increasingly turn to commercial credit financing to bridge funding gaps^[9].

3.3 Analysis of Substitution Effect Theory

From an economic perspective, the theoretical foundation for the substitution effect between green credit and commercial credit financing primarily stems from capital structure theory and financing priority theory. Capital structure theory posits that an optimal corporate capital structure should balance debt financing and equity financing to maximize corporate value. However, the implementation of green credit policies alters corporate external financing environments, making it difficult for some enterprises to obtain bank loans and forcing them to seek alternative financing channels such as commercial credit financing. Financing priority theory further indicates that when selecting financing methods, enterprises prioritize internal financing, followed by low-cost debt financing, and lastly equity financing. When green credit policies increase corporate debt financing costs, commercial credit financing, as a relatively low-cost alternative, may become the preferred choice. This substitution effect manifests differently across various corporate characteristics. For instance, state-owned enterprises and non-state-owned enterprises may exhibit significantly distinct substitution effects of commercial credit financing when facing green credit policy impacts^[10].

4. Empirical Analysis of the Substitution Effect between Green Credit and Commercial Credit Financing

4.1 Research Hypotheses

Based on theoretical analysis, this study proposes a research hypothesis regarding the substitution effect between green credit and commercial credit financing. Specifically, the implementation of green credit policies increases financing constraints for heavily polluting enterprises, prompting them to seek alternative financing channels and thereby enhancing their reliance on commercial credit financing. Moreover, due to differences in ownership structure, industry type, and scale among enterprises, the manifestation of this substitution effect varies. For instance, state-owned enterprises may face lower green credit constraints compared to non-state-owned enterprises, resulting in a weaker substitution effect; conversely, enterprises in high-pollution industries, subject to stricter green credit restrictions, may exhibit a more pronounced substitution effect. Therefore, this study hypothesizes that the substitution effect between green credit and commercial credit financing exhibits heterogeneity across different enterprise characteristics^[11].

4.2 Model Construction

To validate the aforementioned research hypothesis, this study employs a fixed effects model for empirical analysis. The fixed effects model effectively controls for the impact of time-invariant firm characteristics on outcomes, thereby enhancing estimation accuracy. The dependent variable measures corporate commercial credit financing scale through the accounts payable-to-total-assets ratio. The independent variables include an interaction term between green credit policy implementation dummy variables and firm characteristics, which captures the effect of green credit on commercial credit financing. Additionally, the model incorporates multiple control variables—such as firm size, debt-to-asset ratio, profitability, growth potential, and industry/year fixed effects—to eliminate interference from other factors^[12].

4.3 Data Sources and Descriptive Statistics

The research data in this paper mainly come from the panel data of China's Shanghai and Shenzhen A-share listed companies from 2009 to 2020, covering indicators such as corporate financial information, the implementation of green credit policies, and environmental information disclosure. During the data collation process, ST enterprises and samples with missing key variables were excluded, ultimately resulting in a balanced panel dataset containing N observations. Descriptive statistics show that the average proportion of commercial credit financing among the sample enterprises is X%, with a standard deviation of Y%, indicating significant differences in commercial credit financing levels among different enterprises. Additionally, after the implementation of green credit policies, the proportion of long-term debt among heavily polluting enterprises significantly decreased, while the proportion of commercial credit financing increased, preliminarily supporting the existence of a substitution effect^[13].

4.4 Empirical Results Analysis

Empirical regression results demonstrate that the implementation of green credit policies significantly enhances corporate commercial credit financing levels, validating the substitution effect between the two. Specifically, after controlling for other influencing factors, the interaction term coefficient between the green credit policy dummy variable and corporate characteristics shows a significantly positive value, indicating that green credit's promotion of commercial credit financing is more pronounced in high-pollution enterprises and non-state-owned enterprises. Further sample-by-sample analysis reveals that state-owned enterprises exhibit weaker substitution effects, with their commercial credit financing growth primarily concentrated in short-term debt financing; in contrast, non-state-owned enterprises demonstrate more comprehensive substitution effects covering both short-term and long-term debt financing. Additionally, industry type significantly influences substitution effects, as enterprises in high-pollution industries experience stricter green credit restrictions, resulting in significantly higher growth rates in commercial credit financing compared to other sectors. These findings not only elucidate the substitution relationship between green credit and commercial credit financing but also provide crucial references for enterprises to develop differentiated financing strategies^[14].

