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GREEN FINANCE AND FIRM PERFORMANCE, RESEARCH GAPS AND FUTURE DIRECTIONS

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Abstract

The study investigates the impact of green finance on firm performance. A systematic review was conducted using a three-step methodology and qualitative content analysis (QCA) to analyze relevant literature. The findings reveal that green finance significantly enhances financial performance, fosters R&D, and drives technological innovation. It improves firm productivity and aligns firms with environmental standards, benefiting low-financing-constraint firms and state-owned enterprises. However, the impact varies across industries and economic contexts, posing challenges for heavily polluting sectors and financially struggling firms. The study also highlights the moderating role of stakeholders, whether internal or external in providing additional funding resources and governments in crafting policies that enhance the effective implementation of green finance. Future research should explore strategies to enhance green finance's impact on high-polluting enterprises, conduct comparative studies across industries and regions, and investigate governance structures and regulatory environments. Addressing behavioral and managerial factors is also crucial for comprehensively understanding green finance's effectiveness.

Keywords

Green Finance, Firm Performance, Environmental Performance, Stakeholder's Benefits, Firm Productivity, Corporate Financial Analysis

I. Introduction

Accelerated industrialization and sustained economic growth have resulted in a significant rise in energy and natural resource consumption, leading to considerable environmental degradation (Homaeigohar and Elbahri, 2017). Addressing this challenge by reducing the environmental impact of economic growth has become a critical priority globally. The integration of "green" concepts into policy agendas has emerged as a central theme in discussions worldwide. Countries like Canada, Japan, Mexico, and the United Kingdom have issued policies to raise awareness about the negative effects of fossil fuel emissions on climate and associated risks. Internationally, countries have signed the Paris Agreement, a legally binding treaty focused on climate change mitigation (Blau, 2017). Proponents of the green economy advocate for green finance as a viable solution to meet the financing needs of individuals, corporations, and governments involved in sustainable projects (Falcone and Sica, 2019). Broadly defined, green finance involves the acquisition and utilization of funds for activities that protect the environment while delivering a fair return to investors and lenders (Berenmann and Lindenberg, 2019). Acknowledging the recent work of Li and Lin (2024) on the impact of green finance on firm performance, where they highlighted a limitation in their study regarding the scope of firms included, this paper aims to synthesize and expand upon the existing literature. Expanding the dataset to encompass a broader range of firms could comprehensively enhance understanding of green finance's impact (Li and Lin, 2024). In this paper, I review the existing research on green finance and its impact on firm performance. Decisions related to environmental awareness play an important role in shaping the value and performance of an

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organization (Lundgreen and Zhou, 2017), underscoring the relevance of discussion on green finance's impact on firm performance.

The review identifies that green finance initiatives significantly enhance firm performance. However, challenges exist, particularly concerning the impact of green finance on heavily polluting industries and state-owned enterprises. Additionally, the review highlights the moderating role of stakeholders, government policies, regulatory frameworks, and additional funding resources, in promoting the adoption and effectiveness of green finance. The rest of the paper is organized as follows: Section II presents the literature review. Section III discusses methodology and data analysis. Section IV describes the conclusion. The paper finishes with acknowledgments and references.

II. Literature Review

Green Finance

Green finance encompasses diverse perspectives in literature. First, it is recognized as environmental finance, providing financial services that bolster environmental protection, pollution control, and resource conservation (Gray, 2002). Second, it serves as a vehicle for financial innovation, using various instruments to mitigate environmental risks (Labatt and White, 2002). A more recent perspective defines green finance as a mechanism promoting investments that foster ecological sustainability, encompassing green-oriented credit, securities, insurance, and carbon finance (Hu et al., 2021). Green finance represents a contemporary innovation that facilitates alternative financing pathways for green and low-carbon activities (Huang et al., 2019). It channels funds toward environmental preservation (Wang and Zhi, 2016) and offers low-risk financing options (Taghizadeh-Hesary and Yoshino, 2019). Moreover, it drives the development of green investment instruments (Sachs et al., 2019a). Lindenberg (2014) emphasizes that green finance encompasses public policies promoting environmental initiatives, a financial system focused on green investments, and both public and private investments in green projects.

