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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 and also 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 than their non-ESG counterparts. However, at the short run, ESG investment can outperform non-ESG investment through various channels. Empirically, results of ESG outperformance are mixed. We find consensus in the literature that some investors have ESG preference and that their actions can generate positive social impact. 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, Social, Governance, ESG, Performance, Sustainability, Social Impact, Greenwashing

I. 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.

The Global Sustainable Investment Review 2020 reports that sustainable investment across major markets (United States, Canada, Japan, Australasia and Europe) has reached USD 35.3 trillion in assets under management (AUM) representing 35.9% of AUM in these regions and having grown by 15% over the previous years. The rise in ESG investing (also referred to Sustainable Investing, Socially Responsible Investing, or Ethical Investing in this study) is matched by the high number of academic publications in this area as researchers try to get a better understanding about the expectations, beliefs and perceptions of ESG investors and the extent to which their resulting actions are able to generate social impact.

From a theoretical standpoint, it can be argued that ESG investments should underperform non-ESG investments. Pastor et al. (2021a) attribute the underperformance of ESG investments to two reasons. First, investors derive non-pecuniary or non-financial benefits from this investment and push the price of green assets up, thereby leading to lower returns. Second, ESG investments can serve as an instrument to hedge against climate risk. Heinkel et al. (2001), Fama and French (2007), Pastor et al. (2021a), Pedersen et al. (2021), Avramov et al. (2021a, 2021b), and Berk and van Binsbergen (2021) show in a static or one period equilibrium model that ESG investors underperform non-ESG investors. However, the dynamic equilibrium model of Avramov et al. (2021b), shows that the positive shock to the ESG demand and supply factors can lead to outperformance of ESG investments. Pastor et al. (2021a) and Pedersen et al. (2021) in their static model also provide argument for the short-run

outperformance of ESG investments. Pastor et al. (2021a) explains the outperformance of ESG investments through two channels: consumers' channel and investors' channel, i.e., a positive shift in investors and/or consumers' taste can lead to outperformance. Pedersen et al. (2021) explain that outperformance of ESG investments is conditioned on the presence of what type of investors is prevalent in the market. In a market where there is high presence of ESG motivated investors, they drive up the price of the ESG investments thereby leading to a lower expected return.

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 or are perceived as means to make social impact. Others might see it as an exploitative way to obtain funds from the investors which could potentially explain the reason for greenwashing. This general perceptions, beliefs and expectations of ESG investments as a way to generate superior performance and societal impact or real economy impact can be summarized into three competing hypothesis: (a) doing well by doing good, i.e., investors obtain superior performance through ESG investment, (b) doing poorly by doing good, i.e., investors obtain inferior performance through ESG investment, and (c) doing neutral by doing good, i.e., investors obtain neutral performance or no performance benefit through ESG investment.

In this study, we review the recent literature on ESG investing to understand the perceptions, beliefs and expectations in relation to the reality and empirical facts of ESG investments. Our main empirical finding on ESG investment outperformance offers mixed evidence and, thus, we are not able to provide a final judgment on ESG investment performance. We observe that investors have various social preferences and they are willing to forgo financial return for social impact. We also find that their actions such as ESG engagement generate social impact. We note that when considering the activities and performance of ESG investors, it is more insightful to differentiate between retail and institutional investors.

We also provide an empirical analysis on the current state of ESG investment using data on U.S. open-ended funds obtained from Morningstar, covering the period from 2018 to 2021. The aim of our analysis is to investigate the performance of ESG funds during a period with increased preference for sustainability as well as during a period with a negative shock to the economy, i.e., the Covid pandemic. We hypothesize that ESG investments should outperform since it serves as a hedge against downside risk. We find that highly rated sustainable funds have better performance ratings, lower return volatility, lower expenses, lower turnover ratio, and lower management fees. US open ended mutual funds underperform

significantly in 2019 and 2020 in terms of the 12-month Carhart (1997) four-factor alpha performance irrespectively of the sustainability ratings but high sustainable funds slightly outperform low sustainable funds over this period. We also find that institutional investors behave differently than retail investors during these periods. In 2019 and 2020, institutional investors pulled out cash from low sustainable funds and poured cash into high sustainable funds, while retail investors pulled out cash from both low and high sustainable funds though most cash was pulled out from the low sustainable funds. In 2021, institutional investors poured cash into both low and high sustainable funds but more cash into high sustainable funds. However, for retail investors, they pulled out cash from low sustainable and pour into high sustainable funds.

This paper is organized as follows: In Section 2, we discuss the investors preferences towards ESG investment. In Section 3, we provide empirical evidence on ESG investments and discuss its current state of ESG. In Section 4, we highlight the fundamental challenges of ESG investment and conclude.

II. Investor Preferences for Sustainability

To incorporate investor preferences for sustainable investing, theoretical models typically treat green assets as consumption goods (see Heinkel et al., 2001; Fama and French, 2007; Pastor et al., 2021a; Pedersen et al., 2021; Avramov et al., 2021a, 2021b; Berk and van Binsbergen, 2021). In these models, investors have tastes for green assets that are unrelated to their returns or derive utility or non-pecuniary benefits from holding green 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 investment itself.

