Climate and Corporate Finance*

Accepted for publication at the *Annual Review of Financial Economics*

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Abstract

Climate change poses risks and creates opportunities for firms, investors, and financial intermediaries. In this review, I survey the literature at the intersection of climate change and corporate finance, examining how climate considerations shape firms' investment, financing, governance, and strategic decisions. I then broaden the lens: climate change is not simply an exogenous factor for firms; rather, corporate decisions also shape future climate conditions and the systems in which firms operate. Building on this perspective, I outline directions for future research, including system-level investing, the internalization of externalities, the role of catalytic capital in financing sustainable investments, investment across the displacement cycle, and the implications of AI for climate finance. These research avenues could help advance corporate finance's contribution to more effectively addressing climate change and fostering sustainable development.

Significance Statement

Climate change is changing the environment in which firms invest, finance themselves, and make strategic decisions. This article reviews the literature on climate finance and core corporate finance questions concerning investment, financing, governance, and managerial incentives. It then examines how corporate decisions and capital allocation also shape future climate conditions and the systems in which firms operate, outlining directions for future research that extend beyond firm-level decisions to broader system-level outcomes.

Keywords: climate finance; corporate finance; climate risk; sustainable investing; blended finance; systemic risk.

JEL codes: G10; G30; G32; G34; G38; Q54; Q56.

* The author is grateful to an anonymous referee for helpful comments and suggestions. The author wrote the initial draft and subsequently used generative AI tools (ChatGPT and Gemini) to assist with language editing. All AI-generated suggestions were reviewed and edited by the author, who maintained full editorial control and remains responsible for the final content of the article.

1. INTRODUCTION

Climate change has become increasingly relevant to corporate finance. Physical climate events can affect firms' revenues, costs, employees, assets, supply chains, and financing needs, while climate policies and technological change can alter the value of existing assets and create new investment opportunities. At the same time, investors and lenders increasingly receive information about firms' climate exposures, while climate considerations can shape firms' decisions about investment, financing, risk management, governance, and strategy. Understanding these interactions requires moving beyond how climate risk is measured and priced in financial markets to examine how climate change shapes corporate decisions and how those decisions, in turn, affect environmental and other system-level outcomes.

The literature at the intersection of climate change and finance has expanded rapidly. Giglio, Kelly, and Stroebel (2021) provide an early review of the literature on climate change and financial markets, with particular emphasis on measuring and pricing climate risk across asset classes. Their review offers a foundation for understanding how climate risks are incorporated into financial markets and reflected in asset prices. I complement their work by focusing on the implications of climate change for corporate finance and, conversely, the implications of corporate finance for climate change. A key contribution of this article is also to identify directions for future research that extend the analysis beyond firm-level decisions to broader system-level outcomes.

A corporate finance perspective highlights an important distinction: firms are not merely exposed to physical and transition risks; they also have agency. They can adapt their operations, redirect investment, develop new technologies, and change their financing and governance arrangements in response to changing conditions. Their decisions, in turn, shape environmental outcomes and the economic conditions to which other firms, investors, and communities are

exposed. Climate change is therefore both a source of risk for firms and an outcome that corporate decisions can influence. This perspective motivates a broader question: *How do climate change and the transition to a sustainable economy shape corporate decisions, and how do firms' and investors' decisions, in turn, shape the economic, environmental, institutional, and social systems in which they operate?*

This article is organized in two parts, which are illustrated in Figure 1. The first part (Section 2) reviews the existing literature at the intersection of climate change and corporate finance, covering corporate investment and financing, governance, managerial incentives, and related topics.[1] The second part (Section 3) broadens the analysis from firm-level decisions to system-level outcomes and develops an agenda for future research. Together, these two parts connect established questions about how climate change affects firms to a broader research agenda examining how firms and financial markets can shape the systems in which they operate.

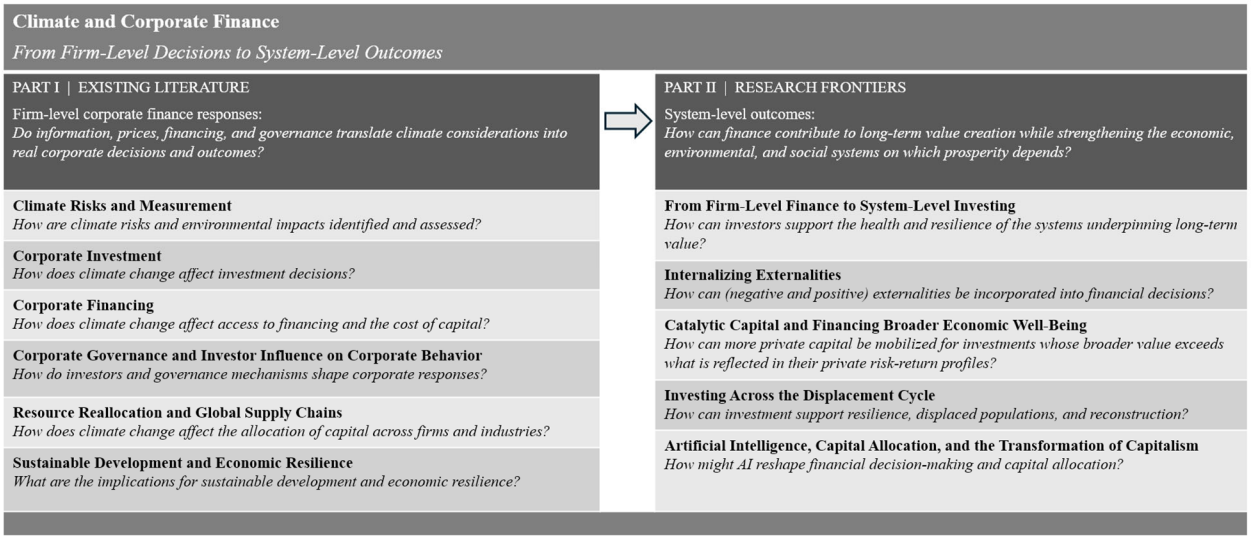


Figure 1. Overview

[1] Given the rapid expansion of the literature, this article does not aim to provide an exhaustive review of all research at the intersection of climate change and corporate finance. Rather, it focuses on selected contributions that examine core corporate finance questions.

