

ORIGINAL ARTICLE

Sustainable Finance: Tools, Effectiveness, and Challenges

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ABSTRACT

This article provides an overview of recent research on sustainable finance, focusing on the effectiveness, limitations, and challenges of key instruments used in green finance, biodiversity finance, blended finance, and impact investing. Drawing on empirical evidence and conceptual frameworks, this article highlights how these tools can contribute to environmental and social goals. It also examines the role of shareholders and corporate practices in advancing sustainability. In addition, this article discusses the Asian context, where institutional and economic conditions can create distinct opportunities and challenges for sustainable finance. Finally, the article concludes by emphasizing the need for interdisciplinary research given the complex nature of sustainability challenges.

JEL Classification: G30, G32, M14, Q01, Q56

1 | Introduction

Sustainable investing—an investment strategy that aims to achieve environmental and social impact alongside financial returns—has been growing at a ferocious pace, as investors increasingly express concerns about climate change, biodiversity loss, social inequality, and other societal issues. According to Bloomberg, sustainable investing is on track to surpass \$40 trillion by 2030, corresponding to over 25% of the projected \$140 trillion assets under management (Bloomberg Intelligence 2024).

While the growth of this market is nothing short of breathtaking, it is not without concerns and challenges. Indeed, concerns have been raised that such investments and companies' ESG (environmental, social, and governance) practices may not have any real impact; rather, they might be a form of “greenwashing” (i.e., the practice of portraying oneself as environmentally conscious, but without any intent to deliver) or “window dressing” of existing activities. These concerns are compounded by the inherent difficulty of measuring companies' social and environmental impact. In this article, I provide an overview of recent research that I have conducted to better understand the effectiveness, limitations, and challenges of various tools of sustainable finance.

Note that, while the terms “sustainable investing” and “sustainable finance” are often used interchangeably, there is a nuance between them. Sustainable finance is the overarching framework, in that it encompasses a broader range of financial activities that integrate environmental and social factors, while sustainable investing refers to the practice of investing in companies, projects, or funds that aim to generate social and environmental outcomes alongside financial returns. For example, if a firm issues green bonds to finance its operations, this refers to “sustainable finance,” as it entails the use of sustainable finance instruments as a financing strategy. If an asset manager invests in green bonds as part of its fixed income strategy, this is a “sustainable investing” strategy, as the asset manager aims to achieve both environmental impact and financial returns for its clients.¹

In the remainder of this article, I discuss work on green finance (Section 2), biodiversity finance (Section 3), blended finance (Section 4), as well as impact investing (Section 5). I then discuss the role of shareholders (Section 6) and companies (Section 7) in contributing to sustainability outcomes. Finally, I discuss specific considerations related to sustainable finance in the Asian context (Section 8) and conclude by discussing potential avenues and challenges for future research (Section 9).

2 | Green Finance

In a series of articles, I studied the market for green bonds—that is, bonds whose proceeds are earmarked to be invested in green projects (Flammer 2020, 2021a, 2023). While the first green bonds were issued primarily by governments and supranational entities (such as the European Investment Bank, who issued the very first green bond on record in 2007), corporations are increasingly issuing green bonds as well. As noted in Flammer (2021a), while the total issuance of corporate green bonds was merely US\$5 billion in 2013, it soared to US\$96 billion in 2018. OECD (2025) estimates that it further increased to US\$382 billion in 2024. This trend echoes the rapid growth in sustainable investing observed in recent years.²

Four main insights came out of this work. First, the stock market responds positively to the issuance of green bonds. That is, when companies announce that they issue green bonds, their stock price increases around the day of the announcement. This suggests that shareholders perceive green bonds to be value-enhancing. Second, issuers significantly reduce their emissions in the years following the green bond issuance. This indicates that green bonds serve as a signal of the companies' commitment toward the environment, as opposed to being mere tools of “greenwashing.” Third, green bond issuers experience an increase in ownership by long-term and green investors, suggesting that green bonds help attract an investor clientele that is mindful of the long term and the natural environment. Fourth, and importantly, the above results (which refer to the average corporate green bond) concentrate among the set of green bonds that are certified by independent third parties.³ These findings indicate that—in the absence of public governance in the green bond market—private governance in the form of certification serves as an important governance tool to mitigate greenwashing concerns. Conversely, these results also suggest that greenwashing is a concern for those bonds that are not certified.^{4,5}

