Green Finance and Urban Development: Evidence from Cities in China

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Abstract. Green finance drives urban development, and plays a key role in Beautiful China Initiative. Since Integrated Reform Plan for Promoting Ecological Progress was published in 2015, each province and cities in China actively responds and implements this policy. This essay uses a systematic review method to sort relevant domestic and international documents, and is written to study the impact of green finance on urban development. By sorting the documents, we find that green finance plays positive effect on cities' green development and high-quality economic development. Based on these findings, this paper will further focus on urban green development, differentiation policy to promote inclusive growth and the spirit of the 20th National Congress must be put into effect in relevant policies and data. These four aspects will be used to look forward to the future development of research on this topic. This essay makes up the gap in the relatively scarce comprehensive research on green finance and urban development and plays a practical role in promoting green development and greener social development.

Keywords: Green finance; urban development; carbon emission reduction; high-quality economic development; Green Total Factor Productivity.

1. Introduction

Over recent years, with unusual global climate and extreme weather event happening frequently, these pose threat to living environment of human. Green finance plays a crucial role in handling these problems, follow the tendency and accelerate the construction of a beautiful China and move towards becoming a great modern socialist country. In order to promote green development, China has established pilot zones for green finance reform and innovations based on specific development of each city and provinces. China also actively promotes green finance development by using green finance product and service innovations. With the rapid development of urbanization, statistically, urbanization rate of permanent population increased from 10.64% at the end of 1949 to 59.58% in 2018 and the annual rate increased 0.72% [1]. China becomes one of the fastest urbanizing countries in Asia and even in the world. But with the rapid urbanization, a lot of serious environmental problems have emerged in the city, such as frequent high temperature and flood disaster. These environmental problems has had a serious impact on people's lives and the development of society. Therefore, promoting cities toward a green, low-carbon and sustainable path is necessary.

By sorting relevant domestic and international documents, a lot of scholar have made big progress on studying the relationship between green finance and urban green development and the effect of green finance on urban economic development [2]. Besides, some previous articles have reviewed the relevant research on green finance. For example, Review and Prospect of China's Green Finance Development in the New Era over the Past 10 Years[2]. However, existing summarized thesis is short of studying the relationship between green finance and urban development, systematic theoretical framework, and literature review. In addition, Existing summarized thesis is especially difficulty aligning with the new development tasks of the 20th National Congress and the current stage of green finance development. Therefore, these problems restrict the prospect and development of a path, namely green finance promoting urban development. The aim of this essay is making up the gap in the relatively scarce comprehensive research on green finance and urban development. Besides, by using a systematic review method, this eassy makes clear of thread of thoughts in green finance, recognize the margin and difficulty of studying the effect of green finance on urban development. As a result, this essay will provide guidance with policy makers and financial practitioners, help to promote green development and greener social development and Chinese modernization.

Based on these, this essay will follows the following arrangement. Firstly, using a systematic review method, this essay will determine a definition of green finance and sort its development process. Secondly, from the macro and meso perspectives of urban economic development, and urban green development and carbon reduction, this essay will study the effect of green finance on urban development. Finally, we will summarize the entire essay and look forward to the research prospects and directions in the future.

2. Difinition of Green Finance

Theoretically, Green Finance also known as Environmental Finance or Sustainable Finance. It refers to while promoting the development of finance, considering environmental protection as a fundamental measure [3]. Environmental attribute is the basic attribute of green finance. Besides, promoting harmony between humanity and nature and sustainable development are two of the main characteristics of green finace activies. Following table 1 presents the important events during the process of green finance:

Table 1. important events during the process of green finance

Period		Events
Pre-industria		Concept of green finance in budding stage
18th century- mid-20th century		The heyday of industrial civilization;concept of green finance came into economists' sight and was marginalized by the dominant of neoclassical economics
		Few pioneer states made early practice and exploration on green finance
The middle and later periods of 20th century		Serious environmental problems;green finance was appreciate
21st century	2015	International document： "Transforming our World: The 2030 Agenda for Sustainable Development", "**The Paris Agreement**" China's document:"Integrated Reform Plan for Promoting Ecological Progress", "The 13th Five-Year Plan"
	2016	Green finance is listed into G20 agenda ;**"Guidelines for Establishing the Green Financial System"**
	2017	**The People's Bank of China issued "the Division Plan for Implementing the Guidelines for Establishing the Green Financial System"**
	Until now	Green finance is flourishing at home and abroad

As the Table 1 presents, it considers timeline as a clue and summarize the development of green finance from its budding stage to becoming a globally important financial tool. This table also point out the key policies, events and milestones to clearly present formation, promotion, and global practice and development of green finance.