2. CLIMATE AND CORPORATE FINANCE: A REVIEW

2.1. Climate Impact, Climate Risk Exposure, and Measurement Challenges

Firms affect climate outcomes through their polluting activities and are themselves exposed to climate-related risks. For example, firms contribute to climate change through their greenhouse gas emissions, while physical climate risks, future climate regulations, and technological change may affect their ability to operate and the value of their assets. The climate finance literature studies both dimensions: firms' environmental footprint and their exposure to climate risks. Both, however, are challenging to measure in the data.

A large literature uses firms' emissions to measure their impact on climate change. Measuring emissions is far from straightforward, however, because quantifying emissions across firms' operations is inherently difficult. Emissions are commonly classified into three different "scopes." Scope 1 captures firms' direct emissions; Scope 2 captures indirect emissions from purchased energy; and Scope 3 captures emissions across the broader value chain. Scope 3 emissions are particularly difficult to measure and often rely on estimates or information reported by other firms. Much of the literature focuses on Scope 1 emissions, potentially providing an incomplete picture of firms' overall climate impact.

Moreover, differences in definitions, reporting practices, and estimation methods can generate substantial variation across measures and data providers. For example, conventional emissions measures may not capture all climate-relevant effects of corporate activities. These include greenhouse gases (GHG)—such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (F-gases)—as well as other air pollutants—such as nitrogen oxides (NO_x) and sulfur dioxide (SO_2)—that influence the climate indirectly through atmospheric chemistry and aerosol formation. The climate finance literature predominantly examines carbon

emissions or greenhouse gas emissions, with less attention to the broader climate effects of other pollutants.

Measuring firms' exposure to climate risks presents similar challenges. The literature commonly distinguishes between physical and transition climate risks. *Physical climate risks* refer to the adverse effects of climate change on firms, including extreme weather events, sea-level rise, and disruptions to production and supply chains. *Transition climate risks* refer to the regulatory, technological, market, and reputational risks associated with the transition to a lower-carbon economy. Researchers have developed a range of firm-level measures of these exposures. For example, Sautner et al. (2023) and Li et al. (2024) develop measures of climate exposure using textual analysis of corporate disclosures. Such measures are valuable because climate exposure is heterogeneous across firms and cannot be inferred simply from industry classifications. At the same time, different measures capture different dimensions of climate exposure and vary in their coverage, methodology, and the quality of the underlying data.[2]

A related but distinct challenge is that a change in a firm's measured environmental footprint need not correspond to a change in the underlying environmental outcome. Duchin, Gao, and Xu (2025) provide a useful illustration. Studying the market for polluting industrial plants, they find that firms divest polluting assets in response to environmental pressures, but aggregate pollution does not decline because the assets are acquired by firms facing weaker environmental pressures. Divestitures can therefore improve the environmental profile of the seller without reducing pollution from the underlying assets. Their findings highlight the distinction between changes in measured firm-level environmental performance and changes in real environmental outcomes.

[2] In addition to climate risk, the recent literature increasingly considers biodiversity risks as well (e.g., Garel et al., 2024; Giglio et al., 2026), reflecting the close interconnection between climate change and nature loss.

More fundamentally, when a measure captures only part of the underlying environmental activity or exposure, changes in the measured outcome need not correspond to changes in the real outcome of interest. Understanding what climate measures capture—and what they leave out—is therefore essential for interpreting the evidence on how climate risks affect firms and how firms affect climate change.

2.2. Climate Change and Financial Markets

A large literature examines whether climate risks are reflected in financial markets.[3] For corporate finance, however, an important question goes beyond whether climate risks are priced. Rather, the question is whether and how climate risks shape corporate decisions. An asset pricing response shows that investors value or discount exposure to a characteristic; it does not, by itself, establish that climate considerations affect corporate investment, financing, or environmental performance. This distinction motivates an important empirical question: when climate information becomes financially relevant, through what channels does it reach corporate decision makers? Possible channels include the cost of capital, lender monitoring, shareholder engagement, executive incentives, customer demand, and regulation. The following sections review the literature that examines these different channels.

2.3. Climate Change and Corporate Investment

Climate change affects corporate investment by altering both the expected returns to investment and the uncertainty surrounding those returns. These effects operate through familiar corporate finance mechanisms: firms compare the expected cash flows from an investment with its cost, taking into account financing constraints, adjustment costs, and the option value of waiting when

[3] Giglio, Kelly, and Stroebel (2021) and Hong, Karolyi, and Scheinkman (2020) provide reviews of this literature.

investment is irreversible and future conditions are uncertain. This section first describes how physical and transition risks enter these calculations. It then considers heterogeneity in firms' capacity to respond, the role of uncertainty, the direction of investment (mitigation vs. adaptation), and the alignment of private and societal returns.

Climate risks can affect corporate investment through several channels. *Physical* climate risks can directly affect firms' operations, assets, labor supply, and supply chains. For example, Addoum, Ng, and Ortiz-Bobea (2023) show that extreme temperatures affect the profitability of U.S. public firms in over 40% of industries, while Ponticelli, Xu, and Zeume (2023) show that high-temperature shocks significantly increase energy costs and lower the productivity of small manufacturing plants. More broadly, Burke, Hsiang, and Miguel (2015) document a nonlinear relationship between temperature and economic productivity across countries, with productivity declining at higher temperatures. These findings underscore that physical climate risks can affect firms' cash flows, thereby changing the expected returns to investment. *Transition* climate risks operate differently. Carbon pricing, environmental regulation, technological substitution, changing energy prices, and shifts in consumer demand can alter the expected profitability of existing assets and investments. A firm can therefore face substantial climate risk even when its physical assets are well protected, if its business model depends on technologies or markets exposed to the low-carbon transition.

