

Revealed Beliefs about Responsible Investing:

Evidence from Mutual Fund Managers *

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Abstract

What do asset managers – a group of presumably sophisticated investors – believe regarding the financial performance of Environmental, Social, and Governance (ESG) investment strategies? We address this question by exploring the relationship between US mutual fund managers’ incentives to deliver high returns and their portfolio ESG performance. Mutual funds with managerial ownership (“skin in the game”) exhibit significantly lower ESG performance than otherwise similar funds. Co-investing managers are less likely to buy high-ESG stocks after exogenous shocks in the flow incentives to hold such assets. Moreover, the negative effect of managerial ownership on portfolio sustainability is stronger for managers paid to maximize assets under management and weaker for managers paid to maximize returns. Overall, the results are contrary to what one would expect if fund managers, on average, considered ESG selection an enhanced form of portfolio management to maximize risk-adjusted returns.

JEL Classification: G11, G23

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1 Introduction

Integrating environmental, social, and governance (ESG) considerations in investment strategies is one of the major trends in the asset management industry. Investment companies expect to incorporate ESG elements into nearly two-thirds of their portfolios within a decade (Index Industry Association, 2022).¹ However, it remains unclear how professional money managers really perceive the practice of selecting investee companies based on ESG criteria and how they expect these strategies to affect financial performance.

Two opposing narratives are hotly debated. Some evidence suggests that ESG integration as an enhanced form of portfolio management allows fund managers to increase long-term financial performance by accounting for material information on emerging risks and opportunities (see, e.g., Renneboog, Ter Horst, and Zhang, 2008; Maxfield and Wang, 2021). Others instead argue that ESG strategies are a way to maximize flows (and hence fees) by satisfying the demand from sustainability-conscious investors, but at the expense of future expected returns. Understanding the relative merits of these competing views can provide insights into the link between sustainable investing and expected returns, particularly given the expertise of professional money managers. However, the task is challenging as it requires uncovering fund managers' genuine beliefs about ESG investing.

This paper employs a revealed beliefs approach to shed light on how fund managers

¹Institutional investors and asset managers state that they consider climate change as a material risk for their portfolios and act accordingly (Krüger, Sautner, and Starks, 2020). Nowadays, many, if not most, asset managers explicitly and publicly embrace ESG integration (e.g., BlackRock, 2022).

perceive ESG investment strategies. We analyze how portfolio selection choices vary with managers’ personal investments in the funds they manage. Previous literature suggests that money managers who tie their wealth to funds—that is, have “skin in the game”—are more likely to invest based on their own utility function and beliefs.² By studying how managerial ownership relates to ESG performance, we attempt to uncover the motivational drivers of ESG practices in the mutual fund industry.

The basic idea of our empirical strategy is straightforward. Suppose managerial ownership increases fund managers’ incentives to deliver higher risk-adjusted portfolio returns. If fund managers, on average, expect ESG strategies to outperform, they will more aggressively tilt their holdings toward high-ESG firms when they have skin in the game relative to when they have not. Thus, we would observe a positive relationship between managerial ownership and portfolio sustainability. Conversely, if fund managers expect ESG strategies to underperform, having skin in the game will incentivize them away from high-ESG assets, creating a negative relationship between managerial ownership and portfolio sustainability.

We base our analyses on a comprehensive dataset of managerial ownership for 1,216 actively managed broadly-diversified U.S. equity mutual funds from January 2015 through December 2020. We focus on funds that follow a well-diversified strategy in which managers are unrestricted in their exposure to ESG factors. (We use funds that commit to following

²For instance, portfolio managers with money at stake in their funds are less likely to hold lottery-like stocks (Agarwal, Jiang, and Wen, 2022), take lower excess risks to attract flows (Ma and Tang, 2019), and are more prone to deliver higher risk-adjusted performance (Khorana, Servaes, and Wedge, 2007; Cremers et al., 2009; Agarwal, Daniel, and Naik, 2009) relative to other managers.

socially responsible investing practices in their prospectuses in a placebo test.) The start of our sample period in 2015 is determined by the availability of our main portfolio sustainability measures, but it is also when ESG strategies started increasing in popularity in the US. Our sample covers a total of 2,537 unique fund managers. For each fund manager, we hand-collect information on managerial ownership in the funds they run from mutual funds' Statements of Additional Information (SAI). 77% of funds in our sample have at least one manager who co-invests personal wealth in the fund, with the average amount of managerial investment being about \$802,000. Our primary measure of fund ESG performance is the peer-adjusted fund's asset-weighted average sustainability score of holdings, computed from sustainability scores measured and disclosed by Morningstar based on Sustainalytics firm-level scores.

Our main finding is that a fund's managerial ownership is associated, on average, with a lower portfolio sustainability performance. This negative relationship holds when controlling for fund, fund family, and manager fixed effects and with alternative measures of managerial ownership and portfolio sustainability. The observed effect is economically sizable. A one-standard-deviation higher USD amount of managerial ownership is associated with a 23% of a one-standard-deviation lower peer-adjusted ESG performance.

Next, to further investigate fund managers' ESG revealed beliefs, we study the effect on portfolio sustainability of changes in managerial ownership. We find that following increases in managerial ownership, managers opt for lower-ESG firms, whereas reductions in managerial ownership are followed by improvements in portfolio sustainability metrics.

Turning to the interpretation, the negative relationship between managerial ownership and portfolio sustainability performance suggests that US fund managers, on average, do not believe ESG selection to be a positive driver of a portfolio’s financial performance. We refer to this as the “Revealed Beliefs” explanation.³ However, other factors may contribute to this observed negative relationship. For instance, managers of low-sustainability funds may be more likely to adopt skin in the game to reassure clients about the fund’s alignment with their interests (“Signalling” explanation). Several pieces of evidence provide further support for the importance of the “Revealed Beliefs” explanation.

First, we exploit exogenous shocks in the flow incentives to have a higher portfolio sustainability performance. Specifically, skin-in-the-game fund managers increased portfolio sustainability less than other managers in reaction to the publication of Morningstar’s Sustainability Globes in March 2016. This result is consistent with the interpretation that managerial ownership decreases the incentives to chase ESG-driven flows without “fundamental” reasons. Relatedly, skin-in-the-game managers shifted their portfolio less toward high-ESG stocks during the Covid-19 financial market turbulence in the first half of 2020.

Second, as our interpretation builds on the role of managerial incentives, differences

³In addition to portfolio investment decisions, an important tool of responsible investing is the engagement with portfolio companies to advance their sustainability practices. Institutional investors can have an important influence in that respect (e.g., Dyck et al., 2019; Azar et al., 2021). Reforming “dirty” firms in a sustainable direction can also be a profitable investment strategy (Gollier and Pouget, 2014). However, individual portfolio managers are not generally able to exert a strong direct influence on firms, implementing ESG investing mostly through portfolio selection (even if it may be less effective in influencing corporate ESG practices, e.g., Heath et al., 2023). Moreover, Lowry, Wang, and Wei (2023) find that, even among high-ESG funds, only those with strong financial incentives directly engage with firms on ESG-related issues.

in fund managers' compensation contracts are also revealing. First, compensation linked to AUM is associated with higher portfolio sustainability, while compensation linked to financial returns is associated with lower portfolio sustainability. In addition, we find that the negative effect of managerial ownership on portfolio sustainability is amplified for managers paid based on AUM and is mitigated for managers paid based on financial performance. These differences confirm the effects of fund managers' incentives on portfolio sustainability.

This paper contributes to three strands of literature. First, it contributes to a better understanding of the financial returns of sustainable investing. Theory suggests that stocks of more sustainable firms should be associated with lower expected returns, given their non-pecuniary and/or risk-management benefits (e.g., Heinkel, Kraus, and Zechner, 2001; Pástor, Stambaugh, and Taylor, 2020). However, this empirical prediction is hard to prove with a traditional "asset prices" approach because, especially on emerging topics, *realized* returns may not be indicative of *expected* returns (Elton, 1999; Pástor, Stambaugh, and Taylor, 2022). It is, therefore, important to test expectations of ESG-related returns also using other approaches. Giglio et al. (2023) investigate the ESG beliefs of retail investors using survey data, finding that these investors generally expect ESG investments to underperform the market. In a similar spirit but with a different approach, our study sheds light on the ESG beliefs of a financially sophisticated class of investors, professional money managers, likely to often act as marginal investors in financial markets.

Second, the paper adds to the literature on the effects of fund manager ownership on

portfolio characteristics. In finance, managerial ownership is generally considered an effective tool to mitigate agency costs (Jensen and Meckling, 1976). The mutual fund industry is not exempt from agency problems: While investors often want to maximize risk-adjusted fund returns, fund managers may deviate from this objective due to, for instance, career concerns (Chevalier and Ellison, 1999) and their goal to maximize investment flows (Chevalier and Ellison, 1997). Several contributions find that managerial ownership, by better aligning the interests of fund managers and investors, improves fund performance (Khorana, Servaes, and Wedge, 2007; Cremers et al., 2009), and it reduces excessive risk-taking (Ma and Tang, 2019) and reliance on lottery-like stocks (Agarwal, Jiang, and Wen, 2022). We show that, on average, fund managerial ownership is associated with lower sustainability performance.⁴

Finally, our paper contributes to the literature on the behavior of financial intermediaries on sustainability issues. Investor demand for responsible investment products (e.g., Bollen (2007), Renneboog, Ter Horst, and Zhang (2011), Hartzmark and Sussman, 2019; Bauer, Ruof, and Smeets, 2021; Barber, Morse, and Yasuda, 2021) gives asset managers strong incentives to adopt ESG strategies. But while the objectives of increasing ESG performance and maximizing financial returns may sometimes overlap, managers often have to strike a balance.⁵ For example, Liang, Sun, and Teo (2022) find that hedge funds endorsing the

⁴Our paper also links to the more general literature on whether corporate social responsibility (CSR) practices are the result of agency problems or shareholder value maximization. For example, Ferrell, Liang, and Renneboog (2016) show that corporations with higher managerial pay-for-performance sensitivity (a measure of better governance) engage more in CSR. By contrast, Ghitti, Gianfrate, and Reccagni (2022) find that executive ownership is negatively associated with a firm's CSR. For a review of the literature on the links between CSR/ESG and corporate performance, see Gillan, Koch, and Starks (2021).