3. Green Finance and Urban Green Development

3.1. Green Finance Helps Cities Reduce Carbon Emissions

The concept of green development aims to achieve optimal social benefits with minimal environmental costs, while promoting high-quality and sustainable development that fosters harmonious coexistence between humanity and nature. This necessitates cities to expedite their transition towards greener practices and advancements, while embracing the path of civilized development. By doing so, they can contribute to the construction of a beautiful China and successfully attain the objective of "double carbon".

At present, the academic community has reached a consensus on the in-depth discussion of the relationship between green finance and urban development and carbon reduction: green finance has a significant positive impact on urban development and carbon reduction, and it is particularly prominent in large cities [4,5] and non-resource cities [5].Green finance can achieve carbon reduction through the following three mechanisms: first, in terms of technology, green finance policies can achieve carbon reduction effects through green technology innovation [5,6], or by increasing R&D investment and improving green innovation levels to reduce carbon emissions [4]; second, in terms of policy, green finance policies promote carbon reduction by adapting to different levels of environmental regulation [4,5,7], or by implementing green financial reform and innovation pilot zone policies to achieve carbon reduction effects [5,6], and at the same time with low-carbon city pilot areas, the carbon reduction effect is better [6]; third, in terms of economy, green finance can achieve carbon reduction by optimizing the industrial structure and combining economic development and industrial structure upgrading [5,8], or by promoting green debt financing to achieve carbon reduction [4], and green investment has the greatest impact on carbon emissions [7], and by promoting the development of digital inclusive finance, it can also achieve synergistic effects of reducing pollution and carbon emissions [8].

3.2. Green Finance Can Mitigate Urban Environmental Pollution

The accelerated process of urbanization has led to some environmental pollution problems that pose significant obstacles to enhancing the well-being of city dwellers and achieving sustainable urban development. Recognizing their crucial role in societal welfare and national advancement, cities must prioritize efforts towards effective environmental pollution control measures to facilitate the attainment of green and sustainable developmental goals. In this regard, green finance emerges as an indispensable instrument for tackling ecological challenges while fostering long-term sustainability; thus profoundly impacting strategies aimed at mitigating urban environmental degradation.

In the extensive discourse on the role of green finance in urban pollution control, numerous scholars have essentially arrived at a consensus: green finance can mitigate urban environmental pollution. Green finance primarily achieves this by operating through three key mechanisms: Firstly, from a technological standpoint, green finance policies enhance the efficacy of urban environmental governance by augmenting investments in research and development (R&D) and fostering innovation in green technologies [9]. Secondly, when combined with government intervention, green finance can enhance carbon emission efficiency [10]. Thirdly, from an economic perspective, green finance policies can curtail urban environmental pollution by facilitating adjustments and optimizations in industrial structure as well as promoting industrial upgrading [8,9,11], or alternatively optimizing the allocation of funds towards environmentally friendly initiatives to realize a mutually beneficial outcome for both urban economy and environment [9], thereby stimulating digital inclusive financial development. This approach simultaneously yields synergistic effects on pollution reduction and carbon mitigation [8], improves energy efficiency while transforming consumption patterns towards greener alternatives to reduce environmental pollution. Moreover, the three pathways involving optimization of industrial structure along with reductions in energy intensity and improvements in energy consumption patterns contribute significantly towards mitigating emissions causing urban pollution [11].There is an overlay effect within policy implementation observed within "dual control zones" and "low-carbon pilot cities", thus highlighting the positive impact of implementing green finance policies [12].

4. The Influence of Green Finance on Urban Economic Development

4.1. Macro: Green Finance Promotes High-quality Urban Economy

On one hand, the development of urban economy is deeply rooted in the synergistic collaboration among economic entities such as enterprises, households, and the government. Additionally, green financial policies can also contribute significantly to the high-quality advancement of urban economy. On the other hand, green total factor productivity encompasses considerations regarding production efficiency levels during economic growth processes and their impact on the environment. It serves as a crucial indicator for measuring the quality of economic growth.

