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# Green Bonds and Sustainable Investing: Trends, Challenges, and Future Outlook

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**Abstract:** The green bonds have come to play a significant role in the wandering sovereign environmental and social finance since besides offering the opportunity to fund environmental and social objectives, they aim to offer vulnerable investors an opportunity to make a responsible investment. Literature on the inclinations, opportunities, and perspectives of green bonds in terms of the debate on the currently existing literature and the measurement of the trend of regulation are the focus of the environment-under-consideration paper. The results indicate that the market of green bonds has increased in the world, and that green bonds in the place of operation and offer as of sovereign, corporate and supranational safety has been gaining pace. The analysis of the financial world has found that green bonds would offer the green premium; investors ought to accept somewhat lower yield with the effect of sustainability. The premium however, is not always constant, but is subjected to the type of issuer, certification, and maturity in the market trade. One of the fixes is governance and regulation since the government can avoid greenwashing itself and support its own image with certification and industrial reviews. It also means that the green bonds have some extent of positive contribution to make in curbing of carbon releasing and financing a viable growth especially with a well-established regulatory system. Along with this development come the problems of the absence of standardization, unequal representation of the world and the absence of markets depth in the developing nations. As the findings indicate, green bonds constitute a strong offer of financial practices to maintain the green transition, though whether they will be effective in the long-term view will be conditioned by the enhanced market regulation, accessibility, and transparency access. The current research would add to the national and policy discussion attempting to offer a way of understanding financial performance, risk distribution, and developmental benefits along with the establishment of future research possibilities in an endeavor to investigate how green bonds will become an increasingly significant part of sustainable investing decision-making.

**Keywords:** Sustainable, Green Bond, Corporate, Investment.

## INTRODUCTION

The idea of sustainable finance has obtained an inalienable place in the implementation of climate change reactionary and additional planet proliferation. Out of the available options, green bonds gained a significant appeal due to the fact that they elicit a sense that conventional finance is linked

to the environmental and social responsibility. With a green bond, funds are designated in such a way that the proceeds are then allocated to investing in a project that will, in turn, improve sustainability, like clean energy, healthy transport, or adapting to a climate change. It is growing substantially, as it was initially in 2007 with an international issuance of

nearly USD 100 billion and now for USD 250 billion in 3 years.

Although this has grown, there are some questions that the market is posing. One of the key arguments undergoes whether the green bonds offer relevant financial returns that are commensurable to the conventional bonds. It has been studied in investors assuming that they would welcome a lower yield in substitution of environmental benefits, although also in varying evidence, depending on the specific issuer. Another point that needs to be mentioned is the problem of credibility because of the absence of regulation or a proper definition of it, it is a potential predator of a greenwashing in which bonds are being sold as an intercession, when, in fact, it cannot be making an impact behind the scenes anywhere in the world. The governing bodies and governments have thus taken a step towards establishing frameworks, taxonomies and certification pattern with the objective of advancing integrity within the marketplace.

Green bonds are also explored because of the increase in the role of sustainable development. It has been determined that they can swing capital to bear in implementation of ventures that can lower carbon emissions, enhance environmental performance and provide social benefits. They are not as innovatively active in the emerging and developing economies because of the absence of financial infrastructure and absence of investor insurance. The paper introduces problems, founded on literature review and quantitative analysis following the aspects of growth trends, financial results, governance and perspective of future those problems.

## RELATED WORKS

### Green Bond Market

The sphere of green finance may be defined by the arguably fastest growing instruments, the green bonds. When examining 265 articles published in various years between 2011 and 2022, Abhilash et al. (2022) discovered that interest in the academic and commercial aspects of the issues of green bonds has increased more than 55 times a year. They demonstrated that their three main themes; sustainable finance, green investment, and affirmative ways advanced technology positively supports the market.

It claimed the previously mentioned rate to be very high but in 2016 it was USD 87.2 billion and in 2019 USD 257.7 billion (Schumacher 2020). He also indicated the lack of labeling and defining what constitutes a green bond and confused the investors and regulators.