Theoretical Framework: Discussing the Impact of Green Finance on Firm Performance

Firm performance encompasses the measurable outcomes and achievements of an organization. It involves the efficient utilization of resources, adaptation to market dynamics, innovation, and maintenance of competitive advantage within the industry (Ittner & Larcker, 2003). Performance metrics serve as critical benchmarks against strategic goals, evaluating operational efficiency, profitability, customer satisfaction, employee engagement, and overall organizational success (Ittner & Larcker, 2003). Firms need to achieve sustainability in their performance, balancing financial success with social and environmental improvements (Shahzad et al., 2019). This approach emphasizes continually enhancing financial performance or profitability, ensuring the firm's sustainability in social, ecological, and economic dimensions (Bennouri et al., 2018). This definition highlights firm performance through three major theories—signaling theory, stakeholder theory, and competitive strategy theory—which collectively support the beneficial effect of green finance on firm performance.

Stakeholder Theory provides valuable insights into how organizations can effectively engage with stakeholders to promote environmental sustainability. According to Stakeholder Theory, environmental regulations help organizations manage conflicts with stakeholders, thereby fostering sustainable development (Kitsikopoulos et al., 2018). Stakeholders—including shareholders, creditors, consumers, employees, suppliers, governmental bodies, communities, and environmental advocates—hold significant influence over corporate objectives (Donaldson and Preston, 1995).

Signaling theory provides insights into how companies signal their commitment to environmental responsibility. For instance, they may appoint executives with significant ownership stakes advocating for green practices (Goranova et al., 2007). This theory emphasizes the importance of high-quality signals, particularly in markets characterized by information asymmetry.

Competitive strategy theory posits that green practices enable companies to seize opportunities arising from green economic growth, expand new profit avenues, and secure a competitive edge (Hart,

1995). Environmental social responsibility can be transformed into a resource or capability that provides a sustainable competitive advantage, thereby helping the organization to stand out from its competitors (Siegel and Vitaliano, 2007).

III. Methodology and Data Analysis

This study employed a three-stage systematic literature review (SLR) methodology to analyze relevant literature to achieve the research objectives. The three stages of this approach include the following:

Article Search and Retrieval Protocol

To ensure comprehensive coverage of research publications related to the study, repositories such as Scopus, Web of Science, and Google Scholar were utilized. During the search process, critical keywords related to green finance and firms' performance were identified through "Google Search." These keywords included the terms "green bonds" AND "firm performance", "green credit" AND "firm performance", and "green investments" AND "firm performance". The initial search, without filtering, yielded 529 documents (33 from Scopus, 335 from Web of Science, and 161 from Google Scholar). The selection period from 2015 to 2024 for this research on green finance and firm performance is rooted in the pivotal developments and global commitments that unfolded beginning in 2015.

Selection of Relevant Articles

The initial search yielded a considerable number of articles, many of which addressed topics such as green innovation, green human resource management, green inventory, and others. However, these articles failed to clearly define the relationship between green finance and firms' performance. Following this, the study employed two primary inclusion and exclusion criteria: first narrowing down the studies by specifying sources from Q1 and Q2 journals. Focusing on Q1 and Q2 journals ensures a higher standard of research quality and relevance within the academic community. Following a refined filtration process and the removal of duplicate articles, the pool of relevant articles was narrowed down to 98. The 98 identified articles underwent a comprehensive review, encompassing titles, abstracts, keywords, introductions, methodologies, and conclusions. As a second step, to discern the most relevant articles, a set of inclusion and exclusion criteria was systematically applied to all 98 articles. The review follows a similar inclusion and exclusion criteria as Akomea-Frimpong et al. 2022. In this criterion, the included articles must extensively cover green finance and firm performance or cover the defining metrics of firm performance. 71 articles met these criteria and were deemed suitable for inclusion in this study.