⁵Conflicts between sustainability and financial objectives may also arise in mutual fund voting at firms'

United Nations Principles for Responsible Investment (PRI) attract greater investment flows but underperform other hedge funds. Ceccarelli, Ramelli, and Wagner (2023) show that in reducing portfolio carbon risk exposure mutual fund managers consider the potential cost in terms of lower portfolio diversification. Gantchev, Giannetti, and Li (2021) document that fund managers balance the benefits of flows of stronger sustainability performance and the benefits of higher financial returns. Costello et al. (2022) show that environmentally committed fund managers hold more green stocks and perform better on them than non-committed managers. Chen and Dai (2023) find that managers with smaller estimated flow-to-performance sensitivity invest more in ESG, broadly consistent with our findings. Whereas we focus on conventional funds (and use ESG funds as a placebo group), Cremers, Riley, and Zambrana (2023) find a positive relationship between a portfolio’s active ESG tilt and its future performance only among explicit ESG funds. Importantly, Gibson Brandon et al. (2022) show that US signatories of the UN PRI attract larger flows but do not significantly change their ESG investments, suggesting that stated preferences and actual investments can be different. Through a revealed beliefs approach (and while controlling for unobserved heterogeneity of fund family and manager preferences), our paper sheds light on an important driver of the portfolio sustainability – fund managers’ skin in the game.

annual general meetings (Michaely, Ordonez-Calafi, and Rubio, 2021; Di Giuli, Garel, and Petit-Romec, 2023), when managers vote “by voice” rather than “by feet”, that is, through their capital allocation.

2 Data and sample design

This section provides a description of the data sources and the main variables of portfolio manager ownership and mutual fund characteristics. In addition, we provide supplementary details on the construction of variables in the Appendix.

2.1 Mutual fund data

We identify our sample of mutual funds and fund managers based on two main data sources, the CRSP Survivor-Bias-Free U.S. Mutual Fund Database (CRSP MF) and the Morningstar Direct Mutual Fund Database (MS Direct).

Our sample covers broadly diversified equity-only U.S. mutual funds. In our main empirical analyses, we wish to focus on funds that are supposed to follow a well-diversified strategy in which managers are unrestricted in their decision to consider ESG factors or not. Therefore, we exclude index funds and funds that state in prospectuses that they consider ESG factors as a part of their investment process from our main sample. We use these funds in placebo tests.

We aggregate the data at the fund level by total net asset weighting of the corresponding fund share classes from the CRSP MF. Additionally, to guard against the possibility of incubation bias affecting our results (Evans, 2010), we exclude funds with total net assets lower than \$1 million.

Our initial sample consists of 1,273 funds managed by 2,616 unique managers, and the

sample period spans from January 2015 through December 2020. The start of our sample period is determined by the availability of Morningstar’s portfolio sustainability scores, but it also coincides with when ESG strategies started gaining popularity in the US.

We proxy managers’ integration of ESG factors into the investment process through Morningstar’s mutual fund sustainability scores, based on firm-level measures provided by Sustainalytics.⁶ Like most ESG data providers, Sustainalytics bases its firm-level ESG assessments on issues that are deemed to be financially material, that is, to have the potential to significantly impact the value of a company within a specific industry (e.g., Sustainalytics, 2021). We compute our main variable of interest, *Peer-adj. sustainability score*, as the difference in each quarter, between the fund’s asset-weighted sustainability score and the related peer-average asset-weighted sustainability score (excluding the fund’s score itself), divided by the average asset-weighted sustainability score of peer funds, where we define peers to be the funds in the same style category.⁷ Higher sustainability scores reflect a greater managerial commitment to considering ESG factors in the investment selection relative to peer funds.

⁶Morningstar’s sample is restricted to fund-reporting date observations in which asset-weighted coverage of fund’s portfolio holdings is at least 67% (50% prior to October 2018) and in which the number of fund peers is less than 30 (affecting only 54 fund-quarter observations in our sample). Funds report holdings on a quarterly basis, thus to estimate monthly scores, the most recent reported portfolio is carried forward, and the score is estimated using the updated company-level ESG scores each month. The percentage of the assets under management of the covered securities is then rescaled to 100%.

⁷Starting from September 2019, Sustainalytics and Morningstar replaced their firm and fund-levels ESG Sustainability scores with ESG Risk scores. To obtain consistent portfolio sustainability measures over time, we invert the peer-adjusted ESG scores from September 2019 onward, such that higher scores reflect higher overall sustainability throughout our sample period. In addition, we confirm that this change in methodology does not affect our findings when we separately investigate the pre- and post-change periods. These results are available upon request.

We also consider Morningstar’s sustainability ratings (Globes) and sustainability rank as alternative measures of a fund’s sustainability performance. *Globes* is a categorical variable based on the number of Morningstar globes assigned to the fund and takes the value from 1 to 5. *Sustainability rank* is a fund’s decile rank based on the sustainability score relative to other funds in the same style segment.⁸

To capture fund portfolio sustainability inclination in more detail, we collect data on ESG issues of individual firms in mutual fund portfolios. Specifically, we calculate shares of mutual fund portfolio holdings with severe, high, significant, moderate, low, and no ESG controversies, as defined by Sustainalytics. The percentage of the assets under management of the covered securities is then re-scaled to 100%. Next, we calculate peer-adjusted measures of shares on each of the six categories by subtracting the corresponding category average portfolio shares of funds in the same style segment.

The main fund control variables include fund size, fund family size, fund age, expense ratio, fund turnover, fund performance, fund flows, volatility, a binary indicator of whether a team manages the fund, and a female manager indicator. Table A1 in the Appendix provides descriptions for each of these variables and details on other fund and manager characteristics used in the paper.

⁸Dolvin, Fulkerson, and Krukover (2019) report a significant difference in sustainability scores between small-cap and large-cap funds, with large-cap funds having better scores.

2.2 Managerial ownership

We hand-collect information on mutual fund managers' ownership from funds' Statement of Additional Information (SAI), which we obtain from the SEC EDGAR (Electronic Data Gathering, Analysis, and Retrieval) database.

A typical SAI contains disclosure of portfolio manager(s) ownership stake as of the fiscal year-end of a fund (most funds report it during the fourth quarter of the calendar year). Funds are required to report whether each portfolio manager's ownership falls in one of the following brackets: \$0 (none), \$1–\$10,000, \$10,001–\$50,000, \$50,001–\$100,000, \$100,001–\$500,000, \$500,001–\$1,000,000, or above \$1,000,000. We compute our measure of managerial ownership by manually collecting this data for each manager and converting reported ranges into dollar amounts. Following Khorana, Servaes, and Wedge (2007) and Ma and Tang (2019), we assume managerial ownership is at the midpoint of the reported ranges. For example, if the ownership stake of Manager A is in the range of \$50,001–\$100,000 reported in November, we assume the manager owns \$75,000 in the fund. Further, given that managerial ownership is reported on an annual basis, we assume that managerial ownership in month t equals the closest reported value for a given manager.

Our main ownership variables of interest are *Ownership*, an indicator equal to one for fund managers with ownership above \$0 in a given year and zero otherwise, and $\ln(1 + \$Ownership)$, the logarithm of one plus the dollar amount of a fund's total managerial ownership. As alternative measures, we consider the variable $\ln(1 + Mean\$Ownership)$, the logarithm

of one plus the dollar amount of a fund’s average ownership, and $\$Ownership/AUM$, the total managerial ownership relative to the asset under management.

We obtain data on managerial ownership for 2,537 managers managing 1,216 funds. Our final sample covers 22,789 observations, which is 96.10% of all fund-quarter observations of US broadly diversified domestic equity mutual funds.⁹

2.3 Managerial compensation and demographics

From the same SAIs, we also hand-collect information on mutual fund managers’ compensation structures. We define the indicator *Fixed pay* equal to one for managers receiving a fixed salary (and zero for managers with some variable compensation). We also define variables indicating whether the manager’s compensation is linked to the fund’s financial performance (*Performance pay*), to assets under management (*AUM pay*), or to the advisor’s profit (*Advisor profit pay*). While the majority of fund managers have contracts with multiple variable components, many are paid exclusively based on the fund’s financial performance. We define the variable *Performance pay only* to indicate such cases.

While in the main analysis we control for heterogeneity among manager preferences and backgrounds with team/manager fixed effects, for additional tests we also collect demographic information on fund managers of solo-managed mutual funds. Specifically, we first

⁹The remaining 3.90% of fund-quarter observations without managerial ownership details primarily occur due to funds being merged or ceasing to exist, thus not reporting an updated prospectus in the EDGAR database.

collect data on a manager’s name, educational background, and fund management dates (tenure) by cross-matching data from Morningstar Direct, Bloomberg, and FINRA. Second, based on this biographical information, we locate managers in LexisNexis and the Marquis Who’s Who Biographies to obtain dates of birth. Next, we follow the procedure described in Agarwal, Cocharadt, and Orlov (2022) and search for managerial family background information, specifically number of of daughters that a manager is parenting, in LexisNexis, Intelius, Ancestry.com, and fund company websites. If no information on children or their gender can be found, we code this variable as missing (and do not set it to zero).

2.4 Sample characteristics

Table 1 provides summary statistics for our sample of mutual fund managers and characteristics of the main variables of interest. The descriptive statistics reveal that 77% of funds in our sample have a manager (or a management team) co-investing personal capital in the fund. The average amount of managerial ownership is \$802,208 (or 0.32% of assets under management). The average fund in our sample has about \$3 billion in assets under management, comes from a family of funds that has \$70 billion under management, has been in operation for about 24 years, has a 1% expense ratio, 57% turnover ratio, and is likely to be managed by a management team (76% of funds) of male managers (only 18% of funds have at least one female manager). On average, funds in our sample invest 7.31% of assets to firms with severe and high ESG issues and 22.91% to firms that exhibit no ESG controversies.