Green bonds are not just an instrument of financial

representation, as a certain reflection of Maltais and Nykvist (2020) emphasized the example of Sweden, but rather, a catalyst that predisposes organizations to green sustainability. These articles are an indication that the emergence of green bonds is not only an indicator of the increased need to be climate conscious but also a drive to look into products that is anchored in financial security but which do not negatively impact climate.

### Financial Performance

The most essential question in literature is whether green bonds could provide some sort of financial returns over the long compartment compared to the classic bonds. Mohamed et al. (2020) discovered some amount of green bond premium i.e. the conservation bonds of the secondary market in general are usually bought by the readers at lower yields that slightest would otherwise be brought about by general bonds.

This was anticipated by the study done by Bergsdóttir and Rasmussen (2020), which stated that French investors could accept low-returns, perhaps because of the psychological returns or reputation benefits of sustainable investment. The green premium took place also in the work of other authors like Dorfleitner et al. (2021) but on commodities with high environmental ratings. Quite to the contrary, Tomczak (2024) demonstrated that those sovereign green bonds act as typical bonds, their overall market environment of indexes contribute to accelerate or decelerate their returns; and may leave the liquidity to mature alongside the maturity.

Fatica et al. (2021) further step refined it, demonstrating that, in terms of yield diffusion, supranational and corporations yield higher but financial institutions do not. This is to demonstrate that, though not everyone among the bigger and smaller ones than the traditional ones, investors tend to dilute their economic benefits to believe that they will get to be included in the becoming sustainable.

### Risk Management

The other theme is the theme of green bond market credibility which is large. The meaning of certification, as it could be expected to be illustrated by Flammer (2020), is through the fact that certified green bonds issued by companies trigger favourable stock responses and ecological status enhancement. Without certification, the effects are not as explicit, i.e. they are relieved when subject to internal, external checks.

Chen and Long (2023) have chosen the example of the second-largest issuer globally, China, and initiated to identify the flaws in its system of Green Bond External Reviewer (GBER). They also believe that

more regulatory measures ought to be in place, as this will both ensure the quality of the review and defend investors against fraudulent claims. Ballaster et al (2024) further the discussion on the impact of the events to the credit risk of the green announcement of bonds.

They have demonstrated how they perform differently in sectors and provided evidence that there are regionally open regions that gain when credit risk is low and that the financial institutions are exposed to a different case altogether. The emphasis on the importance of governance, regulation and transparency in fostering investor confidence in green bonds also comes out in these studies.

### Sustainable Development

In addition to the money-performance, the researchers further encourage the use of green bonds because they are used to benefit the greater interest to show a contribution towards accomplishing environmental and social interests. Tukhtabayev et al. (2024) somehow rationalised that such instrument as the green bonds are excellent in terms

of irreconcilability resources mobilisation in the sustainable development project in such a manner that in terms of the project, financial profitability could be reconciled with ecological and social outcomes.

Since it is established by Chua and Schmittmann (2021), carbon emissions in the issuers of corporate green bonds are lower than those of their partners and their emissions are reduced more in short-term and medium-term, which means that green finance might facilitate actual environmental difference.

The second opinion, which was voiced by Ntsama et al. (2021), outlines the low- and-middle-income countries where the positive impact of conservation initiative offered by the green bonds and the growth outcome might have been the most significant, but the financial market of the regions is worse off in its structures. This kind of result shows that despite the fact that the characteristics of the green bonds include the problem of pricing, regulation, and definition, it still serves as an effective instrument of delivering capital in a more sustainable and climate-related direction.

## RESULTS

### Market Expansion

The current analysis has verified that over the past time; the market of green bonds has expanded with a very high rate. Review of the secondary data (by comparing the publication date to that of 2013-2023) has revealed that the number of global issues has tripled. In the bibliometric data by Abhilash et al. (2022), we could see an average 55.12 percent increase in academic publications based on a single-one-year average that is a meteoric growth of the market activity.