Content and Meta-Analysis

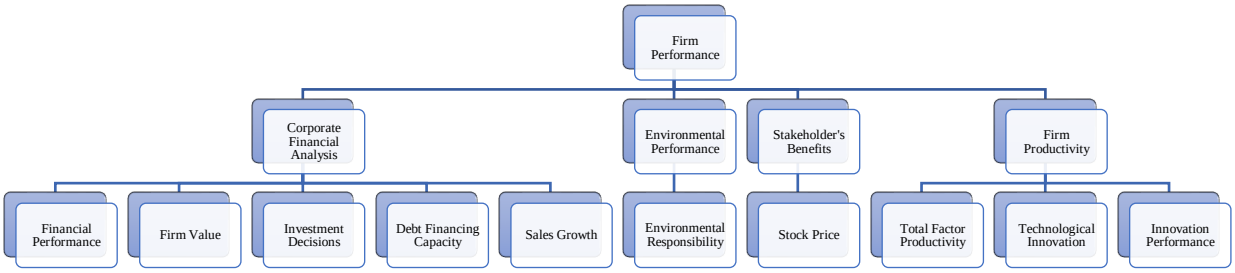
During this phase, the selected 71 articles underwent a comprehensive examination using qualitative content analysis (QCA). QCA is a method that involves categorizing text data and discerning common themes and statements through coding and classification. This process involved extracting relevant words, texts, and statements from the 71 articles, followed by coding, and grouping these items into themes. In the analysis, four key themes and ten sub-themes were identified to understand the factors affecting firm performance. The independent variable in this study is green finance and its products, which include green bonds, green investments, and green credit. The dependent variables on which the impact is being studied correspond to the sub-themes outlined in Table 1 and Figure 1. Furthermore, all the papers included in the analysis are related to the three prominent theories highlighted in the theoretical framework.

The main themes include corporate financial analysis, firm productivity, stakeholder benefits, and environmental performance. Under corporate financial analysis, five sub-themes emerged: financial performance, sales growth, firm value, investment behavior, and debt financing capacity. Firm productivity includes total factor productivity (TFP), technological innovation, and innovation performance. Additionally, the sub-theme of environmental responsibility has been recognized under the theme of environmental performance. Similarly, under the stakeholder's benefits sub-theme,

stock price has been identified. Stakeholder theory is reflected in the stakeholder benefits and corporate financial analysis theme, as it emphasizes the importance of managing shareholders' expectations to enhance overall firm performance. The competitive strategy theory aligns with both the firm's productivity and corporate financial analysis themes, highlighting how strategic choices and resource allocations can drive a firm's competitive advantage and financial outcomes. Signaling theory is particularly relevant to environmental performance, as it explores how firms communicate their sustainability efforts and environmental impact to stakeholders, thereby shaping perceptions and influencing behaviors.

After analyzing the data, the data was defined as positive impacts, limitations, and moderating factors as presented in Table 1.

Figure 1 Framework for Analyzing Firm Performance through Thematic and Sub-Thematic Categories



Source: Own production

Table 1 Positive Impacts, Limitations and Moderating Factors of Green Finance

Theme	Sub Theme	Positive Impacts	Limitations	Moderating factors
Corporate Financial Analysis	**Financial Performance**	Green finance addresses societal concerns, stabilizes cash flow, reduces investment risks, and enhances governance structures (Habib et al., 2023). It enhances financial performance through mechanisms such as improved decision-making (Yu et al., 2023), increased Research & Development (Li and Lin, 2024), environmental tax incentives, government subsidies (Jiang et al., 2022), technological innovation (Chen and Ma, 2021), external social reputations (Tan et al., 2022), and increasing returns on interest-bearing assets (Lian et al., 2022). Green investments generally enhance firms' performance, notably benefiting larger firms, foreign-owned entities, and those in low-tech industries (Siedschlag and Yan, 2023). In the context of energy-saving enterprises, the green credit policy has a positive impact on financial performance (Zhang et al., 2023) through mechanisms like short-term debt (Li and Lu, 2022) streamlining investments, (Li et al., 2024), improving operational efficiency, resource quality, and marketing retention (Xi et al., 2022; Xiliang	Green credit has shown mixed responses for polluting (Li et al., 2023), state-owned enterprises, and industries heavily reliant on external financing (Chen, 2022). This negative impact is evident through factors like tightened financing conditions, reduced investment levels (Yao et al., 2021), and challenges to firm profits (Jiang et al., 2022).	Issuing green bonds enhances green innovations by alleviating financing constraints through the influence of external regulations and internal governance structures (Wang et al., 2022). This process works by providing firms with the necessary capital to invest in sustainable projects while regulatory frameworks and strong internal governance ensure that these funds are used effectively and responsibly, thereby promoting innovation.

