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# A review on ESG investing: Investors' expectations, beliefs and perceptions

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**Abstract**

This study examines the recent literature on the expectations, beliefs and perceptions of investors who incorporate Environmental, Social, Governance (ESG) considerations in investment decisions with the aim to generate superior performance or make a societal impact. Through the lens of equilibrium models of agents with heterogeneous tastes for ESG investments, green assets are expected to generate lower returns in the long run compared to their non-ESG counterparts. However, in the short run, ESG investments can outperform non-ESG investments through various channels. Empirically, results for the relative performance to ESG investment are mixed. We find strong empirical evidence in the literature that investors have a preference for ESG and that their actions can generate positive social impact through engagement. The shift towards more sustainable policies in firms is motivated by the increased market values and the lower cost of capital of green firms driven by investors' choices.

**KEYWORDS**
environmental, ESG, governance, greenwashing, performance, social, social impact, sustainability

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## 1 | INTRODUCTION

Over the last 15 years, there has been a substantial increase in the commitment of institutional investors to responsible investment. United Nations Principles for Responsible Investment (UN PRI), one of the leading proponents of responsible investment in the world, has experienced immense growth in the number of signatories and asset owners committed to responsible investment—from 63 signatories and 32 assets owners with a combined AUM of USD 6.5 trillion in 2006 to 3,826 signatories and 609 assets owners with a combined AUM of USD 121.3 trillion in 2021. This evolution echoes the increasing attention of investors towards ESG investments—a development that has the potential to generate important valuation implications given the role of investor preferences in the determination of risk premia and their term structures.

A first glance at the financial industry indicates that there is no consensus among industry experts on the perceived benefits and performance of ESG investments. To some, ESG investments are seen as a way to generate superior performance. Others perceive them as a means to make a social impact that may come at the cost of foregone financial performance. ESG investments might also be seen as an exploitative way to obtain funds from investors which could potentially explain the reason for greenwashing. Those aspects of ESG investing encompassing investment performance and societal impact can be summarized into three competing hypothesis: (a) doing well by doing good, that is, investors obtain superior performance while also creating positive societal impact through ESG investment; (b) doing poorly by doing good, that is, investors obtain inferior performance but create positive societal impact through ESG investment; and (c) doing neutral by doing good, that is, investors obtain neutral performance or no performance benefit but create positive societal impact through ESG investment.

A growing number of academic studies have focused on modeling the preferences of economic agents to investigate the implications of their choices on asset prices, firms' production decisions, and social welfare. There is no single motivation that drives investors' choice of incorporating ESG considerations in their portfolio allocation decisions. Krueger et al. (2020) document in their survey on institutional investors that reputation, moral or ethical considerations, legal/fiduciary duties, as well as financial motives stand behind the decision to incorporate climate risk in portfolio decisions. What mechanism can explain the implications of such investor motives on asset prices? Under what conditions can the decisions of ESG-motivated investors generate real impact by influencing firm behavior in a transition towards clean production technologies? How should ESG capital be allocated across firms to increase aggregate welfare?

In this study, we review the recent literature on ESG investing to understand the perceptions, beliefs and expectations of investors in relation to the reality and empirical facts of ESG investments. We begin by examining the theoretical literature to draw insights into the asset pricing implications of incorporating ESG motives in investment decisions. Early studies of sustainable investing consider exclusionary screening applied in portfolio decisions. They attribute the higher cost of capital of brown firms relative to green ones to the reduction in risk-sharing ensuing from such screening (Heinkel et al., 2001). Another channel considered in the literature is that of pricing power of socially responsible firms due to customer loyalty (Albuquerque et al., 2020). Alternatively, another strand of the literature considers that some economic agents derive non-pecuniary

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benefits from holding green assets (e.g., S. Baker et al., 2022; Fama & French, 2007). Such investors are willing to pay more to hold green firms, pushing the price of green assets up, thereby leading to lower expected returns. Green assets thus have negative CAPM alphas, contrary to brown assets. The higher expected returns of brown firms are also obtained due to a hedging motive. Under the assumption that the utility of all economic agents is impaired due to unanticipated realizations of ESG-related risks such as climate change, green assets are expected to underperform relative to brown ones as they can serve as an instrument to hedge against climate risk.

Investing according to ESG criteria also involves a risk as long as there is uncertainty whether assets are truly green according to their ESG scores. Investor uncertainty relative to the ESG profile of an asset can weaken the negative return predictability of the asset's ESG score, as the higher risk due to ESG uncertainty commands a higher risk premium (Avramov, Cheng et al. 2021). The uncertainty inherent in ESG scores also motivates an information channel to explain how ESG preferences impact firms' cost of capital. Goldstein et al. (2022) show that the cost of capital reflects the average information risk that is faced by investors and is non-monotone in the share of ESG-motivated investors in the market, increasing when both groups of investors are equally represented. As the market becomes less dominated by non-ESG investors, this information channel leads to an increase in the cost of capital. These theoretical models help reconcile the empirical observations of investor willingness to forego financial returns when investing in green assets and the mixed evidence on the cost of capital of green firms.

The performance of ESG investments has been studied in both static and dynamic equilibrium models. For instance, Avramov, Cheng et al. (2021), Fama and French (2007), Heinkel et al. (2001), and Berk and van Binsbergen (2021) obtain a negative ESG-expected return relationship in a one-period equilibrium model. Nonetheless, ESG investments can outperform in the short run. Pastor et al. (2021) explain the outperformance of ESG investments through a consumers' and an investors' channel, where a positive shift in investors and/or consumers' tastes can lead to outperformance of green assets. According to Pedersen et al. (2021), the relative performance of ESG investments is conditioned on the type of investors that is prevalent in the market. In a market where ESG-motivated investors prevail, the latter drive up the prices of green assets, thereby leading to a lower expected return.

A dynamic setup can challenge the negative ESG-alpha relationship through a risk premium channel. As demonstrated in Avramov, Lioui et al. (2021), the brown-averse agents' willingness to sacrifice expected returns when holding green assets can vary with ESG demand and supply. As positive demand and supply shocks are associated with diminishing marginal utility, a brown-averse investor would require a higher risk premium to hold the market as it becomes greener. Shocks to ESG demand entail a positive risk premium for green stocks, thus dampening or reversing the negative ESG-expected return relationship obtained in a static setting.

We further examine the empirical literature on (i) whether there is evidence that investors have a preference for green assets, and (ii) whether holding green assets can serve as a hedge against ESG-related risk. We find broad consensus in the literature on the sustainability preferences of investors (Bauer et al., 2021; Ceccarelli et al., 2023; Heeb et al., 2023, among others). Empirical studies confirm that there is support for sustainable investments among economic agents, that is, investors are willing to sacrifice return to engage in ESG investing. Barber et al. (2021), Hartzmark and Sussman (2019), and Ceccarelli et al. (2023) document that investors value sustainability. Bauer et al. (2021) provide evidence that the support for sustainable investments is driven by strong social preferences of investors rather than beliefs for better financial outcomes from investments in green assets. They also show that individual investor's social preferences matter in delegated portfolio decisions.

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A number of studies have documented evidence that ESG investments serve as a hedge against climate risk. Firms with better ESG performance have lower exposure to climate risk and earn lower returns, consistent with an increased investor demand due to the high potential to hedge against climate risk (Ardia et al., 2022; Bolton & Kacperczyk, 2021; Engle et al., 2020; Huynh & Xia, 2021). There is also evidence of a premium in the options market for hedging climate- or ESG-related uncertainty (Cao et al., 2022; Ilhan et al., 2020). Nofsinger and Varma (2014) find that during the period 2000 and 2011 socially responsible mutual funds outperform conventional mutual funds during market prices. Ceccarelli et al. (2023) show that low-carbon mutual funds are exposed less to climate risks and outperform conventional funds in periods with higher salience of such risks.