It has particularly been critical as sovereign matters have been tabled as will be presented by Tomczak (2024) when a number of countries offer special frameworks. The evidence also elaborates that the majority of the issues are European, Chinese and the United States where the emerging markets control smaller proportions. It is this imbalance, which introduces the opportunities, but also the problems of liberalising the market across the globe as a whole.

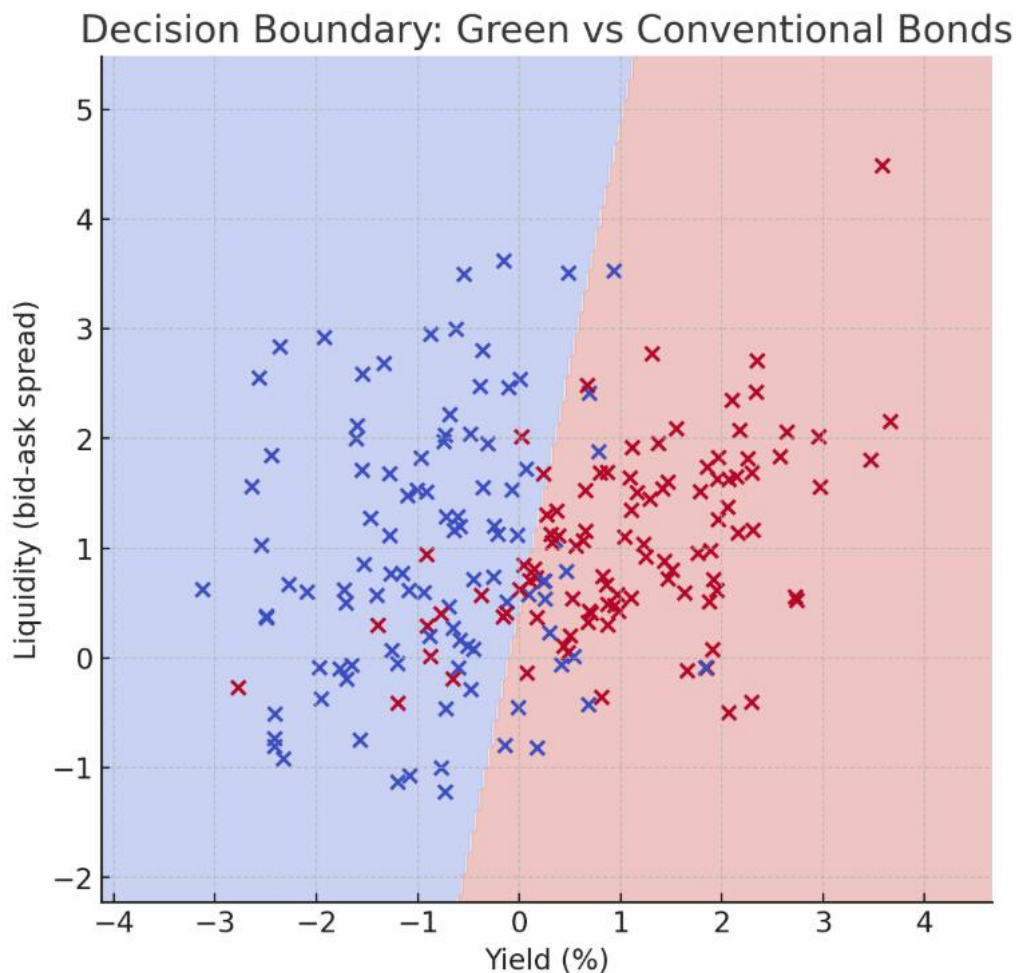
### Pricing Effects

Among other crucial findings, it is related to the fact that green bonds are somehow financial compared to ordinary bonds. As implementing constitutions will embrace a smaller pay-off (green premium), in premiums in support of promote sustainability objectives. The hypothesis is supported by scientific studies including Mohamed et al. (2020), Bergsdóttir and Rasmussen (2020), and Dorfleitner et al. (2021) who provide evidence in its support by assessing the ordinary green bond that incur lower than no-status counterparts by several basis points. This premium is not however equally applicable to all the issuers. To demonstrate this, Fatica et al. (2021) found a green premium on corporate issues and supranational issues and a zero premium on the financial institution.