		et al., 2022). As a result, highly polluting firms in the capital market have experienced reductions in both equity and bond financing (Lin and Pan, 2023).		
	Sales Growth	Green investment and green credit are positively linked to sales growth. This relationship is driven by the ability of organizations to access investments under favorable conditions, enabling them to utilize eco-friendly resources, production technologies, and marketing channels effectively (Yannan et al., 2021). By satisfying the environmental quality expectations of the customers (Han, 2024) and meeting regulatory requirements firms can enhance sales growth and secure a competitive position in the market (Yannan et al., 2021)		
	Firm Value	Green credit improves the value of firms by enhancing green innovation quality (Wang et al., 2022). Whereas the value of energy firms is enhanced by optimizing cash management (Ning et al., 2024), easing financing constraints, and enhancing external supervision (Lai et al., 2021).	The greater impact of green credit on firm value is seen in state-owned and large-scale enterprises (Li et al., 2023), thus creating an uneven distribution of benefits across different types of firms.	Governmental involvement in creating tailored green credit policies that address diverse factors, rather than adopting a one-size-fits-all approach (Lai et al., 2021).
	Investment behavior	Investment Behavior is promoted by green finance through incentivizing sustainability practices and regulatory compliance, penalizing high-pollution enterprises while offering increased funding opportunities to non-high-pollution enterprises (Zhang et al., 2024).		
	Debt financing capacity	Green credit benefits high-polluting enterprises through various contributing factors: reduced short-term and long-term debt financing, increased R&D and fixed asset investments (Peng et al., 2021), and the decline in illiquid debt financing behavior, particularly in state-owned enterprises in regions with lower green development indices (Chai et al., 2022)	Green credit policy inhibits performance in energy or emission-intensive firms (Zhang et al., 2023). It leads to increased financing constraints and rising debt financing costs (Lu et al., 2022).	The limitations can be mitigated by several factors, including the influence of shareholders, environmental information disclosure, and regional regulations. (Li et al., 2021).
Firm Productivity	**Total Factor Productivity**	Green finance policies significantly contribute to enhancing firm-level productivity through strategies that promote green innovation and technological advancement. The positive influence particularly	Feng and Liang (2022), caution that green credit policies may adversely affect the TFP of manufacturing firms by restricting long-term loans and promoting	Governmental intervention can mitigate the negative impacts by designing better green credit policies. By

		benefits firms with low financing constraints, state-owned enterprises Gao et al.,2024), and those with high analyst coverage (Li and Wang, 2023). Green finance (green bonds and credits) contributes to green technology innovation by providing long-term loans, optimizing debt structures (Zhang et al., 2024), directing resources toward environmentally induced R&D initiatives (Zhang, 2021), structural upgrades, and increased investments in human capital and R&D intensity (Wang and Wang 2023), upgrading industrial structures (Li et al., 2022). Cui et al. (2022) highlights the positive correlation between green credit and corporate TFP, especially among non-state-owned enterprises and firms in developed regions, due to improved resource allocation and technological innovation. Dong and Tao (2022) and Kong et al. (2022) both support the statement that green finance incentivizes high-polluting firms to invest in green innovation, thereby enhancing TFP and reducing agency costs. Li et al. (2024) conclude that green finance enhances firm performance by boosting TFP and reducing debt among eco-friendly companies, highlighting the dual benefits of sustainability and economic efficiency. Green credit policies significantly increase productivity gains (Wang et., 2024) and diversification in heavily polluting enterprises (Li and Chen, 2022), transforming and upgrading industries with weak governance and those already engaged in non-polluting sectors (Zhang, 2021).	short-term financing options (Wang et al., 2024). Potential restrictions on credit allocation and exacerbated financing constraints in industries with stringent regulatory environments (Zha et al., 2024). Guo and Zhang (2023) find that green finance policies vary in effectiveness across different economic contexts, benefiting green credit-restricted industries more significantly, while posing challenges to others in terms of accessing financial resources and promoting innovation. Guo et al. (2023) suggest that the effectiveness of green finance in promoting TFP depends on its ability to alleviate financing constraints and stimulate R&D investment, with varying impacts across enterprise types and regions. Xu et al. (2023) state that while green finance policies can lead to TFP improvements, they may also result in reduced firm employment, particularly affecting state-owned enterprises and low-skilled workers. Wen et al. (2021) state green credit could negatively affect R&D intensity and TFP in energy-intensive firms, underscoring the complexity of balancing environmental goals with economic performance.	carefully refining and implementing these policies, the government can mitigate the financial risks associated with green credit guidelines, ensuring that environmental objectives are met while maintaining market stability (Wen et al., 2021; Xu et al., 2023)
	Innovation Performance	Green bonds significantly enhance corporate innovation performance and overall corporate value (Khurram et al., 2023) particularly in high-polluting and energy-intensive enterprises (Liu et al., 2021; Zhang et al., 2022). Green credit enhances the production of green patents in heavily polluting enterprises (Hu et al., 2021; Lin et al., 2023). This improvement is attributed to reduced green agency costs and increased investment in R&D (Wu et al.,	The Green Credit Policy has been observed to decrease technological innovation (Wang et al., 2022) and innovation efficiency among heavily polluting firms (Wang et al., 2023). These adverse effects are primarily attributed to heightened financing constraints, reduced subsidies (Lin et al., 2023), and declined	Local government interventions have been identified as critical in mitigating these negative impacts (Zhang et al., 2022).

