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Sustainable and Climate Finance: An Integrative Framework from Corporates to Markets and Society

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ABSTRACT

This paper revisits the study of climate and sustainable finance. We conduct a systematic review of existing research and develop an integrative conceptual framework that starts with a corporate finance perspective to (1) encompass the perspective "inside the firm", to then (2) broaden from corporate finance to capital markets, and finally (3) from capital markets to an ecosystemic perspective. Within each of these three classes, we discern pivotal concepts in the domains of (A) climate finance, (B) sustainable finance, and (C) financial reporting and rating. We conclude by identifying promising avenues for policy and research that, in our perspective, merit increased consideration by researchers and regulators when designing future studies or policy interventions.

Keywords: Climate finance, sustainable finance, green finance, ESG, SRI, CSR, SDG, sustainability, environment, governance, reporting, ratings

JEL Codes: G30, Q54, Q56

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1 Introduction

Sustainability and climate finance are increasingly receiving attention from a diversified set of stakeholders. At the firm level, companies are increasingly seeking the route of sustainable growth via green innovation. At the investment level, financial markets and specialized intermediaries such as credit rating agencies are incorporating ESG factors into their methodology and have signed the Principles of Responsible Investment (PRI), pleading their commitment to the inclusion of environmental, social, and governance (ESG) factors in their market valuation and credit rating processes. At the policy and "ecosystemic" level, regulators are developing a comprehensive policy agenda on sustainable finance which aims to re-orient investments towards more sustainable business and social activities and at the same time are trying to tame greenwashing phenomena.

In light of this multifaceted scenario, finance scholars are confronted with a broad spectrum of theoretical and empirical research inquiries to investigate. Furthermore, as Laura Stark's (2023) Presidential Address of the American Finance Association has emphasized, they can conduct "research that considers both pecuniary and non-pecuniary aspects of ESG, taking an objective stance with regard to objectives, costs, and benefits related to sustainable finance, ... providing evidence on the associated economic implications".

Recently, there have been valuable literature reviews to summarize scholarly work on the different trajectories that sustainable and climate finance research can take. Bartolacci *et al.* (2020) review the literature that specializes in small and medium-sized enterprises (SMEs) using a bibliographic coupling. Widyawati (2020) conducts a systematic literature review of socially responsible funds. Khan (2022) provides a bibliometric and meta-analysis of ESG disclosure and its effect on firm performance. Singhania *et al.* (2023) distinguish sustainable finance research in terms of publication trends, co-authorship networks, keywords, countries and institutions, journal co-citation, and cluster analysis. Billio *et al.* (2023) review the state-of-the-art literature that deals with ESG valuation and rating methodologies and the impact of ESG factors on credit risk, debt and equity costs, and sovereign bonds.

Considering ESG problems throughout the investment process leads to increased long-term investments in sustainable economic activities, and projects that correspond with the sustainable development goals (SDGs) to expand benefits beyond investors to reach whole communities. Coherently, this paper identifies three perspectives: it starts from "inside the firm", broadens to "the capital market" and encompasses a far-reaching "ecosystemic standpoint". Accordingly, we classify 64 papers into three categories: (1) Inside the firm, (2) From corporate finance to capital markets, and (3) From capital markets to investors (ecosystemic perspective). Some interesting conceptual and method-

ological insights emerge from our literature review, as we highlight in the next sections.

We then propose our integrative conceptual framework that originates from a corporate finance perspective, with the primary objective of (1) assimilating the internal perspective of the firm management. Subsequently, it progresses (2) from corporate finance to encompass investors in capital markets and ultimately (3) broadens its scope from capital markets to an ecosystemic outlook which comprises critical social issues and different perspectives of managers and investors. Within each of these three categories, we identify fundamental concepts in the areas of (A) climate finance, (B) sustainable finance, and (C) financial reporting and rating. This leads to the identification of nine key promising avenues for policy and research.

This article is structured as follows. First, in Section 2, we summarize the main findings that emerge from available published research on climate and sustainable finance. Next, in Section 3, we examine a collection of some contemporary research on sustainable finance. Section 4 presents our vision of an integrative conceptual framework. The concluding part highlights avenues of research that scholars may consider when planning their studies in climate and sustainable finance.