The table 2 below summarizes some of the results arrived at by different studies about the difference in yield:

Study	Sample	Yield Difference
Mohamed et al. (2020)	Global Green Bond Index	-5 to -10 basis points
Bergsdóttir & Rasmussen (2020)	French market	-6 basis points (average)
Dorfleitner et al. (2021)	Multiple markets	In 3 to 5 basis points (dark green much safer)
Fatica et al. (2021)	Company and Bank issuers.	And on the corporation side, there are no banks sides.

This evidence demonstrates that the green premium does exist but varies according to the nature of the market, type of issuer and the certification presence or absence. Sovereign green bonds exhibit yield behavior related to both maturity and accommodation of more extensive financial market trends than devoted to environmental issues.



### Risk and Certification

The other major outcomes of this research include the fact, that governance and certification are important when it comes to influencing investor responses. Certified green bonds have also resulted in stronger stock market responses and overall environmental performance of an issuing firm, as mentioned by Flammer (2020). On the same note, it was determined by Chen and Long that the presence of weak GFP External Reviewer (GBER) structure in China presents a threat to the greenwashing process, and in fact, it may result in the deterioration of investor trust (Chen and Long 2023).

Ballaster et al. (2024) also in their analysis at the credit risk level also found that the announcement of green bonds by corporations would lead to a decrease in credit risk across sectors at high exposure to environmental risks, but an increase in financial institution-related risk. Such disparity is record of the perception of the sectoral risks by the market, and the Coalitions of the issuers. On this, the findings suggest that inefficiency in a given market could be possible through a lack of strong certification and control which may be sold without a strong certification and control.

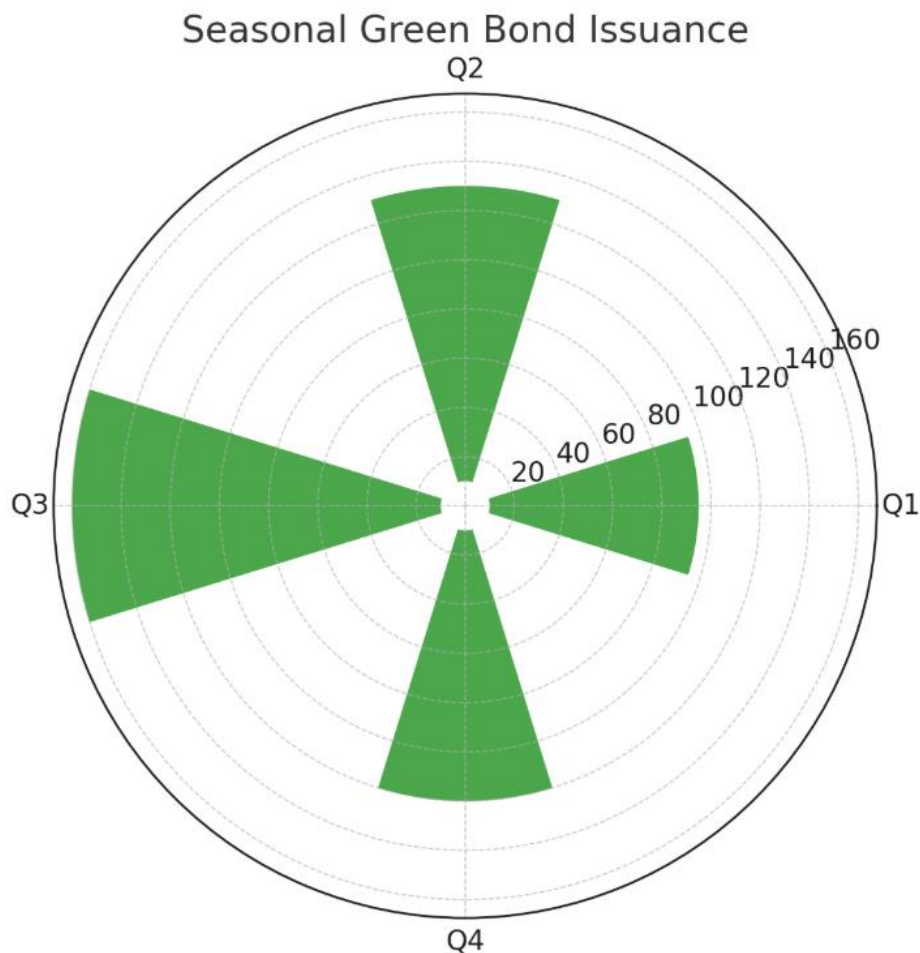
Below is a plain piece of python code that illustrates how t-test can be applied with the help of the comparison of yields, which may be between green and traditional bonds:

These statistical analyses demonstrate that these yields associated difference in different markets are in fact substantial as a contention to cause a measurable green premium.

### Sustainability and Development



The outcomes also bear witness to the fact that the bonds that are green contribute productive impacts to the environments and social uniqueness. Chua and Schmittmann (2021) support this and add that over a larger exchange rate, green bond issuers decreased their degree of carbon, in contrast to those who did not. True application of capital by the green bonds to deliver long term and social outcomes that promote transparency and trust in the green finance was also pointed out in the research of Tukhtabayev et al., (2024). Ntsama et al. (2021) highlighted the flaw of reasoning in their article, that in green markets (in lower/middle-income countries), green bonds may resolve issues in the development sector and guarantee the existence of a green economy, the local markets are small.



Despite a financial trade-off, green bonds are a tool, which can be adapted, with the hope that it can corrupt the capital into sustainability. They can be effective, when they are well managed, when there are international systems as well as they have been expanding to new markets.

### Recommendations

According to the results, it is possible to provide a set of recommendations that might assist in turning green bonds more efficient and brighter in the context of sustainable investments. Better regulation and standardization are wanted. International bodies and regulators should also liaise with one another to attract clear and mainstream definitions of a green bond. This will lessen on the chances of greenwashing and the investor confidence will be boosted. There will also be clear regulations and certification systems that will lead to funnelling of funds to real projects that can achieve quantifiable environmental benefits.

It should be more accountable and disclosure. The issuers of green bonds must publish periodic and transparent reports on how the funds are used and the effects the funds are experiencing to the atmosphere. Shareholders should be able to monitor progress on a reduction of carbon, creating renewable energy or other areas of sustainability. Third party reviews and audits by independent third parties may also assist in establishing a greater rate of trust in the market.

It needs to motivate the growing markets. The better economies are holding most of the green bond's

issues yet the developing world is still struggling to access the facilities. Through the international financial institutions, the development banks or through blended finance which provides guarantees or through subsidy, the green bonds should be made more accessible there. It would also make the world sustainable not only complementary of the rich nations.

Investors and their education and awareness has to be enhanced. The exploration of the community of investors does not have an impression of the green bonds and the advantages. This might need the financial institutions to finance this through training, inculcation of knowledge and communication as a way of continuing consolidating more and more retail and institutional investors.

In pursuit of long-term learning on green bond market development, green bonds should be interconnected more intimately with the achievement of perceived climate impacts. This is not only making them a financial product, but in fact, a practical source of environmental change.

## CONCLUSION

This paper established herein to converse the green bond science as a new science that can be the best characteristic of sustainable finance, with a look of trend, concern and possibilities. The results affirm that the green bond market is rapidly expanding within the last ten years because of the increasing demand of the investors and the global impacts of climate policies.

According to numerous studies, it has been implied that there are some pieces of evidence of the presence of a small premium imposed by investors as compared to traditional bonds, which is why it is a green premium indeed. But this premium can differ with issuers, between markets and type of bonds implying no homogeneity in financial performance.

Governance and certification had been some of the key topics. The organizational autonomy and the authority relations will positively affect the image and reduce the likelihood of risks and the intent to participate in the process of green washing and will not encounter unfriendly remarks so readily on the market. When this is the case and an institution becomes hideously dependent on institutional reinforcement is when an institution is making a finger at a critic of the regulation's regimes including those of the emerging market type economies.