		2023), technological innovation (Hao et al., 2020), and substantial governmental subsidies (Long et al., 2023).	green innovation (Zhang et al., 2022).	
	Techno - **-logical Innovation**	Green Credit Policy (GCP) and green bonds have a significant positive impact on technological innovation (Ren et al., 2024) especially within highly polluting and energy-intensive enterprises (Zhang et al., 2022). The enhancement in TI is due to reduced barriers, incentives (Zhang et al., 2022), and reduced financial constraints (Ren et al., 2024).	Agency costs can diminish the effectiveness of the GCP on TI, and the outcomes vary based on property rights and firm size (Zhang et al., 2022).	Government efforts to improve green finance policies can play a crucial role in mitigating the negative impacts on corporate innovation. By refining and enhancing these policies, the government can better support firms in overcoming challenges, thereby promoting more effective and sustainable corporate innovation (Zhang et al., 2022).
Stakeholder's Benefits	**Stock Price**	Green finance provides several benefits to stakeholders, particularly in the context of stock prices and market reactions. Stock prices respond positively to green bond issuance, showing significant increases following announcements (Baulkaran, 2019; Tang and Zhang, 2020; Wang et al., 2020). The positive stock returns are not solely due to reduced debt costs but also stem from increased institutional ownership, particularly from domestic institutions, and improved stock liquidity (Tang and Zhang, 2020). This demonstrates that green bonds are beneficial for current shareholders. Investors show positive responses to green bond announcements (Flammer, 2021). Issuers also show improved environmental performance post-issuance, with higher ratings and lower CO2 emissions (Flammer, 2021). This trend is accompanied by increased ownership by long-term and green-focused investors, supporting the signaling theory that green bonds act as a credible commitment to environmental responsibility (Flammer, 2021). Furthermore, green finance reduces stock price crash risk by easing financial constraints. This	The Green Credit Guidelines (GCG) can increase stock price crash risk for heavily polluting enterprises by imposing financial constraints and reducing information disclosure quality. This negative impact is more pronounced in state-owned enterprises and firms with lower corporate governance standards and reduced information transparency (Shao et al., 2022).	Policymakers need to balance environmental goals with financial stability, which could involve measures to reduce the unintended negative effects of green finance on the stock market (Shao et al., 2022).

