The Financial Support Effect of Green Bonds--Analysis of Contributions to Sustainable Development Goals

Lu Han

Hatfield College, Durham University, Durham, United Kingdom
bxfs36@durham.ac.uk

Abstract. Green bonds have experienced rapid global expansion in recent decade, establishing themselves as a key sustainable finance instrument and are widely viewed as an important means of advancing the Sustainable Development Goals (SDGs). This article systematically analyzes the functions and mechanisms of green bonds in promoting the realization of some of the SDGs from the perspective of financial support and the pathways and mechanisms through which green bonds support sustainable development. On this basis, by sorting out the scale data showing that the global green bond issuance volume has increased from less than 50 billion US dollars in 2014 to more than 500 billion US dollars in 2023, and combining typical cases such as China's "carbon neutrality" - specific green bonds and the European Union's climate transition bonds, this paper conducts a comprehensive assessment of the implementation effects of green bonds in promoting energy structure transformation, improving the ecological environment, and other aspects. By examining the current status of green bonds, their operational mechanisms, and their support for various SDGs, and drawing on typical case studies and data, this article explores their effectiveness and limitations. Policy recommendations are then proposed to optimize the institutional design and market practices of green bonds, thereby better serving the strategic goals of global sustainable development.

Keywords: Green Bonds, SDGs, Financial Support, Environmental Governance

1 Introduction

The 17 Sustainable Development Goals (SDGs) proposed by the United Nations in 2015 cover a wide range of areas, including poverty eradication, clean water, renewable energy, and climate action, and are the core agenda for global common development. However, the world needs approximately US$4.2 trillion annually to achieve the SDGs, while the current funding gap is as high as US$2.5 trillion, especially in developing countries. By the conclusion of 2023,the aggregate volume of green bonds launched worldwide had surpassed the US$2.5 trillion milestone, expanding at a rate of over 30% on a compounded yearly basis [1]. Among them, Europe remains the largest issuer, accounting for approximately 45%, followed by Asia (35%) and North America (15%).

A. J. Moshayedi (ed.), *Proceedings of the 2025 International Conference on Hybrid Commerce, Human Capital, and Economic Dynamics (ICHCH 2025)*, Advances in Economics, Business and Management Research 374,
https://doi.org/10.2991/978-2-38476-585-0_99

China has ascended to the position of the globe's second-largest source of green bond issuances since 2016, with an issuance amount of RMB 580 billion in 2023.

The main investment areas of green bonds include renewable energy (35%), green transportation (20%), water resource management (15%), green buildings (12%), etc. These areas are highly consistent with many goals in SDGs, such as SDG 7 (affordable and clean energy), SDG 9 (industry, innovation and infrastructure), SDG 11 (sustainable cities and communities), etc. In this context, green bonds, as a debt financing tool specifically used to support environmental improvement and climate change response projects, are gradually becoming an important means to fill the funding gap and promote green transformation. At present, a large body of literature has explored the issuance mechanism, market development and function of climate bonds in ecological conservation. For example, Fan et al. pointed out that green bonds can help reduce financing costs and enhance the Environment Social Governance (ESG) image of enterprises [2]. Ban et al. emphasized that the circulation of green bonds not only enhances the ecological awareness of the capital market but also enhances investors' confidence in sustainable projects through signal mechanisms [3]. In addition, some studies have attempted to connect green finance with SDGs. For instance, the Organisation for Economic Co-operation and Development (OECD) proposed that a green finance indicator system should be established to measure its contribution to SDGs [4]. However, existing research has largely focused on the micro-impacts of green bonds or single-country case studies, lacking a comprehensive assessment of their role in achieving the SDGs from a macro-financial perspective.

Thus, the significance of this study lies in constructing an analytical framework based on financial functional theory to comprehensively assess the impact of green bonds on the realization of SDGs. By combining quantitative data with case studies of representative countries and projects, this study reveals the practical successes and challenges of green bonds, providing empirical evidence for policymakers. This analysis will also analyze the institutional and market barriers to green bonds in promoting the SDGs and propose policy recommendations to enhance their support for SDG goals.

2 Concept and Characteristics of Green Bonds

Green bonds are essentially a form of debt mechanism created for the specific purpose of funding projects that deliver positive ecological outcomes, such as those addressing environmental improvements and climate change. Its core features include clear use of funds (funds must be used for projects that meet the green definition, such as renewable energy, green buildings, low-carbon transportation, etc.), third-party certification (most green bonds must be reviewed by international certification systems to ensure the green nature of the project), transparent information disclosure (issuers are obligated to provide periodic public reports on the allocation of the proceeds, accompanied by a detailed assessment of the project's positive environmental impact) and strong policy guidance (green bonds often receive policy support from governments or international organizations, such as tax incentives, risk subsidies, etc.) [5]. These features make green bonds an important financial tool for promoting sustainable development goals.