2 The State-of-the-Art

In this Section, we present a systematic review of the state-of-the-art theoretical and empirical research on sustainable and climate finance. To conduct this analysis, in June 2023, we queried Scopus for articles meeting the following criteria: (i) articles published in ABS 3+ ranked journals from 2008 to 2022; and (ii) articles having the following keywords: "sustainable finance", "climate finance", "green finance", "ESG", "sustainability, "Corporate Social Responsibility", "CSR", "Impact investing", "Socially responsible investing", "SRI", "green bonds", "green returns", "climate change", or "climate risk" included in either title, abstract and/or listed among the keywords. We skimmed these articles and dropped those that lacked a fit with the topic under scrutiny. We used the remaining 64 articles for our literature review. They are listed in Table A1 in the Online Appendix. For each article, Table A1 reports the authors, title, journal, year of publication, the definition of the sample, and a summary of its key findings.

We classified these 64 papers into three categories: (1) Inside the firm, (2) From corporate finance to capital markets, and (3) From capital markets to investors (ecosystemic perspective). Some interesting conceptual insights emerge from our literature review.

First, the relative numbers of papers identified for the three categories are, *per sè*, interesting summary statistics. We identified 27 papers in the

"Inside the firm" category, 20 papers belonging to the "From corporate finance to capital markets", and the remaining 17 papers about the broad topic of "From capital markets to investors (ecosystemic perspective)". The "Inside the firm" typically includes firm-level studies. The "From corporate finance to capital markets" research area includes topics that relate to issuers, investors, markets and their reciprocal linkages. Finally, the "From capital markets to investors (ecosystemic perspective)" category provides insights at the policy and institutional level.

Second, there are differences in the type of journals that are further represented in each category. The category "Inside the firm" includes finance and management journals, with the Journal of Business Ethics (4 papers) and the Journal of Financial Economics (3 papers) being the most represented. The category "From corporate finance to capital markets" is more purely finance-oriented, with the Journal of Banking & Finance (5 papers) and the Review of Financial Studies (3 papers) as representative journals. Overall, as expected, the number of papers published each year on climate and sustainable finance has been constantly increasing, reaching a maximum of 14 papers in 2022.

We identify key insights from the conclusions of the papers of each category. First, we start with the firm-level papers included in the category "Inside the firm". These papers typically relate to CSR, sustainability, and their impact on various aspects of business and finance. CSR positively affects credit ratings, particularly for larger firms with better financial indicators. However, research shows (see Zerbib (2019)) that bonds issued to finance sustainable projects have yields nearly identical to otherwise non-sustainable bonds. Thus, that evidence indicates that CSR characteristics are typically not factored into bond prices. Firms with high CSR demand high-quality external audits. Firms in areas with high CSR, major cities, and financial centers exhibit greater CSR engagement and lower equity financing costs. Higher CSR performance correlates with tighter cash constraints, greater pay-for-performance sensitivity, better legal protection of shareholder rights, and lower levels of expropriation by controlling shareholders. ESG performance correlates positively with firm size, leverage, and metrics of financial performance. A much-discussed topic is why top-performing CSR companies have higher market valuations (e.g.: Tobin's q) compared to industry peers, On one hand, higher market valuation today is paralleled, in equilibrium, by future lower-risk adjusted returns (Fama and French, 2007). More recently, Pastor *et al.* (2020) reaffirmed that view by developing a model that points to the effect that a large group of investors may have on pricing stocks of companies highly committed to ESG goals. The price impact of such a large presence of optimistic investors could be material, resulting in higher market valuations and future lower investment returns. Thus, designing sustainable businesses does not necessarily lead to success, even though attracts investors with community-focused motives.

Environmental actions can mitigate information asymmetry, but some actions can harm environmental legitimacy.