Such non-pecuniary benefits from investing in green assets could vary with the state of the economy, giving rise to models that incorporate dynamics in ESG demand and supply. Investor preference specifications would thus allow for preference shocks for sustainable investing, in line with asset pricing models with demand shocks (see Wurgler and Zhuravskaya, 2002; Albuquerque et al., 2014; Koijen and Yogo, 2019).

In standard asset pricing models such as the Capital Asset Pricing Model (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. 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 as well in the large degree of disparity that exists across ESG ratings of firms issued by different data providers, as documented by Berg et al. (2020) and Gibson et al. (2021b). As ESG ratings are instrumental in shaping the investment decisions of institutional and retail investors, the conflicting signals they get on the true ESG profile of a firm can have tangible implications on the expected returns of that firm.

One channel through which the ESG profile of a firm can affect asset prices is through investor tastes. Heinkel et al. (2001) examine two types of investors – green investors who hold strictly green firms and neutral investors who are indifferent towards the greenness of firms. They show that green investors underperform neutral investors and attribute the underperformance to the lack of risk sharing among neutral investors. However, Heinkel et al. (2001) argue that an increase in the number of green investors can generate positive social impact where the brown firms are induced to become green because of the low cost of capital.

Starting from the premise of the CAPM model, Fama and French (2007) provide a simple framework to understand the asset pricing implications of investors' tastes for green assets. Their framework follows models of investor disagreement, where investors disagree over the probability distributions of future payoffs. If disagreement is the only deviation from the CAPM assumptions, deviations from CAPM pricing can be appreciated through alphas. In the presence of investors with misinformed beliefs, the portfolios of informed investors generate positive alphas contrary to the portfolio choice implications for misinformed investors who generate negative alphas. Fama and French (2007) argue that the asset pricing effects produced by disagreement when some investors trade based on misinformed beliefs are similar to those that arise when investors have tastes for assets that do not depend on their returns (socially responsible investing being one such example). ESG investors choices thus mirror those of misinformed investors and earn negative alphas.

In the model of Pastor et al. (2021a), ESG investors generate low expected returns compared to non-ESG investors. These investors have tastes for sustainable assets and derive utility from holding them, as in Fama and French (2007). In addition, their expected underperformance is also driven by the assumption that green assets 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 CAPM 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). In addition to preferences for green assets, investor's utility incorporates climate considerations: investors dislike unanticipated deteriorations in climate. The resulting asset pricing implications – higher expected returns from 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, Baker et al. (2020) 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.

Pedersen et al. (2021) analyze the ESG-return relationship within a mean-variance setup, where the solution to the investor's portfolio problem is characterized by an ESG-efficient frontier. To generate the frontier, one needs three types of investors – ESG-unaware (standard mean-variance optimizers who ignore information contained in ESG scores), ESG-aware (who use ESG scores to update their views on expected returns and variances), and ESG-motivated investors (who have preferences for high ESG scores in addition to mean-variance preferences). Pedersen et al. (2021) find an ESG frontier that 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.

In addition, the size of the ESG industry or the fraction of ESG investors in the economy can have an effect on the performance of ESG investments. Pastor et al. (2021a) 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 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 in addition 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.

Investors can be faced by a certain degree of uncertainty, however, about whether a firm is sustainable or not. There currently exist no harmonized ESG disclosures or standardized measures of the actual ESG performance of firms, while rating agencies diverge substantially in the ESG ratings they publish (see Chatterji et al., 2016; Berg et al., 2022; Gibson et al., 2021b; Christensen et al., 2022). The mixed signals that investors 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 et al. (2021a) 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.

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 as well. 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. (2021a) 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.

Given such a mechanism for impacting firms' investment decisions, the exclusionary screening criteria applied by (institutional) investors would seem 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 the 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, i.e., exercising the rights of control to change firms' policies, would be a more effective strategy to achieve a shift to greener firms.

The models discussed so far, are all cast in a single-period static setting. A dynamic equilibrium model that accommodates shocks to investor preferences for ESG can rationalize an 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. In addition, the dynamic shifts in investor interest towards sustainable investment opportunities that we have witnessed over the past years warrants the accommodation of preference shocks when modelling investor behavior and choices. For example, Bansal et al. (2022) shift the focus towards 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 et al. (2021b) provide asset pricing implications of 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) can be reflected in a negative ESG-alpha relationship, as obtained in static models. On the other hand, the convenience yield is not fixed but can vary with ESG supply and demand. Avramov et al. (2021b) conclude that 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 et al. (2021b) and the two-period economy models of Pastor et al. (2021a) provide theoretical arguments for the possibility of ESG investment outperformance in terms of realized returns. ESG demand factors play in their models a key role. A positive shock to investor ESG preferences in the Avramov et al. (2021b) 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. (2021a), 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.

The implications of ESG disagreement or uncertainty on the expected performance of ESG investments documented in Berg et al. (2020) and Avramov et al. (2021a) 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 and 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 they learn about the distribution of the future payoffs, and they adjust accordingly? Sandroni (2000), Blume and Easley (2006), and Yan (2008) examine time separable preferences and provide evidence in support of the market selection hypothesis. Borovička (2010) examines the hypothesis under recursive preference 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.