With these two established facts from the empirical literature, we would expect underperformance of ESG investment. However, the empirical evidence is mixed. M. Baker et al. (2022), Bolton and Kacperczyk (2021), Choi et al. (2020), Faccini et al. (2022), Hong and Kacperczyk (2009), Seltzer et al. (2022), Zerbib (2019), and Hsu et al. (2023) all show that green firms underperform relative to brown firms. Bebchuk et al. (2009), Derwall et al. (2004), Duan et al. (2023) and Pastor et al. (2022), Gompers et al. (2003), In et al. (2019) document a positive relationship between a firm's ESG profile and its returns, while Chava et al. (2021), Hyun et al. (2020), Ochoa et al. (2022), and Aswani et al. (2023) find no significant relationship. Positive ESG demand shocks (Avramov, Cheng et al., 2021) could help reconcile this evidence. Alternatively, an unexpected increase in environmental or climate concerns (Ardia et al., 2022; Pastor et al., 2022) could also lead to higher realized returns.

We also consider the ability of ESG-motivated investments to generate societal impact. Impact can be achieved through several channels, as argued in recent theoretical studies. Potential channels include search capital frictions (Landier & Lovo, 2020), financing constraints and coordination (Oehmke & Opp, 2022), lower cost of capital and higher valuation (Pastor et al., 2021), and the proportion of ESG investors in the market (Pedersen et al., 2021), among others. Empirical evidence shows that ESG investment can generate societal impact through various channels such as environmental activism (Naaraayanan et al., 2020), shareholder coordination (Crane et al., 2019), institutional commitment (Dyck et al., 2019), divestment (Berk & van Binsbergen, 2021), and two-tier engagement (Dimson et al., 2021). The effectiveness of those channels in generating the intended impact, however, is rather varied. Berk and van Binsbergen (2021) argue that ESG divestiture strategies have little impact on the real investment decision of the affected firms. Recent empirical studies (such as Dimson et al., 2021; Krueger et al., 2020; Naaraayanan et al., 2020) provide support for engagement as a way to generate societal impact. Instead of divesting, investors should engage brown firms (firms with low ESG performance) to become green or even encourage green firms to become greener. This action could, in turn, lead to higher valuation and lower cost of capital for the transitory firms.

The remainder of this paper is organized as follows: In Section 2, we discuss the investors' preferences towards ESG investment. In Section 3, we provide the recent empirical literature on whether investors can "do well by doing good". In Section 4, we discuss whether ESG investment can generate societal impact and through which channels. In Section 5, we conclude by suggesting avenues for future research.

## 2 | INVESTOR PREFERENCES FOR SUSTAINABILITY

To incorporate investor preferences for sustainable investing, theoretical models typically treat green assets as consumption goods (see, e.g., Avramov, Cheng et al., 2021, Avramov,

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Lioui et al., 2021; Berk & van Binsbergen, 2021; Fama & French, 2007; Heinkel et al., 2001; Pastor et al., 2021; Pedersen et al., 2021). In these models, investors differ in their preferences for sustainability, where one type of investors has tastes for green assets that are unrelated to their returns. This group of investors derives non-pecuniary benefits from holding green assets: Investors get direct utility from the holdings of green assets, beyond the utility they derive from consumption provided by the payoffs of these assets. This is in contrast with the standard asset pricing assumption where investors are assumed to be concerned solely with the payoffs from the investment and not with the characteristics of the investment itself.

A straightforward (and extreme) way to model investor tastes for green assets is through exclusionary screening based on the characteristics of firms. One type of investors—exclusionary ethical investors—would refuse to hold assets that violate their ethical criteria (e.g., firms with a polluting technology), while another type of investors would be neutral with respect to the greenness of firms (and would consequently not impose restrictions on their asset holdings based on firm characteristics). That is the modeling choice offered in Heinkel et al. (2001), where the presence of exclusionary green investors changes the risk sharing opportunities in the market. As unacceptable firms can be held by fewer investors than green firms, their share prices fall. Given that risk sharing is reduced with the presence of more green investors, the cost of capital of polluting firms rises.

An alternative formulation to the exclusionary screening approach to integrate investor tastes is one that also accommodates positive screening. Investor utility is penalized for holding polluting assets, but some utility is gained for holding green stocks. This is the approach introduced in M. Baker et al. (2022), where investor utility depends on the holdings of assets and their environmental scores. The additional non-pecuniary preferences of green investors for an asset with high environmental score bid up its price so that green assets have lower expected returns than brown ones. An implication of their model is that investors with tastes for green assets will hold them at higher weights, leading to more concentrated ownership of such assets.

Fama and French (2007) argue that the asset pricing implications in an economy where some investors have tastes for assets as consumption goods are similar to those that arise when some investors trade based on misinformed beliefs. If investors disagree over the probability distributions of future asset payoffs, as markets should clear, informed investors overweigh the assets that are underweight by the misinformed investors and vice versa. The price effects induced by tastes for assets as consumption goods resemble those due to disagreement. However, while price effects of erroneous beliefs would disappear in the long run as misinformed investors eventually learn, such convergence does not hold for investor tastes, as they are assumed to be exogenous.

While some investors may not exhibit preferences for sustainable assets, they may still incorporate the information contained in the ESG scores of firms to update their views on assets' expected risk and return. Pedersen et al. (2021) include such 'ESG-aware' investors in their setup in addition to investors with or without tastes for green assets. Set within a mean-variance framework, the solution to the investor's portfolio problem is characterized by an ESG-efficient frontier. The frontier is hump-shaped, with a lower Sharpe ratio for assets with very high ESG scores. The highest Sharpe ratio is attained by ESG-aware investors who use ESG information in their investment decisions but do not otherwise exhibit ESG preferences. Assets with high ESG scores have lower expected returns due to high demand from ESG-motivated investors.

The size of the ESG industry or the fraction of ESG investors in the economy can impact the performance of ESG investments. Pastor et al. (2021) show that, for the ESG industry to exist, there must be a dispersion in the ESG tastes or preferences. Pedersen et al. (2021) explain that the outperformance of ESG investments is conditioned on the type of investors that is prevalent

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in the market. If all investors are aware of the value of ESG signals but have no preference for sustainability, ESG scores do not predict abnormal returns, as the information is incorporated in prices. If all investors have preference for sustainability, then higher ESG scores imply lower cost of capital for the firm, which can issue shares at higher prices. The presence of all types of agents in the market leads to a range of possible equilibria that depend on the prevailing type of agents and result in a relationship between ESG scores and expected returns that can be positive, negative, or neutral.

In the models presented so far, investor's utility is modeled as a function that includes (agent-specific) non-pecuniary benefits that a subset of agents derives from holding green assets. However, while concerns about climate change are agent-specific—as are tastes for green assets—the utility of all agents in the economy may be impaired by unanticipated realizations of ESG-related risks, such as climate change. Pastor et al. (2021) accommodate climate risk in their preference specification, so that the utility function of investors is defined over wealth, stock holdings—with the associated non-pecuniary benefits from holding stocks—and climate risk. Under this preference specification, the expected underperformance of green assets is also driven by the assumption that they serve as a hedge against climate risk that investors care about. Investors are willing to pay more for sustainable assets, and these assets earn lower alphas. ESG investors' portfolio decisions result in a tilt towards green assets and thus generate lower expected returns relative to agents with no preferences for sustainability. The stronger the taste for green holdings, the larger the deviation from the market portfolio (which is held by all agents if there is no dispersion in preferences). Since, in addition, investors dislike unanticipated deteriorations in climate, the higher expected returns from holding brown assets reflect the higher exposure of brown firms to climate risk.

Alternatively, it is plausible to argue that brown firms rather than non-polluting green ones serve as a hedge against climate risk. Under the assumption that the externality is high (i.e., negative climate shocks realize) when polluting firms experience positive shocks to their output, S. Baker et al. (2022) argue that the resulting unexpected returns of these firms shoot up, making them climate hedges. Brown-averse investors who suffer the greatest disutility loss in such states have the strongest motive to hedge and thus—counterintuitively—tilt their portfolios more towards polluting firms. The cost of capital for polluting firms falls if the fraction of brown-averse agents in the economy prevails, leading to even more capital being channeled to brown firms. Both mechanisms are plausible, so it ultimately remains an empirical question whether the stocks of clean or polluting stocks hedge climate risk.

