The Effect of Green Finance on Global Value Chain Position

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Abstract. Green finance and global value chain (GVC) position are hot topics in current academic research, but the systematic combing of their relationship is not enough. This research utilizes a systematic literature review approach to integrate the related research from three dimensions: measurement method, effect analysis and transmission mechanism. It is found that green finance provides financial support by easing the financing constraints of enterprises, encourages enterprises to carry out green technological innovation, optimizes allocation efficiency by guiding resources to high value-added links, and obtains resource inclination by releasing green positive signals, thus promoting GVC position in multiple dimensions. This paper constructs a comprehensive analytical framework for examining the effect of green finance on position in GVCs. It also identifies the limitations of existing research at the end, suggesting areas for further exploration in the future. The paper also offers valuable insights and provides a reference into the development of green finance.

Keywords: Green Finance, Green Credit, Global Value Chain Position, Porter Hypothesis.

1 Introduction

Green finance is a policy instrument featuring the dual attributes of traditional financial services and environmental regulatory intervention, and acts as a critical pillar for the quality-focused sustainable growth of the national economy [1]. GVC means that multiple links of products or services are completed in different countries, and each link has created a certain added value [2]. GVC position refers to the labor division standing of the economy in the GVC.

As global economic integration has continued to deepen over the past few decades, the GVC system has greatly changed the structure of international trade and injected new impetus into international economic activities and global economic growth [3]. With advanced technology, developed countries occupy the high-end links of GVC and engage in high value-added activities [1]. However, developing countries, such as China, are still engaged in low value-added activities, which are in the middle and low end of GVC [4]. At the same time, confronted with mounting severe ecological and environmental problems, the guidance issued by the central government ministries and commissions clearly pointed out that it is essential to build and optimize the green

© The Author(s) 2026
L. C. Yoong (ed.), *Proceedings of the 2026 2nd International Conference on Financial Innovation and Marketing Management (FIMM 2026)*, Advances in Economics, Business and Management Research 408,
https://doi.org/10.2991/978-94-6239-801-6_81

financial system. Green finance has gradually become the core of helping China's economic green transformation.

In recent years, academic researchers have started to investigate the underlying relationship between green finance and GVC position. They have found that green finance indeed exerts an impact on GVC position through certain mechanisms. These findings provide valuable advice for many developing countries, such as China, on how to promote economic development. However, the academic community has not systematically organized and integrated the various measurement methods and research conclusions in this field. Therefore, this paper systematically summarizes the existing studies on the correlation between green finance and position in GVCs. It focuses on examining the main measurement methods, important influence effects, and the primary transmission mechanisms identified by scholars.

2 Measurement Methods

2.1 Measurement Methods for Green Finance

In the empirical literature of green finance, its measurement methods are mainly divided into three categories. Some scholars use a single indicator method, usually using a single indicator such as the share of green credit and the tendency of green financial resources of enterprises to assess the overall development degree of green finance. This method is simple in data collection and processing. However, this approach faces certain difficulties. For example, it cannot fully reflect the multidimensional characteristics of green finance. Most scholars use the comprehensive index method to construct a multi-level evaluation system of indicators and measure it by the entropy method. For example, Liu and Chu chose several sub-indicators such as green credit and green insurance to construct a comprehensive evaluation system [5]. Compared with the single index method, this method is more detailed and comprehensive in measuring variables, so it has become the mainstream research method at present. However, the comprehensive index method also has obvious limitations, and its index system is quite different, which leads to incomparable results. In recent years, the policy shock method, which is easier to identify cause and effect, has gradually become a research hotspot. It identifies the causal effect through the difference-in-differences (DID) approach. For example, Li et al. used green credit policy to investigate its dynamic impact on the GVC position of manufacturing enterprises [6].

2.2 Measurement Methods for GVC Position

The method for measuring GVC position has transitioned from the traditional export trade approach to the value-added trade approach. The traditional export trade approach ignores the intermediate input value, while the value-added trade approach avoids this defect and becomes the mainstream method at this stage. The value-added trade approach mainly includes index of vertical specialization, GVC position index and upstreamness index. Hummels et al. put forward the index of vertical specialization [3].