There is broad consensus in the recent literature that responsible investors are willing to pay for sustainable investment. However, there is disagreement on whether the investors' willingness to pay scales with the level of impact. Brodback et al. (2020), Barber et al. (2021), and Bonnefon et al. (2022) show that responsible investors care about the magnitude of impact. Contrary to these findings, Heeb et al. (2022) show that while dedicated responsible investors are willing to pay for sustainable investment, they are not willing to pay more for impact, i.e., responsible investors' willingness to pay does not scale with the level of impact. Bauer et al. (2021) show that pension fund members are willing to forgo financial returns to increase the focus on sustainable investments. Investors on municipal securities markets however are not willing to forgo wealth for societal benefits, as documented in Larcker and Watts (2020).

Heeb et al. (2022) also show that the willingness to pay for sustainable investments is driven by an emotional rather than a calculative valuation of impact. They 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) findings also suggest that emotions may also drive investors' valuation of sustainable investments. Brodback et al. (2020) 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. (2020) show that, on average, investors have a preference for "climate-friendly" funds and find that there is a "green shift" in the investment community. Baker et al. (2018) find that investors in 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 issue. Bolton et al. (2020) evaluate the ideology of institutional investors in terms of whether they are money conscious or 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 leaned towards 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.

III. Sustainability and Investment Performance

In this section, we review the recent empirical literature on whether investors can "do well by doing good", i.e., whether investors can earn superior returns by investing in sustainability, and whether sustainable or ESG investments can generate positive social impact.

At the firm level, Hong and Kacperczyk (2009), Baker et. al. (2018), Zerbib (2019), Hsu et al. (2020), and Bolton and Kacperczyk (2021) show that green firms underperform relative to brown firms. Gompers et al. (2003), Derwall et al. (2004), Bebchuk et al. (2009), In et al. (2019), and Pastor et al. (2021b) document a positive relationship between a firm's ESG profile and its equity returns, while Aswani et al. (2022) find no significant relationship. The meta-study of Atz et al. (2021) finds 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 the corporate sustainability into an environmental, social and governance component to understand the empirical evidence on ESG-performance relationship, there is overwhelming and robust evidence that better governance is associated with better financial performance and higher firm value (see Core et al., 1999; La Porta et al., 2002; Gompers et al., 2003; Bebchuk et al., 2009; Ammann et al., 2011; Bebchuk et al., 2013). The environmental and social components which are reflecting 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 Margolis et al., 2011, or Ferrell et al., 2016).

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. Finally, Atz et al. (2021) note that 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, physical risk, transition risk or litigation risk heightened by social norms (see Hong and Kacperczyk, 2009; Hsu et al., 2020; Bolton et al., 2021). 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. Baker et al. (2020) find 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 preference for sustainable investments and derive non-pecuniary utility from holding green assets, they are 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 ESG 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, offsetting the negative ESG-expected return relationship (Avramov et al., 2021b). 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. Avramov et al. (2021a) show that ESG uncertainty can also change the ESG-performance relation, as such corroborating the arguments put forward in Atz et al. (2021).

Empirical studies reach largely opposing conclusions on the relationship between ESG performance and investment returns. Focusing on a specific aspect of the ESG profile of a firm – its carbon emissions – In et al. (2019), Hsu et al. (2020), Bolton and Kacperczyk (2021) and Aswani et al. (2022) document diverging findings. Based on a sample of publicly traded U.S.

firms, Hsu et al. (2020) 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. (2022), 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, Amman 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 Amman 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 vs. 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. (2021) show that a substantial fraction of hedge funds that are signatories to the UN PRI engage in greenwashing. 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. (2021) relate the evidence of greenwashing and underperformance to agency problems.

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. (2020) find that low-carbon funds are likely to have lower exposure to future potential realizations of 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. (2021) 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. (2020) 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.

We note that 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.

ESG investments may not necessarily result in higher returns, but they may generate positive social impact. To investigate this potential for social impact, Naaraayanan et al. (2020) examine the real effect of environmental activist investing on the 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. Dyck et al. (2019) show that investors who are signatories to the UN PRI generate higher impact on firm' environmental and social performance than the average investor. Gibson et al. (2021a) connect the commitment of the responsible institutional investors to their action and performance. 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. (2021) 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.

We further examine the effectiveness of divestment vs. engagement ESG strategies in bringing forward societal change or having real impact in the economy. Shareholders may 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.

There is evidence that ESG engagement reduces firms’ downside risk (Hoepner et al., 2021). Divestment strategies have been shown to have relatively small stock price effects around the announcement date and insignificant after the announcement date (Nguyen et al., 2020). In addition, 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). In line with this evidence, Krueger et al. (2019) 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.

Dimson et al. (2020) find that a two-tier engagement strategy, combining 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. (2019) 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 aim at value maximization, but they could similarly be motivated by non-pecuniary outcomes, sometimes harming shareholder value (Krueger, 2015). He et al. (2020) focus on the differences in incentives among 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.

Institutional investors are deemed to be more sophisticated and have access to more or superior information than retail investors. Retail investors predominantly react to simple signals such as past return measures in their investment decisions (see Del Guercio and Tkac, 2002; Evans and Fahlenbrach, 2012; Salganik-Shoshan, 2016). Households seem to act as simple decision-makers and invest using readily available information. Performance chasing behavior rather than learning about managerial skill explains aggregate flows to mutual funds (Ben-David et al., 2021).