3 Analysis of the Financial Support Effect and Mechanism of Green Bonds

The financial support effect of green bonds mainly includes four aspects: financing, risk sharing, resource allocation efficiency, and information intermediation and market incentives. First, in terms of financing effect, due to their substantial upfront capital requirements and prolonged periods before profitability, green ventures frequently face a fundamental mismatch with the short-term orientation of traditional lending institutions. Green bonds raise funds through the capital market, lowering the financing threshold of green projects. For example, with its initial foray into the green finance market, the China Development Bank entered the market in 2017 with its first-ever green bond.The funds raised were mainly used to support renewable energy and energy conservation, and emission reduction projects, effectively alleviating the funding pressure of related companies [6]. Second, in terms of risk-sharing mechanisms, the introduction of government guarantees, third-party certification mechanisms and green project insurance has reduced the risk premium of green bonds and improved market acceptance. For example, the French government has helped small and medium-sized enterprises obtain low-cost green financing by establishing a green bond guarantee fund [7]. Third, in terms of resource allocation efficiency, the use of funds from green bonds is usually subject to strict supervision, requiring clear disclosure of the purpose of funds to ensure that funds are accurately invested in projects that meet the SDGs. Studies have shown that the average carbon emission reduction efficiency per unit of funds of green bond projects is 18% higher than that of traditional projects [8]. Finally, in terms of information intermediaries and market incentives, third-party green certification (such as the CBI Climate Bonds Standard) has improved the information transparency of green bonds and enhanced investor confidence. Moreover, the act of issuing green bonds has been instrumental in enhancing corporate sustainability profiles, not only by directly elevating their ESG scores but also by strengthening their reputation among ethically-focused investors,forming a positive incentive [9].

4 Contribution of Green Bonds to SDGs

The SDGs comprise 17 goals, and green bonds have played a positive role in achieving many of them. First, green bonds promote Goal 6 (guaranteeing universal and equitable access to safe water and sanitary services, coupled with the effective and enduring management of these critical resources for future generations) and are widely used in water resource protection and management projects. In 2019, the Indonesian government issued green sovereign bonds, part of which was used to build rainwater collection systems and sewage treatment facilities in Jakarta, improving urban water supply safety and sanitation [10]. Second, green bonds promote Goal 7 (guaranteeing secure modern energy for every person, characterized by dependability, a foundation in renewables, and affordability), and there is substantial backing for a diverse array of clean energy initiatives, including but not limited to wind, solar, and biomass power generation. For example, in 2022, the Industrial and Commercial Bank of China issued a green bond

worth RMB 10 billion, and the funds raised were used to support wind power, photovoltaic, green transportation and other projects. The bond adopts the international green bond standard (GBP) and is certified by a third-party agency, which enhances investor confidence. An estimated reduction of 3 million tons of CO_2 per year is anticipated, a direct result of the projects financed under this green bond initiative, making a positive contribution to achieving the "dual carbon" goals and SDGs Goals 7 and 13. Third, green bonds support Goal 11 (fostering the development of urban areas and communities that are characterized by inclusivity, safety, resilience, and environmental sustainability). They are crucial to the construction of urban green infrastructure, such as green transportation, sponge cities, and ecological restoration. For example,the designated green municipal bonds launched by Beijing's municipal authorities are used to support the green transformation of urban rail transit and the construction of urban sewage treatment facilities, thereby enhancing the city's sustainable development capacity [6]. Finally, green bonds promote Goal 13 (adopting urgent measures to address the climate crisis and buffer against its detrimental effects is paramount.). They directly contribute to carbon emission reduction by supporting the construction of low-carbon infrastructure, such as electric vehicle charging networks, green buildings, and carbon capture and storage technologies. For instance, the World Bank is one of the pioneers of the global green bond sector. Since 2008, the World Bank has issued more than US$20 billion in green bonds, with funds mainly used to support renewable energy, forest protection and water resource management projects in developing countries. The Brazilian Amazon forest protection project supported by the World Bank has successfully reduced the area of deforestation through green bond financing, improved the sustainable development capacity of local communities, and directly contributed to SDGs Goal 13 and Goal 15 (terrestrial ecosystem protection) [11].