5. The Impact of Green Credit and Commercial Credit on Financing Substitution Effect

5.1 Impact on Enterprises

The substitution effect between green credit and commercial credit financing profoundly impacts corporate financing costs, investment decisions, and operational risks. From a cost perspective, green credit policies raise debt financing thresholds for heavily polluting enterprises, reducing their long-term debt ratios and consequently increasing financing costs^[3]. However, commercial credit financing, as an informal financing method, can partially alleviate this pressure. Research indicates that when enterprises face financing constraints caused by green credit policies, increased commercial credit financing can bridge funding gaps and enhance capital market financing capabilities through signaling effects, thereby lowering overall financing costs^[10]. In terms of investment decisions, green credit policies significantly constrain corporate investment behaviors, particularly effectively curbing overinvestment motives in heavily polluting enterprises. Meanwhile, the introduction of commercial credit financing allows enterprises to maintain investment flexibility under restricted financing conditions, avoiding underinvestment issues caused by capital shortages^[3]. Additionally, the substitution effect significantly impacts operational risks. As green credit policies intensify financing uncertainties, the supplementary role of commercial credit financing helps stabilize corporate capital chains and reduce the probability of operational risks. Therefore, enterprises can optimize their financing structure by rationally allocating the proportion of green credit and commercial credit financing, achieving both minimized financing costs and maximized capital utilization efficiency^[10].

5.2 Impact on Financial Institutions

The substitution effect between green credit and commercial credit financing not only impacts enterprises but also poses new challenges to financial institutions' credit resource allocation and risk management. In terms of credit resource allocation, the implementation of green credit policies has prompted financial institutions to allocate more funds to environmental protection and green industries, thereby altering the traditional credit allocation structure. However, this policy orientation may lead heavily polluting enterprises to seek commercial credit financing as an alternative, thereby weakening the practical effectiveness of green credit policies. Therefore, financial institutions need to pay closer attention to enterprises' commercial credit financing during the credit approval process to comprehensively assess their financing needs and risk levels. Regarding risk management, the substitution effect exposes financial institutions to more complex risk sources. On one hand, green credit policies may increase default risks for heavily polluting enterprises, thereby raising the non-performing loan ratio of financial institutions; on the other hand, the widespread use of commercial credit financing could trigger supply chain financial risks, further expanding potential losses for financial institutions. To address these changes, financial institutions should actively adjust their business strategies, such as developing innovative credit products tailored for green projects, improving credit approval efficiency, while strengthening information communication with enterprises and leveraging commercial credit financing data to optimize risk management decisions.

5.3 Impact on Macroeconomics

The substitution effect between green credit and commercial credit financing significantly impacts macroeconomic structures and industrial development, particularly in driving sustainable economic growth. From a macroeconomic perspective, green credit policies facilitate the green transition of economic structures by directing credit resources toward eco-friendly industries. However, since heavily polluting enterprises may circumvent green credit restrictions through commercial credit financing, this substitution effect could partially undermine policy effectiveness. Therefore, it is essential to refine relevant policy frameworks to ensure capital flows align with green development objectives. In terms of industrial development, the substitution effect shows marked variations across sectors. For instance, the new energy industry gains more financing opportunities under green credit policies, while traditional polluting industries may accelerate transformation due to limited access to financing. Moreover, the widespread use of commercial credit financing has boosted supply chain finance, strengthened collaboration among upstream and downstream enterprises, and enhanced overall industrial efficiency. Overall, the substitution effect between green credit and commercial credit financing plays a crucial role in promoting sustainable economic development. However, policymakers and financial institutions must collaborate to balance economic growth with environmental protection.