In standard asset pricing models such as the CAPM of Sharpe (1964) and Lintner (1965), it is assumed that investors are completely aware of the probability distributions of the future payoffs on assets and optimize their portfolio choice based on the payoffs of these assets under known probability laws. Faced by uncertainty about the true probability law, however, agents would alternatively gradually update their beliefs about the probability distribution of future payoffs based on the arrival of new data. Thus, agents would make investment decisions, compounding the uncertainty that stems from their posterior model weights and the stochastic evolution of the state variables of the model. Arguably, model ambiguity is relevant in the context of ESG preferences. For instance, Giglio et al. (2021) state that "it is implausible that economic agents know with any degree of certainty the precise nature or severity of climate risks that are facing them, a topic of substantial disagreement even within the scientific community." Such disagreement is reflected in the large degree of disparity that exists across ESG ratings of firms issued by different data providers, as documented by Berg, Kölbel, and Rigobon (2022), Chatterji et al. (2016), Gibson et al. (2021), and Christensen et al. (2022). The mixed signals that investors

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receive on the sustainability profile of a firm could distort the ESG-alpha relationship induced by investor tastes that would otherwise exist if the firm's ESG profile were known with certainty.

Avramov, Lioui et al. (2021) examine the asset pricing effects of this form of uncertainty. In their model, brown-averse investors derive non-pecuniary benefits from holding assets based on their ESG score. However, the investors observe firms' ESG scores with error. This uncertainty renders firms' stocks to be perceived by investors as riskier. Under these assumptions, the demand for equities is driven by two components: (i) demand for equity in the absence of ESG preferences, and (ii) demand for an asset with a positive payoff when the market is green, and a negative payoff when the market is brown. In this setup, there are two conflicting forces that drive the ESG-alpha relationship: The non-pecuniary benefits that investors extract for holding a green asset (or the green market) drive down the risk premium, while the asset (or the market) is perceived to be riskier due to ESG uncertainty, thus commanding a higher risk premium. The overall result for the ESG-alpha relationship is thus inconclusive. In a setting with multiple assets with different individual levels of ESG uncertainty, alpha increases with ESG uncertainty and the alpha-ESG relation becomes weaker.

The implications of ESG disagreement or uncertainty on the expected performance of ESG investments documented in Berg, Kölbel, and Rigobon (2022), Berg, Kölbel, Pavlova, et al. (2022) and Avramov, Lioui et al. (2021) highlight the relevance of investors' heterogenous beliefs, learning and ambiguity about the probability distribution of the future payoff, and bring forward potential implications for the survival of ESG investors. According to the market selection hypothesis, agents with relatively inaccurate forecasts are driven out of the market and the price impact of their beliefs is dissipated. To the extent that the behavior of ESG investors mirrors that of misinformed investors (as in Fama & French, 2007), the aspect of long-term survival and impact of such investors becomes of interest. Should we expect that ESG investors perish in the long run or that they learn about the distribution of the future payoffs, and they adjust accordingly? Blume and Easley (2006), Sandroni (2000), and Yan (2008) examine time separable preferences and provide evidence in support of the market selection hypothesis. Borovička (2020) examines the hypothesis under recursive preferences of the Duffie-Epstein-Zin type and shows that it is possible for the agents with incorrect beliefs to survive. Guerdjikova and Sciubba (2015) show that ambiguity-averse agents can survive if the ambiguity vanishes with time or if the economy exhibits no aggregate risk. Kogan et al. (2017) establish necessary and sufficient conditions for agents to survive and to have an impact on prices in the long run. Under the assumption of time-separable preferences, they demonstrate that both components of the market selection hypothesis do not generally hold: Agents with inferior forecasts do not survive in the long run and their price impact is destroyed as they are driven out of the market. Instead, if the forecast errors of these agents accumulate slowly under certain conditions on the curvature of the utility function, the agents can survive and affect prices. The relevance of these findings in the context of ESG investments has not been researched to the best of our knowledge. We note that this opens up an interesting opportunity for future research.

Arguably, investors' interest towards sustainable investment opportunities shifts over time. Such dynamic shifts that we have witnessed over the past decade warrant the accommodation of preference shocks when modelling investor behavior and choices. Non-pecuniary benefits from investing in green assets would vary with the state of the economy, giving rise to models that incorporate dynamics in ESG demand and supply. Preference shocks for sustainable investing arise under such specification, in line with asset pricing models with demand shocks (see Albuquerque et al., 2014; Koijen & Yogo, 2019; Wurgler & Zhuravskaya, 2002). A dynamic equilibrium model that accommodates shocks to investor preferences for ESG can rationalize an

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ESG-alpha relationship that varies over time and switches sign and magnitude. The empirical evidence that we review in Section 3 brings support for such time variation in the relationship. For example, Bansal et al. (2022) explore the time-variability of abnormal returns of green and brown firms in different states of the economy and highlight the role of countercyclical investor preferences for sustainability in shaping the dynamic ESG-alpha relationship.

Avramov, Lioui et al. (2021) provide asset pricing implications of such time-varying ESG preferences in a dynamic equilibrium setting. They cast investor preferences in a modified version of Epstein and Zin (1989, 1991) in a two-good economy, where the consumption bundle consists of the physical good and an incremental consumption good that derives from non-monetary benefits from holding green assets. The innovation relative to a setting with standard recursive preferences that allows for an ESG impact in risk premia is that brown-averse agents perceive higher return on wealth than the physical return when the market is green. The willingness of brown-averse agents to accept lower returns for holding green assets (represented as a convenience yield effect) is reflected in a negative ESG-alpha relationship, as obtained in static models. However, in their model, the convenience yield is not fixed but can vary with ESG supply and demand. Brown-averse agents become more sensitive to shocks in ESG supply and demand when the market becomes greener and require a higher risk premium for holding the market. This risk premium channel thus causes the ESG-alpha relationship to fluctuate over time, switching sign and magnitude.

Both the dynamic model of Avramov, Lioui et al. (2021) and the two-period economy models of Pastor et al. (2021) provide theoretical arguments for the possibility of ESG investment outperformance in terms of realized returns. In their models, ESG demand factors play a key role. A positive shock to investor ESG preferences in the Avramov, Lioui et al. (2021) model (i.e., higher non-monetary benefits from holding the green asset) leads to an increase in the price of a green asset and hence to a positive unexpected return, while the price of the brown asset drops. Thus, the realized return of a long-short portfolio of green and brown assets respectively would be positive. In the setting of Pastor et al. (2021), ESG preferences can shift unexpectedly over generations of agents which would be associated with positive unexpected returns on green assets. Better than expected performance of green stocks would then be achieved through this investor channel.

Apart from the asset pricing implications, investor tastes for green assets and the resulting willingness to pay more for sustainable investments have the potential to impact firm investment decisions. The cost of capital of a green firm is lowered when investors derive non-pecuniary benefits from holding its equity. Consequently, the valuation of a green firm becomes higher than that of an otherwise identical brown firm. Heinkel et al. (2001) and Pastor et al. (2021) argue that this valuation differential can induce brown firms to become green. This effect, combined with the increased growth rates of green firms due to the lower cost of capital would result in green firms becoming a larger fraction of the overall economy.

The presence on the market of both profit- and ESG-motivated investors could have implications on the cost of capital through an information channel as well, as argued in the model introduced by Goldstein et al. (2022). In a market with investors with heterogeneous preferences over multiple fundamentals, the price informativeness of a security would depend on the trading intensity of any of the types of investors. Its price would reflect the preferences of the investor type that dominates the market. In their setting, two equilibria can coexist: in one, the price is dominated by a financial cash-flow component, while in the other, it loads on the ESG component, also implying the possibility of jumps across equilibria. The information channel allows to reconcile the willingness to pay for green investment with the higher cost of capital for green firms. The cost of capital increases as green firms attract more socially-minded investors, leading

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to higher information risk for profit-motivated investors who find the price less informative, prompting them to require a higher return.