- Table 1 -

Figure 1 shows the mean managerial ownership and the share of managerial-owned funds from 2015 through 2020. The percentage of funds with managerial ownership ranges from 75% to 78%. We observe a general increase in the dollar amount of managerial ownership over the years, from \$762,149 in the first quarter of 2015 to \$853,251 in the fourth quarter of 2020. Both the percentage of mutual funds with managerial ownership and the average amount of co-investment are in the same ballpark as the numbers reported by Ma and Tang (2019) for the 2007-2014 period (70% and \$540,000, respectively).

Looking at the compensation variables, we observe that around 96% of observations in our sample have fund managers with a bonus-linked compensation as opposed to a fixed salary. 24% of fund managers are paid (also) based on their fund's assets under management, 56% based on their advisor's profit, and 89% based on their fund's financial performance.¹⁰ 32% of fund managers have their compensation tied exclusively to financial performance. These summary statistics are comparable with the ones reported in Ma, Tang, and Gomez (2019) for the 2006-2011 period.

Finally, Appendix Figure A1 shows the sample distribution of *Peer-adj. sustainability score* and $\ln(1+\$Ownership)$.

¹⁰In addition to these categories, advisors often (42.93% of funds in our sample) impose extra conditions that must be met before the payment to the manager becomes effective (so-called deferred pay). However, funds rarely provide a detailed description of the deferred option; thus, we do not include it in our analyses and only consider it in robustness tests. We find no instances of stand-alone deferred compensation.

3 Managerial ownership and ESG performance

We assume that fund managers with skin in the game are more likely to choose portfolio holdings to maximize financial performance. Hence, we here investigate the relationship between fund managers' skin in the game and portfolio sustainability to shed light on their beliefs about the link between financial returns and sustainability performance.

3.1 Main results

We start by providing simple graphical evidence of the relation of interest. Panel A in Figure 2 shows the average quarter-ahead peer-adjusted sustainability score for funds with and without managerial ownership. For each sample year, the relative sustainability performance of funds with co-investing managers appears systematically lower than the sustainability performance of other funds. The same pattern emerges for all quarters in our sample and when using alternative measures of portfolio sustainability. For instance, Panel B in Figure 2 shows that the distribution of Morningstar's sustainability Globes for funds with managerial co-ownership is shifted to the left (towards fewer Globes) compared to funds with no managerial co-ownership.

- Figure 2 -

In Table 2, we formally test the link between a fund's managerial ownership and its future exposure to high-sustainability stocks. Specifically, we regress peer-adjusted sustainability

scores on the *Ownership* indicator (specifications (1) to (3)) or $\text{Ln}(1+\$Ownership)$ (specifications (4) to (6)). In all the regressions, we control for fund size, fund family size, fund age, expense ratio, fund turnover, fund performance, fund flows, fund volatility, a management team indicator, and a female manager indicator. We lag all independent variables by one quarter. To ensure that our results are unlikely to be driven by unobservable factors or heterogeneous trends, we include year-quarter, fund, fund family, and manager/team fixed effects, depending on the specification. Manager/team fixed effects in particular control for stable differences in preferences and political attitudes. Further below, we explicitly control for additional demographic variables. To allow for cross-sectional and cross-temporal correlation of error terms, we double-cluster standard errors by year-quarter and fund.

- Table 2 -

The results indicate that a fund's managerial ownership is associated with lower future sustainability performance. The estimated coefficients on our main ownership variables are negative and highly statistically significant. Based on the estimated coefficient in specification (1) controlling for fund fixed effects, managerial-owned funds have more than half of one standard deviation lower sustainability performance ($2.11/3.79 = 0.56$).

We obtain similar inferences when looking at the continuous measure of managerial ownership (specifications (4) to (6)). Based on the estimated coefficient of 0.17 in the specification (4), a one-standard-deviation higher USD amount of managerial ownership (5.74) is associated with an almost one-quarter of a standard deviation lower peer-adjusted ESG

performance ($5.14 \times 0.17 = 0.97$, $0.97/3.79 = 0.25$). Figure 3 illustrates the negative relationship between sustainability performance and $\ln(1+\$Ownership)$ through a binned scatter plot, controlling for fund characteristics and family fixed effects. The estimated negative cross-sectional relationship appears driven mostly driven by the extensive margin, that is, among funds with some managerial ownership the relation of the level of ownership and portfolio sustainability performance is less pronounced. However, we will see in Section 3.4 that increases (decreases) in managerial ownership are associated with decreases (increases) in portfolio sustainability.

- Figure 3 -

The different specifications in Table 2 provide different perspectives on the results. We include year-quarter and fund fixed effects in the baseline specifications (1) and (4).¹¹ This allows us to identify the managerial ownership effect from managerial turnover within funds and to control for unobservable characteristics at the fund level that may potentially influence a fund’s ESG strategies. The fund fixed effects pick up, among other things, possible differences between funds primarily targeting retail investors and funds primarily targeting institutional investors.¹² In addition, fund families may have different approaches to ESG topics on a family level or impose additional ESG-related guidance on their managers. Thus,

¹¹For space reasons, we do not present regressions without fixed effects, but the results do not depend on this, with the coefficients on ownership in such regressions being of similar size or bigger than in the more saturated regressions.

¹²In results available upon request, we confirm that our results hold for retail and institutional mutual funds separately without statistically significant differences.

we include fund-family fixed effects in specifications (2) and (4).¹³ In this setting, we can compare the ESG performance of funds with and without managerial co-investment in the same family. Comparing within families, we observe lower magnitudes of the ownership effect, suggesting that fund family policies explain part of the sustainability-ownership relationship. Yet, the point estimates on *Ownership* and $\ln(1+\$Ownership)$ are again negative and statistically significant. In specifications (3) and (6), we include manager/team fixed effects, allowing us to control for fund managers’ time-invariant differences in the adoption of ESG strategies. We obtain similar estimates as with other, less stringent specifications.

Overall, our results document a negative relationship between a fund’s managerial ownership and sustainability performance.

3.2 Placebo tests

To provide further evidence of our results, we run “placebo” tests using two groups of mutual funds (not included in our main sample) whose managers do not have much “ESG discretion”: passive funds and explicitly sustainable funds. Appendix Table A2 reports the results.

For both index funds (specifications (1) and (3)) and explicitly sustainable funds (specifications (3) and (4)), we observe no clear relationship between managerial ownership on portfolio sustainability. The (non-)results of the placebo tests suggest that the negative relationship observed in the main sample derives from fund managers’ active ESG-related

¹³Following the literature, we define fund-family groups based on the family name variable in CRSP. However, following Dannhauser and Spilker III (2023), we hand-validate the family names to correct typos.

trading decisions.

Finally, do managers who manage both explicitly sustainable and conventional funds behave differently than other managers? To answer, in Appendix Table A3, we rerun our main specification by including the indicator *ESG manager*, equal to 1 if at least one fund manager also manages an explicitly sustainable fund (not included in our main sample), and its interaction with our main ownership variables. The *ESG manager* indicator is equal to 1 for 8.7% of the observations in our sample. We find a less negative relationship between managerial ownership and portfolio sustainability for “ESG managers”, but the estimated interaction term coefficients are not statistically significant.

3.3 Robustness

In what follows, we briefly discuss the results of an extensive set of robustness checks, which are reported in the Appendix.

3.3.1 Alternative fixed effects

In Appendix Table A4, we augment our primary analyses in Table 2 with even more stringent sets of fixed effects. In specifications (1) and (4), we add manager/team-by-quarter-year interaction fixed effects. For this exercise, we restrict the sample to managers who manage multiple funds simultaneously. In total, 1,933 managers (76% of all managers) in our sample run more than one fund (603 funds in total) at a certain point in our sample period, corre-

sponding to 8,332 fund-quarter observations. Comparing within the same manager/team in the same quarter, we find that managers who run multiple funds simultaneously are more likely to have lower ESG performances in the funds in which they have a higher ownership stake. In specifications (2)-(3) and (5)-(6), we introduce family-by-quarter-year and segment-by-quarter-year fixed effects. The point estimates of interest remain negative and highly statistically significant.

3.3.2 Controlling for manager demographic characteristics

In Appendix Table A5, we replicate our main finding by controlling for additional manager characteristics. Notice that this analysis is nested in the specification with team/manager fixed effects in Table 2, but we here restrict the attention to the sub-sample of solo-managed mutual funds. Specifically, we control for characteristics that may simultaneously influence managers' co-investment and ESG trading decisions: educational attainment and the number of daughters, as managers parenting daughters may exhibit stronger social preferences (e.g., Cronqvist and Yu, 2017).¹⁴ Accounting for these additional demographic characteristics does not affect our main coefficients of interest.

¹⁴We obtained information on the gender composition of managers' kids for 153 managers following the procedure described in Agarwal, Cocharadt, and Orlov (2022).

3.3.3 Alternative measures of sustainability and ownership

Next, in Appendix Table A6, we use alternative measures of sustainability as dependent variables: the fund-level sustainability ranking (Panel A), the sustainability Globes (Panel B), and the shares of the portfolio invested in firms with different levels of involvement in ESG controversies. In all cases, we confirm that funds co-invested by their managers exhibit lower tilts towards high-sustainability/ESG assets.

In Appendix Table A7, we study the effect of alternative measures of managerial ownership. Panel A investigates the effect of the team’s average (instead of total) ownership, $\text{Ln}(1+\text{Mean } \$\text{Ownership})$. We obtain results statistically and economically similar to the ones in our main specifications, confirming that our main finding does not depend on team size. Based on the estimated coefficient of 0.19 in the specification (1), a one-standard-deviation higher $\text{Ln}(1+\text{Mean } \$\text{Ownership})$ is associated with a decrease in more than one-fifth of one standard deviation in ESG performance ($5.41 \times 0.19 = 0.84$, $0.84/3.79 = 0.22$).

