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The Impact of Green Finance on Regional Economic Growth: Conceptual Definition, Impact Mechanism and Frontier Prospects

Zike Zeng

College of International Economics and Trade, Institute of Lanzhou University of Finance and Economics, Lanzhou, China
zengzike6661@outlook.com

Abstract. Green finance is an institutional arrangement that helps coordinate ecological protection with high-quality economic development. This paper reviews the literature on how green finance affects regional economic growth. Based on this review, an analytical framework is developed with four components: resource allocation, technological innovation, industrial restructuring, and institutional governance. The findings show that green finance influences regional economic growth through three core channels. The capital guidance channel optimizes capital flows through credit allocation. The innovation-driven channel lowers financing costs and encourages green technology R&D. The structural transformation channel promotes industrial upgrading and factor reallocation. These three channels are interwoven. Together, they form the internal logic through which green finance drives regional growth. This paper also identifies key debates in the literature, including the crowding-out effect, distributional effects, and institutional dependence. Future research directions are proposed, such as model refinement and fiscal-financial interactions. The four-mechanism framework developed here provides a theoretical foundation for future empirical research and offers a conceptual reference for designing differentiated green finance policies.

Keywords: Green finance, regional economic growth, resource allocation, spatial spillover

1. Introduction

Existing studies show that green finance supports regional economic growth by optimizing resource allocation, directing capital toward green industries, and promoting industrial restructuring [1-3]. Given this, a systematic review of how green finance affects regional economic growth is both theoretically and practically important.

Previous research has examined this issue from several angles, including capital allocation, technological innovation, and industrial upgrading [2-6]. However, these findings remain fragmented, and a coherent theoretical framework is still lacking. This paper focuses on the mechanisms through which green finance influences regional economic growth. It develops an analytical framework based on four channels: resource allocation, technological innovation,

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industrial restructuring, and institutional governance, and synthesizes the underlying logic of how green finance drives regional economic growth.

2. Conceptual framework and theoretical foundations

2.1. Definition and components of green finance

Green finance is an institutional arrangement that directs capital toward green industries through financial instruments [7]. Its main tools include green credit, green bonds, carbon finance, and green funds. A higher level of green finance development improves green firms' access to financing while constraining polluting firms [2]. Policy interventions in the green finance domain have been observed to enlarge the borrowing capacity of green firms and curtail that of polluting entities [8]. It is through such instruments that the operational influence of green finance is primarily exerted.

2.2. Measuring regional economic growth and theoretical framework

Assessments of regional economic performance typically draw upon three categories of metrics: per capita gross domestic product, green total factor productivity, and the extent of industrial upgrading [1,9]. Within neoclassical growth theory, the accumulation of physical capital stands as the principal engine of expansion, whereas endogenous growth models assign a more decisive role to technological progress. By lowering the cost of capital for research and development, green finance provides a stimulus for innovative activity [6]. In addition, green finance reforms generate spatial spillover effects, and studies show that these policy effects are stronger in regions with stricter environmental regulations [3,5].

2.3. Analytical framework of the review

As shown in Figure 1, green finance affects regional economic growth through four main channels. The first is the resource allocation channel, which guides capital flows through differentiated credit policies [8]. The second is the technological innovation channel, which reduces financing costs and encourages firm-level innovation [4]. The third is the industrial restructuring channel, which promotes industrial upgrading and factor reallocation [6]. The fourth is the institutional governance and spatial spillover channel, which depends on institutional environments and cross-regional spillovers [5,10]. These four channels together support output growth, structural optimization, and green total factor productivity gains.

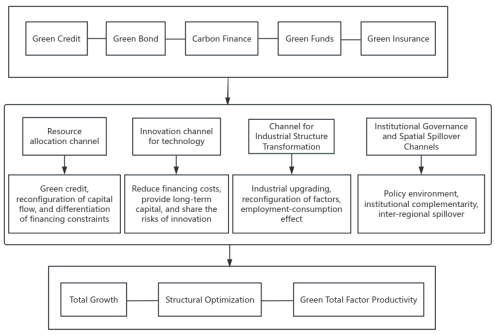


Figure 1. A conceptual framework of green finance affecting regional economic growth

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3. Resource allocation and cost of capital channels

3.1. Green credit and the reallocation of capital flows

Green credit incorporates environmental performance into lending decisions. Green projects receive preferential rates, while polluting projects face tighter restrictions. As a result, capital naturally flows toward green industries. After green finance reforms, the financing scale of green firms increases significantly, while that of polluting firms declines [8]. As green finance develops, the gap in financing capacity between the two types of firms widens [2].