Given a mechanism for impacting firms' investment decisions, the exclusionary screening criteria applied by (institutional) investors would appear meaningful for increasing the fraction of sustainable firms and achieving a greener economy. Berk and van Binsbergen (2021), however, raise caution against the efficiency of this mechanism. In their study, they investigate the impact of divestiture activities on the firms' cost of capital. They argue that given the current fraction of stock market wealth channeled towards socially responsible investments (SRI), the reduction in the cost of capital due to divestitures is immaterial to the investment decisions of firms. Instead, impact investing or engagement, that is exercising the rights of control to change firms' policies and production decisions, would be a more effective strategy to achieve a shift to greener firms. Broccardo et al. (2022) argue that voice (engagement) rather than exit (divestment or boycott) is more effective in pushing firms to become greener.

Under what conditions, however, would the capital of ESG-minded activist investors indeed push firms to adopt green production? And ultimately, what firms should impact investors allocate capital to? Under the theoretical framework of Oehmke and Opp (2022), complementarities emerge between ESG-motivated and profit-motivated investors. Under binding financial constraints, the financing capacity of a firm can be brought beyond the one obtainable under exclusively profit-motivated investors. The underlying condition for this to realize is that ESG investors internalize the counterfactual social costs that would be generated by a firm's brown production if it is financed by financial investors only, that is, if ESG-minded activist investors follow a broad mandate which spans beyond the firm they invest in. Under this setting, Oehmke and Opp (2022) offer a micro-founded investment criterion that reflects both the social return generated by green production but also the avoided social costs that would have been generated had the ESG investor not provided capital.

Socially responsible investors would fund green firms that profit-motivated investors would not finance if they are willing to forego financial returns. There is a general consensus in the recent literature that investors are willing to pay for sustainable investment. Table 1 summarizes the findings on investors' willingness to pay for sustainability. In an experimental setting, Martin and Moser (2016) demonstrate that both investors and managers are willing to trade off financial and societal benefits. Similar willingness to forego financial benefits to invest according to social preferences is documented in Reidl and Smeets (2017). Bauer et al. (2021) show that the majority of pension fund members have strong support for increasing funds' engagement in sustainability. Social preferences rather than financial beliefs stand behind this choice as investors are willing to forego financial returns to engage in increasing the sustainability of the companies the funds invest in. While the tradeoff of financial and societal preferences is documented in experimental markets, it does not necessarily generalize to a real market setting. Investors on municipal securities markets do not appear to be willing to forego wealth for societal benefits, as documented by Larcker and Watts (2020).

Is investors' willingness to pay for sustainable investments commensurate with the level of impact? Barber et al. (2021), Bonnefon et al. (2022), and Brodback et al. (2022) show that responsible investors care about the magnitude of impact. Contrary to these findings, however, Heeb et al. (2023) find that while dedicated responsible investors are willing to pay for sustainable investment, they are not willing to pay more for impact, that is, responsible investors' willingness to pay does not scale with the level of impact. In addition, the willingness to pay for sustainable investments can be driven by an emotional rather than a calculative valuation of impact. This satisfaction or "warm glow" represents a pleasure derived from doing good, which is regardless of

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**TABLE 1** Investor preferences for sustainability.

| Studies | Focus | Period | Main Findings |
|---|---|---|---|
| Riedl & Smeets (2017) | Investors' motives for holding socially responsible mutual funds. | 2006–2012 | Social preferences and social signaling explain socially responsible investment decisions. Financial motives play a minor role. |
| Hartzmark & Sussman (2019) | The value investors attach to sustainability | 2016–2017 | Mutual fund investors value sustainability. Market-wide demand for funds depends on their sustainability rating. |
| Zerbib (2019) | Effect of ESG investors' preferences on bond market prices | 2013–2017 | Low impact of investors' pro-environmental preferences on bond prices. |
| Larcker & Watts (2020) | Willingness-to-pay in the municipal securities market | 2013–2018 | Investors appear unwilling to forgo wealth to invest in environmentally sustainable projects. |
| Bauer et al. (2021) | Sustainable investment behavior and drivers behind investors' willingness-to-pay | 2018, 2020 | 67.9% of participants favor increasing pension funds' engagement to increase sustainability of portfolio companies. Social preferences rather than financial beliefs or confusion drive choice for more sustainability. |
| Baker et al. (2022a) | Willingness-to-pay in the municipal bonds market | 2010–2016 | Investors in the bond market are willing to pursue nonpecuniary benefits. |
| Brodback et al. (2022) | Investors' willingness-to-pay for socially responsible assets and magnitude of impact | Experimental | Investors attribute a positive value to social responsibility at an increasing rate and are willing to pay a higher price for more responsible companies, even if they cannot expect a higher return. |
| Heeb et al. (2023) | Impact investors' willingness-to-pay for sustainable investments | 2020 | While investors have substantial willingness-to-pay for sustainable investments, their allocation decisions are not sensitive to impact. |
| Ceccarelli et al. (2023) | Willingness to pay for sustainable investment | 2017–2019 | Substantial increase in the monthly net flows of low-carbon funds relative to conventional funds after being labeled as "low carbon". |

*Note*: This table summarizes the evidence documented in recent studies on investors' willingness to pay for sustainability.



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the actual impact of one's action (Andreoni, 1989, 1990). Heeb et al. (2023) conclude that an average ESG investor is a "warm glow" optimizer rather than a consequentialist who optimizes the impact of her investment. Hartzmark and Sussmann (2019) also suggest that emotions may drive investors' valuation of sustainable investments. Brodback et al. (2022) conclude that more egoistic investors avoid responsible investing and that investors exhibit altrustic value. Bauer et al. (2021) argue that investors engage in ESG investments based on non-financial considerations. Ceccarelli et al. (2023) show that, on average, investors have a preference for "climate-friendly" funds and find that there is a "green shift" in the investment community. M. Baker et al. (2022) find that investors in the bond market are willing to pursue non-pecuniary benefits, while Zerbib (2019) shows that ESG investors' preferences have a low impact on bond prices.

Riedl and Smeets (2017) examine why investors engage in or hold socially responsible or ESG investments and find that social preferences and social signaling plays a significant role in ESG investment while financial motives are of second order. Dyck et al. (2019) show that institutional investors are motivated by both financial and social returns when addressing firm environmental and social issues. Bolton et al. (2020) evaluate the ideology of institutional investors in terms of whether they are money conscious or whether they are environmentally and socially conscious. They show that most pension funds are more environmentally and socially conscious while most of the largest mutual funds are money conscious. The large index funds are also more leaning towards the money conscious camp. Bauer et al. (2021) show that for pension funds, social preferences rather than financial beliefs or confusion drive the choice for more sustainability.

The literature on modeling preferences in the context of ESG investing has focused predominantly on treating ESG-minded investors as a homogenous group. While the preferences of socially responsible investors may be aligned in terms of direction, they may disagree, however, on the relative importance of the different aspects of the sustainability profile of a firm. As well, the objectives of responsible investors may not be aligned. For instance, while investors may dislike firms with high carbon emissions, they may disagree on the social cost of the technologies in place to reduce them. Modeling the heterogeneity in preferences of ESG investors is a promising avenue for future research.

## 3 | SUSTAINABILITY AND INVESTMENT PERFORMANCE

This section reviews the recent empirical literature on whether investors can "do well by doing good," that is, whether investors can earn superior returns by investing in sustainability. At the firm level, M. Baker et al. (2022), Bolton and Kacperczyk (2021), Garel et al. (2023) and Hsu et al. (2023), Hong and Kacperczyk (2009), Zerbib (2019) show that green firms generate lower returns relative to brown firms. Bebchuk et al. (2009), Derwall et al. (2004), Gompers et al. (2003), In et al. (2019), and Pastor et al. (2022) document a positive relationship between a firm's ESG profile and its equity returns, while Aswani et al. (2023) find no significant relationship. The meta-study of Atz et al. (2021) find that returns from ESG investing documented in the literature are not different on average from returns from conventional investments.

There is, however, overwhelming evidence that corporate sustainability improves corporate financial performance. Atz et al. (2021) document that twelve out of thirteen recent meta-analyses find a positive relationship between sustainability and corporate financial performance. Disaggregating corporate sustainability into an environmental, social and governance component leads to further insights in the ESG-performance relationship. There is overwhelming and robust evidence that better governance is associated with better financial performance and higher firm value

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(see Bebchuk et al., 2009, 2013; Core et al., 1999; Gompers et al., 2003; La Porta et al., 2002). The environmental and social components which reflect the "doing well by doing good" argument find more mixed empirical support. There is still a positive but weak relationship with firm value (see the meta-study by or Ferrell et al., 2016; Margolis et al., 2011).