		effect is particularly significant among companies heavily invested in environmental initiatives, non-state-owned enterprises, large firms, and those with high media visibility (Cen, 2023).		
Environmental Performance	**Environmental Responsibility**	Green finance initiatives, such as green credit and green bond issuance, have demonstrated substantial positive impacts on environmental performance across firms. For financially sound companies, green bond issuance has proven effective in aligning economic success with environmental stewardship (Borrallo et al., 2024). Moreover, green bonds stimulate increased corporate environmental investment, particularly in regions with government support, thereby enhancing overall environmental performance (Guo et al., 2021). These initiatives are particularly advantageous for small private firms and highly polluting enterprises in marketed regions, fostering improved environmental practices (Jiang et al., 2022) and reducing environmental violations (Chen and Ma, 2021). Additionally, the Green Credit Policy (GCP) has been instrumental in reducing pollution emissions and enhancing environmental performance, especially benefiting state-owned firms and enterprises with high R&D intensity (Shao et al., 2023).	The negative effect of green finance is more pronounced on heavily polluting firms and non-state-owned enterprises (Wang et al., 2024). They experience diminished environmental performance due to increased financing constraints and reduced investment in environmental technologies (He et al., 2022). Furthermore, financially struggling firms may not effectively leverage green bonds to achieve significant environmental benefits, as economic considerations often take precedence over environmental goals (Borrallo et al., 2024).	The availability of additional financial resources can help firms overcome limitations, allowing them to better balance their economic and environmental objectives. With adequate financial backing, firms can more effectively utilize green bonds to achieve meaningful environmental outcomes (Borrallo et al., 2024). Moreover, by refining and effectively implementing green finance policies, the government can significantly mediate the impact of these external factors, ensuring that firms are better aligned with environmental goals (He et al., 2022).

Source: Own production

IV. Conclusion

The overall findings of the study underscore the significant positive impact of green finance initiatives, such as green credit and green bond issuance, on enhancing various facets of firm performance and stakeholder benefits. Green finance plays a pivotal role in improving financial performance by stabilizing cash flows, reducing investment risks, and enhancing governance structures (Habib et al., 2023). It also facilitates increased Research & Development (R&D), technological innovation, and access to environmental tax incentives and government subsidies (Chen and Ma, 2021; Jiang et al., 2022; Xi et al., 2022). Moreover, green investments, including policies like the Green Credit Policy (GCP), have demonstrated positive impacts on firm productivity, particularly Total Factor Productivity (TFP), by fostering green innovation and technological advancement (Gao et al., 2024; Li and Wang, 2023). These initiatives are particularly advantageous for firms with low financing constraints and state-owned enterprises, contributing to structural

upgrades and improved resource allocation (Wang and Wang, 2023; Li et al., 2022). Furthermore, green finance positively influences sales growth and enhances firm value by aligning companies with environmental quality expectations and regulatory standards (Han, 2024; Wang et al., 2022). It also encourages investment behavior that promotes sustainability practices and compliance with environmental regulations (Zhang et al., 2024). However, the study identifies three major limitations of green finance initiatives. First, there are mixed responses from heavily polluting industries and state-owned enterprises, which may face tightened financing conditions and reduced profitability (Chen, 2022; Jiang et al., 2022). Second, the effectiveness of green finance can vary across different economic contexts and firm types, potentially posing challenges in accessing financial resources and promoting innovation (Guo et al., 2023). Third, while green finance policies aim to enhance environmental performance, financially struggling firms may not fully leverage these opportunities due to economic priorities overshadowing environmental goals (Borrallo et al., 2024). The study notes that while governments can act as moderating factors by reformulating policies to be more accommodating for high-polluting industries, both internal and external stakeholders are vital in providing additional financial resources (Borrallo et al., 2024). Internal stakeholders, such as shareholders and company executives, may contribute by reinvesting profits or allocating funds within the organization. External stakeholders, including financial institutions and investors, can offer additional funding through grants, loans, subsidies, or investments, all of which are crucial for supporting sustainable transitions.

Future studies can explore how the impact of green finance on high-polluting enterprises can be improved. Comparative studies across different sectors and regions should highlight specific challenges and opportunities, providing insights into effective strategies for promoting sustainability. Moreover, the systematic review has several limitations. Firstly, it relies on secondary data and existing literature, which may not capture the latest developments in green finance. Secondly, focusing exclusively on high-quality journals (Q1 and Q2) might exclude relevant studies from lower-ranked journals, potentially limiting the diversity of perspectives. The selection and inclusion criteria can introduce selection bias due to subjective judgments about article relevance and quality. Additionally, the review is restricted to articles published between 2015 and 2024, possibly omitting earlier foundational research. Qualitative content analysis, while thorough, involves subjective interpretation, leading to potential biases in theme identification. The findings are based on specific contexts and methodologies of the reviewed articles, which may limit generalizability across different regions and industries.

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