The implications for investment depend not only on the underlying exposure but also on firms' capacity to respond. If two firms have identical climate risk exposure but differ in their financial capacity, financing constraints, managerial capabilities, hedging, or supply-chain structures, their realized climate losses—and consequently their investment responses—may differ substantially. Hence, how corporate investment responds to climate risks should be studied in

terms of both firms' exposure and their capacity to respond. This distinction is increasingly emphasized in the empirical literature. For example, Ginglinger and Moreau (2023) show that firms with greater exposure to physical climate risks adopt more conservative financing policies to maintain debt capacity and preserve their ability to invest; Javadi et al. (2023) show that firms with higher climate risk exposure hold more cash to safeguard financial slack; and Pérez-González and Yun (2013) show that firms more exposed to weather-related risk are more likely to hedge using weather derivatives.

Climate change also introduces uncertainty about future physical conditions, policy, technology, energy prices, and demand. When investment is irreversible, this uncertainty can delay or reshape investment decisions. Lin, Schmid, and Weisbach (2026) study planned power plants and show that climate and demand uncertainty affect the timing and composition of capital expenditures. Flammer, Giroux, Heal, and Lucchetta (2026) distinguish risk from ambiguity and show how ambiguity about future conditions can depress green investment.

Climate change can also alter the direction and composition of corporate investment, including investment in technological innovation. Aghion et al. (2016) show that higher fuel prices induce firms to shift innovation toward cleaner technologies, illustrating how climate-related price incentives can redirect technological change. More broadly, the literature distinguishes between investments in climate mitigation and climate adaptation. *Climate mitigation* aims to reduce the firm's contribution to climate change and includes investment in clean technologies, energy efficiency, low-carbon production processes, and mitigation-oriented R&D. *Climate adaptation* aims to reduce firms' exposure or vulnerability to climate risks and includes investment in resilient infrastructure and supply chains, climate-proofing of operations, relocation, and adaptation-oriented R&D. Some activities, such as R&D and changes in business models, can serve either

objective. Mitigation investment may involve substantial upfront costs and uncertain or delayed private returns, while adaptation investment can protect firm value by reducing exposure to physical risks, with benefits often realized through avoided future losses.

Li and Flammer (2025) provide a holistic view of the portfolio of firms' climate strategies—mitigation, adaptation, and political engagement—that companies may simultaneously pursue to address physical and transition climate risks. In addition to investments in mitigation and adaptation, they consider political strategies that seek to shape the policy environment and therefore influence transition risk. They find that greater physical climate risk is associated with greater adaptation, whereas greater transition risk is associated with greater use of political strategies rather than greater mitigation. This evidence suggests that firms may respond to different types of climate risk through different strategies, rather than through a uniform increase in climate-related investment. It also points to a potentially self-reinforcing cycle: as physical climate risks intensify, firms may devote more resources to adaptation, while efforts to shape climate policy may weaken the policy response needed to reduce transition risk and, ultimately, the underlying drivers of climate change.[4]

Finally, climate investment depends on the alignment between private returns, the broader societal returns, and the horizons over which these benefits accrue. Some investments generate primarily private benefits, while others create benefits for customers, workers, suppliers, communities, or the planet—benefits that are not fully reflected in the firm's cash flows. Climate investments can also involve near-term costs and uncertain or distant benefits. These wedges can discourage investment even when the broader returns are positive and create a natural role for

[4] The lobbying response can also generate externalities for other firms and society at large by weakening the climate transition. In this regard, Leippold, Sautner, and Yu (2026) show that anti-climate lobbying increases risk for investors, rather than reducing it.

financing arrangements or policies that better align private incentives with longer-term societal benefits.

2.4. Climate Change and Corporate Financing

Climate change can affect corporate financing through both the demand for and supply of capital. Physical and transition risks can alter expected cash flows, asset values, collateral, and default probabilities, thereby affecting firms' borrowing capacity and cost of capital. At the same time, mitigation and adaptation investments can increase firms' demand for external finance. This section examines how climate considerations enter debt and equity markets and whether changes in financing conditions translate into changes in firms' real decisions.

2.4.1. Debt Financing

Debt markets provide an important channel through which climate risk can affect corporate financing. In particular, the empirical literature suggests that banks take climate risks into account when issuing loans. Huang et al. (2022) show that firms with greater exposure to physical climate risks face higher loan spreads, greater collateral requirements, and tighter covenants. Similarly, Ivanov, Kruttli, and Watugala (2024) find that firms affected by transition risk face higher borrowing costs and tighter credit terms.[5] Kacperczyk and Peydró (2026) further show that banks with climate commitments reduce credit to higher-emission firms, leading affected firms to reduce debt, leverage, size, and investment, but not their future emissions. Together, these findings indicate that climate considerations can tighten firms' access to bank financing and affect real activity, although this need not translate into lower emissions.

[5] Relatedly, Gormsen, Huber, and Oh (2026) show that green projects tend to have a lower cost of capital. This echoes a large literature documenting that socially responsible firms tend to have better access to finance (e.g., Cheng, Ioannou, and Serafeim, 2014; El Ghoul et al., 2011; Goss and Roberts, 2011).

Bond markets provide another important channel of debt financing. The literature on green bonds is the most developed in this area. Flammer (2021) documents the evolution of the green bond market from its inception and shows that corporate green bond issuance is associated with a positive stock market response, especially for first-time issuers and for bonds certified by third parties. She further finds that issuers subsequently improve their environmental performance and attract greater ownership by long-term and green investors. Taken together, these findings suggest that green bonds can serve not only as a financing instrument but also as a potential signal of firms' environmental commitment.

Certification is central to this interpretation. Where public standards and enforcement are incomplete, third-party certification can provide a private governance mechanism that helps verify the environmental characteristics of the bond and the use of its proceeds. Flammer (2020, 2021) finds that the market and environmental benefits of green bonds are only found among certified bonds, consistent with certification increasing the credibility of the signal. Tang and Zhang (2020) provide complementary evidence that green bond issuance is associated with positive stock market responses, greater institutional ownership, and improved liquidity.