The above insights refer to the global market for corporate green bonds. In Flammer (2021b), I show that similar insights apply in the more specific context of the Asian market for corporate green bonds. In particular, I show that, while corporate green bonds had a slower start in Asia, the market picked up as of 2015—potentially in the wake of the Paris Agreement—with the total issuance amount rising from US\$2.4 billion in 2015 to US\$35.1 billion in 2018. It further increased to approximately US\$114.6 billion in 2024.⁶ Moreover, I document that Asian stock markets respond positively to the issuance of corporate green bonds, and that the issuing companies achieve higher environmental performance post-issuance.

In addition to green bonds, there are other instruments of green finance, such as green loans and green equity. While less research has been devoted to these instruments, similar considerations are likely to apply as well—e.g., in terms of their effectiveness and potential for greenwashing.⁷

3 | Biodiversity Finance

Climate change is closely intertwined with the loss of biodiversity, another grand challenge our society is facing. Several

organizations such as the World Wide Fund for Nature (WWF) and the United Nations (UN) highlight the urgency and importance of mitigating the biodiversity crisis; doing so is crucial for the planet, our health and well-being, as well as the global economy, since more than half of the world's gross domestic product (GDP) is dependent on nature and the services it provides (WWF 2022).

The protection and restoration of biodiversity requires considerable amounts of funding. The Nature Conservancy estimates that we face a financing gap of about US\$722–967 billion per year to effectively address the biodiversity crisis (The Nature Conservancy 2020). This raises a key question: How can we close this financing gap? One potential avenue is private capital investments in biodiversity projects that aim to provide both financial returns and biodiversity impact. While this practice is gaining momentum among investors, it is not well understood.

In Flammer et al. (2025a), we shed light on this new phenomenon in two ways. First, we provide a conceptual framework that lays out how biodiversity—which is a public good—can be financed by private capital. In this regard, a key component is the bundling of the public good (biodiversity) with a private good whose value increases with the protection of biodiversity. For example, the protection of pollinators (such as bees, beetles, and butterflies) can enhance the farmland's productivity; the preservation of coastal ecosystems helps prevent flooding; the preservation of forest ecosystems can generate carbon credits and hence improve the farmers' profits. Hence, investments that bundle private goods with biodiversity preservation can achieve the dual role of protecting biodiversity while providing a financial return to investors. While such bundling serves as a monetization mechanism, the risk–return tradeoff of biodiversity investments may nevertheless not be appealing enough to attract private capital. To subsidize and de-risk biodiversity investments, one potential remedy is the use of blended finance. That is, development funding (from the public sector or philanthropic organizations) is “blended” together with private capital to reduce the risk borne by private investors, thereby improving the risk–return tradeoff from the private investors' perspective. In this vein, the blending improves the attractiveness of biodiversity investments and hence serves as a catalyst to attract private capital.

Second, we provide empirical evidence on biodiversity finance using deal-level data from a leading biodiversity finance institution. We find that projects with higher expected financial returns tend to be financed by pure private capital. Their scale is smaller, however, and so is their expected biodiversity impact. For larger-scale projects with a more ambitious biodiversity impact, blended finance is the more prevalent form of financing. While these projects have lower expected returns, their risk is also lower. This suggests that the blending—and the corresponding de-risking of private capital—is an important tool for improving the risk–return tradeoff of these projects, thereby increasing their appeal to private investors.

Finally, we examine a set of projects that did not make it to the portfolio stage. This analysis suggests that, in order to be financed by private capital, biodiversity projects need to meet a certain threshold in terms of both their financial return and

biodiversity impact. Accordingly, while private capital investments in biodiversity are a useful addition to the toolbox, they are unlikely to provide a silver bullet against the biodiversity crisis. In other words, while private investments can help close the financing gap and contribute to the conservation and restoration of biodiversity, they are unlikely to substitute for the implementation of effective public policies.