Regressions in Panel B look at the effect of total managerial ownership relative to the fund’s asset under management ($\% \text{Ownership}/\text{AUM}$). This variable captures fund managers’ “skin in the game” relative to all the other fund investors rather than absolute incentives.¹⁵ The results indicate that the higher the investment of fund managers relative to the fund’s total AUM, the lower the fund’s future ESG performance. Specifically, a one-standard-

¹⁵For instance, it is conceivable that a manager owning a more significant fraction of assets under management can shape the investment portfolio based on her beliefs with less pressure from large fund clients, particularly institutional ones.

deviation higher $\%Ownership/AUM$ (0.77) is associated with a decrease in more than one-seventh of one standard deviation in ESG performance. In the most restrictive specification with manager/team fixed effects (specification (3)), this effect remains economically important but turns statistically insignificant.

3.4 Effects of managerial ownership changes

So far, the results indicate a negative relationship between a fund's managerial ownership and portfolio sustainability. Going beyond the analysis with fund fixed effects, we here provide further evidence of the effects of changes in managerial ownership on fund managers' ESG investment decisions.

In our sample, we identify 1,099 fund-quarter observations with changes in managerial ownership, with an average change of \$69,657. Of these episodes, 649 are increases in ownership (average increase: \$437,404), and 450 are decreases in ownership (average decrease: -\$460,717). We have only 36 transitions from no ownership to positive ownership and 102 fund-quarter observations transitioning from positive ownership to no ownership.

- Figure 4 -

Figure 4 shows the average changes in peer-adjusted sustainability scores following changes in managerial ownership. Increases in ownership are followed by decreases in portfolio sustainability, while decreases in ownership are followed by increases in portfolio sustainability.

The effects on sustainability are especially pronounced following changes in ownership above \$1 mln and following episodes of initial managerial co-investment or complete withdrawals of managerial stakes. Following no changes in ownership (20,206 fund-quarter observations in total), we observe no changes in the peer-adjusted sustainability score (average change: -0.01%).

- Table 3 -

Panel A in Table 3 reports the results of regressions of quarter-ahead changes in sustainability performance on various measures of ownership changes.¹⁶ We find that increases (decreases) in ownership are followed by decreases (increases) in ESG performance. This result is highly statistically significant for all alternative measures of ownership changes.

Importantly, in Panel B in Table 3, we find no evidence for the opposite directional effect in the ownership-ESG relationship: Quarterly changes in fund sustainability performance are not followed by changes in managerial ownership. See also Figure A2 in the Appendix for an illustration. This finding is important because conceivably, it might have been that fund managers, who do not adopt ESG factors in their investment strategies, have to co-invest more in their funds to signal their effort/skill/commitment to investors. According to this interpretation, we would expect increases in fund sustainability to be followed by decreases

¹⁶These measures include: *ChangeOwnership*, a categorical variable that equals 1 for fund-quarter observations with an ownership increase, -1 for a decrease in ownership, and 0 for no change; *ChangeLn(1+\$Ownership)*, as a logarithm of one plus the absolute dollar amount of the change, multiplied by -1 for negative changes; *ChangeOwnership%*, a percentage change in ownership; and *OwnershipIncrease* and *OwnershipDecrease* dummy variables equal to 1 for episodes of positive and negative change in ownership, respectively, and zero otherwise.

in managerial co-ownership. This does not seem to be the case.

4 Interpretation

We have so far provided evidence of a strong negative relationship between a fund’s managerial ownership and its sustainability performance. We interpret this evidence as a revealing sign that US mutual fund managers do not consider ESG selection a positive material driver of a portfolio’s future expected returns (“Revealed Beliefs” explanation). However, other factors may influence this relationship. In particular, low-sustainability funds may require more managerial ownership than high-sustainability funds to reassure clients about the fund’s alignment with their interests (“Signalling” explanation).¹⁷

In this section, we conduct two tests further supporting the role of fund managers’ beliefs in driving the negative relation between managerial ownership and portfolio ESG performance.

4.1 Effects of exogenous shocks in ESG-driven flows

First, we study how fund managers with or without skin in the game react to exogenous shocks in the flows incentives to hold high-ESG stocks.

We consider first the publication of Morningstar’s Sustainability Globes in March 2016,

¹⁷Consistent with the potential role of strategic signalling, Scheld and Stolper (2023) find that fund managers’ voluntary advertising of their skin in the game in their letters to shareholders is associated with a short-term increase in retail investment flows.

an exogenous shock that increases the influence of a fund’s sustainability performance on investment flows. Investors flocked to funds with more labels (Hartzmark and Sussman, 2019). In turn, fund managers willing to attract higher flows increased their demand for high-ESG stocks (Gantchev, Giannetti, and Li, 2021). If professional money managers perceive a tension between sustainability and financial performance, as our revealed beliefs interpretation suggests, fund managers with skin in the game can be expected to react less to the publication of the Globes, i.e., to chase sustainability-driven flows less because they would perceive this to come at the expense of financial performance.

To test this conjecture, in Table 4, we run difference-in-differences (DID) regressions of fund peer-adjusted sustainability scores from 2015-Q1 through 2016-Q4. The explanatory variables of interest are the interaction term $Ownership \times PostGlobes$ and $Ln(1+Ownership) \times PostGlobes$, where $PostGlobes$ is an indicator variable equal to 1 for observations after 2016-Q1. We control for the same set of variables used in our main analyses. In specifications (2) and (4), we also interact the control variables with $PostGlobes$ to account for potential changes of their effects over time (though the results do not depend on this).

- Table 4 -

The estimated coefficients in specifications (1) and (2) indicate that in reaction to the publication of the Globes ratings in March 2016, co-investing managers moved less toward high-ESG assets than managers without skin in the game.¹⁸ The difference-in-differences

¹⁸Besides fund managers’ trading decisions, quarterly changes in portfolio ESG scores may also derive

effect is economically important, as it corresponds to more than one-tenth of a standard deviation in peer-adjusted sustainability score. We obtain similar inferences when employing our continuous measure of ownership in specifications (3) and (4).

According to many observers, the sudden, unanticipated outbreak of Covid-19 represented another major shock to the demand for sustainable investments.¹⁹ Whether fundamental or non-fundamental considerations drove this high demand for sustainable assets is still up for debate. It is, therefore, interesting to study whether fund managers with “skin in the game” increased or decreased their exposure to high-ESG firms during this period.

- Table 5 -

In Table 5, we regress fund peer-adjusted sustainability scores over the period from 2018-Q1 through 2020-Q4, interacting our ownership variables with *Covid-19*, an indicator variable equal to 1 for observations in 2020-Q1 and 2020-Q2.²⁰ In specifications (2) and (4), we also interact the control variables with *Covid-19*. Both measures of managerial co-ownership

from changes in market values of portfolio assets. However, as Panel A in Appendix Table A8 shows, we do not observe any difference-in-differences effect when using the sub-sample of U.S. index funds, whose sustainability performance, by construction, is likely to vary with asset price changes but not active trading decisions. Hence, we can attribute the results in Table 4 to fund managers’ behavior.

¹⁹In line with this view, the extant literature indicates that high-ESG stocks were more resilient in the first half of 2020 (Albuquerque et al., 2020; Ding et al., 2021). Glossner et al. (2022) find no evidence that institutional investors, on average, significantly re-balanced their portfolios toward more sustainable firms. However, ESG-themed funds experienced inflows (Pástor and Vorsatz, 2020). While retail flows to sustainable funds declined from the pre-Covid period (Döttling and Kim, 2022), institutional investor flows increased and helped these funds mitigate the market crash for high-ESG stocks (Albuquerque, Koskinen, and Santioni, 2023).

²⁰We obtain similar results when focusing only on the effect in 2020-Q1 only, or throughout 2020. By contrast, we do not find any significant differences when using the placebo period of the second half of 2019 as the treated period.

are associated with a statistically significant *lower* shift toward high-ESG stocks during the Covid-19 financial market turbulence. (Like for the previous difference-in-differences exercise, we do not observe any significant differences among index funds. See Panel B of Appendix Table A8.) These results indicate that also and especially during the early phases of the pandemic, skin-in-the-game fund managers did not consider ESG factors as major drivers of firm value, at least not to the extent implied by market prices.

4.2 The role of managers' compensation structure

Finally, the heterogeneity of our main findings based on fund managers' compensation structure also provides insights relevant to our interpretation.

Managerial compensation can significantly influence the degree of agency conflicts in mutual funds (Chevalier and Ellison, 1997; Ma, Tang, and Gomez, 2019). If fund managers perceive a tension between a fund's sustainability and expected financial performances, they will be less likely to chase ESG performance when they have strong incentives to maximize returns instead of investment flows. Hence, for managers contractually incentivized to focus on financial performance, we expect ESG performance to be less influenced by managerial ownership.²¹

In Table 6, we estimate the effect on ESG performance of the interaction of managerial

²¹In this sense, performance-based compensation is likely to have an effect similar to managerial ownership. However, it is interesting to note that performance-based compensation is asymmetric in the sense that managers receive a bonus for outperforming their benchmarks, but they are not penalized if they underperform. For this reason, performance-based pay is not the same as having skin in the game through investments of personal wealth in the fund.

ownership with various elements of the compensation contract, controlling for family fixed effects.²² In specifications (1) and (3), we test the effects of three common types of variable compensation: compensation linked to AUM, to advisory profitability, or to the fund's financial performance.²³

- Table 6 -

The regression results show a statistically significant positive coefficient on *AUM pay*, which means that portfolio managers with incentives to maximize investment flows strongly tend to invest more in high-ESG stocks. Specifically, explicit AUM managerial incentives explain around 30% of a one-standard-deviation in *Peer-adj. sustainability score*. However, when these managers co-invest in their portfolios, their emphasis on ESG investments almost completely vanishes; the interaction term in column (1) is about as big as the main effect of *AUM pay*. This result is consistent with potential conflicts between fund managers' objectives of increasing investment flows and maximizing risk-adjusted fund returns, as established in Chevalier and Ellison (1997).²⁴

²²In these regressions, we can not control for fund-fixed effects because compensation contracts are mostly unchanged over time.