3.2. Risk pricing, cost of capital, and financing constraints

Traditional finance prices credit risk. Green finance adds environmental risk to the pricing framework. Firms with better environmental performance obtain lower loan rates, while those with poorer performance face higher financing costs or even rejection.

As green finance develops, financing costs decrease for green firms and increase for polluting firms [2]. Financing scale expands, but the change in cost is less pronounced, suggesting that current policies mainly support green firms through quantity rather than price [8]. For high-carbon firms, higher financing costs or even the loss of access to credit make transition more difficult. Green finance reforms reduce capital supply to polluting projects, forcing these firms to contract [4]. This channel has both benefits and costs: capital flows toward green industries, but high-carbon firms face considerable transition pressure in the short term.

4. Technological innovation and productivity channels

4.1. The theoretical logic of green finance in supporting technological innovation

Green technology R&D needs a lot of money and takes a long time. It's also risky. Financing is often a real challenge here. Green finance helps technological innovation in three ways. It lowers financing costs. It provides long-term capital. It also shares innovation risks. After green finance reforms, firms do much more green innovation. One reason is that financing constraints have eased [4]. Green finance policies also give green firms more financing. This lets them upgrade their technology [8].

4.2. Productivity gains and the "green spillover" effect

Technological innovation helps not just the firms that innovate. It also spreads outward. This raises productivity across the whole region. Technology finance policies cut urban carbon emissions by a lot. They do this by pushing technological innovation and industrial upgrading [1]. But this spillover doesn't happen on its own. The positive effect of green finance on firm innovation is stronger in regions with higher financial development [4]. Policy effects are also stronger where environmental rules are tighter [3]. Green finance-driven technological innovation thus raises productivity from individual firms to the regional level through cross-sectoral and cross-regional diffusion.

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5. Industrial restructuring and employment-consumption effects

5.1. Industrial upgrading and factor reallocation

Green finance promotes industrial transformation in two ways: restraining high-pollution, high-energy traditional industries and supporting emerging green industries. After green finance reforms, the financing scale of polluting firms drops significantly [8]. These firms face higher financing costs and weaker access to credit, forcing them to contract or transform [2]. On the other hand, green credit and green bonds channel social capital toward green sectors. Green finance reforms improve green firms' innovation capacity by easing financing constraints and optimizing credit allocation [4]. Resource-rich countries invest resource revenues in renewable energy, driving industrial chain development—a clear example of factor reallocation [6].

5.2. Employment structure, wages, and consumption chain responses

The expansion of emerging green industries creates new jobs in R&D and technology, which typically offer higher wages. However, the closure of traditional industries creates employment substitution. Skill mismatches are the core problem. Workers in traditional energy sectors cannot easily move into green industries; they need time, training, and sometimes cross-sector mobility. Energy network expansion and economic diversification themselves require labor reallocation [5].

Workers in emerging industries earn higher incomes, which boosts their consumption power and stimulates local markets. Corporate social responsibility, especially supply chain responsibility, is important [3]. Upstream transformation, midstream adjustment, and downstream adaptation all cause fluctuations in employment and income across the supply chain. Industrial transformation creates high-quality jobs but also generates structural frictions. Easing employment pressure and smoothing consumption fluctuations are key to ensuring that green finance effectively promotes regional growth.

6. Institutional governance and spatial spillover effects

6.1. Institutional environment and policy complementarity

Whether green finance works depends not only on the instruments themselves but also on the supporting institutional environment. A sound regulatory system is essential. Green finance needs to distinguish genuine green projects from non-green ones to prevent greenwashing. Blockchain technology can improve transparency, but its application requires institutional safeguards [10]. In the age of AI, green finance relies on smart technologies to enhance accessibility, and technology adoption depends on institutional support [11].