It is calculated by dividing the value of foreign-sourced inputs contained in the exports of a given industry by the total export value of the corresponding industry [3]. Koopman et al. put forward a method to calculate GVC position index, but this index can only reflect a country's relative importance as a supplier or user of intermediate goods [7]. Subsequently, Wang et al. improved the calculation method of upstreamness index on this basis, and calculated GVC position by introducing the concepts of upstream and downstream production length [8]. With the supplement and improvement of many scholars, the use of these methods has become more and more mature, which has significantly improved the calculation accuracy.

3 Effect Analysis

3.1 Direction of Effects

There are two opposing views in the existing literature, namely, promotion theory and inhibition theory. The promotion theory mostly adopts medium and long-term samples, focuses on green enterprises and high-tech industries, and supports the innovation offsets effect; inhibition theory mostly adopts short-term samples, focusing on heavily polluting enterprises, and emphasizes the impacts of compliance costs and financing constraints. According to the promotion theory, green finance will eventually help enterprises to climb to the high end of the value chain by guiding capital to the clean industry and encouraging green technology innovation. At the same time, the Porter Hypothesis (PH) also demonstrates the rationality of this view. Porter et al. put forward that proper environmental governance can stimulate enterprises to implement technological upgrading and innovation, and the innovation offsets effect can partially or completely offset the compliance cost, thus enhancing the competitiveness of enterprises [9]. Li et al. also found that enterprises supported by green credit performed better in export domestic value-added rate and other indicators [6]. However, the inhibition theory emphasizes the compliance cost effect of green finance. Huang and Xie noted that the green lending policy may aggravate the financial constraints of pollution-intensive firms, resulting in insufficient research and development (R&D) investment and thereby hindering their ability to enhance their GVC positions [10].

3.2 Nonlinear Relationship and Threshold Effect

The above-mentioned controversy about the effect direction of green finance on GVC position shows that the relationship between the two is not a simple linear feature, but a more complex nonlinear form. It is found that the influence of green finance on GVC position has obvious characteristics in stages: from a short-term perspective, it is mainly the inhibitory effect of compliance cost and financing constraints, and over the medium and long period, it is mainly the promoting effect of technological innovation and resource allocation. Heavy polluting enterprises are under obvious short-term pressure, while green enterprises can directly benefit from the green financial dividend. This stage feature of "short-horizon inhibition and long-horizon promotion" is essentially the external performance of the threshold effect. Although studies directly examining

the threshold effects between the two are still rare, existing literature has extensively demonstrated the threshold characteristics of both green finance and GVC position from various perspectives. For example, the implication of green finance for carbon emission levels has been found to present a significant dual threshold effect, as empirically confirmed by Zhang et al. [11]. In addition, Zhang and Yu confirmed that the green lending policy can greatly enhance the GVC position of corporations, and the results suggest that the GVC upgrading effect of this policy has threshold characteristics [12]. The above research shows that the threshold effect will be an important perspective to understand the change of green finance and GVC position in the future.

3.3 Heterogeneity Analysis

The existing studies have investigated the differences in the influence of green finance on GVC position from multiple dimensions. At the level of enterprises and industries, Huang and Xie found that the restraining effect of green lending policy on pollution-intensive enterprises' GVC position exhibits greater prominence across industrial sectors that have undergone substantial category adjustments, industrial sectors with high direct carbon output and industries with serious information imbalance [10]. Li et al. confirmed that the green lending policy has a more obvious effect on improving GVC position of manufacturing enterprises, high-tech enterprises, state-owned enterprises, general trading enterprises and mixed trading enterprises [6]. At the regional level, Li et al. also found that the policy effect is greater in enterprises in areas with low financial marketization level and non-resource cities [6]. At the policy and foreign direct investment (FDI) level, He and Zhou examined the issue from the perspective of clean production audits. They found that the combined effect of this policy and the spillover effects of joint ventures can significantly enhance a company's position in green GVCs. However, such a synergistic effect was not observed when considering wholly foreign-owned enterprises [13]. The above heterogeneity research not only deepens the understanding of the relationship between the two but also provides a basis for the precision of policy design.

4 Transmission Mechanism

Reviewing the existing literature, green finance primarily affects GVC position through the following four mechanisms.