The signaling interpretation, however, raises the question of whether the financing generates *additionality*. A positive market response to green bond issuance does not establish that the bond induces environmental investment that would not otherwise have occurred. Similarly, subsequent improvements in environmental performance do not necessarily imply that the financing itself led to those improvements. While certification appears to mitigate concerns about greenwashing—as companies issuing certified green bonds show subsequent improvements in their environmental footprint—it does not, in itself, establish additionality. As the green bond market matures, the informational value of the green label appears to diminish. Aswani and

Rajgopal (2025) find that the stock market response to green bond issuance has become insignificant over time, consistent with a declining signaling value as the market expands and investors acquire more information.[6]

Since the emergence of the green bond market, several other fixed income instruments tied to sustainability objectives have been introduced to the market. Prominent examples are sustainability-linked bonds (SLBs). Unlike green bonds, SLBs generally allow proceeds to be used for general corporate purposes, tying financing costs instead to predefined sustainability targets. Feldhütter, Halskov, and Krebbers (2024) and Berrada et al. (2024) examine SLB pricing and highlight the importance of target design and credibility. The empirical literature on SLBs remains scarce, however. A central question is whether linking financing costs to sustainability performance creates meaningful incentives to improve environmental outcomes, or whether weakly calibrated targets allow firms to obtain sustainability-linked financing without meaningful sustainability improvements or additionality.[7]

2.4.2. Equity Financing

Equity markets provide another channel through which climate considerations can affect corporate financing. A growing literature examines whether climate-related risks and sustainability preferences are reflected in equity prices. Bolton and Kacperczyk (2021) show that equity markets price carbon exposure, while equilibrium models by Pástor, Stambaugh, and Taylor (2021) and

[6] A related literature in asset pricing examines whether investors accept lower yields on green bonds—the so-called "greenium." This literature includes Zerbib (2019), Larcker and Watts (2020), and Baker, Bergstresser, Serafeim, and Wurgler (2022), among others. The estimated greenium is generally small and varies across markets and identification strategies, with certification and investor clientele playing an important role. This literature is related to, but distinct from, the corporate financing question because it focuses on the pricing of the environmental attribute rather than on whether green financing changes firms' real decisions.

[7] Recent work also studies sustainability-linked loans (e.g., Du, Harford, and Shin, 2026; Kim et al., 2025), focusing on the role of banks in this market.

Zerbib (2022) analyze how investor preferences for sustainability affect expected returns and portfolio allocation. Pedersen, Fitzgibbons, and Pomorski (2021) characterize the trade-off between sustainability preferences and financial performance through the ESG-efficient frontier. Together, this literature highlights two complementary channels through which climate considerations may affect equity markets: compensation for exposure to climate-related risks and valuation effects arising from investor preferences.

For corporate finance, the central question is whether these valuation effects translate into changes in the supply and cost of capital to firms. If investors with strong climate preferences bid up the securities of sustainable firms, the resulting change in the cost of equity could affect corporate financing and investment. If investors instead primarily trade existing securities among themselves, the principal effect may be a redistribution of ownership without a material change in the firms' financing conditions and underlying activities. Distinguishing these channels requires moving beyond asset prices to examine whether investor actions affect firms' cost of capital, financing access, and ultimately their real decisions, including investments in climate mitigation and adaptation as well as other climate-related strategies. This distinction also raises broader questions about the mechanisms through which investors influence corporate behavior, including through engagement and governance. I turn to these considerations in the following section.

2.5. Climate Change, Corporate Governance, and Investor Influence on Corporate Behavior

Beyond their effects on firms' cost of capital, investors may influence corporate responses to climate change through their ownership and control rights. Ownership claims provide investors with the ability to pursue different strategies to influence corporate behavior. These strategies include portfolio allocation approaches, such as *ESG screening* (e.g., negative screening involving exclusion or "exit" of certain stocks, and thematic screening that tilts portfolios toward companies

with specific characteristics) and *ESG integration* (i.e., incorporating ESG factors into portfolio construction). Such approaches are primarily *portfolio-based strategies*, through which investors incorporate ESG-related information and sustainability preferences into their portfolio construction. Although these strategies may indirectly affect firms through lower demand for their stocks and a higher cost of capital, they do not typically involve direct interaction with the portfolio companies. In contrast, *governance-based strategies* involve investors leveraging the rights associated with their ownership positions to exercise "voice" and seek changes in corporate policies and practices through engagement with managers and boards, including through *shareholder engagement* and *shareholder activism*. Understanding these mechanisms is central to assessing the extent to which investors can influence firms' climate mitigation and adaptation efforts, as well as their other climate-related strategies.

2.5.1. Investors' Portfolio Allocation Strategies

Much of the academic literature has focused on portfolio-based strategies, particularly ESG screening and ESG integration. These strategies primarily reflect investors' preferences and portfolio optimization decisions.

A central question in this literature is how investors incorporate climate-related information and sustainability preferences into portfolio decisions. One strand of research emphasizes investor preferences and demand for sustainable investments. Hartzmark and Sussman (2019) show that investors respond to sustainability-related information when allocating capital to mutual funds, suggesting that sustainability considerations affect portfolio choices.[8] A related literature examines

[8] To further understand investors' preferences for socially responsible investments, Bauer, Ruof, and Smeets (2021) run two field surveys with a pension fund. They find that two-thirds of participants are willing to expand the fund's engagement with companies based on sustainability objectives, even when they expect engagement to hurt financial performance.

ESG integration from an asset pricing perspective. Investors may incorporate ESG information because they believe it contains information about firms' future cash flows, risks, or expected returns. For example, Krueger, Sautner, and Starks (2020) document that institutional investors increasingly view physical and transition climate risks as financially relevant. Together, these studies highlight that investors may incorporate climate considerations because they affect expected risk and return, because investors have preferences for sustainable outcomes, or because both forces operate simultaneously.

For climate-related investing specifically, screening and integration often focus on managing investors' exposure to climate risks and opportunities. Investors may seek to reduce portfolio exposure to firms with high carbon intensity, increase exposure to firms positioned to benefit from the transition to a low-carbon economy, or incorporate climate-related risks into valuation models and portfolio construction. The implications of these portfolio-based strategies for corporate behavior, however, are less clear. In the context of divestment, Berk and van Binsbergen (2025) show that because securities sold by one investor are purchased by another, the equilibrium effect of impact-oriented divestment on firms' cost of capital—and therefore on corporate investment decisions—may be limited. Broccardo, Hart, and Zingales (2022) similarly distinguish between *exit* and *voice* as mechanisms for addressing corporate externalities. They show that the relative effectiveness of divestment and engagement depends on the distribution of investors' social preferences, and that divestment can reduce social welfare under certain conditions.