Second, we provide a concise summary of the key points of investor-level papers of the category "From corporate finance to capital markets". Some papers focus on the effects of firm cost of capital, highlighting that improved environmental risk management lowers the cost of external funding. In this field, some studies conclude that green assets have a lower implied cost of capital, consistent with the theoretical view we underlined earlier between current valuation and expected returns. There seems to be a robust inverse association between sustainability financial performance and the cost of equity. Institutional investors show their appreciation for corporate strategies that protect from climate risks through risk management tools and executive engagement. On the contrary, strategies that divest or liquidate brown assets are less appreciated. Other papers focus on ESG ratings. ESG ratings share common dimensions but do not converge, particularly in high-risk industries. Some papers (e.g. Gibson Brandon *et al.*, 2021) find that stock returns are positively correlated with disagreement in ESG ratings, while others (e.g., Billio *et al.*, 2021) that the disagreement in the scores provided by the rating agencies disperses the effect of preferences of ESG investors on asset prices, to the point that even when there is agreement, it has no impact on investment performances. ESG rating consensus predicts future ESG news, but this relationship is influenced by the extent of disagreement among raters. To summarise, coherently with the evidence provided by Billio *et al.* (2023), positive ESG ratings are associated with an improvement in credit ratings, a reduction in CDS spreads, and a decrease in the costs of debt and equity.

Third, the category "From capital markets to investors (ecosystemic perspective)" includes a diverse set of papers at the policy and institutional level. Important aspects of these papers are as follows. Most ESG funds operate in secondary markets and have limited real economic impact, particularly in environmental and social aspects. Higher fees are associated with ESG products, driven by product creation and overselling. The surge in investments related to Environmental, Social, and Governance (ESG) factors could potentially alleviate the urgency for essential regulatory reforms and collaborations between the public and private sectors. Solutions include public-private partnerships, outcome-focused regulation, and addressing externalities.

3 Contemporary Research on Climate and Sustainable Finance

In this section, we discuss how the articles selected for this special issue contribute to advancing our understanding of climate (three papers) and sustainable finance (three papers).

Fiordelisi *et al.* (2024) contribution focuses on climate change fear in relation to natural disasters and investor behavior. Although an increasing number of papers analyze losses due to natural disasters, there is no evidence that climate change events have an impact on Sustainable Investment Decisions. This paper proves, by using data on natural disasters, that these natural disasters have a substantial influence on the returns of Exchange-traded Funds (ETF), showing that investors react to natural disasters by investing in sustainable financial products. The findings suggest that large-scale natural disasters significantly increase investors' preferences for sustainable ETFs. This study also provides evidence that investors' sentiment toward the sustainability theme has changed over time.

El Ghoul *et al.* (2024) address the research question of whether climate change exposure matters to stakeholders. This work adds to climate finance research by studying stakeholder reactions to climate change exposure in the context of capital structure and product market interactions. Based on a sample of 2,547 U.S. firms from 2004 to 2020, the study finds that climate change exposure intensifies stakeholder-driven costs of high leverage. The impact is stronger to firms headquartered in Democratic-leaning states, during the post–Paris Agreement period, to economic sectors with higher physical asset exposure, and to firms with more sensitive stakeholder responses. All in all, the study of El Ghoul *et al.* (2024) indicates that financial fragility (measured as high leverage ratios) makes firms more vulnerable to climate change shocks, and raises the attention and stricter scrutiny from their stakeholders.

Heo (2024) studies how climate change affects bank fragility. His main results are that both physical and transitional climate changes lead to substantial increases in systemic risk, and the impact is more material for banks with higher climate change exposure, higher loan portfolio synchronicity, and higher bank default probability. Heo (2024) findings are confirmed when using an instrumental variable approach, and by exploiting staggered adoptions of climate adaptation policy across states. The paper also establishes that climate adaptation can reduce systemic risk caused by climate change. Overall, Heo (2024) study provides suggestive evidence that climate change worsens financial instability. However, Heo (2024) research suggests that undertaking an adaptation policy can build resilience and neutralize its most adverse consequences.