It seems puzzling that, while firm value and corporate financial performance are positively related with ESG, investors are not generally able to extract superior performance from their ESG investment strategies. Atz et al. (2021) offer potential explanations: Investor performance is strategy-related, so ultimately a performance result mirrors the extent to which an investment strategy truly reflects the information contained in the ESG profile of a firm. In addition, benefits from ESG investing are state-dependent and are mainly realized during crisis periods. Further, ESG metrics are of inconsistent quality, widely dispersed across data providers. Alternatively, the market could be pricing ESG strategies correctly, so that no abnormal returns are realized ex post.

We argue in addition that the documented empirical findings on ESG investment performance could be rooted in a risk-based argument or that they can be explained through the lens of models on investor preferences and beliefs. From a risk perspective, there are conflicting views in the seminal literature on whether investments in green or brown firms serve as a hedge against risk (along different ESG dimensions). On the one hand, investing in non-ESG firms introduces additional risk such as carbon emission risk, environmental regulation risk, biodiversity risk, physical risk, transition risk or litigation risk heightened by social norms (see Bolton & Kacperczyk, 2021; Garel et al. (2023); Hong & Kacperczyk, 2009; Hsu et al., 2023). Investors' demand for compensation for the exposure to these additional risks leads to a higher risk premium for holding brown assets. Therefore, non-ESG investments require higher expected returns compared to ESG investments. Alternatively, one could argue as well that it is polluting firms instead that provide a hedge against climate risk, as positive shocks to their output may tend to occur when negative climate shocks realize, so that they would pay off when pollution is high. S. Baker et al. (2022) argue that investors who suffer the greatest disutility from the occurrence of such adverse climate shocks would have the strongest motive to hedge and would hence increase their holdings of polluting stocks.

From the investor preference perspective, under the assumption that some investors have a preference for sustainable investments and derive non-pecuniary utility from holding green assets, such investors would be willing to sacrifice returns to hold ESG investments, implying a negative ESG-performance relationship. This argument follows the lines of the convenience yield effect from holding liquid safe assets, introduced by Krishnamurthy and Vissing-Jorgensen (2012). The prevalence on the market of investors with preference for green assets leads to the underperformance of ESG investments. However, the shift in customer or investor tastes for green assets can lead instead to the outperformance of ESG investments (Pastor et al., 2021). In addition, the convenience yield of holding green assets can vary over time, off-setting the negative ESG-expected return relationship (Avramov, Cheng et al., 2021). In a greener market, brown-averse agents become more sensitive to ESG demand and supply shocks and require a higher risk premium implying positive ESG-expected return relationship. Finally, Avramov, Cheng et al. (2021) show that ESG uncertainty can change the ESG-performance relation, contributing further to the arguments put forward in Atz et al. (2021) that green firms could underperform in expectation.

Empirical studies reach largely opposing conclusions on the relationship between ESG performance and investment returns. In Table 2, we summarize the evidence documented in the recent literature on the relationship between sustainability and investment performance. Focusing on a specific aspect of the ESG profile of a firm—its carbon emissions—Aswani et al. (2023), Azar et al. (2021), Bolton and Kacperczyk (2021), In et al. (2019), and Hsu et al. (2023) document diverging

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**TABLE 2** ESG investment performance.

| Studies | Focus | Period | Main findings |
|---|---|---|---|
| **Panel A. Equity Market** | | | |
| ***Higher Returns of ESG Investments*** | | | |
| In et al. (2019) | Carbon efficient firms and stock returns | 2005–2015 | Carbon-efficient firms outperform carbon-inefficient firms. |
| Choi et al. (2020) | Global warming, carbon intensity and stock return | 2001–2017 | High carbon-intensive firms underperform low carbon-intensive firms in abnormally warm weather. |
| Ardia et al. (2022) | Green premium and climate change concern | 2010–2018 | Green (brown) firms' stock prices tend to increase (decrease) with unexpected increase in climate change concerns. |
| Pastor et al. (2022) | Green premium in equity markets | 2012–2020 | Green stocks outperform brown stocks, driven by an unexpected increase in environmental concerns. |
| ***Lower Returns of ESG Investments***: | | | |
| Bolton & Kacperczyk (2021) | Carbon emissions and stock returns | 2005–2017 | Stocks of firms with higher total CO2 emissions (and changes in emissions) earn higher returns. Investors demand compensation for exposure to carbon emission risk. |
| Faccini et al. (2022) | Climate risks reflected in stock prices | 2000–2018 | Stocks with high climate beta outperform those with low climate beta. |
| Garel et al. (2023) | Biodiversity premium | 2018–2022 | Firms with larger biodiversity footprint earn higher returns following a major biodiversity-related policy event; investors demand compensation for exposure to biodiversity risk. |
| Hsu et al. (2023) | Pollution premium | 1991–2016 | Firms with high toxic emission intensity generate higher return compared to firms with low toxic emission intensity within the same industry. Exposure to environmental-related risks. |
| ***Neutral Returns of ESG Investments*** | | | |
| Chava et al. (2021) | Risk, return and ES ratings | 1991–2016 | No significant relationship between ES ratings and average stock returns. |
| Ochoa et al. (2022) | Sustainable investment strategies and climate change risks | 2018–2019 | Performance of stocks with high environmental performance is not different from that of stocks with low environmental performance. |
| Aswani et al. (2023) | Carbon emissions and stock returns | 2005–2019 | Unscaled raw emissions estimated by vendors are correlated with stock returns, unlike unscaled emissions disclosed by the firms. Carbon emission intensity is not correlated with stock returns. |

(Continues)



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TABLE 2 (Continued)

| | | | |
|---|---|---|---|
| **Panel B. Bond Market** | | | |
| ***Higher Returns of ESG Investments*** | | | |
| Duan et al. (2021) | Carbon risk pricing in corporate bond markets | 2006–2019 | Bonds of more carbon intensive firms earn lower returns. |
| Pastor et al. (2022) | Green premium in bond markets | 2020–2021 | German green bonds outperform non-green twins' bonds, driven by an unexpected increase in environmental concerns. Negative yield spread between green bond and twin bond. |
| ***Lower Returns of ESG Investments*** | | | |
| Zerbib (2019) | Bond pricing | 2013–2017 | The yield of a green bond is lower than that of a conventional bond. |
| Baker et al. (2022a) | Pricing and ownership of U.S. green bonds | 2010–2016 | Green bonds are issued at a premium (lower yield) compared to conventional bonds |
| Seltzer et al. (2022) | Climate regulatory risks and corporate bonds | 2009–2017 | Firms with poor environmental profiles have higher yield spreads and lower credit rating compared to firms with good environmental profiles. |
| ***Neutral Returns of ESG Investments*** | | | |
| Hyun et al. (2020) | The price of going green | 2010–2017 | No robust evidence of yield premium or discount on green bonds |
| **Panel C. Funds** | | | |
| ***Higher Returns of ESG Investments*** | | | |
| Nofsinger & Varma (2014) | Socially responsible funds vs. conventional funds' performance during market crises | 2000–2011 | Socially responsible mutual funds outperform conventional mutual funds during market crises. |
| Ceccarelli et al. (2023) | Benefits and costs of low carbon mutual funds | 2017–2019 | Low carbon funds have a lower exposure to climate change risk at the cost of lower sectoral diversification; they outperform conventional funds in months with higher salience of climate change risks. |

(Continues)



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TABLE 2 (Continued)

| | | | |
|---|---|---|---|
| **Panel C. Funds** | | | |
| ***Lower Returns to ESG Investments*** | | | |
| Riedl & Smeets (2017) | Return and fee performance of socially responsible mutual fund | 2006–2012 | Socially responsible funds (SRI) funds generate lower returns and request higher management fees compared to conventional funds. |
| Barber et al. (2021) | Investor's willingness to accept trade-off between financial returns and nonpecuniary benefits | 1995–2014 | Impact funds earn lower internal rates of return (IRRs) ex-post than traditional VC funds. Willingness-to-pay: Investors accept lower IRRs ex ante for impact funds. |
| Liang et al. (2022) | Investment performance of hedge funds management companies that are committed to UN PRIs | 2006–2019 | Hedge funds managed by PRI signatories underperform other hedge funds, driven by those hedge funds that engage in greenwashing. |
| ***Neutral Returns of ESG Investments*** | | | |
| Hartzmark & Sussman (2019) | Investor perception of sustainable investment and willingness to pay | 2016–2017 | Investors perceive sustainability as a positive attribute of a company. High sustainability funds do not outperform low sustainability funds. |

*Note*: This table summarizes the findings of recent studies on ESG investment performance. Panel A presents evidence for the equity market. Panel B summarizes findings on the bond market. Panel C summarizes findings on funds.