Against that backdrop, we evaluate the evidence brought forward by recent empirical studies on the performance of institutional versus retail investors and their preference for sustainable investment. Hartzmark and Sussmann (2019) and Amman et al. (2019) show 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 the 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.

Based on a survey about climate risk perceptions, Krueger et al. (2019) 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 long-term institutions rather than passive long-term institutions. Long-term institutional investors are also associated with lower portfolio turnover and have benefited 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., 2020). Glossner (2019) finds that firms held by short-term investors have significantly more ESG incidents as compared to firms held by long-term investors which experience significantly less costly ESG incidents.

Higher institutional ownership (Crane et al., 2019; Dyck et al., 2019; Chen et al., 2020), stronger investors' social norm or strong community belief (Dyck et al., 2019), from EU regional concentration (Crane et al., 2019), longer investor horizon (Glossner, 2019; Kim et al., 2019), and public commitments (Gibson et al., 2021a) 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 the firm environmental and social performance. Glossner (2019) and Kim et al. (2019) find that investors with longer investment horizon improve the firm's ESG performance. Chen et al. (2020) show that an exogenous increase in institutional holding caused by the Russell index reconstitutions improves the portfolio firms' CSR performance.

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. Döttling et al. (2021) show that funds with higher sustainability ratings experienced sharper declines in

retail flows during the pandemic. They indicate that retail investor demand for SRI is highly sensitive to income shocks. Concerning the performance of ESG funds that mostly attract retail investor flows, Pastor and Vorsatz (2020) document significant underperformance of such funds relative to their benchmark.

We note that disagreement of ESG ratings among ESG raters is a fundamental challenge facing ESG investment. Gibson et al. (2021b) study the impact of ESG rating disagreement on stock returns. They find that, for environmental rating, there is a positive relationship between rating disagreement and stock return, while for social and governance rating, there is a negative relationship between rating disagreement and stock return. The social and governance rating disagreement is driven by mispricing and the rating providers' location in civil or common law jurisdictions.

There is overall consensus in the literature that investors value sustainability. Focusing on mutual funds, Hartzmark and Sussman (2019) establish that investor demand for funds varies as a function of their sustainability rating. Following the introduction of the Morningstar sustainability ratings in 2016, highly rated funds along the sustainability dimension succeeded in attracting significantly more capital inflows than their non-ESG counterparts. That empirical fact stands in contrast to the lack of conclusive evidence that mutual funds with a high ESG rating outperform their peers that rank lower on that dimension (Ammann et al., 2019; Hartzmark and Sussmann, 2019; Pastor and Vorsatz, 2020) or that fund flows chase performance (Chevalier and Ellison, 1997; Sialm et al., 2015).

Active equity mutual funds are known to generally underperform relative to their stated benchmarks, net of fees. The puzzle of the existence of the large and underperforming industry is often approached by considering state dependent mutual fund returns: Active funds tend to outperform passive benchmarks in crisis periods (and thus serve as hedge against recessions). Pastor and Vosatz (2020) challenge this view. Contrary to the hypothesis of state-dependent returns and its prior tests in the literature, active mutual funds are found to underperform their passive benchmarks during the Covid19 crisis (Pastor and Vosatz, 2020). However, funds that are seen by investors as highly-rated in terms of sustainability, tend to do well – or at least better – during such times relative to peers with poor ratings. Investor flows to highly rated sustainable funds also dominate the outflows from low-rated funds.

Given that evidence, in the following we analyze whether the ESG-flow relationship is differentiated according to investor composition – retail or institutional – for U.S. mutual funds

since 2019.[1] We obtain monthly returns, monthly total net assets, monthly net asset value per share, turnover and expenses ratios, management fees, and a retail fund indicator from the CRSP Survivor-Bias-Free Mutual Fund Database. We merge the data with the Morningstar sustainability and performance rating from the Morningstar Direct Database. We exclude from the sample all observations with missing turnover, expenses, and management fees. As in Ammann et al. (2019), we also focus on the U.S. open ended mutual funds, but we do not eliminate balanced, bond, index, international and sector funds. Therefore, we consider all U.S. open ended mutual funds with a sustainability rating from Morningstar. Also, we exclude all funds that are not assigned to the Morningstar Global categories, funds that are closed to investors, and that have total net assets below $1 million. We consider each share class of a fund to be a distinct fund. We compute the relative net flows, 12-month Carhart (1997) four-factor alphas, and the 12-month volatility following Ammann et al. (2019). All our variables excluding performance rating, fund age, relative share classes, and number of observations are winsorized at the 1% and 99% level, respectively, to mitigate the effect of outliers.

Table 1 provides the mean fund characteristics sorted by sustainability ratings. In line with Ammann et al. (2019), we find that highly rated sustainable funds have better performance ratings, lower return volatility, lower expenses, lower turnover ratio, and lower management fees. We note that factor-adjusted alphas are negative throughout the period, ranging between -18% annualized in 2021 to -0.9% in 2019. The negative risk-adjusted returns that we document echo the findings in Pastor and Vosatz (2020) that highlight the underperformance of active mutual funds during the Covid19 crisis. Our sample covers both active and passive funds. We note that the underperformance in 2019 that we document is even larger in magnitude for the overall sample than during the first year of the pandemic.