²³Similar to Ma, Tang, and Gomez (2019), we find that incentives based on these targets are not necessarily mutually exclusive. Out of observations with variable compensation, around 33% pay managers only based on investment performance; 6% offer a bonus based only on the advisor's profits; and 0.3% offer a bonus based exclusively on AUM. For all the other funds in our sample, managers receive some combination of the three types of bonus. Ma, Tang, and Gomez (2019) show that the probability of having the compensation linked to the advisor's profit (*Advisory pay*) is significantly higher if the manager is a founder or co-owner of the advisory firm (twice more likely in our sample). In our setting, this may produce other confounding effects on the managerial perception of ESG. For this reason, the regressions in Table 6 additionally control for an eponymous manager indicator (which does not influence our estimates).

²⁴In results available upon request, we also test the effect of having compensation exclusively based on

In specifications (2) and (4), we test the effect of having the fund manager’s compensation *exclusively* tied to financial performance, a feature characterizing around 32% of our sample observations (of which 71% exhibit managerial ownership). We find that managers exclusively paid based on financial performance invest less than other managers in high-ESG stocks even without managerial ownership (see the negative coefficient on *Performance pay only*). For these managers, ownership matters less as an additional motivation not to overweight high-ESG stocks, as indicated by the positive estimated coefficients on the interaction terms $Ownership \times Performance\ pay\ only$ and $Ln(1+Ownership) \times Performance\ pay\ only$.

Overall, the effects on the portfolio ESG performance of managers’ compensation structure, and its interactions with managerial ownership, support the interpretation that – based on their actions – fund managers expect portfolios tilted towards higher-ESG firms to deliver lower future expected returns.

5 Conclusion

The adoption of environmental, social, and governance (ESG) strategies has been one of the most important developments in the financial industry over the last decade, and some observers expect it to increase even further in the future. However, its effects on financial

a fixed salary, as opposed to performance-based bonuses. As in Ma, Tang, and Gomez (2019), this applies only to a tiny fraction of our funds, specifically, to only 3.2% of managers. We find that having a fixed salary significantly amplifies the negative relationship between ESG performance and managerial ownership. The estimated coefficients are not statistically significant, presumably due to the small variability in the fixed salary and ownership relationship.

performance are increasingly debated. Some believe ESG integration to be an enhanced form of portfolio management accounting for new risks and opportunities; others believe it is a way to meet sustainability-conscious investor demand at the expense of financial returns. Which of these two views better reflects major investors' ESG beliefs?

Answering this question is challenging. In surveys, investors may express excessive optimism about the positive financial consequences of their choices. Studying differences in realized returns between high-ESG vs. low-ESG funds (with the usual asset-pricing assumption that, on average, investors get what they expected) is also problematic, as they do not necessarily reflect differences in ex-ante expectations (Elton, 1999; Pástor, Stambaugh, and Taylor, 2020).

In this paper, we circumvent these empirical challenges by adopting a “revealed beliefs” approach to the behavior of US mutual fund managers, an important group of sophisticated investors. We infer their ESG beliefs by studying how their monetary incentives to deliver a high financial performance relate to their sustainability portfolio choices. We document a negative relationship between a fund's managerial ownership and its portfolio sustainability, both in the cross-section and in differences.

Of course, ESG strategies may or may not pay off in the long run, regardless of fund managers' beliefs, which may be distorted or myopic. For instance, Cheng, Raina, and Xiong (2014) show that U.S. securitization agents did not anticipate the 2007 housing market crash even in their personal home transactions with significant wealth at stake. Nonetheless, the

results of this study raise concerns about marketing sustainable investment strategies as a way to attain superior financial performance. Investors should be cautious in blindly accepting a business case for sustainability that sophisticated investors, on average, do not seem to believe.

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Figures

Figure 1: Fund managerial ownership over time

This graph shows the average managerial fund ownership in USD (left vertical axis) and the average fraction of managerial-owned funds (right vertical axis) from 2015 through 2020.

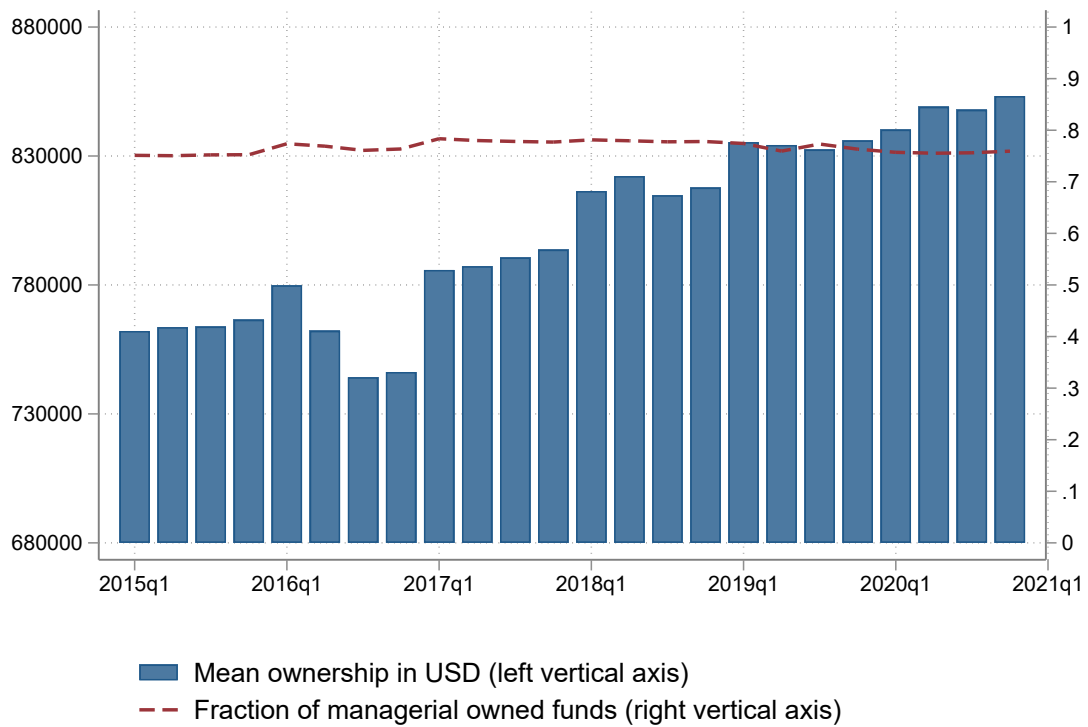


Figure 2: Fund managerial ownership and portfolio sustainability performance
 Panel A shows the annual average peer-adjusted sustainability score for mutual funds with and without managerial ownership from the beginning of 2015 through the end of 2020. Panel B shows the distributions of Morningstar sustainability rating (Globes) for the same two groups of funds.

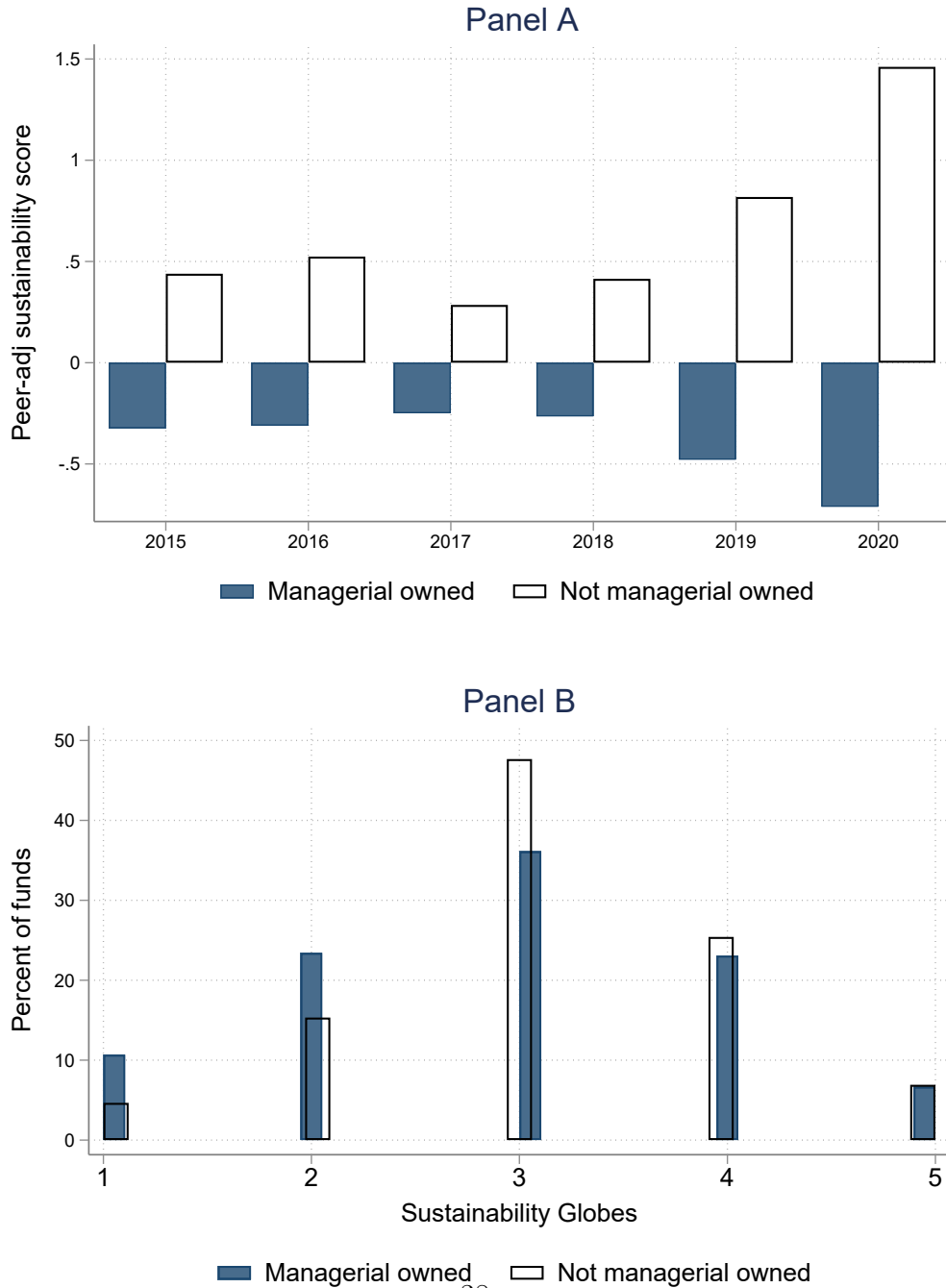


Figure 3: Fund managerial ownership and portfolio sustainability

This binned scatter plot shows the relationship between funds' quarter-ahead peer-adjusted sustainability score and $\text{Ln}(1+\$Ownership)$. The graph controls for fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators) and family and year-quarter fixed effects.