Koskinen *et al.* (2024) examine how stakeholder orientation contributes to financial outcomes and environmental performance. Their study is based on data from Canada and the United States in the period 2002 to 2020. In those years, both in Canada and some US states, there has been the passing of stakeholder-oriented constituency statutes. Having identified firms involved in statute change Koskinen *et al.* (2024) show that Canadian firms and stakeholder-oriented U.S. firms have better environmental performance

than shareholder-oriented U.S. firms. However, they highlight that good environmental performance increases profits and valuations for all firms in the U.S., but especially for shareholder-oriented firms. Canadian firm sample shows no significant financial impact. Moreover, the financial impact of environmental performance became negative for Canadian firms after the Supreme Court decision in 2008 on BCE Inc. vs. 1976 Debentureholders, stating that the duty of the board of directors is to act in the best interest of the corporation, and not only limited to its shareholders. The U.S. results for valuations are robust after taking into account potential endogeneity issues using instrumental variables and dynamic panel regressions. Thus, this paper's findings suggest a trade-off between firm environmental and financial performance under different governance schemes. On the one hand, when corporate stakeholder orientation prevails, environmental performance improves but the firm's financial performance deteriorates. On the other, adopting a corporate shareholder orientation will maintain the firm's bottom-line results but it will be damaging the environment.

The article by Giacchetta and Giacometti (2024) investigates the impact of climate transition risk on the European financial system. Assuming a climate stress scenario they examine the consequences of the expected capital shortfall of the major European banks. Using European Bank Authority (EBA) corporate loans data, Giacchetta and Giacometti (2024) measure the dynamic transition of bank equity beta and compare them to the non-financial corporate loan exposure of each bank towards the energy sector. Furthermore, they estimate the dynamic risk premium associated with the selected climate transition risk factor to explain and potentially exploit stock market anomalies. Focusing on countries' exposures they uncover at the end of 2022, aggregated European climate risk (CRISK) can be quantified in about EUR 165 bn. As far as the climate premium is concerned, the paper shows that a dynamic climate risk premium is negatively correlated with transition risk exposure.

Finally, Livieri *et al.* (2024) analyze climate transition risk by adopting a jump-diffusion credit risk model. The pricing of transition risk is observed when a change in business risk is triggered by the enactment of green policies that intend to direct society toward a sustainable and low-carbon emissions economy. When such a shift in climate regulation appears, the value of certain firms' assets can be downgraded because firms could face higher costs to shift to a less carbon-intensive business model. The article's empirical strategy is to model the pricing of corporate defaultable bonds and their Credit Default Swap contracts (CDS). When tested empirically the authors show that a jump-diffusion credit risk model can capture, at least partially, the transition risk. As predicted, that result is obtained when a downward jump in firm value occurs due to tighter green laws. Livieri *et al.* (2024) first calibrate a CDS term structure model, next they perform a quantile regression exercise

to assess the relationship between implied prices and proxies for transition risk. Their results lead to the conclusion that transition risk is naturally a jump process, and a model that lacks this property cannot capture its main characteristics and impact on asset prices.

4 An Integrative Framework on Sustainable and Climate Finance

Climate risks and sustainable finance have arrived in the mainstream becoming a general concern. Drawing on our examination of the existing body of knowledge on sustainable and climate finance and the contemporary examples of research presented in the previous section, we now discuss areas that in our view warrant attention. Several unresolved questions serve as valuable foundations for outlining potential research developments. We propose an integrative framework with a matrix that matches the focus on different stakeholders (i.e., corporates, investors, and society at large) with the perspective of climate finance, sustainable finance, and financial reporting and rating.

Specifically, as in the rest of the paper, we address these challenges according to the three perspectives of (1) Inside the firm, (2) From corporate finance to capital markets, and (3) From capital markets to investors (systemic perspective). For each category, we identify three "realms" of future research. Within each of these three research fields, we identify fundamental concepts in the areas of (A) climate finance, (B) sustainable finance, and (C) financial reporting and rating. This leads to the identification of a matrix of nine key promising avenues for research and policy analysis, as summarised in Table 1.

For the category (1) "Inside the firm", we identify the realm of (1/A) climate change, the realm of (1/B) the primary market (floating new issues to raise capital and exits), and the realm of (1/C) Small and Medium-sized Enterprises (SMEs).