To traverse in this direction in future, one must endeavor to synchronization of definitions and increased derivation of self across emerging economies and the assurance of the interconnectivity

between the bond proceed and increasingly proximate of quantifiable environmental effects. With these solutions to these problems, we can now anticipate a more significant role of green bonds when it comes to finance in terms of realizing the shift to a sustainable and low-carbon economy.

## REFERENCES

1. Abhilash, Shenoy, S. S., & Shetty, D. K. (2022). A state-of-the-art overview of green bond markets: Evidence from technology empowered systematic literature review. *Cogent Economics & Finance*, 10(1). <https://doi.org/10.1080/23322039.2022.2135834>
2. Ballester, L., González-Urteaga, A., & Shen, L. (2024). Green bond issuance and credit Risk: International evidence. *Journal of International Financial Markets Institutions and Money*, 94, 102013. <https://doi.org/10.1016/j.intfin.2024.102013>
3. Bergsdóttir, B., & Rasmussen, M. L. (2020). An Empirical Analysis of the Green Label Effect On the euro-issued bonds on the French market. In *Copenhagen Business school* (p. 93). [https://research-api.cbs.dk/ws/portalfiles/portal/62173946/879727\\_An\\_Empirical\\_Analysis\\_of\\_the\\_Green\\_Label\\_Effect.pdf](https://research-api.cbs.dk/ws/portalfiles/portal/62173946/879727_An_Empirical_Analysis_of_the_Green_Label_Effect.pdf)
4. Chen, X., & Long, W. (2023). To Enhance the Credibility of the Green Bond Market through Regulating GBERS: The Case of China. *Laws*, 12(6), 91. <https://doi.org/10.3390/laws12060091>
5. Chua, H. T., & Schmittmann, J. (2021). How Green are Green Debt Issuers? *IMF Working Paper*, 2021(194), 1. <https://doi.org/10.5089/9781513592992.001>
6. Dorfleitner, G., Utz, S., & Zhang, R. (2021). The pricing of green bonds: external reviews and the shades of green. *Review of Managerial Science*, 16(3), 797–834. <https://doi.org/10.1007/s11846-021-00458-9>
7. Fatica, S., Panzica, R., & Rancan, M. (2021). The pricing of green bonds: Are financial institutions special? *Journal of Financial Stability*, 54, 100873. <https://doi.org/10.1016/j.jfs.2021.100873>
8. Flammer, C. (2020). *Green Bonds: Effectiveness and implications for public policy*. [https://www.columbia.edu/~cf2870/PDFs/Green-Bonds\\_CFlammer\\_NBER2020.pdf](https://www.columbia.edu/~cf2870/PDFs/Green-Bonds_CFlammer_NBER2020.pdf)
9. Maltais, A., & Nykvist, B. (2020). Understanding the role of green bonds in advancing sustainability. *Journal of Sustainable Finance & Investment*, 1–20. <https://doi.org/10.1080/20430795.2020.1724864>
10. Mohamed, B. S., Mahtani, V., & Da Fonseca, D.

- (2020). Facts and fantasies about the Green Bond premium. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4713139>
11. Ntsama, U. Y. O., Yan, C., Nasiri, A., & Mboungam, A. H. M. (2021). Green bonds issuance: insights in low- and middle-income countries. *International Journal of Corporate Social Responsibility*, 6(1). <https://doi.org/10.1186/s40991-020-00056-0>
  12. Schumacher, K. (2020). The shape of green fixed income investing to come. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3663308>
  13. Tomczak, K. (2024). Sovereign Green Bond Market: Drivers of yields and liquidity. *International Journal of Financial Studies*, 12(2), 48. <https://doi.org/10.3390/ijfs12020048>
  14. Tukhtabayev, A., Dadajonova, M., Sativaldiyeva, G., Kholiyorov, U., & Hamidova, S. (2024). Harnessing green bonds for Sustainable Development: An Empirical Impact and insight. *E3S Web of Conferences*, 574, 03006. <https://doi.org/10.1051/e3sconf/202457403006>