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Green Capital Structure: A Review of Literature and Future Directions

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Abstract: This review paper investigates the literature on the structure of green capital with emphasis on its theoretical framework, determinants, challenges and prospects. With present understandings concerning what influences firms in their choice for environmentally friendly funding options as well as how these impact corporate finance management and long-term sustainable development by amalgamating recent empirical research findings. Moreover, this survey underscores the increasing significance of such an approach during global shift towards low carbon economies; it also points out various areas that require more work for deeper knowledge in this field to be achieved. Finally, we suggest some future directions for investigating into green capital structure so that we can appreciate its role furthering ecological balance.

Keywords: Green capital structure, green finance, sustainable development, environmental sustainability, corporate financial management, low-carbon economy.

Introduction

The global financial landscape has undergone a significant transformation due to the increasing sense of urgency around climate change and environmental degradation. Governments, companies and investors are recognizing more than ever before that they need to consider sustainability considerations when making decisions (Zhang et al., 2024). In this regard, green finance is seen as an essential means of attracting funds for environmentally friendly projects and programs (Soundarrajan & Vivek, 2016). Green capital structure also known as greenness refers to any firm's financing mix which is aimed at supporting ecological ventures only. The concept of greenness can be traced back to broader areas within corporate finance where various aspects related capital structures have been studied over many years by researchers as well as practitioners (Modigliani & Miller, 1958). Some traditional theories on this topic include Tradeoff theory or Pecking order theory among others which have contributed greatly towards understanding factors influencing choice of financing methods (Kraus & Litzenberger, 1973; Myers & Majluf, 1984). However given emergence of eco-friendly financing there is need for fresh insights into how these models apply in case study analysis about eco-friendliness (Zhou et al., 2020).

This review paper's goal is to represent relevant studies regarding green capital structure, identify trends in research and point out possible directions for future inquiry. In order to help the discussion about sustainable finance contribute more towards environmentally-friendly corporate behavior, this attempt has reviewed various theoretical underpinnings as well as factors that determine them; challenges faced by these structures and opportunities they present (Tang & Zhang, 2020).

Theoretical Foundations

The theoretical basis of green capital structure came from Modigliani and Miller's work in 1958, which is called the capital structure irrelevance theorem. It states that if there were perfect markets then the value of a firm would not depend on its capital structure. Still, this assumption was followed by acknowledging market imperfections involving taxes, bankruptcy costs as well as agency problems leading to different views about what constitutes an optimal mix for firms' liabilities (Kraus & Litzenberger, 1973; Meckling & Jensen, 1976). If the advantages of borrowing are weighed against the costs associated with bankruptcy and agency problems, companies would go for a trade-off theory (Kraus & Litzenberger, 1973). In terms of sustainable development finance structure, this could mean that enterprises shall opt for debt capitalization through green bonds provided that they have more to gain than lose from them; for example, when these instruments offer cheaper funds or wider investor base access among other things (Zhang & Wang, 2021). When there is a deficit on the availability of information between investors and administrators, managers may tend to depend on internal finance rather than external sources according to Myers & Majluf (1984) who created the hypothesis called pecking order theory. In terms of green finance, this could be worsened by an information asymmetry caused by complex and pioneering nature of environmentally friendly projects leading to what Zhou et al. (2020) refer as "green information gap". This means that companies may have a harder time securing outside funding for their green initiatives since these undertakings are intricate and unprecedented thereby strengthening the relevance of pecking order theory in green financial space also elaborated by (Ibrahim et al., 2022).

When companies consider the benefits of borrowing in comparison with the costs of bankruptcy and agency issues, they are likely to adopt a trade-off theory (Kraus & Litzenberger, 1973). In relation to the finance structure for sustainable development, this may imply that organizations will choose debt capitalization by means of green bonds if only such firms stand more chances of benefiting from them than not; e.g., where this kind of instruments provide lower-cost funds or broader access to investors base among other advantages (Zhang & Wang, 2021).