Overall, this literature suggests that portfolio-based strategies such as ESG screening and ESG integration are important mechanisms through which investors incorporate climate-related information and sustainability preferences into investment decisions. However, evidence that these

strategies directly influence corporate behavior or generate broad real economy effects remains limited. This distinction motivates the literature on corporate governance strategies, which examines whether and how investors use their ownership rights to influence corporate decisions more directly.

2.5.2. Investors' Corporate Governance Strategies

Beyond portfolio allocation decisions, ownership provides investors with mechanisms through which they can influence corporate behavior. These mechanisms can broadly be classified into *shareholder engagement* and *shareholder activism*. Shareholder engagement refers to the use of dialogue and ongoing interactions with managers and boards to encourage changes in corporate policies and practices. Shareholder activism involves more formal and public exercises of ownership rights, including shareholder proposals, proxy voting campaigns, and other interventions designed to influence corporate decisions.

The literature highlights how *shareholder engagement* can serve as an important governance mechanism for influencing corporate policies and behavior. McCahery, Sautner, and Starks (2016) show that institutional investors frequently intervene behind the scenes through dialogue with portfolio companies, often before resorting to exit. Relatedly, Krueger, Sautner, and Starks (2020) document that institutional investors increasingly view climate risks—including physical and transition risks—as financially relevant and identify engagement as an important mechanism through which they seek to address these risks.

Moreover, shareholder engagement on environmental and social issues can influence firm outcomes. Dimson, Karakaş, and Li (2015) show that successful ESG engagements are associated with positive abnormal stock returns and improvements in operating performance. Barko, Cremers, and Renneboog (2022) find that successful ESG engagements improve firms' ESG

performance, particularly among firms with weaker initial ESG profiles. Dyck et al. (2019) provide international evidence that institutional investors can influence firms' environmental and social performance, particularly when investors have stronger incentives and capabilities to engage. Dimson, Karakaş, and Li (2026) examine coordinated engagements in which institutional investors collaborate to influence firms' environmental and social practices, finding that a two-tier strategy involving lead and supporting investors increases engagement success and is associated with improved target performance and greater fund flows. Taken together, these findings suggest that engagement can influence firms' environmental practices and their exposure to climate risks.[9]

Shareholder activism represents a more formal and visible channel through which investors seek to influence corporate decisions. The broader activism literature shows that shareholders can affect firms by challenging managerial decisions, proposing changes in governance structures, and advocating for strategic adjustments. Brav et al. (2008) and Bebchuk, Brav, and Jiang (2015) examine hedge fund activism and provide evidence that activist investors can induce changes in corporate strategy, governance, and the firms' operations. While traditional hedge fund activism typically focuses on financial and governance objectives, the mechanisms underlying activist campaigns—monitoring, public pressure, and the exercise of shareholder rights—are also relevant for ESG-related (including climate-related) activism.

Shareholder activism extends beyond hedge funds to investors more broadly. Shareholder proposals are an important mechanism of such activism (e.g., Smith, 1996; Del Guercio and Hawkins, 1999; Gillan and Starks, 2000). Cuñat, Giné, and Guadalupe (2012) use close-call votes on corporate governance proposals to identify the causal effects of proposal adoption and find that passed proposals are associated with positive announcement returns and improvements in long-

[9] See Sautner (2026) for a review of the literature on institutional investor engagement related to climate and nature.

term firm outcomes. Flammer (2015) applies the same identification strategy to socially and environmentally responsible proposals and finds evidence of positive effects as well. Taken together, this literature suggests that shareholder-sponsored changes in corporate policies and governance practices can have economically meaningful consequences for firms.

More recent research examines environmental and climate-related shareholder activism more specifically. For example, He, Kahraman, and Lowry (2023) show that mutual fund support for environmental and social proposals—even when these proposals fail—predicts firms' subsequent environmental and social incidents and the effects of these incidents on shareholder value. Their findings suggest that shareholder proposals serve both as mechanisms for influencing corporate decisions and as signals of investors' assessments of the firms' underlying risks. Naaraayanan, Sachdeva, and Sharma (2026) provide evidence that environmental activist campaigns can lead targeted firms to reduce toxic releases, with these reductions driven by abatement expenditures and on-site source-reduction initiatives rather than lower production. Flammer, Toffel, and Viswanathan (2021) show that environmental shareholder activism can induce firms to increase their voluntary disclosure of climate change risks, particularly when activism is initiated by institutional investors and, especially, long-term institutional investors.

Overall, this literature suggests that investor engagement and shareholder activism provide more direct mechanisms for influencing corporate climate-related policies than portfolio allocation strategies. Through voting, shareholder proposals, and other ownership-based channels, investors can shape firms' governance practices, disclosures, and climate-related policies. The evidence, however, is primarily at the level of individual portfolio companies. An open question is whether shareholder influence at the firm level translates into meaningful reductions in aggregate emissions and contributes to the transition to a lower-carbon economy.

2.5.3. Managerial Incentives and Time Horizons

As discussed in the previous section, investors can influence corporate climate policies and strategic priorities through shareholder engagement and activism. These channels of influence interact with the internal governance of firms, and in particular the design of managerial incentives by boards of directors. Because many climate investments involve near-term costs while generating benefits over longer horizons, time horizons and hence the provision of long-term incentives are likely to be especially important.

A large literature in economics and psychology shows that individuals tend to place disproportionate weight on immediate rewards, reflecting present bias and hyperbolic discounting (e.g., Loewenstein and Thaler, 1989; Laibson, 1997). These behavioral tendencies can affect corporate decision-making, particularly when managers face pressures to deliver near-term results or when their compensation and career prospects depend on short-term performance. Models of managerial myopia show that such incentives can lead managers to underinvest in projects with long-term payoffs (e.g., Narayanan, 1985; Stein, 1988). Graham, Harvey, and Rajgopal (2005) provide evidence of such myopia, reporting that many executives indicate being willing to sacrifice long-term value to meet short-term earnings targets. Relatedly, Bushee (1998) shows that pressure from transient institutional investors induces firms to reduce R&D investment, and Dechow and Sloan (1991) show that CEOs spend less on R&D during their final years in office.