< Please insert Table 1 about here >

To investigate the performance differential between mutual funds based on their sustainability ratings, we form each year a long-short portfolio of funds with the highest/lowest sustainability rating as of the end of the previous year. Table 1 indicates that funds with a high sustainability rating outperform on a risk-adjusted basis their low-rated peers during the 2020-2021 period, while they underperform slightly in 2019. A long-short portfolio of funds based

[1]Morningstar changed the methodology behind their sustainability ratings in October 2018. To retain consistency, we consider ratings starting from December 2018.

on sustainability ratings earns a significant alpha of 0.13% in 2020 and 0.24% in 2021. In 2020, the performance differential along sustainability scores of retail and institutional funds is of very similar order of magnitude, whereas in 2021, a long-short portfolio based on sustainability ratings of retail funds earns a monthly alpha of 0.29% vs. 0.20% for institutional funds. In 2019, the long-short portfolio earns an alpha of -0.05%, mainly driven by institutional fund underperformance, and the alpha becomes indistinguishable from zero for retail funds. Results are reported in Tables 2 and 3.

< Please insert Table 2 about here >

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We also note that institutional and retail funds differ along another dimension. While highly rated ESG funds attract more investor flows then funds that rank low on sustainability overall, funds flow towards sustainable institutional funds are positive, while retail funds generally register negative net flows.

The results we document confirm the outperformance of sustainable funds found in Ammann et al. (2019), albeit only for the two years of the Covid19 crisis. Our evidence suggests that this outperformance is not consistent over time. Our findings corroborate the evidence in Pastor and Vosatz (2020) that sustainable funds outperform in times of crisis. It is also consistent with the stock-level result in Albuquerque et al. (2020) who document comparatively high stock returns of U.S. companies with high environmental and social ratings in the first quarter of 2020. In addition, the evidence we document suggests that institutional highly rated ESG funds may not necessarily have an edge relative to retail funds.

The time-varying nature of the relationship between sustainability ratings and future realized fund returns that we document hinges as well on the extent to which the composition of the different quintiles of funds according to their ESG rating varies over time. To appreciate the variability of fund ESG ratings, we report rating transition probabilities for the funds in our sample over the past three years in Table 4.

< Please insert Table 4 about here >

In 2019, about a third of the funds in the extreme rating categories maintain their rating, rising to almost a half for the median rating category. A third of these funds get upgraded or

downgraded by a notch, while as much as a quarter move by two notches. This is in stark contrast to the transition matrices observed in 2020 and 2021. Over this latter period, funds appear to be more likely to remain in their current rating category – more than 60% of funds remain in their rating category in 2020, and between 50% and 70% in 2021. Only about 5% see themselves downgraded by two notches from the highest rating, while between 7% and 14% are upgraded by the same amount from the lowest ESG rating category. While the time period is fairly limited for drawing more general conclusions, our results are suggestive of ESG ratings becoming less volatile over time. Convergence of ESG ratings may point towards ratings revealing more closely the true ESG profile of firms – a question that we leave for future research.

4 Conclusion

We review the seminal ESG literature to provide insights into investors' beliefs, expectations, and perceptions of ESG investment to generate superior performance and create a real societal impact. There is agreement in literature that investors show a preference for sustainability meaning that they are willing to sacrifice returns to invest in sustainable or green assets. To put it differently, they are willing to forgo returns to create societal impact. The empirical evidence on the superior performance of ESG investment is mixed. But there is empirical evidence suggesting that ESG engagement rather than divestment can create a positive real societal impact. We leverage the Morningstar sustainability ratings of funds to gain an understanding of the persistence of investor preference for sustainability and to understand the performance of ESG investment during a bad state of nature induced by the Covid-19 exogenous shock. We document that highly rated sustainable funds outperform lowly rated sustainable funds during the crisis period which might suggest that ESG investment serves as a hedge against downside risk. In addition, retail funds rather than institutional funds appear to capture to a greater extent the outperformance of ESG investments over the past few years.

We further investigate the channels that could explain the asset pricing implications of investor preferences for sustainability. Under the generally employed assumption in recent studies that some investors have preference for green assets and derive non-monetary benefits from holding them, the expected ESG-performance relationship is negative. This relationship can be viewed through the lens of a convenience yield effect that reflects agents' willingness

to accept a lower risk premium when holding green assets. To explain the mixed empirical evidence that studies document, we identify the following propositions.

First, a shift in the ESG-performance relationship can occur as a result of unexpected strengthening of the ESG concerns of economic agents (customers shifting demand towards greener products, investors changing their preferences for greener holdings). Under such a hypothesis, Pastor et al. (2021a) obtain that green assets can perform better than expected relative to brown assets. News about ESG concerns are reflected in high unexpected returns of green assets. Thus, a high unanticipated component of green stock returns may prevail over the negative hedging premium, resulting from green stocks being better hedges against adverse ESG shocks compared to brown stocks. In terms of realized returns, the outperformance of green stocks over brown stocks documented over the last decade can then be attributed to unexpectedly strong increases in ESG concerns, as established in Pastor et al. (2021b).

Second, ESG ratings are largely inconsistent across sustainability rating providers. Treating them as deterministic may have implications for the ESG-performance relationship, as such uncertainty over the ESG profile of investments can be priced. Avramov et al. (2021a) find that ESG rating uncertainty distorts the ESG-alpha relationship. Allowing for such uncertainty to be reflected in the portfolio decisions of agents 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.