First, (1/A), the intersection of corporate finance and climate change represents a field that demands rigorous exploration. Future research in corporate finance can delve deeper into the intricate relationship between financial decision-making and climate-related risks and opportunities. Understanding how climate change has direct effects on financial performance is crucial for developing adaptive strategies. For instance, researchers are likely to focus on the role of corporate governance in climate risk management, investigating how boards and executives can align financial strategies with environmentally sustainable practices. Corporate governance conflicts and incentives in addressing climate risks will indeed be a critical aspect, shedding light on the role of leadership in aligning increasingly competing goals (Aguilera *et al.*, 2023) and navigating potential conflicts of interest. Relatedly, a pivotal direction is the selection of projects that achieve the dual objectives of maximizing shareholder value and contributing to a clean environment and society wel-

Table 1: An integrative framework on sustainable and climate finance.

	(1) Inside the firm	(2) From corporate finance to capital markets	(3) From capital markets to investors (systemic perspective)
(A) Climate finance	(A/1) climate change	(A/2) climate risk pricing	(A/2) macro-finance and policy intervention
(B) Sustainable finance	(B/1) primary market (capital raising and exits)	(B/2) SRI	(B/3) investors' and stakeholders' perceptions
(C) Financial reporting and rating	(C/1) SMEs	(C/2) heterogeneity/disagreement in ESG ratings	(C/3) global financial decision-making

fare. As sustainability becomes integral to corporate ethos, investigating the financial performances of eco-friendly initiatives will be imperative. The incorporation of climate-related disclosures and reporting standards into financial frameworks is another promising research area. Valuation methodologies for sustainable investments are likely to emerge as a significant field of study, addressing the need for accurate assessments of the long-term financial worth of environmentally responsible projects. To this extent, future research can contribute significantly to the evolution of corporate finance practices that not only respond to the challenges posed by climate change but also facilitate the transition towards a more sustainable and resilient global economy.

The second realm of the "Inside the firm" category (1/B) deals with approaching primary markets particularly when floating new issues to raise capital or exiting initial investors). A new avenue of research in corporate finance is opened to study the consequences of transitioning from brown to green operational activities. A critical facet of this exploration will be the financing mechanisms underpinning this transition, analyzing the efficacy of various capital-raising strategies for sustainable initiatives. Green bonds, for instance, are emerging as the security more frequently used to finance sustainable projects, which include recent innovations such as digital green bonds (Butticè and Vismara, 2022). Green bond proceeds are committed to financing environmental and climate-friendly investments but at the same time restrict financial flexibility if further shocks appear that force changes in corporate strategies. Preliminary evidence on green bond pricing shows that their yields are not different from those observed at generic bonds. Additionally, as corporations increasingly engage in asset restructuring and external expansions through M&A campaigns, keeping a sustainability lens and understanding the intricacies of sustainable deals will be crucial. Researchers will likely investigate the financial, strategic, and governance dimensions of such transactions, aiming to provide insights into those restructuring plans that deliver value creation within a sustainable framework. Moreover, as businesses confront the imperative to shed unsustainable assets, the dynamics of exiting such investments will be a further important research area. This includes understanding the financial implications, market reactions, and strategic considerations associated with unbundling non-sustainable assets (see Curi and Murgia, 2020 for a review of asset sales theory and evidence).

Third, (1/C) Sustainable finance ought to be adapted to incorporate the distinctive characteristics and nuances inherent to SMEs. Investigating the impact of sustainable financing on the growth, resilience, and competitiveness of SMEs will be a key focus, shedding light on the potential benefits and challenges associated with adopting eco-friendly business models. Dealing with SMEs encompasses ESG ratings for SMEs. Indeed, ESG ratings, while instrumental in gauging the sustainability performance of businesses, pose particular challenges for SMEs. The standardized nature of ESG metrics

may not align with the diverse operations and structures of SMEs, making it challenging for them to conform to predefined criteria. Moreover, SMEs may find it burdensome to engage with third-party ESG rating agencies, as the associated costs and efforts can be disproportionately high relative to their scale. The absence of universally accepted ESG reporting standards further complicates matters, leading to variations in evaluation methodologies and potentially resulting in inconsistent ratings. Addressing these challenges is crucial to ensure that ESG ratings effectively capture the sustainability efforts of SMEs, allowing them to contribute meaningfully to the broader discourse on responsible business practices.