These pressures can be reinforced by the structure of managerial incentives, including short evaluation horizons and compensation tied to near-term performance. Flammer and Bansal (2017) provide evidence that adopting longer-term executive compensation increases firms' long-term orientation and investments in long-term strategies such as innovation and stakeholder relationships. Gopalan et al. (2014) show that the duration of executive compensation tends to be

longer among firms with more growth opportunities, more long-term assets, and greater R&D intensity, while Edmans, Fang, and Lewellen (2017) provide evidence that short-term equity vesting affects real investment, reducing R&D and capital expenditures. Marinovic and Varas (2019) provide a theoretical foundation for these findings, showing how CEO horizons and compensation duration can generate short-termism.

Relatedly, Flammer, Hong, and Minor (2019) show that integrating environmental and social performance criteria into executive compensation contributes to firms' long-term orientation and improves their environmental and social outcomes, including reductions in emissions and increases in green innovation. Cohen et al. (2023) extend this evidence internationally, showing that ESG-linked executive compensation is associated with improvements in ESG outcomes and, in particular, that emission-linked compensation is followed by reductions in CO_2 emissions.

Taken together, these studies highlight a potential "tragedy of time horizons" in corporate decision-making: when managers, investors, and capital markets place greater weight on near-term outcomes, firms may underinvest in projects whose costs are immediate, but whose benefits accrue over longer horizons. This tragedy of time horizons is also reflected in firms' responses to climate risk (e.g., Li and Flammer, 2025), which underscores the importance of understanding how corporate governance and managerial incentives shape firms' climate investments.

More research is needed on climate investment horizons. How do ownership structure, investor horizons, executive compensation, and corporate governance interact to shape firms'—and investors'—willingness to undertake investments with long-run climate benefits? Under what conditions do investors encourage firms to bear near-term costs for benefits that may materialize over long horizons and may not be reflected in near-term accounting performance? These are important questions for future research.

2.6. Climate Change, Resource Reallocation, and Global Supply Chains

Much of the climate and corporate finance literature takes the firm as the unit of analysis. Yet climate change can also reshape the allocation of productive capacity by inducing firms to adapt, relocate, or close plants; reallocate resources across technologies and business units; and reorganize supply chains.

Within firms, climate change and climate policies can alter the relative costs and expected returns of plants, projects, and technologies, prompting firms to reallocate resources internally. Corporate finance research shows that firms reallocate capital and labor in response to differences in investment opportunities, and that financing constraints influence this reallocation (e.g., Giroud and Mueller, 2015). In the climate context, Bartram, Hou, and Kim (2022) study how financing constraints shape firms' responses to transition policies (in their setting, California's cap-and-trade program) and how the internal reallocation of resources can have unintended consequences for aggregate emissions. More broadly, physical risks can reduce the productivity of exposed assets, while transition risks can change the relative returns to high- and low-carbon activities, creating new incentives for firms to reallocate resources.

Climate change can also redirect technological innovation and investment across locations. The agriculture and food sector is a particularly important setting because productivity depends directly on temperature, precipitation, and other environmental conditions. Schlenker and Roberts (2009) document nonlinear effects of temperature on U.S. crop yields, highlighting how climatic conditions affect the productivity of agricultural assets. Moscona and Sastry (2023) show that climate exposure redirects agricultural innovation toward crops and technologies better suited to changing conditions. These findings illustrate how climate change can reshape the direction of technological innovation and the allocation of productive capacity.

Climate-related reallocation can also occur across firms and industries. Climate transitions can create opportunities for new firms while reducing the value of incumbent technologies and business models. Yet relatively little research examines how different forms of finance shape climate-related entry, exit, and the restructuring of firms and industries.

Finally, climate-related reallocation extends beyond firm boundaries to global supply chains. Firms may respond to physical risks by changing suppliers or adjusting production across locations. Pankratz and Schiller (2024) show that heat exposure at supplier locations reduces the operating income of both suppliers and their customers. They further find that customers are 7% more likely to terminate supplier relationships when suppliers' realized heat exposure exceeds what customers could have anticipated, and that replacement suppliers have lower expected and realized heat exposure. These findings illustrate how climate shocks propagate through production networks and how firms adapt by reorganizing supplier relationships.

The different dimensions discussed in this section raise several questions for corporate finance. How do financing constraints affect firms' ability to relocate production, substitute suppliers, diversify sourcing, or adopt new technologies? Do financial markets facilitate the reallocation of capital toward less-exposed locations and emerging technologies? How do financing decisions propagate through supply chains, particularly in climate- and nature-dependent sectors such as agriculture and food? Addressing these questions would extend the climate finance literature beyond the effects of climate risk on individual firms to examine how financial frictions and corporate decisions shape the broader allocation of productive capacity across firms, locations, technologies, and production networks.

2.7. Climate Finance, Sustainable Development, and Economic Resilience

Climate risks and adaptive capacity vary substantially across countries and communities. Firms in emerging markets and developing economies (EMDEs) often face high physical climate risks, inadequate infrastructure, elevated financing costs, and limited access to capital. These constraints are particularly consequential because many EMDEs depend heavily on agriculture and other climate-sensitive activities, while also facing substantial needs for investment in adaptation and resilient infrastructure. Moreover, given global supply chain linkages, strengthening climate adaptation and resilience in EMDEs is also critical for firms in developed markets seeking to minimize supply chain disruptions. This raises a central question: how can climate finance mobilize the capital needed to invest in productive capacity, strengthen climate resilience, and support sustainable development in these economies?

This question links climate finance to development finance, where two distinct problems can impede investment. The first is a financing friction: limited access to capital, high financing costs, and currency and country risk can prevent investments that would otherwise be privately profitable. The second is an externality: investments in climate-resilient agriculture, infrastructure, and natural capital can reduce climate vulnerability, protect ecosystems, strengthen food security, and support local economic development, yet private investors may capture only a fraction of these benefits. As a result, investments that generate substantial social and environmental value may remain underfunded even when their broader benefits exceed their costs.