Third, dynamic asset pricing models can reconcile a positive ESG-expected return relation. The convenience yield reflecting agents' willingness to compromise on a lower risk premium for holding green assets can vary dynamically with ESG demand and supply. In such a dynamic setting, Avramov et al. (2021b) establish that as the market becomes greener, brown-averse agents become more sensitive to ESG demand and supply shocks, requiring a higher risk premium for holding the market. Green assets are associated with a positive premium, whereas brown assets command a negative premium, leading to an ESG-expected return relationship that can vary dynamically over time.

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Table 1: Fund Characteristics across Sustainability Rating Categories.

The table reports average fund performance and other characteristics of U.S. open-ended mutual funds over the period 2019–2021 at share class level. Each year, funds are sorted into equally weighted portfolios according to their Morningstar sustainability ratings observed at the end of the previous year. Average characteristics per sustainability rating category are reported for the current year. Relative net flow is calculated based on total net assets (TNA) and monthly returns over 12 months as $[TNA_t - (1 + R_t) * TNA_{t-1}]/TNA_{t-1}$ following Sirri and Tufano (1998). Carhart (1997) four-factor alphas are calculated using monthly returns over a 12-months period, and return volatility is obtained as the standard deviation of monthly returns over the prior 12 months. For each rating category, the table also reports average monthly returns, Morningstar performance ratings, total net assets, net asset value (NAV) per share, fund age (in years). We also report average characteristics for a long-short portfolio consisting of funds with high, respectively low sustainability category. Annual averages for the overall sample are given in the last column. * ,**, and *** indicate significance at the 10%, 5,% and 1% level, respectively. CRSP does not provide data on turnover ratios, expenses ratios and management fees for 2021 and therefore we exclude them for 2021.

	Sustainability Rating							
	Low	**Below Average**	**Average**	**Above Average**	**High**	**High – Low**		**Overall**
Panel A: Average fund characteristics for 2019								
Relative Net Flow (%)	-0.51%	-0.39%	-0.43%	-0.44%	-0.32%	0.20%	**	-0.42%
Monthly Return (%)	1.69%	1.84%	1.96%	2.00%	2.00%	0.31%	***	1.91%
Performance rating	2.96	3.23	3.16	3.16	3.21	0.21	***	3.17
12-mth alpha (%)	-17.98%	-17.99%	-17.95%	-18.06%	-18.02%	-0.05%	**	-17.99%
12-mth volatility (%)	4.63%	4.57%	4.86%	4.89%	4.73%	0.11%	***	4.75%
Total net assets ($m)	551.23	738.65	626.62	798.33	645.09	99.12	***	688.18
NAV per share ($)	21.66	21.33	22.06	23.93	22.32	0.81	***	22.21
Fund age	13.71	13.32	13.54	13.91	13.83	0.16		13.59
Turnover ratio (%)	116.76%	69.06%	65.52%	54.15%	50.22%	-67.46%	***	68.08%
Expenses ratio (%)	1.15%	0.98%	1.05%	1.06%	1.09%	-0.06%	***	1.05%
Management fees	0.63	0.49	0.56	0.59	0.62	-0.01	**	0.56
Retail share classes (%)	51.49%	46.07%	47.05%	45.55%	47.44%	-2.87%	***	46.92%
Nb of Observations	11,981	35,557	41,070	25,134	9,129			122,871

Table 1 – *Continued*

	Sustainability Rating							
	Low	**Below Average**	**Average**	**Above Average**	**High**	**High – Low**		**Overall**
Panel B: Average fund characteristics for 2020								
Relative Net Flow (%)	-0.50%	-0.59%	-0.65%	-0.18%	0.35%	0.73%	***	-0.46%
Monthly Return (%)	1.52%	1.47%	1.58%	1.79%	1.99%	0.42%	***	1.62%
Performance rating	2.87	3.18	3.20	3.30	3.34	0.50	***	3.20
12-mth alpha (%)	-12.70%	-12.72%	-12.74%	-12.68%	-12.53%	0.13%	***	-12.70%
12-mth volatility (%)	6.36%	6.24%	6.28%	6.14%	6.27%	-0.17%	***	6.25%
Total net assets ($m)	668.92	774.00	716.16	566.00	526.06	-101.79	***	684.18
NAV per share ($)	19.95	21.60	23.83	23.92	24.43	4.76	***	22.98
Fund age	13.97	13.33	14.16	13.77	12.93	-0.92	***	13.76
Turnover ratio (%)	126.60%	63.77%	70.13%	61.37%	44.63%	-84.09%	***	69.49%
Expenses ratio (%)	1.06%	0.95%	0.98%	1.04%	1.08%	0.02%	**	1.00%
Management fees	0.58	0.49	0.54	0.59	0.61	0.02	**	0.55
Retail share classes (%)	48.33%	43.43%	43.04%	46.58%	47.03%	-0.65%		44.57%
Nb of Observations	8,806	28,941	41,083	22,075	7,402			108,307
Panel C: Average fund characteristics for 2021								
Relative Net Flow (%)	0.25%	-0.12%	-0.10%	0.03%	0.35%	0.10%		-0.02%
Monthly Return (%)	1.24%	1.31%	1.36%	1.28%	1.27%	0.03%		1.32%
Performance rating	2.96	3.00	3.22	3.32	3.27	0.31	***	3.17
12-mth alpha (%)	-0.94%	-0.94%	-0.88%	-0.76%	-0.70%	0.24%	***	-0.86%
12-mth volatility (%)	5.22%	4.61%	4.58%	4.55%	4.53%	-0.70%	***	4.63%
Total net assets ($m)	644.06	985.58	835.28	638.92	671.64	27.75		806.04
NAV per share ($)	25.58	26.95	27.67	28.81	29.98	4.40	***	27.71
Fund age	13.92	13.82	14.27	14.58	13.30	-0.62	***	14.14
Retail share classes (%)	47.03%	43.17%	40.93%	44.97%	46.61%	-0.42%		43.16%
Nb of Observations	11,072	35,395	57,458	30,162	8,932			143,019