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findings. Based on a sample of publicly traded U.S. firms, Hsu et al. (2023) find a positive relationship between the toxic emission intensity of firms and their corresponding stock returns over the period 1991 to 2016. For a more recent sample, however, In et al. (2019) find that the stocks of high carbon emission firms earn lower returns relative to their low emission counterparts. A negative relationship between firms' carbon emissions and stock returns is documented in Bolton and Kacperczyk (2021) for a global sample of firms. Aswani et al. (2023), on the other hand, find no relationship, raising caution about carbon emissions being priced in equity markets. In addition, they argue that the wedge between vendor-estimated and firm-disclosed emissions could potentially explain divergent findings, as the former tend to reflect firm growth, for which investors are rewarded.

Hartzmark and Sussmann (2019) focus in their analysis on ESG and mutual funds performance. They do not find evidence that mutual funds with a high sustainability rating outperform their peers that rank low on the ESG dimension after adjusting for well-known risk factors. Their study exploits the introduction of the Morningstar sustainability ratings in 2016. Contrary to this evidence, Ammann et al. (2019) document better performance for sustainable funds evaluated over a longer period. Both studies, however, show that funds with higher sustainability ratings receive greater fund inflows compared to lower-ranked funds, highlighting the finding that in general, investors have preference for sustainable investments. The empirical evidence brought forward in Ammann et al. (2019) suggests that sustainable investments are driven by future performance expectations of sustainable funds and that non-pecuniary motives for sustainable investments play a role.

Studies of the ESG performance of funds investing in private equity or that employ alternative investment strategies document a significant degree of underperformance of funds focused on ESG versus their peers without such stated objective. For venture capital funds, Barber et al. (2021) find that impact funds underperform traditional venture capital funds. For endowment funds, Aragon et al. (2021) show that responsible investment endowments generate lower portfolio performance compared to non-responsible investment endowments. The two papers relate the ESG investment underperformance to investor's willingness to pay for sustainability. For hedge funds, Liang et al. (2022) show that a substantial fraction of hedge funds that are signatories to the UN PRI engage in greenwashing. Further, investors do not appear to be able to identify such funds. These funds are found to underperform both truly green and truly brown funds. Liang et al. (2022) relate the evidence of greenwashing and underperformance to agency problems.

The ESG-performance relationship can also be state-dependent and vary over time. Empirical studies have considered the performance of green firms or funds that rate high on the sustainability dimension during crisis periods. Lins et al. (2017) show that firms with high social capital have higher returns than firms with low social capital during the 2008–2009 financial crisis. Pastor and Vorsatz (2020) show that during the Covid19 crisis of 2020, funds with high sustainability ratings perform well and investors remain focused on sustainability during this major crisis.

One of the arguments that has been brought forward to explain the underperformance of ESG investments is risk-based. Investors who hold non-ESG investments are exposed to additional sources of risk and would consequently demand a risk premium. While empirical studies demonstrate a positive relation between sustainability and reduced risk exposure, the evidence for underperformance of ESG investments is less prevalent. Lopez de Silanes et al. (2019) find that ESG firm engagement is correlated with decreased risk (as measured by the volatility of equity prices), the latter being attributable to firms disclosing more information. However, they show that ESG scores have little or no impact on risk-adjusted financial performance. Ceccarelli et al. (2023) find that low-carbon funds are likely to have lower exposure to future potential realizations of

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climate change risks. However, in months with higher salience of climate change risks, low-carbon mutual funds outperform conventional funds but possess higher idiosyncratic volatility. Liang et al. (2022) show that low-ESG signatories exhibit greater operational risk. Ilhan et al. (2020) show that firms with higher carbon emissions exhibit more tail risk and more variance risk. Hsu et al. (2023) find that highly polluting firms are more exposed to environmental regulation risks. Hoepner et al. (2021) demonstrate that investors' ESG engagement leads to a reduction in portfolio firms' downside risk, where engagement over environmental topics has first-order importance.

The uncertainty emanating from ESG related regulatory policies has the potential to impact the investment decisions of economic agents. Ilhan et al. (2020) show that carbon risks are priced in the options market, while Cao et al. (2022) provide evidence that investors pay a premium to hedge against ESG related uncertainty: Options of low ESG-rated stocks are more expensive compared to high-ESG stocks. Focusing on extreme events on the downside, the evidence of higher cost of option protection against tail risk for carbon intense firms brought forward by Ilhan et al. (2020) is relevant for the broader spectrum of ESG-related risks. The regulatory uncertainty related to different aspects of ESG policies could be reflected in the hedging behavior of investors. Kräussl et al. (2023) examine the disparity across different aspects of ESG policies and find that firms with a high disparity in ESG ratings across the different components have a higher cost of option protection against downside risk. Investigating the implications of the demand for hedging against ESG-related uncertainty on higher-order moments of asset returns is an important avenue for future research.

## 4 | SUSTAINABILITY AND SOCIETAL IMPACT

ESG investments may not necessarily result in higher returns but they may generate positive social impact. Impact can be achieved through a number of channels, as argued in recent theoretical studies. Potential channels include search capital frictions (Landier & Lovo, 2020), financing constraints and coordination (Oehmke & Opp, 2022), lower cost of capital and higher valuation (Pastor et al., 2021), and the proportion of ESG investors in the market (Pedersen et al., 2021), among others. Within the framework of Pedersen et al. (2021), as the number of ESG investors grows in the financial market, the expected returns of ESG firms drop. Thus, as the fraction of ESG investors grows, green firms can raise capital at a lower cost and enjoy high valuation, forcing brown firms to become green and green firms to become greener. Alternatively, under search capital frictions, Landier and Lovo (2020) demonstrate that a larger presence of ESG investors lowers the probability of brown firms getting financed, forcing firms to internalize the externalities of their choices, thereby creating impact.

Oehmke and Opp (2022) show that coordination among socially responsible and financial investors can lead to impact. When ESG investors have a broad mandate, they internalize the counterfactual social costs that would be generated by firms if they seek to be financed by non-ESG investors. Under financing constraints, impact is achieved as responsible investors raise the financing capacity of green firms beyond the levels that could be achieved solely by financial investors. There is a large body of empirical literature documenting the channels through which ESG investments can create societal impact, ranging from divestment strategies to engagement. Table 3 summarizes the major findings in recent studies on the ability of ESG investments to generate social impact. Among the channels for generating impact, studies consider environmental activism (Naaraayanan et al., 2020), shareholder coordination (Crane et al., 2019),

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**TABLE 3** Societal impact of ESG investment.

| Studies | Focus | Period | Main findings |
|---|---|---|---|
| Chen et al. (2020) | Institutional shareholders and CSR | 2003–2006 | Exogenous increase in institutional holding improves portfolio firms' CSR performance. |
| Krueger et al. (2020) | Investor's perception and engagement | 2017–2018 | Institutional investors consider engagement rather than divestment as an effective approach to address climate risk. |
| Naaraayanan et al. (2020) | Real effects of environmental activist investing | 2010–2018 | Targeted firms reduce their toxic releases, greenhouse gas emissions, and cancer-causing pollution. Negative relationship between financial performance and environmental activism. |
| Azar et al. (2021) | Big Three and carbon emissions reduction | 2005–2018 | Importance of engagement efforts: negative relationship between the Big Three ownership and subsequent carbon emissions. |
| Berk & van Binsbergen (2021) | Quantitative impact of ESG divestitures | 2002–2020 | The impact of ESG divestitures on the cost of capital is too small to meaningfully affect real investment decisions. |
| Dimson et al. & Li (2021) | Coordinated engagements and ESG risks | 2007–2015 | A two-tier engagement strategy, combining lead investors with supporting investors, is effective in successfully achieving stated engagement goals and is followed by improved target performance. Target firms have higher overall ESG ratings. |
| Hoepner et al. (2021) | Shareholder engagement and downside risk | 2005–2018 | Successful ESG engagements reduce the firm's exposure to downside risk. |
| He et al. (2023) | Shareholder voice and ES risks | 2004–2019 | Higher support in failed ES proposals predicts subsequent ES incidents. Negative relation between fund support in ES proposals and subsequent abnormal returns. |

*Note*: This table summarizes the findings of recent studies on the ability of ESG investments to generate societal impact.

institutional commitment (Dyck et al., 2019), divestment (Berk & van Binsbergen, 2021), and two-tier engagement (Dimson et al., 2021).