For the category "From corporate finance to capital markets", we identify the realm of (2/A) climate risk pricing, the realm of (2/B) socially responsible investing (SRI), and the realm of (2/C) heterogeneity/disagreement in ESG ratings.

First, (2/A) climate risk pricing. The international financial system will play a pivotal role in directing capital towards emerging green assets, with a particular emphasis on mitigating the impacts of climate change. Hence, a key area of exploration will revolve around assessing the efficiency of market pricing mechanisms for climatic risks, aiming to understand how financial markets incorporate and reveal the evolving landscape of climate-related risks. Another critical dimension is the research into climate risk assessment and disclosure practices for both firms and financial intermediaries, meant to enhance our understanding of how entities communicate and manage their exposure to climate risks. The design of investment strategies that effectively hedge against climate risks and liabilities is likely to offer insights into optimal portfolio construction in a changing climate landscape. Fortunately, data pertaining to climate-related phenomena is increasingly becoming more readily available and is of higher quality. The availability of more detailed metrics concerning climatic events will enable a more comprehensive empirical evaluation of how climate risks affect asset pricing.

Second, (2/B) socially responsible investing (SRI) is defined by the United Nations Principles of Responsible Investment as a strategy and practice to incorporate ESG factors in investment decisions and active ownership. In this realm, researchers are expected to explore novel frameworks for evaluating the social impact of investments, moving beyond traditional financial metrics to develop comprehensive methodologies that capture the diverse and nuanced outcomes of socially responsible investments. An interesting avenue for future research lies in longitudinal studies to assess the sustainability and durability of social impact initiatives, providing insights into their long-term effects on communities and stakeholders. For example, researchers are directing efforts to assess whether investment strategies that embrace ESG themes through active ownership or firm engagement generate superior performances or affect other investment dimensions such as risks or returns (e.g. Dimson *et al.*, 2015, 2021).

This line of research will certainly intensify given that so far the conclusions are emerging that there were neither costs nor benefits to pursuing socially responsible investing (Revelli and Viviani, 2015). The integration of advanced data analytics and artificial intelligence in impact measurement is another promising avenue, allowing for more accurate, timely, and scalable assessments. Future research may also scrutinize the role of policy frameworks and regulatory environments in fostering or hindering the growth of social impact investing. Understanding the behavioral aspects of investors and the broader market dynamics in relation to social impact investments will be critical for shaping effective strategies. Last, recent papers have started to analyze how fintech firms are supporting ESG values. First, Vismara (2019) studies sustainability on the two leading UK equity crowdfunding platforms, Crowdcube and Seedrs. His findings show that, although sustainability orientation attracts a higher number of restricted investors, it does not increase the chances of success or engage professional investors. Whereas professional investors select promising ventures to generate high economic returns, small ones also consider goals beyond purely financial returns. Mansouri and Momtaz (2022) examine the economic attractiveness of sustainable entrepreneurship for entrepreneurs and investors in the context of blockchain finance and find that startups with salient ESG goals raise financing at higher valuations but underperform post-funding. Finally, Cumming *et al.* (2024) document that digital finance platforms with higher levels of ESG selection criteria are more likely to survive over time. In decomposing ESG, they find that governance is the most significant component of the three, while environmental criteria have increased in importance for platform survival in recent years. Future finance studies will face the challenge of analyzing how to implement the transition to the dual goals of green and digital.

Finally, dealing with (2/C) heterogeneity/disagreement in ESG ratings, Billio *et al.* (2021) present empirical findings indicating that the presence of diversity in rating criteria can result in divergent assessments by agencies evaluating the same companies, leading to a notable lack of consensus among these providers. Moreover, these varied interpretations of ESG principles have repercussions on sustainable investments, giving rise to distinct investment universes and, consequently, the establishment of disparate benchmarks. This complexity implies a formidable challenge within the asset management sector when attempting to gauge the efficacy of a fund manager, particularly when financial outcomes are heavily influenced by the chosen ESG benchmark. Notably, the discord in scores assigned by rating agencies will signal a metric that helps to dissolve the influence that the investor measure of ESG conformity could have on asset prices.