Green finance policies can contribute to the high-quality development of urban economies in several ways. Firstly, in terms of economy, green finance enhances fund utilization efficiency, reduces enterprise financing costs, provides better financial support for urban economic development, and facilitates its high-quality advancement [13]. Additionally, green finance policies promote the transformation and upgrading of industrial structures through capital output effects and green factor substitution effects [14]. This improves the overall quality and efficiency of the economy, injecting new vitality and growth opportunities into urban economic development, thereby promoting its high-quality development [14,15]. Secondly, in terms of policy measures, green finance policies facilitate high-quality development in China's Yellow River Basin region by leveraging the regulatory role of green supervision and fiscal policies [16]. Furthermore, the implementation of pilot zones for green finance reform and innovation significantly promotes high-quality urban development [14]. Thirdly, green finance policies foster the high-quality and upscale development of urban economies through innovations in green technology as well as guiding residents towards adopting greener consumption habits [15], thus enhancing their competitiveness and sustainable developmental capabilities.

The paper employs green total factor productivity (GTFP) as an indicator to assess the quality of urban economic growth, considering its reflection of both the efficiency and sustainability of economic activities. From a GTFP perspective, it is observed that green finance can simultaneously enhance the GTFP of local cities and neighboring cities. Moreover, green finance exhibits a significant spatial spillover effect on the GTFP of eastern China's cities and large cities classified as type I or above [17,18]. GTFP promotes the high-quality development of urban economy through the following methods: firstly, environmental regulations reinforce the promoting role of green finance on the GTFP of local cities and neighboring cities [17]; secondly, by facilitating energy conservation and emission reduction, green finance has a more pronounced impact on enhancing the GTFP of non-state-owned enterprises, large enterprises, and enterprises with weak financing constraints. As these enterprises constitute a major part of urban economies, this finding suggests that green finance can contribute to improving a city's overall level of GTFP to some extent [19].

4.2. Mesoscopic: Green Finance Promotes the Upgrading of Urban Industrial Structure

The objectives of the exploration on middle economic self-adjustment encompass optimizing economic structure, ensuring regional economic stability, and facilitating the coordination between economic and social development. The transformation and upgrading of urban industrial system serve as a pivotal driving force for urban economic growth, bearing significant implications in enhancing the quality of urban ecological environment and promoting overall economic development.

Firstly, from the perspective of the relationship between green finance and urban industrial structure, green finance serves as a crucial driving force in promoting industrial structural change and upgrading [20]. Moreover, its impact on the transformation and upgrading of industrial structure is particularly significant in the eastern and central regions [21]. Secondly, from a functional perspective, fintech and green finance are promoted to facilitate the deep reform and adjustment of the industrial structure through enhancing human capital, material capital, and policy tools [20]. By establishing and improving the development system of green finance, it can effectively contribute to upgrading the industrial structure and promoting high-quality economic development in China [22]. The integration of environmental regulation with green finance is advocated to promote the environmentally friendly development of industries [21]. The pilot zone for green finance reform and innovation serves as a primary channel for advancing ecological development in regional industrial structures and facilitating high-quality regional growth by piloting policies that enhance fairness, efficiency in credit resource allocation, as well as further strengthening financial system infrastructure [23]. The direct productivity effect, indirect price effect, and market size effect generated by green finance through financing scale and cost influence the cleanliness of the industrial structure [24].

5. Conclusion

As a crucial driver for promoting sustainable urban development, the theory and practice of green finance are blooming in academic circles. This paper aims to provide a comprehensive review of the literature on the impact of green finance on urban development. Firstly, it defines green finance and elucidates its developmental context. Secondly, from the perspective of the impact of green finance on urban green development, this paper analyzes how green finance making significant influence on reducing carbon emissions in cities. Furthermore, from a macro perspective, green finance facilitates high-quality urban economies and enhances total factor productivity related to environmental sustainability; from a medium-scale viewpoint, it has a positive effect on upgrading urban industrial structures.

In the future, green finance will have a more profound impact on urban development. Therefore, this part aims to explore the research path of green finance and urban development. Firstly, it is crucial to investigate the differentiated influence of green finance in various types of cities and stages of development. This will serve as a foundation for formulating precise green finance policies, maximizing policy benefits, and promoting sustainable urban development. Secondly, there is a need to deepen the integration between green finance and urban development to foster the multifaceted sustainable societal progress. This approach will provide a novel theoretical basis and practical framework for an inclusive, sustainable, and environmentally friendly urban economic model. Thirdly, by considering both macro and micro environments while aligning with the spirit of CPC's 20th National Congress, we should summarize the relationship between green finance and urban development. Utilizing policies and data as guidance can help cities achieve new developmental goals that are centered around being environmentally friendly, low-carbon oriented, and high-quality.

Authors Contribution

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

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