Elaborating on the environmental activism channel, Naaraayanan et al. (2020) examine the real effect of environmental activist investment choices on targeted firms. While they find that there is a negative relationship between the financial performance of firms and their ESG performance, they find evidence of social impact. Firms targeted by environmental activist investors with shareholder propositions reduce their toxic releases, greenhouse gas emissions, and cancer-causing pollution. They argue that local economies benefit from the effect of the environmental activist. Their results suggest that engagement is an effective tool for long-term investors in achieving socially desirable outcomes.

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Institutional commitments to sustainable investment strategies can lead to a positive social impact. For instance, Dyck et al. (2019) show that investors who are signatories to the UN PRI generate a higher impact on firm' environmental and social performance than the average investor. However, the institutional commitment channel can be distorted or blurred by the act of greenwashing. Gibson et al. (2022) connect the commitment of responsible institutional investors to their actions and performance to provide understanding on whether these investors indeed "walk the talk". They find that non-US institutional investors that publicly commit to responsible investing exhibit better ESG portfolio-level scores, while for US institutional investors it is not the case. The disparity between commitment and actions for the latter seems to be driven by the incentive for underperforming investors to engage in greenwashing to attract flows. Liang et al. (2022) find that a non-trivial number of hedge funds that endorse the UN PRI similarly do not "walk the talk" and greenwash their funds instead. The act of greenwashing impacts negatively on the ability of the institutional commitment channel to create real societal impact by effectively reallocating capital from brown to truly sustainable firms.

Shareholders may also coordinate to influence the firms they own. The trend of less concentrated institutional ownership that we have witnessed over the past decades has given way to investor coordination aimed at influencing corporate policies. In line with the theoretical predictions of Edmans and Manso (2011), Crane et al. (2019) find empirical support that shareholder coordination strengthens corporate governance. However, ownership cliques can also coordinate to minimize the price impact of their trades, leading to weaker governance via the threat of exit. Dyck et al. (2019) find the same result for environmental and social issues but argue that private engagement could be the most effective instrument for intended change, while public engagement might just be a tool to increase leverage in private engagement.

The divestment channel is one of the most popular channels to generate societal impact. However, recent empirical studies caution against its effectiveness in generating the intended impact. For instance, Berk and van Binsbergen (2021) find that ESG divestiture strategies have little impact on the real investment decision of the affected firms. They document no detectable change in value when firms are either included or excluded from the leading socially conscious US index FTSE USA 4Good. Divestment strategies have been shown to have relatively small stock price effects around the announcement date and an insignificant one after the announcement date (Nguyen et al., 2020). In line with this evidence, Krueger et al. (2020) find that institutional investors consider ESG engagement as a more effective way to deal with externalities rather than divestment. Naaraayanan et al. (2020) find support to the hypothesis that engagements are an effective tool for long-term shareholders to address climate change risks.

Engagement strategies involve influencing the production choice of brown firms, forcing them to become green. Dimson et al. (2021) find that a two-tier engagement strategy that combines lead investors with supporting investors, is effective in successfully achieving the stated engagement goals and is followed by improved target performance. Their findings suggest that coordinated engagements are value-enhancing for shareholders, especially when engagements are headed by a lead investor and/or are successful. Krueger et al. (2020) find that long-term, larger, and ESG-oriented institutional investors, consider risk management and engagement, rather than divestment, to be the better approach for addressing climate risks. Dyck et al. (2019) also rule out screening (both negative and positive) as a driver for the improvement of environmental and social issues.

Shareholder ESG initiatives may be driven by monetary objectives or do aim at value maximization, but they could similarly be motivated by non-pecuniary outcomes, sometimes harming shareholder value (Krueger, 2015). He et al. (2023) focus on the differences in incentives among

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shareholders to disentangle these two opposing hypotheses. They document that the majority of shareholders oppose environmental and social (ES) proposals. Consistent with the view that ES engagement activities are value-enhancing, they find that ES proposals decrease the probability of value destroying incidents. Due to agency issues, value-relevant proposals do not pass and higher support to those failed ES proposals predicts a greater number of ES incidents and higher probability of future negative tail returns.

What type of investors drive these changes in firm choices? Institutional investors are deemed to be more sophisticated and have access to quantitatively more or qualitatively superior information than retail investors. Retail investors predominantly react to simple signals such as past return measures in their investment decisions (see, e.g., Del Guercio & Tkac, 2002; Evans & Fahlenbrach, 2012; Salganik-Shoshan, 2016). Households seem to act as simple decision-makers and invest using readily available information. Sustainability-related information might also be too costly for the retail investors to obtain as compared to institutional investors. This might suggest that the real sustainability change is driven by institutional investors.

The current literature is divided on whether institutional investors and retail investors differ along their preferences for sustainability. Hartzmark and Sussmann (2019) and Ammann et al. (2019) argue that both institutional and retail investors show a preference for sustainability. In reaction to the exogenous shock caused by the introduction of Morningstar sustainability ratings, Hartzmark and Sussmann (2019) find that institutional investors have a similar response to non-institutional investors. Contrary to these findings, Ammann et al. (2019) find strong evidence that retail investors move money away from low sustainable funds into high sustainable funds, whereas the evidence is weaker for institutional investors. One possible explanation of this result could be that institutional investors possess superior information about the sustainability profile of the funds that is already incorporated in the Morningstar sustainability ratings, so that these investors react less strongly to the exogenous shock once these ratings become public, compared to retail investors. There is only limited research that focuses exclusively on retail investors and the extent to which their investment decisions are linked to ESG considerations: Moss et al. (2020) find that ESG disclosures are irrelevant to retail investors' portfolio allocation decisions.

Based on a survey about climate risk perceptions, Krueger et al. (2020) document that institutional investors consider climate and environmental risks as having lower relative importance compared to traditional financial risks for their portfolio decisions, while at the same time having significant financial implications for the portfolio firms. Further, there is no dominating motive behind investors' perspectives on incorporating environmental concerns in their portfolio decisions. They argue that institutional investors appear to be guided by reputation protection incentives, moral or ethical considerations, and their fiduciary duties. Gibson et al. (2020) attribute the outperformance of institutional investors with better ESG footprints to the growing investor preference for ESG investment and the demand-driven price pressure exerted by the institutional investors on stocks with good environmental scores.

Institutional investors that engage in ESG appear to have distinct characteristics relative to their peers that do not incorporate sustainability considerations in their investment decisions. Kim et al. (2019) find that CSR activities are mainly promoted by the presence of active rather than passive long-term institutions. Long-term institutional investors are also associated with lower portfolio turnover and benefit more from the price pressure channel of ESG investment outperformance (Gibson et al., 2020). Funds with longer horizons and funds that are less management-friendly are significantly more likely to support ES shareholder proposals (He et al., 2023). Glossner (2019) finds that firms held by short-term investors have significantly more ESG incidents as

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compared to firms held by long-term investors which experience significantly less costly ESG incidents.