For the category "From capital markets to investors (ecosystemic perspective)", we identify the realm of (3/A) macro-finance and policy intervention, the realm of (3/B) investors' and stakeholders' perceptions, and the realm of (3/C) global financial decision-making.

In the realm of macro-finance (3/A), there is a growing interest in the subject of climate change. Researchers have pinpointed a substantial array of questions that necessitate continuous theoretical and empirical exploration. Notably, the scientific community should focus more on the meticulous development of "green monetary policies". In terms of policy intervention, an expanding cohort of financial regulatory authorities is intensifying efforts to enhance the disclosure of climate-related information by financial entities and companies. Future research can scrutinize the efficacy of these disclosure initiatives, assessing the extent to which they catalyze meaningful change in corporate behavior and financial decision-making towards climate resilience. A parallel focus may delve into the broader effectiveness of climate finance, examining how financial mechanisms and institutions contribute to sustainable projects and adaptation initiatives. Future research should address the multifaceted roles played by insurance mechanisms and governmental entities in initiatives aimed at adapting to climate change. Understanding how these entities contribute to risk mitigation, resource allocation, and fostering resilience in the face of climate-related challenges will be imperative for shaping effective policy interventions. The intersection of finance, regulation, and climate adaptation policies presents a rich landscape for future research, providing opportunities to guide transformative changes toward a more sustainable and climate-resilient financial system.

Second, in the realm of (3/B) investors' and stakeholders' perceptions, the above-mentioned report by McKinsey (2023) reports that only a few S&P 500 companies fully ESG into their equity stories, even though more than 95% of those companies publish sustainability reports. Investors may therefore find it difficult to understand how a company's efforts affect financial performance and, most importantly, intrinsic value if there is no clear connection between sustainability and strategy. About 80% of respondents evaluate individual company positions in light of how ESG impacts anticipated cash flows. A sizable majority are willing to pay more for businesses that can demonstrate a direct correlation between their ESG efforts and financial performance. However, according to a survey of investors, companies' current ESG communications significantly fall short. The respondents want more precise ways to determine long-term value, greater regulatory certainty, and workable ESG-related frameworks. Hence, we understand that investors surveyed are also eager for more definite ESG standards. They are aware that ESG scores do not perfectly correlate with financial ratings today. In turn, that impacts on society at large. A key performance indicator cannot be balanced with others. For instance, human rights issues cannot be offset by a low carbon footprint or inclusivity.

Finally, in the realm of (3/C) global financial decision-making, the constraints posed by resource scarcity and the specter of climate change are exerting an escalating influence. Although the precise magnitude of the ecological ramifications stemming from climate change remains indeterminate,

recent scientific findings are progressively heightening concerns, prompting numerous governments to embark on resolute measures aimed at averting a potential calamity. The shift toward a low-carbon economy necessitates the deployment of a diverse spectrum of financial tools and groundbreaking innovations, which will, in turn, yield profound repercussions for financial markets, corporations, intermediaries, and stakeholders. Future research should address the multifaceted consequences of such a shift, with implications that extend to embrace ecosystemic imperatives.

5 Conclusions

In this paper, we have constructed an integrative framework on climate and sustainable finance. Our analysis starts (1) from the firm, adopting that entity's viewpoint and relying on corporate finance standard approaches to evaluate investments and financing. Subsequently, it expands (2) from corporate finance to capital markets and ultimately (3) from capital markets to an ecosystemic outlook. For each of these three categories, we identify key concepts in the areas of (A) climate finance, (B) sustainable finance, and (C) financial reporting and rating. We started with a thorough review of existing research, and we followed by presenting some new contemporary research in sustainable and climate finance. In the end, we pinpoint, for each of the three perspectives, three domains of future avenues of research and policy analysis. We advance some innovative areas where the field could further flourish. As the issues of climate and sustainable finance come under unprecedented scrutiny in the political, social, and economic debate, we have faith that the proposed research agenda will have increasing impact and importance in the field of finance.

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