In addition, the companies can now tap into the green funds such as sustainability-linked credits and green bonds. This comes from the fact that there has been a shift towards ESG investing (Environmental, Social and Governance) by investors who are increasingly taking ESG into account when making their investment choices (Friede et al., 2015). According to Wu et al. (2024) one of the consequences of growing ESG investments is that it enables enterprises to participate in sustainable finance through green bonds and sustainability-linked loans.

Determinants of Green Capital Structure:

To make a decision about adopting an enduring financial plan, one has to evaluate many aspects. These can be internal to the organization or external such as industry trends and the overall macroeconomic climate. In the view of Zhang et al. (2024), the green capital structure of companies is affected by profitability, size and potential for growth. Zhang & Wang (2021) argued that those firms which are making profit always having cash flow should consider investing in environmental projects since they can afford it financially through 'green' financing availability as well. Likewise, large corporations and those with brighter prospects for expansion have easier access to green finance markets, participating actively in ecologically sound initiatives (Zhou et al., 2020). Apart from that, industry-specific variables account for other factors that determine a green capital structure. Besides, if any firm finds itself within the strict environmental regulations with regards to the government or when located in environmentally sensitive places, it tends to adopt strategies of 'green' finance so as to tackle potential legal liabilities and safeguard its image (X. Zhou et al., 2020). In sum, energy generation, utilities and manufacturing sectors usually attract significant attention whenever environmental issues are raised; this forces interest groups to pressurize for cleaner production alternatives, Zhang et al. (2024).

Macroeconomics green capital structure choices are influenced by interest rates, public measures and investor feelings. The reduction in interest rates has the potential of lowering costs of credit which may encourage corporate to invest in environmentally friendly projects (X. Zhou et al., 2020). Governments can also create an enabling environment for green investments through subsidies, tax credits and pricing carbon among other mechanisms (Zhou & Fan, 2023). In addition, these firms' financing decisions towards greening businesses are influenced by their demand for more diverse sources of funding as investors who put ESG factors at the forefront when making decisions about their investments now have a greater appetite for such investments (Tang & Zhang, 2020). Other things that have been found to be significant for green capital structure are corporate governance mechanisms. This implies that businesses which practice good corporate governance are likely to attract investors who are interested in the environment and also get access to finance that is linked with the environment. Such businesses should have boards of directors that are independent from management as well as risk controls systems which work effectively among other things (Zhang et al., 2024). Moreover, institutional investors concerned with the environment may make firms adopt ecologically green structures while also improving their environmental activities (Zhou et al., 2020).

Challenges and Opportunities:

For companies, adopting a green capital structure can be difficult and full of opportunities. One issue is that information asymmetry exists, creating the "green information gap" (Zhou et al., 2020). This means it is hard to judge how well environmentally friendly projects are performing or what risks they entail; therefore, resources may be wrongly allocated and priced as far as green financial instruments are concerned (Wu et al., 2024) (Tang & Zhang, 2020). To overcome this problem firms must enhance their reporting on sustainability which will enable them to disclose enough data so that investors may evaluate their ecological footprint against others' performance (Zhang et al., 2024). Another challenge is the differing inclinations of investors for green investments. It is true that not every investor considers environmental factors as their priority when making investment choices even though there has been an

increasing need for financial products which are ESG-focused (Zhang & Wang, 2021). Therefore, this could limit the availability of green finance sources and lead to greater costs of capital for firms seeking to adopt sustainable financial structures. However, as more investors incorporate ESG elements into their investment strategies, due to increased awareness concerning ecological threats and opportunities; additional conduits of green funding will emerge (Zhou et al., 2020).