Table 2: Institutional Fund Characteristics.

The table reports average fund performance and other characteristics of U.S. institutional mutual funds over the period 2019–2021 at share class level. Only share classes explicitly marked as institutional based on the CRSP variable INST_FUND are considered. All variable definitions and output follow from Table 1.

	Sustainability Rating							
	Low	Below Average	Average	Above Average	High	High – Low		Overall
Panel A: Average fund characteristics for 2019								
Relative Net Flow (%)	-0.04%	-0.01%	-0.01%	-0.11%	0.16%	0.24%	**	-0.02%
Monthly Return (%)	1.70%	1.85%	1.97%	1.98%	2.03%	0.33%	***	1.92%
Performance rating	3.20	3.41	3.30	3.31	3.37	0.13	***	3.33
12-mth alpha (%)	-17.93%	-17.98%	-17.94%	-18.07%	-18.01%	-0.09%	***	-17.98%
12-mth volatility (%)	4.46%	4.50%	4.82%	4.82%	4.71%	0.25%	***	4.69%
Total net assets ($m)	596.24	689.40	632.08	844.17	688.68	101.96	***	694.41
NAV per share ($)	21.77	20.88	21.93	23.64	22.21	0.65	**	21.99
Fund age	11.15	10.75	11.05	11.19	11.12	-0.11		11.01
Turnover ratio (%)	120.46%	62.39%	63.25%	54.43%	45.36%	-77.36%	***	64.93%
Expenses ratio (%)	0.89%	0.74%	0.81%	0.85%	0.88%	0.00%		0.81%
Management fees	0.58	0.43	0.52	0.55	0.59	0.02	***	0.51
Nb of Observations	5,812	19,176	21,748	13,686	4,798			65,220
Panel B: Average fund characteristics for 2020								
Relative Net Flow (%)	-0.20%	-0.19%	-0.32%	0.31%	0.80%	0.89%	***	-0.08%
Monthly Return (%)	1.53%	1.51%	1.58%	1.80%	2.04%	0.48%	***	1.63%
Performance rating	2.99	3.36	3.30	3.39	3.47	0.51	***	3.32
12-mth alpha (%)	-12.66%	-12.69%	-12.73%	-12.66%	-12.50%	0.13%	*	-12.68%
12-mth volatility (%)	6.24%	6.10%	6.26%	6.10%	6.19%	-0.10%	**	6.18%
Total net assets ($m)	587.02	744.87	740.07	574.58	598.86	30.56		688.05
NAV per share ($)	19.99	20.93	23.55	23.76	23.88	4.26	***	22.63
Fund age	10.92	10.73	11.28	11.08	10.42	-0.86	***	11.01
Turnover ratio (%)	145.64%	58.20%	65.03%	53.87%	44.99%	-104.93%	***	65.78%
Expenses ratio (%)	0.83%	0.72%	0.77%	0.81%	0.87%	0.03%	***	0.77%
Management fees	0.53	0.43	0.50	0.55	0.57	0.01		0.50
Nb of Observations	4,550	16,372	23,399	11,793	3,921			60,035
Panel C: Average fund characteristics for 2021								
Relative Net Flow (%)	0.60%	0.21%	0.15%	0.36%	0.63%	0.02%		0.27%
Monthly Return (%)	1.24%	1.30%	1.37%	1.28%	1.22%	-0.03%		1.32%
Performance rating	3.11	3.14	3.33	3.44	3.38	0.28	***	3.29
12-mth alpha (%)	-0.91%	-0.90%	-0.86%	-0.75%	-0.72%	0.20%	***	-0.84%
12-mth volatility (%)	5.21%	4.51%	4.53%	4.53%	4.40%	-0.83%	***	4.57%
Total net assets ($m)	609.28	985.69	824.47	683.66	849.89	241.07	***	821.58
NAV per share ($)	25.72	26.75	26.97	28.42	29.02	3.32	***	27.24
Fund age	11.41	11.29	11.83	12.01	10.60	-0.81	***	11.63
Nb of Observations	5,865	20,115	33,939	16,599	4,769			81,287

Table 3: Retail Fund Characteristics.

The table reports average fund performance and other characteristics of U.S. retail mutual funds over the period 2019–2021 at share class level. Only share classes explicitly marked as institutional based on the CRSP variable RETAIL_FUND are considered. All variable definitions and output follow from Table 1.