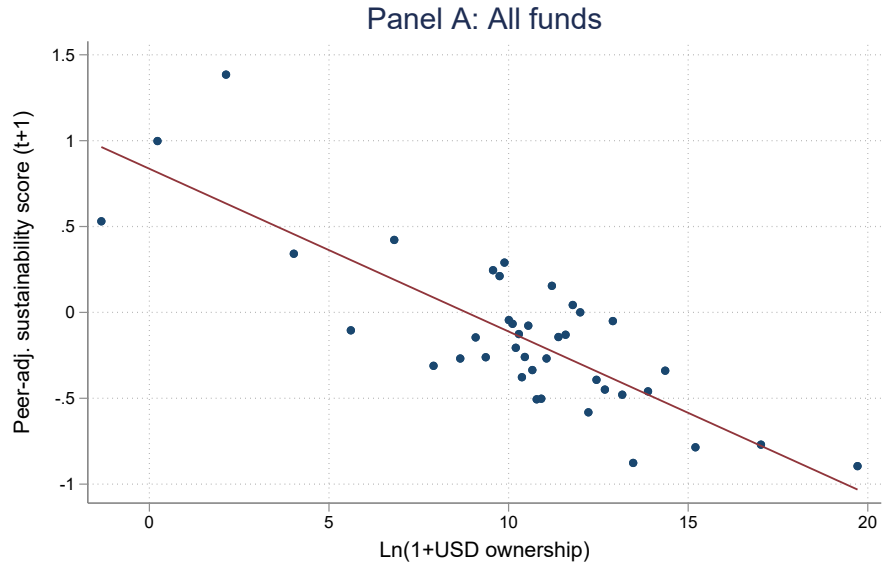
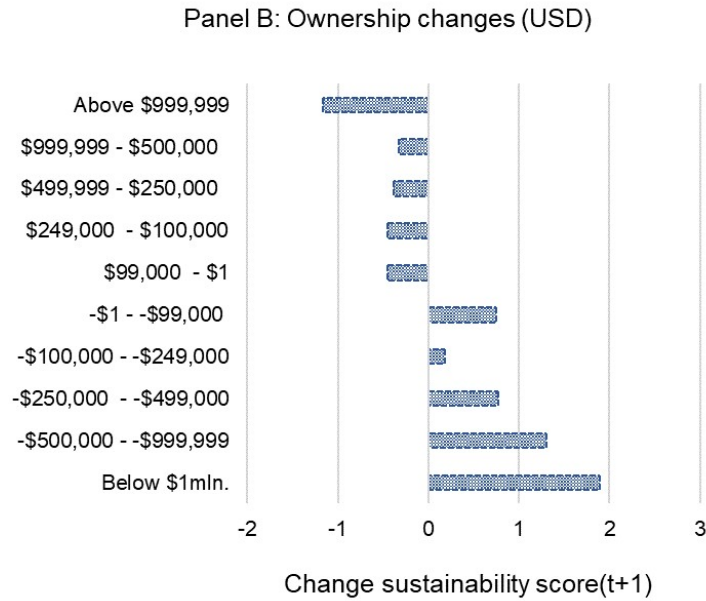
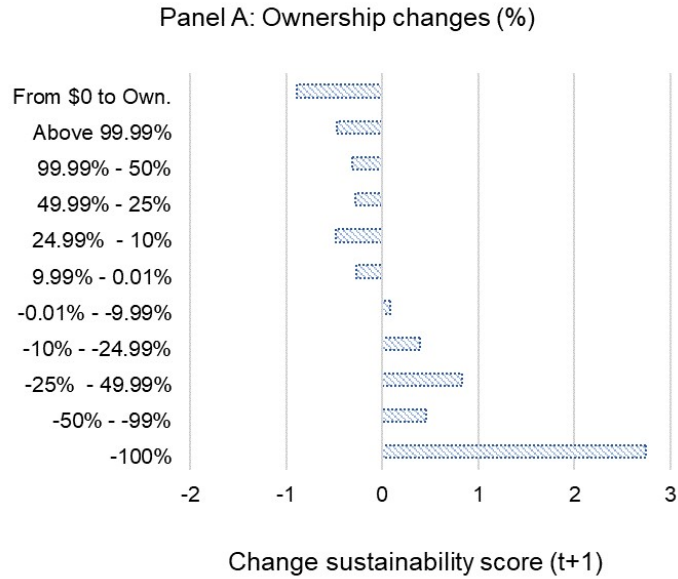


Figure 4: Changes in managerial ownership and changes in sustainability performance

These graphs show the average changes in peer-adjusted sustainability scores following managerial ownership changes, defined in percentage changes over the previous level of ownership (Panel A) or USD (Panel B).



Tables

Table 1: Descriptive statistics

This table shows descriptive statistics of the variables used in the analyses. The sample consists of non-financial constituents of Russell 3000. Appendix Table A1 provides a description of all variables.

	N	min	p25	mean	p50	p75	max	sd
Ownership	22,789	0.00	1.00	0.77	1.00	1.00	1.00	0.42
Ln(1+\$Ownership)	22,789	0.00	9.21	10.20	13.30	13.86	16.38	5.74
Ln(1+Mean \$Ownership)	22,789	0.00	8.36	9.57	12.49	13.38	14.65	5.41
\$Ownership (/1,000)	22,789	0.00	10.00	802.21	600.00	1,050.00	13,000.00	1,008.66
%Ownership/AUM	22,435	0.00	0.00	0.32	0.04	0.20	6.51	0.77
Peer-adj. sustainability score	22,789	-32.46	-2.09	-0.15	-0.01	1.91	29.12	3.79
Sustainability rank	22,789	1.00	3.00	5.39	5.00	8.00	10.00	2.83
Globes	9,369	1.00	2.00	2.97	3.00	4.00	5.00	1.04
Severe	21,157	0.00	0.00	1.30	0.00	1.95	18.77	2.21
High	21,157	0.00	0.00	6.01	3.80	10.83	39.32	6.41
Significant	21,157	0.00	3.52	21.80	23.68	36.93	76.76	17.27
Moderate	21,157	0.00	22.93	29.98	30.28	36.87	73.63	10.36
Low	21,157	0.00	10.15	17.99	16.70	25.35	59.95	9.71
No controversies	21,157	0.00	5.84	22.91	13.77	38.70	96.17	21.06
Family size	22,747	0.18	7.96	9.27	9.77	10.73	14.06	2.43
Fund size	22,662	0.00	5.07	6.37	6.44	7.67	12.45	1.89
Fund age	22,789	1.32	15.81	24.10	20.85	27.27	96.53	13.79
Expense ratio	22,336	0.00	0.85	1.02	1.00	1.18	5.35	0.34
Turnover	22,344	0.00	0.25	0.57	0.45	0.74	8.84	0.51
Fund flows	22,529	-1.17	-0.05	0.02	-0.02	-0.00	422.53	3.06
Fund return	22,618	-0.54	0.00	0.03	0.04	0.07	0.70	0.10
Fund volatility	22,744	0.12	4.84	7.65	6.88	9.74	31.67	3.68
Team	22,789	0.00	1.00	0.76	1.00	1.00	1.00	0.43
Female	22,789	0.00	0.00	0.18	0.00	0.00	1.00	0.38
Fixed pay	22,129	0.00	0.00	0.04	0.00	0.00	1.00	0.19
AUM pay	21,851	0.00	0.00	0.24	0.00	0.00	1.00	0.43
Advisor profit pay	21,851	0.00	0.00	0.56	1.00	1.00	1.00	0.50
Performance pay	22,129	0.00	1.00	0.89	1.00	1.00	1.00	0.31
Performance pay only	22,129	0.00	0.00	0.32	0.00	1.00	1.00	0.47