Note that the findings summarized above refer to a global sample of biodiversity finance deals, out of which 24.2% are in Asia. While the sample is too small to provide a split by geographic areas, the insights obtained from this analysis are likely to apply to the Asian market as well.

4 | Blended Finance

While the use of blended finance structures has gained traction for the financing of biodiversity projects, blended finance can be applied more broadly to finance projects that contribute to the achievement of a more sustainable world and hence the fulfillment of the United Nations' Sustainable Development Goals (SDGs).

In Flammer et al. (2024, 2025b), we provide a conceptual framework that formalizes the decision-making of development finance institutions (DFIs) that engage in blended finance. We then provide empirical evidence on the practice of blended finance using data from a major DFI, namely the World Bank's International Finance Corporation (IFC). The key variable we study is the level of concessionality, which captures the subsidy from the blended capital. Our findings indicate that DFIs provide higher concessionality for projects that have a higher sustainability impact. Moreover, the concessionality is higher for projects in countries with higher political risk and a higher degree of information asymmetries. In such cases, the blending tends to also include risk-management provisions. These findings are consistent with the predictions from our conceptual framework, in which DFIs have a limited budget of public and philanthropic capital that they allocate across projects to create societal value.

5 | Impact Investing

Another tool of sustainable finance is impact investing. Impact investing aims to finance business ventures that are both economically viable and have a positive social impact.

Impact investing primarily uses private capital, which typically comes from individuals, institutional investors (such as pension funds or insurance companies), private equity/venture funds, or family offices.

In Boulongne et al. (2024), we examine whether impact investing is more effective in achieving this dual objective when investments are directed toward ventures located in disadvantaged urban areas (such as slums in the US, banlieues in France, or favelas in Brazil) compared to similar investments directed toward ventures located outside these areas. We explore this question in the context of impact loans made to business ventures

in French banlieues versus non-banlieues, using data from a French impact investor that we merge with establishment-level data from the French INSEE (Institut national de la statistique et des études économiques). We find that, following the issuance of the loans, banlieue ventures achieve greater improvements in financial performance and greater social impact in terms of the creation of local employment opportunities, quality jobs, and gender-equitable jobs compared to observationally similar non-banlieue ventures.

These results indicate that impact investors are able to contract with ventures of greater unrealized potential in banlieues. Why are traditional investors missing out on these opportunities? Our results point toward discrimination against banlieue ventures in the traditional loan market. This is corroborated in a controlled lab experiment in which participants—working professionals who are asked to act as loan officers—are randomly assigned to identical business ventures that only differ in their geographic location. We find that participants are indeed less likely to grant loans to banlieue ventures compared to non-banlieue ventures, despite the ventures being identical.

6 | The Role of Shareholders

Shareholders—that is, the company's owners—have the potential ability to steer their companies toward sustainable behavior. In the theory literature, shareholders are often modeled as agents who only derive utility from shareholder value. From this perspective, most models assume that the firms' objective function is to maximize shareholder value. However, new frameworks have emerged that challenge this assumption. In particular, Hart and Zingales (2017) argue that firms should be maximizing shareholder *welfare* (as opposed to shareholder value per se). Their main point is a simple one: in economics, it is typically assumed that economic agents maximize their utility (as opposed to their financial returns). Yet, in many theories of the firms, it is typically assumed that shareholders maximize their financial returns, which departs from the way one usually thinks about economic agents. In this regard, Hart and Zingales (2017) call for a rethinking of the relevant objective function of shareholders. Relatedly, in her recent presidential address at the annual meeting of the American Finance Association (AFA), Laura Starks highlighted the seemingly subtle yet important distinction between “values” and “value” (Starks 2023).

Shareholders have various tools available to influence their portfolio companies' ESG practices—they can pursue passive sustainable investing strategies (including divestment and thematic screening) and more active forms of sustainable investing (including shareholder engagement and activism). The existing literature suggests that active sustainable investing strategies are more effective than passive forms of sustainable investing in shaping the ESG practices of their portfolio companies.⁸ The intuition is straightforward: when they choose to divest, investors lose their seat at the table and the potential to shape their portfolio companies' business practices. In contrast, investors' active engagement may serve as a more effective governance mechanism, especially when they have large shareholdings.