The chances for green capital formation are affected heavily by the regulatory frameworks. Governments and financial regulators can facilitate favorable conditions for ecological friendly investments by introducing such policies as sustainability taxonomies, disclosure requirements and guidelines on green bond (Tang & Zhang, 2020). These steps serve to bring about uniformity in environmental finance instruments; they also boost visibility in the market while reducing the cost incurred with respect to green funding (Zhang & Wang, 2021). Eco-friendly financing has become more accessible through financial innovations such as sustainable loans and green bonds (B. Zhang & Wang, 2021). At times these initiatives permit companies to receive environment related funds at lower costs of borrowing than other sources of finance (X. Zhou et al., 2020). As the size of market grows bigger and it becomes more sophisticated again; firms may use them to achieve their sustainability objectives with optimization in capital structure simultaneously (Tang & Zhang, 2020).

Empirical Evidence:

Many empirical studies have looked at why and how many green capital structures exist. In order to compute China's energy consumption, Zhang & Wang (2021) adopted data envelopment analysis coupled with panel regression techniques. Finding out that energy efficiency is improved by green finance, it implies that companies having access to funds invested through eco-friendly means are more probable to invest in technologies which save power. To investigate the correlation of issuance on shareholder value creation, Tang & Zhang (2020) examined green bondings. According to their research, which involved worldwide organizations that issue green bonds as a sample, stock markets react favorably towards such events because they think it increases worth. Nevertheless for countries and industries the advantages vary thus suggesting more analysis into different impacts of this form capital structure should be done as claimed by authors. Zhou & Fan (2023) studied how green finance affects economic growth and environmental quality in China using provincial panel data. In their research, they used a fixed-effects regression model and discovered that green finance can enhance economic development while also mitigating ecological degradation. They highlighted the role of capital structure in supporting sustainability through the lens of this investigation.

Although the above investigations shed light on various aspects related to empirical associations concerning ecological capital composition; however, many methodological shortcomings still need to be addressed if knowledge is supposed advance further in this area (Zhan & Zhang, 2022). For example lots of researches depend on nation specific databases thereby limiting applicability beyond borders. Additionally different measurements are used across studies with regard measuring either environmental performance or even what constitutes green financing itself making meta-analyses problematic (Zhang & Wang, 2021). For future researchers to be able build on these findings more easily it would help if they gathered larger amounts of information from wider sources so as better represent more countries or industries (Tang & Zhang, 2020). Besides, it will be beneficial to apply more complex statistical models such as instrumental variables estimation techniques or propensity score matching that can help reduce any concerns of endogeneity related to inferences on causation (Zhou et al., 2020).

Future Research Directions:

Forthcoming research is necessary to address the deficiencies of previous studies and explore new areas, as far as eco-friendly capital structure and its consequences are concerned. One important area that needs further improvement is building more complete and uniform databases which take into

account a wider variety of countries, industries as well as company attributes (Tang & Zhang, 2020). This will enable researchers carry out stronger and more widely applicable tests leading to easier cross-national comparisons between different sectors (M. Zhang et al., 2024).

In addition, what future studies ought to do is looking at how new trends or technologies affect decisions about green capital structures. For instance, the rise in popularity of block chain systems combined with developments in financial technology such as environmental robot advisors and crowd funding platforms might transform green finance landscape (Zhang & Wang, 2021). Scholars should find out what impact these advancements have on firms' access to environmentally friendly money and their performance regarding sustainability within organizations (X. Zhou et al., 2020).

Another area with great potential for further investigation lies in examining links between green capital structure and corporate performance. Although some research works have explored how shareholder value creation can be attributed to various forms of ecological financing methods adopted by firms (Tang & Zhang, 2020), there still lacks sufficient understanding concerning other dimensions profitability innovation competitiveness among others (Zhang et al., 2024). Such an approach would provide us with insights into why businesses should adopt sustainable development strategies.