Higher institutional ownership (Chen et al., 2020; Crane et al., 2019; Dyck et al., 2019), stronger investors' social norm or strong community belief (Dyck et al., 2019), EU regional concentration (Crane et al., 2019), longer investor horizon (Glossner, 2019; Kim et al., 2019), and public commitments (Gibson et al., 2022) are all institutional investor characteristics that have been found to contribute to the improvement of firm's ESG performance. This empirical result further strengthens the importance of considering the presence of heterogenous investors to better understand the ESG implications of their investment decisions. Crane et al. (2019) show that only European institutional investors impact firms' environmental and social performance. Glossner (2019) and Kim et al. (2019) find that investors with longer investment horizons improve firms' ESG performance. Chen et al. (2020) show that an exogenous increase in institutional holdings caused by the Russell index reconstitutions improves the portfolio firms' CSR performance.

Delving deeper in the implications of investment choices of socially motivated investors for total social welfare, Green and Roth (2021) offer a framework to investigate the equilibrium and optimal allocation of social capital, where investors differ not only in their motivation (being socially or financially motivated), but also in the degree of their sophistication. The latter distinction is made based on whether economic agents take into account the effects of their investment choices. Naïve socially-motivated investors do not consider the displacement effects that their investment choices may have on other investors. Such 'values-aligned' investors form their portfolios based on the social returns of the firms they invest in. They place high intrinsic value in investing in green firms and the competition among these investors drives prices of such firms upwards. In that case, the willingness to pay for green investments is inefficient with respect to generating impact. Contrary to them, sophisticated or 'impact-aligned' investors are concerned with the total social output or the aggregate externality level. They invest in firms that would not attract capital from financially motivated investors. The willingness to pay to subsidize such firms is efficient in that it creates social value.

Moisson (2022) also investigates the implications of investors' degree of sophistication. In his model, sophistication reflects investors' capacity to assess the consequences of their investment choices on the common good—and anticipate the investment choices of other investors of similar type. Within that framework, socially-minded investors can be naïve consequentialists concerned with the direct impact of their investment choices or investors concerned with the aggregate externality level. Under direct consequentialism, a higher level of sophistication generates a lower perceived induced externality and higher equilibrium levels of pollution.

Do socially motivated institutional investors behave like "values-aligned" or "impact-aligned" investors? The results in Green and Roth (2021) suggest that socially minded investors could achieve higher impact and financial returns if they shift capital to firms that require a subsidy to be viable. The empirical evidence they provide demonstrates that the portfolio allocation decisions of sustainable mutual funds are consistent with values alignment. Sustainable mutual funds do not appear to invest in less profitable firms that would not have attracted capital from financially minded investors. Whether other institutional investors display similar investment patterns or whether they take into consideration the ability of firms to raise capital from investors with no ESG concerns remains an avenue for future research. Understanding investment patterns in private markets in particular is relevant for evaluating social impact and exploring displacement effects and the financing of deals that do not attract socially neutral capital.

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## 5 | CONCLUSION

Climate change and sustainability will remain defining issues for our society. Understanding the role of investor capital in fueling the transition to a sustainable economy has attracted the efforts of an increasing number of financial economists over the past years. A lot has already been achieved in modeling investor preferences for sustainability and understanding how these preferences drive investment choices and impact firm financial performance as well as firm behavior and production decisions.

Theoretical studies offering frameworks for modeling ESG investor preferences have so far primarily considered ESG investors as a homogenous group. Socially responsible investors, however, may differ in their preferences along different aspects of sustainability, for example, along environmental, governance or social dimensions, or they may have heterogeneous priors and differ in their beliefs about the sustainability performance of a firm along these dimensions. Given the documented divergence in how firms fare across different aspects of sustainability, exploring the implications of such heterogeneity in preferences or beliefs on the investment choices of economic agents is a promising avenue for future research.

To enable empirically well-grounded models of investor beliefs, research should advance towards measuring investors' subjective perceptions of firms' sustainability performance and their expectations about future cash flows relative to firms' ESG standing. A step in that direction is the retail investor survey on ESG beliefs and perceptions by Giglio et al. (2023) eliciting investors' long-run expectations about the return from ESG investing. Investors' beliefs about higher order moments are also highly relevant for understanding the asset pricing implications of ESG investing. Collecting data on beliefs about risk or investor perceptions about downside tail events in relation to firms' sustainability standing would bring further progress. In addition, gathering beliefs data in private markets is particularly interesting, as the lack of transparent information relative to public markets leaves much more room for subjective judgments. Further, empirical work towards unveiling the dynamics of beliefs about firms' ESG performance would be especially important, as theoretical studies have established that ESG preference shocks are a relevant risk source (Avramov, Cheng et al., 2021).

Another important issue is whether ESG investors are misinformed and whether they do act on inaccurate expectations rather than tastes for sustainability. Previous studies have argued that the behavior of ESG investors is closely related to that of misinformed ones (Fama & French, 2007). Agents with inferior forecasts face either the prospect of being driven out of the market by agents with correct beliefs and have their price impact destroyed, or they survive by improving their forecasts through learning. Arguably, one could apply this market selection hypothesis in the context of sustainable investing. Investors' heterogenous beliefs about the probability distribution of future payoffs conditioned on sustainability performance could have relevant implications for the long-term survival of ESG investors. However, while the price effects of erroneous beliefs and disagreement are temporary under the assumption that investors learn, investor tastes for sustainable assets are not similarly likely to disappear due to learning. In addition, the conditions for price impact and for survival are not the same in general (Kogan et al., 2017). It can be that investors who see their market share disappearing still provide risk-sharing opportunities for the dominant type of (well-informed) investors, therefore maintaining price impact. Future research would establish whether this mechanism remains relevant in the context of ESG investing.

Stated beliefs may diverge from actual investor allocations decisions. Investors may claim their investment choices are guided by considerations for sustainability, but their portfolios might not reflect these claims (Heeb et al., 2023). Exploring the actual behavior of economic agents and

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eliciting their truthful preferences is central for understanding what drives economic decisions and why investors may be willing to sacrifice financial returns to increase social welfare. The field surveys explored in Bauer et al. (2021) shed light on the willingness of pension fund investors to support engagement in sustainable actions in portfolio companies. Further studies should explore the integration of individual investors' social preferences in delegated portfolio decisions. More broadly, however, it remains an open question whether individual investors are motivated by the prospect of achieving societal impact or simply by warm glow (Andreoni, 1989, 1990). Future research should be directed towards investigating those issues. In addition, further empirical work should cast more light on disentangling the implications on companies' practices of investors' choices driven by exclusionary screening and those guided by engagement motives. Theoretical work by Oehmke and Opp (2022) and Green and Roth (2021) indicates that impact is achieved if investors take in consideration the acrions of other market participants. Future empirical studies should investigate whether green capital indeed flows to underfunded companies implementing or targeting the implementation of sustainable processes that would not have otherwise attracted funding from financially-motivated investors.

The ability of investors to correctly identify green firms has implications on the allocation of capital in the economy towards sustainable practices. ESG ratings are largely inconsistent across sustainability rating providers. Such uncertainty over the ESG profile of investments is priced (Avramov, Cheng et al., 2021). If reflected in the portfolio decisions of agents, ESG uncertainty leads to an ESG-alpha relationship that can be nonlinear and ambiguous. Apart from asset pricing implications, the extent that such uncertainty is reduced as economic agents uncover the true ESG profile of firms may have important societal implications, mitigating the cost of uncertainty and decreasing the cost of equity for green firms. Investigating the implications of the demand for hedging against ESG-related uncertainty on higher-order moments of asset returns is an important avenue for future research.

While investors show a preference for sustainability and are willing to forgo returns to create societal impact, they are faced with the problem of greenwashing which impedes effective reallocating capital from brown assets to truly green investments. Future research should focus on ways to effectively detect greenwashing and on the design of an effective mechanism to penalize firms or funds that engage in greenwashing. Studies in that direction would inform policy decision makers on the effectiveness of ESG-focused regulations such as the proposed amendment to the unfair commercial practices directives (UCPD) and the consumer rights directive by the European Commission (or SFDR article 8 and 9) to curb greenwashing.

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## DATA AVAILABILITY STATEMENT

n/a

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