The development perspective also broadens the unit of analysis beyond the individual firm. Corporate investment can strengthen local resilience through employment and economic empowerment, supplier networks, infrastructure, food security, and household income. In turn, the resilience of the surrounding economy shapes firms' ability to operate and recover after climate

shocks. Climate finance thus connects firm-level investment to the resilience of the communities, cities, and regions in which firms operate, creating feedback between corporate decisions and broader economic outcomes.

These interconnections are particularly pronounced in EMDEs, where investments in sustainable agriculture, forests, water systems, renewable energy, and resilient infrastructure can address multiple dimensions of vulnerability simultaneously. Yet many such investments generate social and environmental benefits that are not fully reflected in private cash flows. This creates a central challenge for climate finance: mobilizing private capital toward investments whose returns are partly private but whose broader benefits accrue across communities, ecosystems, and future generations. It also raises fundamental corporate finance questions about risk sharing, capital structure, investor horizons, and the role of catalytic capital and blended finance in supporting investments that contribute to sustainable development but may initially not be privately profitable on their own. Flammer, Giroux, and Heal (2026a) develop a framework for blended finance, in which philanthropic or public funding is "blended" with private capital to improve the risk-return profile of sustainable investments and help mobilize private capital. Their analysis highlights how the design of blended finance instruments and the allocation of risk between public and private investors can affect the scalability of sustainable investment.

The institutional context matters as well. Financing mechanisms that work in deep, well-developed capital markets may operate differently in economies characterized by currency risk, weak infrastructure, limited investor protection, or shallow financial markets. These constraints are particularly relevant for scaling sustainable investment in EMDEs. Flammer, Giroux, and Heal (2026b) document organizational and informational frictions that limit investors' ability to fund sustainable projects in EMDEs. Their findings underscore the need for mechanisms that address

perceived and actual risks, alleviate informational and organizational constraints, and strengthen institutional development.

More broadly, understanding how to mobilize capital to finance innovative solutions in climate technology, renewable energy, and nature-based solutions, especially in EMDEs, is central to addressing climate change and nature loss while strengthening global food security and economic resilience to withstand future shocks. For climate and corporate finance, a key frontier is understanding how financial markets can support firms' investments in climate resilience and sustainable development when the benefits extend beyond the firm and the institutional environment constrains the supply of private capital.

3. RESEARCH FRONTIER AND OUTLOOK

The literature reviewed above has made important progress in understanding how climate change interacts with corporate finance, but substantial questions remain within each of the areas discussed. Throughout Sections 2.1–2.7, I have highlighted specific limitations of the existing literature and identified avenues for future research. I will not restate these research gaps here. Instead, this section takes a step back and asks a broader question: what larger questions remain underexplored at the intersection of climate change and corporate finance?

Much of the existing literature takes the firm, financial instrument, or individual investment as the primary unit of analysis. This is natural given the questions that are traditionally studied in corporate finance. This perspective, however, can obscure how financial decisions are embedded in—and shaped by—interconnected natural, social, technological, and political systems. These systems influence the risks, opportunities, and constraints facing firms and investors, while corporate decisions and capital allocation can, in turn, reshape the systems themselves. Their degradation can undermine the long-term performance of companies and the economy as a whole,

creating systemic risks that cannot necessarily be diversified away. An important frontier for research is therefore to examine how these interdependencies—and the incorporation of systemic consequences into investment decisions—shape value creation and real-world outcomes. The research outlook below focuses on these broader questions.

3.1. From Firm-Level Finance to System-Level Investing

A major question is how individual investment and corporate decisions aggregate into system-level outcomes. Existing research provides increasingly rich evidence on how climate risk affects individual firms and investors' portfolios, but much less is known about whether and how capital allocation can alter the underlying systems that generate those risks.

This question is receiving growing attention in practitioner scholarship on *system-level investing*. Lukomnik and Hawley (2021) challenge the conventional treatment of systematic risk as largely exogenous to investors, arguing that diversified investors are themselves embedded in—and can potentially influence—the economic, environmental, and social systems that determine long-run portfolio outcomes. Similarly, Burckart and Lydenberg (2021) develop a systems perspective in which investors consider how their decisions affect the broader systems on which long-term value creation depends. More recently, Lukomnik and Burckart (2026) synthesize and extend this perspective, emphasizing the interdependence between investments, the real economy, and the environmental, social, and financial systems. Their recent work also develops practical tools for moving from system-level principles to investment practice (Lukomnik and Burckart, 2024, 2026).

This perspective raises fundamental questions for finance scholarship: How should investors evaluate an investment when its returns depend partly on the resilience of the broader economic, environmental, and institutional system? How should portfolio risk be assessed when

the actions of individual firms can themselves affect aggregate risks? And how should investors respond to risks that cannot be diversified away because they affect the productivity of capital across large parts of the economy? These questions challenge the conventional separation between portfolio risk and the systems that generate it, while raising the possibility that investment decisions can themselves affect the systematic component of returns.

This perspective also raises a distinction between reallocating ownership claims and changing underlying economic activity. Divesting from a carbon-intensive asset, for example, may change who owns the asset without reducing its emissions, while investment in technologies, infrastructure, natural capital, or human capital may affect the conditions underlying long-term economic productivity even when those effects are not immediately reflected in firm-level financial statements. Understanding when capital allocation changes underlying economic activity, rather than simply reallocating claims on existing assets, remains a largely open empirical question.

Future research could examine whether and how investors' actions affect technological trajectories, infrastructure resilience, supply-chain configuration, natural capital, human capital, and other determinants of long-term economic productivity. It could also examine the channels through which investors influence systems—including capital allocation, engagement, collaboration, field building, and policy or market-shaping activities—and the conditions under which such interventions have economically meaningful effects. The practitioner literature provides a useful conceptual foundation for these questions, but empirical evidence on these mechanisms remains limited. This agenda would connect corporate finance more directly with macro finance, environmental economics, development economics, and the economics of institutions.

3.2. From Measurement to the Internalization of Externalities

The literature has made important progress in measuring climate externalities, expanding the measurement boundary from firms' direct GHG emissions (Scope 1) to indirect emissions from purchased energy (Scope 2) and, increasingly, across value chains (Scope 3). Research has also begun to examine how firms' political engagement can shape public policies and thereby systemic outcomes. These advances notwithstanding, an important question remains: when and how does information about externalities translate into their internalization, changes in corporate decisions, and ultimately, real environmental outcomes?