Carbon pricing mechanisms are equally important. Carbon trading and carbon taxes set a price on emissions, giving firms an incentive to reduce them. Green finance and carbon pricing work better together. Green finance reforms promote corporate green innovation through the combined effects of easing financing constraints, optimizing credit allocation, and providing fiscal subsidies [4]. Policy effects are stronger in regions with stricter environmental regulations [3].

6.2. Cross-regional spillovers and competition mechanisms

Capital mobility, technology diffusion, and firm relocation allow the benefits of green finance in one region to spill over to neighboring areas. Green finance reforms not only reduce energy accessibility

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problems in pilot regions but also generate positive spillovers to adjacent provinces [5]. These spillovers occur through three pathways: financial diffusion, environmental co-benefits, and factor mobility. Digital technologies can, to some extent, amplify these spillovers, as blockchain and AI enable faster information transmission and more efficient resource allocation [10].

Regions with stronger policy support tend to see faster green industry agglomeration, while those with weaker support may face industrial outflow. Green finance reforms provide more financing support to non-state-owned firms, which are more flexible and responsive to policy environments [8]. Green finance has differentiated effects on financing constraints across firm types, and these differences are amplified in regional competition [2]. Green finance is not an isolated local initiative but a systemic change that connects regions. Spatial spillovers help good policies reach broader regions. However, inter-regional competition and the risk of carbon leakage require better policy coordination.

7. Theoretical synthesis, key debates, and research gaps

7.1. Main theoretical consensus

Green finance affects regional growth through three channels. First, resource allocation sends capital from polluting to green industries [8]. Second, technological innovation lowers financing costs and boosts green R&D [1,4]. Third, structural transformation pushes industrial upgrading and factor reallocation [2,6]. Over time, these three channels together help regional growth. Supply chain logistics and green transport also help the green economy [9]. But the transition has short-term costs. Early on, regions with many traditional industries go through an adjustment period [5].

7.2. Key debates

First, the crowding-out effect. Green finance cuts financing for polluting firms, but the cost change is not big [8]. However, other studies find a clear cost increase [2]. This difference suggests the crowding-out effect may look different and vary in strength depending on the context. Second, the distributional effect. Industrial transformation involves the allocation of gains and losses among different parties. Corporate social responsibility has been discussed in the literature, but the analysis of employment and consumption effects remains weak [3]. Third, institutional dependence. Policy effects are stronger in eastern coastal regions but relatively limited in old industrial bases. Spatial spillover effects exist, and policy outcomes depend on the stringency of environmental regulations [3,5]. However, the specific mechanisms through which these factors operate remain unclear.

7.3. Future research directions

First, model refinement and macro-micro linkages. Dynamic general equilibrium models could be introduced to integrate firm financing behavior, industrial restructuring, and regional economic growth into a unified framework. A spatial Durbin model is used to analyze spillover effects, which appears to be a promising direction [5]. Second, fiscal-financial interactions. Green finance intersects with fiscal and monetary policies. Policy tools such as central bank carbon reduction facilities, local government interest subsidies and guarantees, and the inclusion of green ratings in regulatory frameworks together form a policy mix. Future research will need to analyze how these instruments can work together.

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8. Conclusion

An analytical framework is developed here based on four mechanisms: resource allocation, technological innovation, industrial restructuring, and institutional governance. The findings suggest that green finance affects regional economic growth through three core channels. The capital guidance channel reallocates capital from polluting to green industries using instruments such as green credit. The innovation-driven channel encourages firms to engage in green technology R&D and improves total factor productivity. The structural transformation channel promotes industrial upgrading and factor reallocation. These three channels interact with each other and together form the internal logic through which green finance leverages regional economic growth.

The economic effects of green finance also depend heavily on institutions and spatial factors. In terms of the institutional environment, factors such as regulatory systems, carbon pricing mechanisms, and local policy coordination directly influence policy outcomes. In terms of spatial effects, green finance not only affects pilot regions themselves but also generates positive spatial spillovers through financial diffusion and factor mobility, to a certain extent. Putting green finance to work for regional growth is not simple. It needs good financial tools, supportive institutions, and coordinated policies across regions. The four-mechanism framework developed in this paper provides a theoretical foundation for future empirical research and offers a conceptual reference for designing context-specific green finance policies.

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