Furthermore, it is necessary for future scholars' work to go deeper into corporate social responsibility (CSR) reporting in relation to decision-making about eco-friendly capital structures. Due to the increasing expectations of stakeholders with regard to global corporations' environmental stewardship roles; organizations may start feeling more compelled to match their financing strategies with CSR pledges they undertake (B. Zhang & Wang, 2021). It would therefore be important for researchers to investigate how different levels of CSR performance as well sustainability disclosure practices affect firms' ability optimize capital structure alongside accessing green finance (X. Zhou et al., 2020).

Conclusions

The present survey paper offers a deep analysis about green capital structure, including its theoretical basis, factors affecting its choice and difficulties and opportunities facing it. We have identified some determinants of environmental financing options made by companies according to various research works conducted recently. This has further implications for management of finances in businesses as well as sustainability development at large based on empirical findings synthesis. More importantly, this review points out that internationally we are witnessing a global shift towards sustainable energy hence making green capital structure more significant than ever before within enterprises worldwide while also recognizing the fact that some organizations may be required to align their funding strategies with ecological objectives due to mounting international pressure. Nonetheless; there is still limited information availability coupled with differing investor tastes together with support systems which need legal establishment among other things can pose substantial barriers towards achieving these goals. For the future, it will be important to examine these difficulties and propose different areas of study for the green finance sector which is rapidly changing as well as growing. For example, it would be interesting to investigate how sustainability reporting interacts with corporate social responsibility; whether emerging technologies affect this industry or not; does green capital structure influence firm performance among others. It is through such studies that higher education can help inform practice in designing successful policies towards sustainable development by broadening our knowledge about what constitutes 'green' investments and their impacts on organizations at different levels.

References

- Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4), 210–233. <https://doi.org/10.1080/20430795.2015.1118917>
- Ibrahim, R. L., Al-mulali, U., Ozturk, I., Bello, A. K., & Raimi, L. (2022). On the criticality of renewable energy to sustainable development: Do green financial development, technological innovation, and economic complexity matter for China? *Renewable Energy*, 199, 262–277. <https://doi.org/10.1016/j.renene.2022.08.101>
- Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The Journal of Finance*, 28(4), 911–922. <https://doi.org/10.1111/j.1540-6261.1973.tb01415.x>
- Meckling, W. H., & Jensen, M. C. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3), 261–297.
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187–221. [https://doi.org/10.1016/0304-405X\(84\)90023-0](https://doi.org/10.1016/0304-405X(84)90023-0)
- Soundarrajan, P., & Vivek, N. (2016). Green finance for sustainable green economic growth in India. *Agricultural Economics*, 62(1), 35–44. <https://doi.org/10.17221/174/2014-AGRICECON>
- Tang, D. Y., & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, 61, 101427. <https://doi.org/10.1016/j.jcorpfin.2018.12.001>
- Wu, B., Wen, F., Wen, C., Tian, G. G., & Xiao, J. (2024). Green capital: Unveiling the impact of ESG performance on bank capital structure—a global perspective. *Available at SSRN 4785991*. <https://papers.ssrn.com/abstract=4785991>
- Zhang, B., & Wang, Y. (2021). The effect of green finance on energy sustainable development: A case study in China. *Emerging Markets Finance & Trade*, 57(12), 3435–3454. <https://doi.org/10.1080/1540496X.2019.1695595>
- Zhang, M., Li, C., Zhang, J., & Chen, H. (2024). How green finance affects green total factor productivity—Evidence from China. *Sustainability*, 16(1), 270. <https://doi.org/10.3390/su16010270>
- Zhou, M., & Fan, R. (2023). The impact of green capital structure on enterprise development and the regulation of technological innovation under carbon peaking. *Sustainability*, 15(7), 5743. <https://doi.org/10.3390/su15075743>
- Zhou, X., Tang, X., & Zhang, R. (2020). Impact of green finance on economic development and environmental quality: A study based on provincial panel data from China. *Environmental Science and Pollution Research*, 27(16), 19915–19932. <https://doi.org/10.1007/s11356-020-08383-2>