Better measurement does not necessarily imply internalization. An improvement in a reported metric may not correspond to an improvement in the underlying environmental outcome, and the information disclosed may not affect prices, contracts, financing conditions, governance, or investment decisions. This distinction echoes the disclosure literature, which emphasizes that the economic consequences of information depend on how it is perceived by financial markets and incorporated into organizational decision-making (e.g., Leuz and Wysocki, 2016; Christensen, Hail, and Leuz, 2021). In the context of climate, recent evidence suggests that carbon disclosure can have real effects when it is credible and linked to concrete, measurable actions (Bourveau, Garel, and Romec, 2024).

Moreover, internalization does not imply that all externalities can—or should—be fully internalized through prices or private contracts. Externalities may remain unpriced, perceived risks may diverge from actual risks, and some intrinsic values—such as ecosystem integrity—may lie beyond adequate measurement or pricing. Yet they remain priceless, not worthless, and worth protecting in their own right. An important research agenda therefore concerns the boundary conditions of internalization: which externalities can be internalized, through which mechanisms,

and under what conditions? How can intrinsic values be protected, and how can public and private mechanisms redirect capital where markets fall short?

3.3. Catalytic Capital and Financing Broader Economic Well-Being

Related to the previous question on externalities, a third broad question concerns investment opportunities whose private financial returns do not fully capture their broader economic, social, or environmental value. The corporate finance literature typically evaluates investment from the perspective of the firm and its investors. Yet investments in climate resilience, natural capital, infrastructure, and sustainable development can generate benefits across firms, communities, cities, and countries.

As discussed in Section 2.7, this raises an important financing question: how can capital be mobilized for investments whose broader value exceeds what is reflected in their private risk-return profiles? Catalytic and blended finance provide potential mechanisms for bridging this gap, while raising questions about their design. What types of risks can private, public, and philanthropic capital each bear? How can concessionality be structured to mobilize additional private investment rather than substitute for it? How can and should additionality be defined and measured? While Flammer, Giroux, and Heal (2025a, 2025b, 2026a) provide conceptual frameworks and early evidence to think about the economics of blended finance, much remains to be learned to answer these questions.

These questions are particularly important in EMDEs, where currency risk, political risk, information frictions, infrastructure constraints, and shallow capital markets can limit the ability of socially valuable investments to reach commercial scale. The broader research opportunity is to understand how different forms of capital can be combined to finance investments that foster the health, well-being, productive capacity, and resilience of individuals, communities, cities, and

countries. This extends the relevant unit of analysis from financing the firm to financing the economic systems in which firms operate.

3.4. Investing Across the Displacement Cycle

When local resilience is insufficient to absorb climate shocks, forced migration within and across national borders may result. For example, research in development economics shows that climate change and weather anomalies can influence migration from agriculture-dependent countries (e.g., Marchiori, Maystadt, and Schumacher, 2012; Cai et al., 2016; Cattaneo et al., 2019). From a finance perspective, this raises the following question: how can finance sustain economic activity when climate shocks disrupt livelihoods and displace populations? Such disruptions can interrupt employment, undermine businesses, and weaken local economic networks, affecting the displaced populations and the economies of both the disaster-affected and destination regions.

This perspective extends beyond humanitarian finance to consider how finance can support economic agency and productive activity amid displacement. It also highlights the social and human dimensions of climate finance, which remain underexplored in the literature, particularly the role of individuals and communities as economic agents affected by—and responding to—climate-related disruptions. Displaced individuals remain workers, entrepreneurs, consumers, borrowers, and investors. Kluge and Mahoney (2026) develop a conceptual "Refugee Lens Investing" framework that identifies investment opportunities in refugee-led enterprises and businesses serving displaced populations and destination communities.

More broadly, displacement provides a setting in which corporate finance, development finance, impact investing, and humanitarian finance intersect. Studying these interactions could broaden climate finance to also consider financing economic agency and productive capacity through major climate-related disruptions.

3.5. Artificial Intelligence, Capital Allocation, and the Transformation of Capitalism

Finally, a further frontier concerns how artificial intelligence (AI) and related technologies may transform the information, incentives, and institutions through which capital is allocated. This extends beyond the use of AI as an asset or investment tool. AI is changing how firms, investors, and other institutions measure, verify, disclose, and respond to climate risks and opportunities. At the same time, its deployment creates new environmental pressures, particularly through its energy and water demands.

Early work by Wang et al. (2026) examines the intersection of AI, sustainable finance, measurement, verification, and reporting (MRV), fiduciary responsibility, and system-level investing. More broadly, AI raises fundamental questions about whether and how technological advances can reduce the information, coordination, and transaction frictions that constrain climate-related capital allocation. Yet these advances may also introduce new forms of model risk, information asymmetry, and systemic externalities.

For corporate finance, these developments open a broader research agenda. How does AI reshape firms' investment and financing decisions, the information available to capital providers, and the governance mechanisms through which capital is allocated? How should corporate investment, financing, disclosure, and governance adapt as AI changes both firms' capabilities and the externalities they generate? More fundamentally, can AI strengthen the capacity of financial markets to allocate capital toward a more sustainable economy, or might it reinforce existing misallocations and create new sources of systemic risk? Addressing these questions requires understanding not only how AI changes individual firms and investors, but also how it transforms the institutions and mechanisms through which capital allocation shapes economy-wide outcomes.

4. CONCLUSION

Climate change is reshaping the environment in which firms invest, finance themselves, and make strategic decisions. This review examined how physical and transition risks affect corporate investment, financing, governance, managerial incentives, and resource allocation. The literature shows that climate considerations increasingly influence corporate decisions, but important questions remain about how financial markets translate climate information into real economic and environmental outcomes.

Looking ahead, a broader perspective is needed. Firms and investors do not merely respond to climate risks; their decisions also shape the systems that generate these risks. This perspective opens new avenues for research on system-level investing, the internalization of externalities, the role of catalytic capital in financing investments whose societal returns exceed their private returns, and investing across the displacement cycle. Advances in AI may further transform how climate risks are measured, capital is allocated, and investment decisions are made, with potentially important implications for sustainable prosperity.

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