5 Challenges Faced by Green Bonds in Supporting SDGs

Although green bonds have been instrumental in advancing the agenda of sustainable development, their development still faces many challenges:

First, there is currently no unified green bond standard in the world, and different countries and regions have different definitions of "green". Some issuers use the ambiguity of the standard to conduct "greenwashing" operations, which affects the healthy development of its sector [8]. Second, although green bonds emphasize the transparency of the use of funds, in actual operations, some issuers do not disclose detailed information and lack a quantitative assessment of the environmental benefits of the project, making it difficult for investors to accurately assess the true value of green bonds. Meanwhile, green bonds have lower liquidity than traditional bonds, particularly in emerging markets, where the green bond market is small and trading is inactive, limiting their appeal to long-term capital. Furthermore, while some countries have introduced policies to support green bonds, such as tax exemptions and refinancing facilities, others have yet to establish a comprehensive green finance policy framework, hindering their promotion and application.

6 Conclusion

Green bonds, as a bridge connecting financial capital and sustainable development goals, are playing an increasingly important role globally. They not only provide a stable source of financing for green projects but also promote the transformation of financial markets towards sustainable development.

However, the development of green bonds is currently in a nascent phase of development, facing challenges for instance inconsistent standards, insufficient information disclosure, and inadequate policy support. Going forward, coordinated progress should be made at three levels: institutional development, market development, and international cooperation. First, at the institutional level, the green bond framework should be improved and unified green bond standards promoted. Green bond standardization should be strengthened, promoting coordination and mutual recognition of green taxonomy among countries, clarifying green project certification standards, reducing "greenwashing," and enhancing investor confidence. Furthermore, a mandatory and standardized green bond information disclosure system should be established, requiring issuers must continually report on the application of raised capital and the ensuing sustainable outcomes, thereby fostering a more transparent market with comparable metrics. Secondly, at the market level, product structure and policy incentives should be optimized to encourage the development of diversified green bond products, such as social responsibility bonds and blue bonds, to meet market demands with varying risk preferences and investment objectives and enhance market vitality. Maximizing the efficacy of green bonds as a tool for achieving the SDGs necessitates that governmental support and supervisory mechanisms be significantly bolstered. The government should introduce more targeted incentives, such as subsidized loans, tax incentives, and priority approval channels, to stimulate market participants' enthusiasm for green bond issuance. Market oversight should also be strengthened to maintain market order and stability. Finally, at the international level, international cooperation on green bonds should be promoted, cross-border collaboration in the green bond sector should be strengthened, and the establishment of an international green bond trading platform should be promoted to facilitate the efficient flow and allocation of green capital globally. Furthermore, international exchange and sharing of green finance standards, regulatory policies, and practical experience should be conducted to foster greater alignment and collaborative momentum within the international green bond sector.

References

1. UNCTAD.: Investment facilitation and Digital Government. United Nations Conference on Trade and Development World Investment Report, **12**(5),107-155 (2024)
2. Fan, R., et al.: Do green bonds affect stock returns and corporate environmental performance? evidence from China. Economics Letters, **22**(5),23-24 (2023)
3. Ban, N., et al.: Does green bond issuance affect firm value? evidence from China. Global Finance Journal **66**(4), 101-124 (2025)
4. Organisation for Economic Co-operation and Development: Sustainable development goals (SDGs). (2022)

5. Maino, A. G.: Green bonds pricing and the 'greenium'. In: Financing the Energy Transition: The Role, Opportunities and Challenges of Green Bonds. Oxford Institute for Energy Studies, **20**(4),125-160 (2022)
6. Yue, M. D., Nedopil, C.: China Green Finance Status and trends 2024-2025. Griffith Asia Institute and Green Finance & Development Center, **29**(5), 22-30 (2025)
7. Holmes, I., Davies, S.: European perspectives on the challenges of financing low carbon investment: France. E3G Publications **21**(5), 61-63 (2011)
8. Jian, Y.: Green bonds and green environment: Exploring innovative financing mechanisms for Environmental Project Sustainability. Environmental Science and Pollution Research **30**(58), 122293-122303 (2023)
9. Yu, Q., Hui, E. C. M., Shen, J.: The real impacts of third-party certification on Green Bond issuances: Evidence from the Chinese Green Bond Market. Journal of Corporate Finance **89**(6), 102-169 (2024)
10. Abedalrazq, K., et al.: Indonesia Vision 2045: Towards Water Security. World Bank Publications **9**(5), 122-130 (2021)
11. Keohane, G. L.: Redd forests, green bonds, and the price of Carbon. Capital and the Common Good **91**(05), 29-40 (2016)