Table 2: Main result

This table shows the results of OLS regressions of funds' quarter-ahead peer-adjusted sustainability score on *Ownership* (specifications (1)-(3)) and $\ln(1+\$Ownership)$ (specifications (4)-(6)), from January 2015 through December 2020. The sample includes active broadly diversified equity-only U.S. mutual funds. The regressions control for lagged fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators). The regressions also include quarter-year fixed effects, and fund, fund family, or manager/team fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-2.11*** (-5.14)	-1.29*** (-4.62)	-1.53*** (-4.33)			
$\ln(1+\$Ownership)$				-0.17*** (-5.14)	-0.09*** (-4.44)	-0.12*** (-4.18)
Family size	0.22 (1.18)	-0.14 (-0.57)	0.29*** (2.93)	0.22 (1.18)	-0.14 (-0.60)	0.30*** (2.89)
Fund size	-0.03 (-0.20)	0.02 (0.26)	-0.14** (-2.08)	-0.01 (-0.07)	0.03 (0.49)	-0.12* (-1.88)
Fund age	0.01 (0.30)	-0.00 (-0.79)	0.01 (1.16)	0.01 (0.25)	-0.01 (-0.88)	0.01 (0.97)
Expense ratio	-0.19 (-0.33)	-0.41 (-0.94)	-0.43 (-1.13)	-0.22 (-0.38)	-0.41 (-0.95)	-0.42 (-1.11)
Turnover	-0.25 (-1.26)	-0.37** (-2.33)	-0.01 (-0.06)	-0.27 (-1.37)	-0.39** (-2.48)	-0.01 (-0.04)
Fund flows	0.15** (2.13)	-0.03 (-0.55)	0.11 (1.60)	0.15** (2.18)	-0.04 (-0.58)	0.11 (1.61)
Return	-0.07 (-0.06)	-0.74 (-0.63)	-0.09 (-0.08)	-0.08 (-0.07)	-0.69 (-0.59)	-0.07 (-0.07)
Volatility	-0.07 (-1.36)	-0.27*** (-5.52)	-0.08 (-1.49)	-0.07 (-1.31)	-0.27*** (-5.48)	-0.08 (-1.49)
Team	0.03 (0.11)	0.15 (0.86)		0.06 (0.25)	0.17 (0.97)	
Female	-0.22 (-0.84)	-0.03 (-0.10)		-0.19 (-0.73)	-0.02 (-0.08)	
Constant	0.31 (0.15)	4.70* (2.01)	0.07 (0.08)	0.32 (0.16)	4.64* (1.98)	0.00 (0.00)
Observations	21,926	21,935	21,597	21,926	21,935	21,597
R-squared	0.50	0.25	0.56	0.50	0.25	0.56
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	No	No	Yes	No	No
Fund family FE	No	Yes	No	No	Yes	No
Manager/Team FE	No	No	Yes	No	No	Yes

Table 3: Effect of changes in managerial ownership

This table shows, in Panel A, the results of OLS regressions of funds' quarter-ahead changes in peer-adjusted sustainability score on various measures of changes in managerial ownership. Panel B shows the results of OLS regressions of quarter-ahead managerial ownership changes on quarter changes in sustainability score. All regressions are based on the period from Q1 2015 through Q4 2020 and control for fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators), quarter-year, and fund fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

<i>Panel A: Effects of changes in managerial ownership changes on sustainability</i>					
Dep. variable:	Change peer-adj. sustainability score (t+1)				
	(1)	(2)	(3)	(4)	(5)
ChangeOwnership	-0.71*				
	(-2.03)				
ChangeLn(1+\$Ownership)		-0.06**			
		(-2.10)			
ChangeLn(1+\$Ownership) (%)			-0.01*		
			(-1.89)		
OwnershipIncrease				-0.54**	
				(-2.29)	
OwnershipDecrease					1.11*
					(1.94)
Observations	20,755	20,755	20,576	20,755	20,755
R-squared	0.03	0.03	0.04	0.03	0.03
Constant & controls	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes
<i>Panel B: Effects of changes in fund sustainability on managerial ownership</i>					
Dep. variable:	ChangeOwnership (t+1)		ChangeLn(1+\$Ownership) (t+1)		
Change peer-adj. sustainability score		0.00			-0.00
		(0.01)			(-0.00)
Observations		20,916			20,916
R-squared		0.05			0.05
Constant & controls		Yes			Yes
Quarter-year FE		Yes			Yes
Fund FE		Yes			Yes

Table 4: Difference-in-differences effect of Globes introduction

This table shows the results of OLS difference-in-differences (DID) regressions of funds' quarter-ahead peer-adjusted sustainability score from Q1 2015 through Q4 2016 on *Ownership* (specifications (1)-(2)) and $\text{Ln}(1+\$Ownership)$ (specifications (3)-(4)), and the interaction of these variables with the indicator *PostGlobes* equal to 1 after Q1 2016. The regressions control for fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators), and in specifications (2) and (4), also their interaction with *PostGlobes*. All regressions also include quarter-year and fund fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)			
	(1)	(2)	(3)	(4)
Ownership × PostGlobes	-0.31** (-2.48)	-0.41** (-2.89)		
Ln(1+\$Ownership) × PostGlobes			-0.01 (-1.63)	-0.02* (-2.30)
Ownership	-0.59** (-2.61)	-0.52* (-2.25)		
Ln(1+\$Ownership)			-0.05** (-2.80)	-0.04* (-2.36)
Observations	6,854	6,854	6,854	6,854
R-squared	0.40	0.40	0.40	0.40
Constant & controls	Yes	Yes	Yes	Yes
Controls × PostGlobes	No	Yes	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes

Table 5: Difference-in-differences effect of Covid-19

This table shows the results of OLS difference-in-differences (DID) regressions of funds' quarter-ahead peer-adjusted sustainability score from 2018-Q1 through 2020-Q4 on *Ownership* (specifications (1)-(2)) and $\ln(1+\$Ownership)$ (specifications (3)-(4)), and the interaction of these variables with the indicator *Covid-19* equal to 1 for the first two quarters of 2020. The regressions control for fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators), and in specifications (2) and (4), also their interaction with *Covid-19*. All regressions also include quarter-year and fund fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)			
	(1)	(2)	(3)	(4)
Ownership × Covid-19	-0.43** (-2.52)	-0.46** (-2.52)		
$\ln(1+\$Ownership)$ × Covid-19			-0.03** (-2.38)	-0.03** (-2.41)
Ownership	-3.01*** (-5.86)	-2.99*** (-5.84)		
$\ln(1+\$Ownership)$			-0.25*** (-5.79)	-0.24*** (-5.77)
Observations	11,056	11,056	11,056	11,056
R-squared	0.60	0.60	0.60	0.60
Constant & controls	Yes	Yes	Yes	Yes
Controls × Covid-19	No	Yes	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes

Table 6: Cross-sectional heterogeneity across managers' compensation structure

This table shows the results of OLS regressions testing the cross-sectional heterogeneity of the main results in Table 2 along managers' compensation structure. All regressions are based on the period from Q1 2015 through Q4 2020 and control for fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team, female, and eponymous indicators), quarter-year, and family fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)			
	(1)	(2)	(3)	(4)
Ownership × AUM pay	-1.05*			
	(-2.06)			
Ownership × Advisory pay	-0.52			
	(-1.14)			
Ownership × Performance pay	-1.70			
	(-1.27)			
Ownership × Performance pay only		1.24***		
		(3.04)		
Ln(1+\$Ownership) × AUM pay			-0.08**	
			(-2.07)	
Ln(1+\$Ownership) × Advisory pay			-0.03	
			(-0.98)	
Ln(1+\$Ownership) × Performance pay			-0.11	
			(-1.15)	
Ln(1+\$Ownership) × Performance pay only				0.09***
				(2.87)
AUM pay	1.16**		1.16**	
	(2.20)		(2.18)	
Advisory pay	0.31		0.25	
	(0.60)		(0.49)	
Performance pay	1.00		0.82	
	(0.92)		(0.79)	
Performance pay only		-1.20**		-1.14**
		(-2.59)		(-2.43)
Ownership	0.77	-1.87***		
	(0.54)	(-4.71)		
Ln(1+\$Ownership)			0.04	-0.13***
			(0.43)	(-4.58)
Observations	21,035	21,305	21,035	21,305
R-squared	0.25	0.25	0.25	0.25
Constant & controls	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Family FE	Yes	Yes	Yes	Yes

Appendix

Table A1: Description of main variables

This table provides descriptions and sources of the main variables used in this paper. The following abbreviations are used: CRSP - CRSP Survivorship Bias Free Mutual Fund Database; MS - Morningstar Direct Database; SUST - Sustainalytics; SEC - SEC EDGAR database; AE - Authors' estimations; MC - manually collected.

Variable	Description	Source
A. Dependent variables		
Peer-adj. sustainability score	Segment-adjusted sustainability score computed as $\frac{(\sum_{s=1}^n ESGscore_{s,t}w_{i,s,t}) - \overline{ESGscore}_t^{style_i}}{\overline{ESGscore}_t^{style_i}}$ where $\sum_{s=1}^n ESGscore_{s,t}w_{i,s,t}$ is fund i 's asset-weighted ESG score in quarter t , while $\overline{ESGscore}_t^{style_i}$ is the average ESG score in fund i 's segment.	MS, SUST, AE
Sustainability rank	Decile rank of a fund based on sustainability measure relative to other funds in the same segment in a given quarter.	MS, SUST, AE
Globes	Number of Morningstar globes (from 1 to 5)	MS
Severe dummy	Dummy variable equal to 1 if a fund holds firms with severe ESG controversies in a given quarter and 0 otherwise.	SUST, AE
No controversies dummy	Dummy variable equal to 1 if a fund holds firms with no ESG controversies in a given quarter and 0 otherwise.	SUST, AE
Severe	Peer-adjusted share of severe ESG issues firms in a fund's portfolio.	SUST, AE
High	Peer-adjusted share of high ESG issues firms in a fund's portfolio.	SUST, AE
Significant	Peer-adjusted share of significant ESG issues firms in a fund's portfolio.	SUST, AE
Moderate	Peer-adjusted share of moderate ESG issues firms in a fund's portfolio.	SUST, AE
Low	Peer-adjusted share of low ESG issues firms in a fund's portfolio.	SUST, AE
No controversies	Peer-adjusted share of firms with no ESG controversies in a fund's portfolio.	SUST, AE
B. Main independent variables		
Ownership	Dummy variable equal to 1 if managerial ownership is above \$0 in a given quarter and 0 otherwise.	SEC, MC, AE
Ln(1+\$Ownership)	Logarithm of 1 plus a fund's total managerial ownership in USD. In the case of team-managed funds, we construct the aggregate ownership of the team by adding up each manager's ownership stakes in the fund.	SEC, MC, AE