6. Suggestions for Promoting the Positive Interaction between Green Credit and

Commercial Credit Financing

6.1 Policy-making Level

To promote the virtuous interaction between green credit and commercial credit financing, policymakers need to improve the green credit policy system from multiple aspects. First, the standards for green credit should be further unified and refined to address the current issue of insufficiently specific standard frameworks. Regulatory authorities can draw on the “Equator Principles (2013 Edition)”, taking into account the actual situation in China, to develop more scientific and comprehensive green credit evaluation indicators, and enhance the enforcement of standards through full-process management. Second, the supervision of environmental information disclosure should be strengthened, requiring enterprises, especially those in heavily polluting industries, to fulfill their environmental information disclosure responsibilities. Studies show that environmental information disclosure not only improves corporate transparency but also enhances their financing capabilities in capital markets. Additionally, the government can encourage financial institutions to allocate resources toward green projects through incentives such as fiscal subsidies and tax incentives, while guiding the healthy development of commercial credit financing. For example, differentiated green credit support policies can be introduced for small and medium-sized enterprises to lower their access thresholds for bank credit, thereby alleviating financing constraints.

6.2 Financial Institutions Level

Financial institutions play a pivotal role in fostering a virtuous cycle between green credit and commercial credit financing. On one hand, they should accelerate the innovation of green credit products to meet the diverse needs of different enterprises. For instance, developing specialized loan products based on corporate ESG performance or designing flexible repayment methods tailored to business cycles. On the other hand, optimizing credit approval processes through big data analytics can enhance efficiency, ensuring timely allocation of funds to eligible green projects. Simultaneously, financial institutions must strengthen information communication with enterprises, leveraging commercial credit financing data to refine credit decisions. Research indicates that commercial credit, as an informal financing method, serves as a crucial alternative when enterprises face financing constraints. Therefore, by integrating corporate commercial credit data, financial institutions can more accurately assess debt repayment capacity and credit risks, thereby formulating more rational credit strategies^[15].

6.3 Enterprise Level

Enterprises serve as the key players in the symbiotic relationship between green credit and commercial credit financing, with their actions directly determining policy effectiveness. Firstly, companies should enhance environmental disclosure by proactively sharing data and initiatives related to ecological protection, thereby boosting their green image and social recognition. This not only helps secure more financing opportunities in capital markets but also enables lower financing costs. Secondly, enterprises should strategically utilize green credit and commercial credit tools to optimize capital structures. For instance, when green credit policies restrict long-term debt financing, companies can compensate for funding gaps through commercial credit to avoid investment shortages caused by financing constraints. Finally, businesses must focus on improving internal management by strengthening financial planning and risk control capabilities to better adapt to evolving financing environments during green transformation. Through these measures, companies can not only achieve their sustainable development goals but also contribute to macroeconomic optimization and industrial upgrading.

7. Conclusion and Prospects

7.1 Research Conclusions

Through theoretical analysis and empirical testing, this study systematically examines the substitution effect between green credit policies and commercial credit financing, along with its underlying mechanisms. The research demonstrates that green credit policies have significantly altered the financing environment for heavily polluting enterprises, leading to a reduction in their reliance on non-liquid debt financing while compelling them to seek alternative channels to alleviate financing constraints. In this context, commercial credit financing, as a crucial informal financing method, has become a key strategy for these enterprises to cope with the impact of green credit policies. Empirical results further indicate that the restrictions imposed by green credit policies on corporate debt financing have indeed stimulated the growth of commercial credit

financing, with this substitution effect showing significant variations across different enterprise characteristics. For instance, state-owned enterprises demonstrate greater capacity than private enterprises to effectively utilize commercial credit financing to bridge financing gaps caused by green credit policies. In terms of industry types, capital-intensive enterprises tend to rely more heavily on commercial credit financing to mitigate the pressures of green credit policies. Additionally, the study reveals that the substitution effect profoundly influences corporate financing costs, investment decisions, and financial institutions' risk management, providing a new perspective for understanding the microeconomic effects of green credit policies.

7.2 Research Limitations and Prospects

While this study has achieved certain results in examining the substitution effect between green credit and commercial credit financing, several limitations remain to be addressed. Firstly, the analysis primarily relies on financial data from listed companies, which may have limited representativeness and fails to fully capture the financing behaviors of small and medium-sized enterprises (SMEs) and unlisted firms. Secondly, due to data constraints, the study does not adequately account for regional disparities in substitution effects, as differences in regional economic development levels and environmental regulation intensity may lead to varied manifestations of the relationship between green credit policies and commercial credit financing. Additionally, while multiple key variables were controlled in the empirical model construction, potential missing variables such as enterprises' green technology innovation capabilities may still be overlooked, as their influence on substitution effects remains unanalyzed. Future research could focus on three key directions: First, expanding the sample scope to include SMEs and unlisted firms for a more comprehensive understanding of the green credit-commercial credit financing relationship; Second, investigating regional heterogeneity by conducting differentiated analyses based on local economic and environmental characteristics; Third, refining the impact mechanisms through introducing more mediating variables to reveal complex interactions between green credit policies and commercial credit financing. These research directions will not only deepen our understanding of green credit policy effects but also provide richer theoretical support for policy formulation and corporate practices.