In a series of papers, my co-authors and I provide evidence of increasing shareholder activism pertaining to ESG, corporate short-termism, and the demand for greater disclosure of their portfolio firms' climate risks exposure (Flammer 2015a; Flammer and Bansal 2017; Flammer et al. 2021). Furthermore, the insights of these studies suggest that shareholder activism can serve as an important private governance tool that improves firms' ESG practices, the disclosure thereof, and ultimately contributes to shareholder value.

7 | Companies' ESG Practices

7.1 | Diversity, Equity, and Inclusion

Companies' ESG practices—which are often referred to as corporate social responsibility (CSR)—come in different flavors. One dimension that has received considerable attention in recent years, but is not well understood, is diversity, equity, and inclusion (DEI). Perhaps due to the challenges in measuring DEI, DEI metrics often focus narrowly on demographic diversity (e.g., the number of women and minorities on the board), but do not capture equity and inclusion (EI).

In Edmans et al. (2024), we take a first step toward measuring the EI component of DEI. To do so, we use proprietary data on survey responses used by Great Place to Work to compile the list of the 100 Best Companies to Work For in America. We identify 13 of the 58 questions as being related to EI, and aggregate the responses to form our EI measure. Our EI measure has low correlation with gender and ethnic diversity in the boardroom, in senior management, and within the workforce, suggesting that EI captures additional dimensions missing from traditional measures of demographic diversity. This indicates that companies can “hit the target, but miss the point,” that is, improve diversity statistics without actually improving EI.

When turning to the relationship between EI and performance, we find that EI is positively associated with seven out of eight measures of future profitability, such as return on assets, return on sales, profits divided by employees, and sales divided by employees (“labor productivity”). These results are obtained after controlling for the percentages of female and minority employees; indeed, these variables are insignificantly related to almost all performance measures. In short, EI is correlated with higher profits, but diversity alone is not. We also find that EI is positively associated with valuation measures, such as Tobin's Q, suggesting that the market at least partially incorporates the value of EI.

7.2 | Corporate Social Responsibility

Leaving DEI aside, companies implement various other CSR policies. In a series of papers, my co-authors and I show that CSR can benefit companies in several ways—they can increase firms' ability to innovate, increase firms' ability to retain employees, increase employee motivation, increase firms' resilience in times of crises, and increase firms' competitiveness on the product market and the market for government contracts, all of which help contribute to financial performance

(Flammer 2015a, 2015b, 2018; Flammer and Kacperczyk 2016, 2019; Flammer and Luo 2017; Flammer and Ioannou 2021).

Given these potential benefits of CSR, a natural question is: why are companies often hesitant to engage in ambitious CSR programs? In two related studies, my co-authors and I argue that this is partly due to managerial myopia, as the benefits of CSR programs tend to accrue in the long run while they might be costly in the short run (Flammer and Bansal 2017; Flammer et al. 2019). Consistent with this argument, we find that the adoption of ESG-linked compensation (so-called “pay for social and environmental performance”) and long-term executive compensation (i.e., executive compensation linked to the firm's long-term performance) help improve both firm value and firms' engagement in long-term strategies such as CSR.

8 | Sustainable Finance in the Asian Context

While this article discusses sustainable finance primarily from a global perspective, it is worth noting that the Asian context can be quite distinct. In particular, compared to the US and Europe, sustainable finance in Asia faces different challenges and opportunities due to varying development stages, economic priorities, and regulatory landscapes.

In particular, many Asian countries are still developing, with economies heavily reliant on industries such as manufacturing and infrastructure development, some of which are resource-intensive. This means that the transition to a sustainable economy involves a more complex and potentially costly shift for these countries. Relatedly, some Asian countries, particularly those with emerging economies, still rely heavily on coal for energy production. This reliance poses a significant hurdle in decarbonizing their economies and requires careful management during the transition. In addition, sustainable finance regulations and taxonomies are still developing across Asia, with varying levels of rigor and harmonization. Some countries have comprehensive frameworks, while others are still in the early stages of implementation. This is in contrast to the US and Europe that have more established regulatory frameworks—but still evolving and subject to debate—for sustainable finance.⁹

Given these differences, it is important for researchers to study the effectiveness and limitations of sustainable finance instruments in the specific context of Asia. As mentioned in Section 2, my study of the Asian market for corporate green bonds (Flammer 2021b) suggests that many insights we gained from the global market for corporate green bonds carry over to the Asian market, even though this market had a slower start. However, it is not obvious that the same would apply to other sustainable finance instruments. This calls for more research on the Asian market, along the lines of several articles in this issue (e.g., Kim et al. 2026; Zhan et al. 2026).