4.1 Financing Constraint Mechanism

Based on the Credit Rationing Theory, green finance implements directional credit rationing for enterprises with different environmental attributes by adjusting the credit allocation structure, thus affecting the production decision-making and technological upgrading of enterprises. In the transmission mechanism, the green financial policy affects the R&D investment and investment ability of enterprises by changing the availability of corporate credit. This eventually leads to the change of GVC position of enterprises. Specifically, severely polluting firms are facing the tightening of financing

constraints, while green enterprises are supported by the reduction of financing costs, which has changed the company's GVC upgrading ability in both directions. Huang and Xie's research confirmed that the green credit policy significantly inhibited the rise of GVC position by intensifying credit constraints on heavily polluting enterprises. However, the decentralized management of supply chain is helpful to alleviate this inhibition. This mechanism also explains the coexistence of inhibition effect and promotion effect [10].

4.2 Technological Innovation Mechanism

In addition to financing constraints, technological innovation is another core path for green finance to promote GVC to upgrade. Porter Hypothesis holds that appropriate environmental regulation can force enterprises to innovate and partially or completely offset the compliance costs. This hypothesis also explains the transmission mechanism of technological innovation. Green finance provides R&D financial support for enterprises. These supports have prompted them to undertake green technological innovation and affected the promotion of GVC position. Yao et al. verified the validity of the Porter Hypothesis within the context of environmentally targeted lending policies for upper-tier supply chain enterprises and found that this type of eco-focused lending regulation boosted green innovation activities among upstream firms by enhancing internal environmental governance concerns and trade credit induced by downstream market demand [14].

4.3 Resource Allocation Mechanism

The Structural Bonus Hypothesis holds that the cross-sector transfer of production factors from underperforming low-efficiency sectors to high-productivity industrial segments contributes to the sustained enhancement of overall production efficiency across the entire industrial framework. This theory provides a basis for understanding the macro perspective of resource allocation. Its transmission mechanism is: green finance guides capital to flow from pollution-intensive high-emission industries to environmentally sustainable industrial segments through differentiated credit policies. On the one hand, it raises the financing threshold of polluting enterprises. On the other hand, it provides low-cost financial support for green enterprises, thus facilitating the structural transformation, green-oriented optimization and high-end upgrading of the entire industrial system. When the capital allocation structure changes, the output efficiency and added value level of the overall economy will increase, which will eventually promote the GVC position. Zhang and Yu's research provided direct evidence for this. They found that the green credit policy promoted GVC position by enabling enterprises to replace polluting intermediates and adjusting the structure of inputs [12].

4.4 Signal Transmission Mechanism

Signaling Theory points out that under the condition of asymmetric information, the sender of the signal shows his own quality to the receiver by transmitting high-cost and

observable signals, so as to obtain better market returns. This theory provides an important perspective for understanding the Signal Transmission Mechanism. First of all, enterprises take the initiative to obtain green loans, issue green bonds or use green technology to send a positive signal to the capital market that they are committed to sustainable development. This signal is helpful to alleviate the information asymmetry between enterprises and external stakeholders, so as to gain more resource inclination and ultimately enhance the company's position in GVCs. Shao et al. also confirmed that enterprises' green innovation can send positive signals to suppliers, thus obtaining more supply chain financing support [15]. Green credit policy can also send a positive signal by improving the Environment, Society and Corporate Governance (ESG) performance of enterprises, thus enhancing brand market awareness and promoting GVC position [6].

5 Conclusion

This paper sorts out the related literature on green finance and GVC position from three dimensions: measurement method, effect analysis and transmission mechanism. In terms of measurement methods, this paper combs the main research methods of green finance and GVC position respectively. In the aspect of effect analysis, this paper summarizes the effect direction, nonlinear characteristics and heterogeneity analysis between them. Finally, the review explains the transmission mechanism between variables from four core paths: financing constraints, technological innovation, resource allocation and signal transmission.

This paper integrates scattered research and constructs a unified analysis framework, which provides literature and theoretical support for follow-up research and helps deepen the field. There are still some shortcomings in the existing research: the endogenous, nonlinear threshold effect and transmission mechanism interaction between green finance and GVC status need to be further studied. In the future, microscopic panel data can be used, combined with tool variables, DID and panel threshold model to solve endogenous and test nonlinear effects. Expand the spatial model to analyze the spillover effect and compare the heterogeneity of different green financial instruments, so as to provide more solid support for upgrading GVC.

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