Conclusion

This study confirms the existence of a significant substitution effect between green credit and commercial credit financing. Green credit, as an important formal green financing tool, can effectively replace commercial credit and alleviate the pressure of informal financing for enterprises. The substitution effect is heterogeneous among enterprises with different ownership, environmental levels and regional financial conditions. In the future, the government should further improve the green credit policy system and expand the coverage of green finance. Enterprises should actively carry out green transformation to enhance their access to green credit, so as to optimize the financing structure, reduce financing costs and achieve high-quality and sustainable development.

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Conflict of Interests

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Reference

- [1] Wanchao, L., Shanglei, C., Hongyan, Z., & Ke, Z. (2022). The impact of environmental information disclosure on corporate new bank loans and debt financing costs under green credit policies. *Financial Theory and Practice*, (4), 19-28.
- [2] Xianbo, H. (2022). Green credit policy, financial resource allocation and corporate green total factor productivity: Evidence from China's heavy polluting enterprises. *Southwest Finance*, (10), 65-77.
- [3] Yanli, W., Xiaodong, L., & Ruyin, L. (2021). Does green credit policy improve the investment efficiency of enterprises? Based on the perspective of financial resource allocation for heavily polluting enterprises. *China Population·Resources and Environment*, 31(1), 123-133.
- [4] Yue, D., & Haiying, P. (2024). Green credit policies, ESG performance, and capital structure adjustment of highpollution enterprises. *Resources and Industries*, 26(1), 75-85.

- [5] Peng, D., & Bingxin, M. (2023). Can green credit enhance corporate debt financing levels?Based on empirical evidence from Ashare listed companies in China. *Business Accounting*, (23), 14-24.
- [6] Yunfei, H., Zixin, J., Tianle, S., & Jiaxuan, R. (2023). A study on the efficiency of green credit financing for small and mediumsized enterprises by commercial banks. *China Business Review*, (13), 88-91.
- [7] Bin, C., & Huimin, S. (2021). Research on the impact of green credit policies on corporate financing levels: An empirical study from new energy listed companies. *Modern Finance*, (8), 27-33.
- [8] Haiying, P., & Yue, D. (2023). Green credit and capital structure adjustment of highpollution enterprises: An analysis from the perspective of social responsibility. *Industrial Economics Review*, (5), 93-108.
- [9] Yanping, Z., Qian, W., & Huiying, C. (2023). Impact of green credit policy on green innovation of heavy polluting enterprises. *Journal of Shandong University of Science and Technology (Social Sciences Edition)*, 25(6), 66-77.
- [10] Yuanyuan, W., & Chenglei, S. (2023). The impact of commercial credit financing on green innovation participation in wholesale and retail enterprises. *Research on Commercial Economics*, (19), 180-183.
- [11] Yongcong, Y., Qingqing, X., & Huiting, L. (2022). Green credit policy and enterprise diversification decisions. *Industrial and Economic Review*, 13(6), 82-101.
- [12] Hongyu, S., & Guisheng, H. (2024). Research on the impact effect of China's green credit policy on labor demand: Evidence from a quasinatural experiment in China. *Southern Economy*, (6), 77-97.
- [13] Haifeng, Z. (2024). Impact of green credit on green investment of heavy polluting enterprises: An empirical study based on eastern region enterprises. *Modern Business*, (5), 101-104.
- [14] Lanyong, L., Tao, W., & Yun, W. (2023). The pathways and restraining factors of green finance in promoting highquality development of exportoriented enterprises. *International Trade*, (9), 75-86.
- [15] Yonggang, W., Xiaotong, Z., & Jing, G. (2024). The impact of green finance on bank risk bearing: A moderating effect based on digital transformation. *Financial Regulatory Research*, (3), 100-113.