9 | Conclusion

The overview article summarizes recent research I conducted that aims to better understand the effectiveness, limitations, and challenges of various tools available in sustainable finance to

tackle climate change, biodiversity loss, social inequalities, and other grand societal challenges. This research adds to the growing literature on sustainable finance. While this literature is growing rapidly, it is not without challenges. In particular, many sustainability-related issues are complex and require expertise from various fields beyond economics and finance (e.g., natural sciences). Going forward, this calls for more interdisciplinary research to better understand and make progress in tackling these complex challenges.

Relatedly, while the research reviewed in this article focuses on the private sector, the public sector also plays an important role in sustainable finance. Given the divergence between the social vs. private costs and benefits, sustainable finance will be underprovided if left completely to the private sector. Hence, governments need to play a role—e.g., through direct investments, the provision of catalytic capital in blended finance structures, and regulations. Understanding the political economy of the governments' involvement and the optimal design of the governments' interventions toward sustainable finance are important dimensions that call for more research.

Finally, another area that calls for more research is the ongoing “ESG backlash,” which refers to the growing resistance against the consideration and implementation of ESG criteria in investment and business practices. This backlash is multifaceted, stemming from political, ideological, and economic concerns, and is particularly pronounced in the US. In light of this backlash, some commentators wonder whether Asia is best positioned to take on a leadership role in the sustainability agenda (Robson 2024). Understanding the determinants and implications of the backlash is important to inform future efforts to finance a more sustainable world.

Endnotes

- ¹ A similar distinction applies between “green finance” and “green investing” as well as between “biodiversity finance” and “biodiversity investing.”
- ² Note that, despite the rapid growth of this market, corporate green bonds only account for a tiny share of the overall market for corporate bonds. Specifically, Flammer (2021a) estimates a share of less than 0.1% in 2018.
- ³ Note that certification is costly for firms and hence likely to provide a credible signal of the firm's commitment to the greenness of the bond. The cost is not so much in terms of the fee that is charged by the certifying entity (which is trivial for publicly traded firms), but rather in terms of the compliance with the green bond standards (e.g., the Climate Bonds Standard of the Climate Bonds Initiative), which requires considerable managerial effort and resources. Moreover, in the event of non-compliance—a so-called “green default”—the delinquent firm has to take costly actions to restore compliance and potentially suffers reputational damages.
- ⁴ For a more detailed discussion of the challenges in the green bonds market and implications for public policy, see Flammer (2020).
- ⁵ Note that Flammer (2021a) also studies the pricing of corporate green bonds at issuance (primary market) and reports no significant difference in the yield of green vs. non-green bonds, suggesting that green bonds do not provide a cheaper source of financing for firms. This is consistent with the evidence of Larcker and Watts (2020) for municipal green bonds. However, other studies such as Zerbib (2019) find evidence for a “greenium” on the secondary market, suggesting that green

bond investors are willing to accept lower yields, potentially trading off the environmental benefits of green bonds vis-a-vis the financial benefits thereof.

- ⁶ This amount is estimated from OECD (2025) that reports a global issuance of corporate green bonds of US\$382 billion in 2024 and notes that the “Asian corporate sustainable bond issuance represents a significant 30% of global issuance over the last 10 years [2015–2024]” (p. 102). Assuming that the share of green bonds is also about 30% yields $0.3 \times 382 = 114.6$.
- ⁷ For example, see Dursun-de Neef et al. (2022) for related evidence on green loans.
- ⁸ For a curated list of academic publications in sustainable investing, see <https://www.unpri.org/research/top-academic-resources-on-responsible-investment/4417.article>. Accessed 27 July 2025.
- ⁹ For a more detailed discussion, see the comparative study of Iyer (2024).

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