	Sustainability Rating							
	Low	**Below Average**	**Average**	**Above Average**	**High**	**High – Low**		**Overall**
Panel A: Average fund characteristics for 2019								
Relative Net Flow (%)	-0.96%	-0.85%	-0.89%	-0.83%	-0.87%	0.11%		-0.87%
Monthly Return (%)	1.68%	1.83%	1.94%	2.02%	1.96%	0.28%	***	1.90%
Performance rating	2.74	3.02	3.00	2.99	3.02	0.26	***	2.98
12-mth alpha (%)	-18.02%	-18.01%	-17.97%	-18.04%	-18.03%	-0.01%		-18.00%
12-mth volatility (%)	4.78%	4.64%	4.91%	4.97%	4.75%	-0.02%		4.82%
Total net assets ($m)	508.81	796.30	620.47	743.52	596.80	90.95	**	681.14
NAV per share ($)	21.56	21.86	22.20	24.26	22.44	0.98		22.46
Fund age	16.13	16.32	16.35	17.15	16.83	0.75	***	16.51
Turnover ratio (%)	113.27%	76.87%	68.07%	53.80%	55.60%	-57.32%	***	71.64%
Expenses ratio (%)	1.40%	1.26%	1.32%	1.30%	1.33%	-0.07%	***	1.31%
Management fees	0.68	0.57	0.61	0.63	0.64	-0.03	***	0.61
Nb of Observations	6,169	16,381	19,322	11,448	4,331			57,651
Panel B: Average fund characteristics for 2020								
Relative Net Flow (%)	-0.81%	-1.11%	-1.10%	-0.75%	-0.15%	0.54%	***	-0.93%
Monthly Return (%)	1.51%	1.41%	1.58%	1.79%	1.94%	0.35%	**	1.60%
Performance rating	2.73	2.94	3.05	3.20	3.20	0.49	***	3.04
12-mth alpha (%)	-12.74%	-12.76%	-12.75%	-12.71%	-12.56%	0.15%	**	-12.73%
12-mth volatility (%)	6.49%	6.42%	6.31%	6.18%	6.35%	-0.25%	***	6.33%
Total net assets ($m)	756.48	811.95	684.53	556.15	444.06	-253.41	***	679.37
NAV per share ($)	19.90	22.47	24.20	24.10	25.05	5.33	***	23.41
Fund age	17.23	16.71	17.96	16.84	15.76	-0.90	***	17.18
Turnover ratio (%)	106.25%	71.03%	76.86%	69.97%	44.23%	-61.81%	***	74.11%
Expenses ratio (%)	1.31%	1.26%	1.26%	1.30%	1.33%	0.01%		1.28%
Management fees	0.64	0.56	0.61	0.64	0.66	0.03	***	0.61
Nb of Observations	4,256	12,569	17,684	10,282	3,481			48,272
Panel C: Average fund characteristics for 2021								
Relative Net Flow (%)	-0.15%	-0.55%	-0.46%	-0.38%	0.03%	0.18%	*	-0.40%
Monthly Return (%)	1.24%	1.32%	1.35%	1.29%	1.34%	0.11%		1.32%
Performance rating	2.80	2.83	3.07	3.17	3.14	0.34	***	3.01
12-mth alpha (%)	-0.97%	-0.98%	-0.91%	-0.78%	-0.68%	0.29%	***	-0.89%
12-mth volatility (%)	5.23%	4.75%	4.66%	4.58%	4.68%	-0.55%	***	4.71%
Total net assets ($m)	683.24	985.43	850.88	584.17	467.44	-215.81	***	785.59
NAV per share ($)	25.44	27.21	28.68	29.29	31.07	5.63	***	28.34
Fund age	16.74	17.16	17.79	17.72	16.39	-0.34		17.44
Nb of Observations	5,207	15,280	23,519	13,563	4,163			61,732

Table 4: Transition Matrix of Sustainability Ratings.

The table reports observed transition probabilities for Morningstar sustainability ratings observed at the end of the each year for U.S. mutual funds over the period 2018–2021.

	Sustainability Rating				
	Low	**Below Average**	**Average**	**Above Average**	**High**
Panel A: Transition matrix of sustainability ratings from 2018 to 2019					
Low	29.24%	36.43%	23.30%	9.93%	1.09%
Below Average	9.54%	40.01%	38.52%	10.03%	1.90%
Average	4.78%	22.38%	48.65%	20.41%	3.78%
Above Average	1.69%	16.35%	33.48%	35.77%	12.71%
High	1.58%	6.14%	25.25%	35.35%	31.68%
Panel B: Transition matrix of sustainability ratings from 2019 to 2020					
Low	61.82%	28.49%	6.59%	2.03%	1.07%
Below Average	10.77%	59.49%	26.67%	2.99%	0.08%
Average	0.90%	16.11%	68.77%	13.30%	0.92%
Above Average	0.20%	1.44%	28.12%	63.88%	6.36%
High	0.00%	0.00%	4.72%	33.76%	61.52%
Panel C: Transition matrix of sustainability ratings from 2020 to 2021					
Low	50.38%	34.32%	14.61%	0.68%	0.00%
Below Average	6.52%	58.99%	32.18%	2.07%	0.24%
Average	0.46%	15.62%	69.59%	14.11%	0.23%
Above Average	0.24%	2.23%	29.71%	56.50%	11.32%
High	0.00%	1.40%	6.41%	34.57%	57.62%

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