Ln(1+Mean ship) \$Ownership/AUM	Logarithm of 1 plus a fund's average managerial ownership in USD.	SEC, MC, AE
%Ownership/AUM	Percentage of total managerial ownership over total assets under management, trimmed at the 99th percentile.	SEC, MC, AE
ChangeOwnership	Categorical variable that takes the value of 1 for funds with a positive change in ownership, 0 for no change, and -1 for a negative ownership change.	SEC, AE
ChangeLn(1+\$Ownership)	Logarithm of 1 plus a fund's total managerial ownership change in USD. In the case of a negative change in ownership, we multiply the logarithm of 1 plus the absolute value of the change in dollar ownership by -1.	SEC, AE
OwnershipIncrease	Indicator variable equal to 1 for episodes of positive change in managerial ownership and 0 otherwise.	SEC, AE
OwnershipDecrease	Indicator variable equal to 1 for episodes of negative change in managerial ownership and 0 otherwise.	SEC, AE
Fixed pay	Indicator variable equal to 1 for managers compensated exclusively with a fixed salary.	SEC, MC, AE
AUM pay	Indicator variable equal to 1 for managers also compensated based on assets under management.	SEC, MC, AE
Advisor profit pay	Indicator variable equal to 1 for managers also compensated based on their advisor's profit.	SEC, MC, AE
Performance pay	Indicator variable equal to 1 for managers also compensated based on their fund's financial performance.	SEC, MC, AE
Performance pay only	Indicator variable equal to 1 for managers compensated exclusively based on their fund's financial performance.	SEC, MC, AE

C. Main control variables

Returns (raw)	Fund's annual (monthly) raw net return.	CRSP
Fund size	Logarithm of a fund's total net assets in million USD.	CRSP, AE
Family size	Logarithm of the combined total net assets of the fund's family in a given quarter, net of fund size of a fund itself.	CRSP, AE
Fund age	A fund's age in full years from the date the fund was first offered.	CRSP, AE
Turnover	A fund's turnover ratio.	CRSP
Expense ratio	A fund's expense ratio.	CRSP
Fund performance	Cumulative quarterly net-of-fee return.	CRSP, AE
Fund flows	Quarterly net percentage mutual fund flows, computed as the change in total net assets excluding growth in total net assets as a result of fund returns.	CRSP, AE
Fund volatility	Standard deviation of a fund daily returns in a given quarter.	CRSP, AE
Team	Dummy variable equal to 1 if a fund is managed by more than one individual in a given quarter and 0 otherwise.	CRSP, AE
Female	Dummy variable equal to 1 if a fund is managed by a female manager (solo or in a team) in a given quarter and 0 otherwise.	CRSP, AE

Figure A1: Distribution of main variables

These graphs show the distribution of *Peer-adj. sustainability score* and $\text{Ln}(1+\$Ownership)$ for observations included in the main sample.

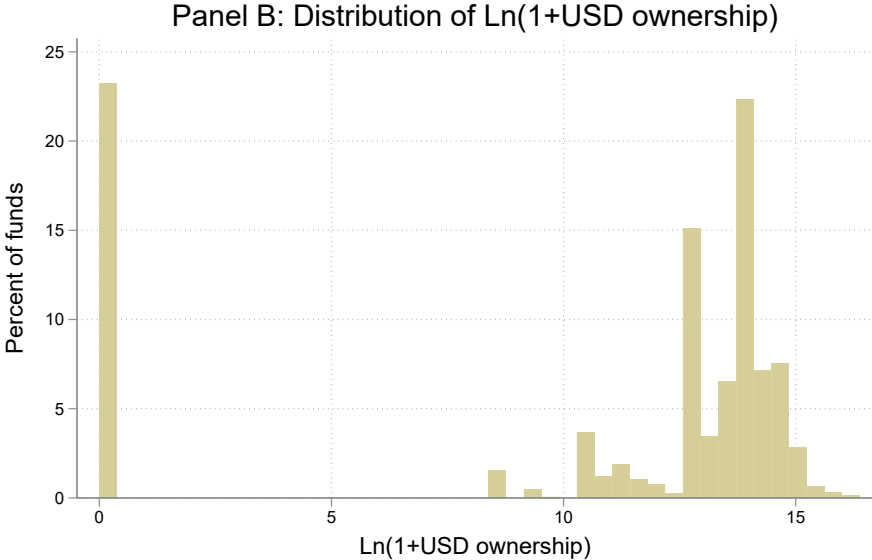
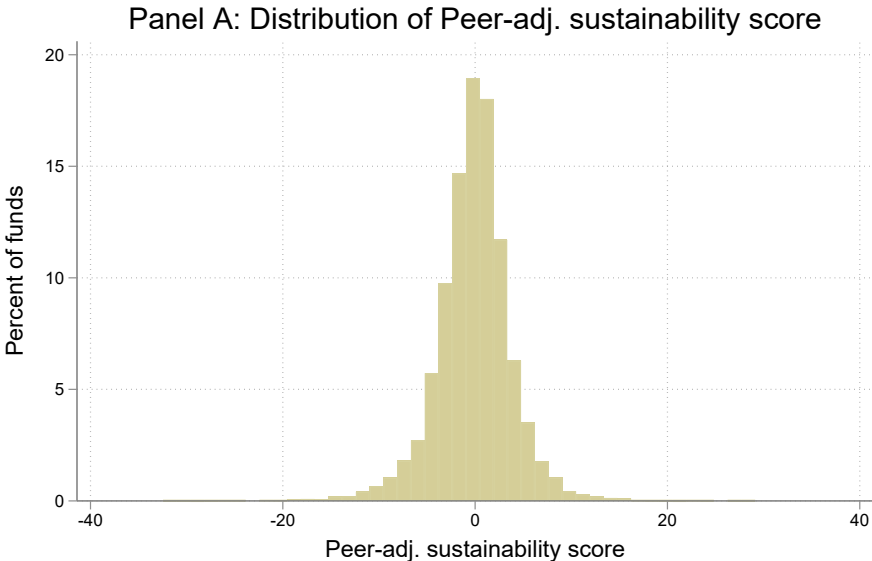


Table A2: Robustness: Placebo tests

This table shows the results of OLS regressions of funds' quarter-ahead peer-adjusted sustainability score on *Ownership* and $\text{Ln}(1+\$Ownership)$, from January 2015 through December 2020, for two “placebo” samples: US mutual funds with explicitly responsible investment mandates (specifications (1) and (2)) and US explicit indexer mutual funds (specifications (3) and (4)). The regressions control for lagged fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators), quarter-year and fund fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses.***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)			
	ESG-mandate funds		Index fund	
	(1)	(2)	(3)	(4)
Ownership	0.77 (0.70)		0.40 (0.85)	
Ln(1+\$Ownership)		0.05 (0.49)		0.03 (0.70)
Observations	1,512	1,512	2,834	2,834
R-squared	0.58	0.58	0.22	0.22
Constant & controls	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes

Table A3: Cross-sectional heterogeneity: ESG managers in conventional funds

This table shows the results of OLS regressions of funds' quarter-ahead peer-adjusted sustainability score on the main ownership variables (*Ownership* $\ln(1+\$Ownership)$) and an indicator equal to one if the managing team includes a manager of an explicitly sustainable fund (*ESG manager*), and its interactions with ownership variables. The regressions control for lagged fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators), quarter-year and fund fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses.***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)					
Ownership \times ESG manager	0.83 (1.24)	0.62 (1.47)	0.32 (0.58)			
$\ln(1+\$Ownership) \times$ ESG manager				0.06 (1.17)	0.05 (1.58)	0.04 (1.01)
Ownership	-2.22*** (-4.88)	-1.36*** (-4.55)	-1.57*** (-4.15)			
$\ln(1+\$Ownership)$				-0.18*** (-4.92)	-0.10*** (-4.43)	-0.12*** (-4.15)
ESG manager	-0.25 (-0.40)	-0.12 (-0.35)		-0.23 (-0.37)	-0.20 (-0.58)	
Observations	21,926	21,935	21,597	21,926	21,935	21,597
R-squared	0.50	0.25	0.56	0.50	0.25	0.56
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	No	No	Yes	No	No
Fund family FE	No	Yes	No	No	Yes	No
Manager/Team FE	No	No	Yes	No	No	Yes

Table A4: Robustness: Alternative fixed effects

This table shows the results of OLS regressions of funds' quarter-ahead peer-adjusted sustainability score on *Ownership* and $\text{Ln}(1+\$Ownership)$ from January 2015 through December 2020. The specifications are as in Table 2 but with different sets of fixed effects: Manager/team \times quarter-year (specifications (1) and (4)), Fund family \times quarter-year (specifications (2) and (5)), segment \times quarter-year fixed effects (specifications (1) and (4)). t-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-0.85*** (-2.82)	-1.12*** (-4.35)	-1.00*** (-4.92)			
Ln(1+\$Ownership)				-0.06** (-2.63)	-0.08*** (-4.19)	-0.07*** (-4.60)
Observations	8,332	19,290	21,925	8,332	19,290	21,925
R-squared	0.68	0.32	0.05	0.68	0.32	0.05
Constant & controls	Yes	Yes	Yes	Yes	Yes	Yes
Manager/Team x Quarter-year FE	Yes	No	No	Yes	No	No
Fund family x Quarter-year FE	No	Yes	No	No	Yes	No
Segment x Quarter-year FE	No	No	Yes	No	No	Yes

Table A5: Robustness: Additional demographic controls

This table replicates the main results in Table 2 controlling for additional demographic characteristics of fund managers: tenure and age (specifications (1) and (2)), education (specifications (3) and (4)) and the number of daughters (specifications (5) and (6)). The sample is restricted to mutual funds with solo managers. *MBAmin* is an indicator equal to 1 if the manager has an MBA, PhD, JD, or MD degree, while *Degree year* is the year of the most recent educational degree earned. *Daughters* is the number of daughters that a manager is parenting. The regressions control for lagged fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and female indicators) and quarter-year fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)					
	Age and tenure controls		Education controls		Demographic controls	
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-2.86*** (-3.40)		-3.37*** (-4.05)		-3.94*** (-3.26)	
Ln(1+\$Ownership)		-0.24*** (-3.42)		-0.28*** (-4.10)		-0.31*** (-3.42)
Tenure	0.08 (1.32)	0.08 (1.29)				
Manager age	-0.05 (-0.52)	-0.04 (-0.46)				
MBAmin			0.52 (0.65)	0.59 (0.70)		
Degree year			0.08 (1.68)	0.06 (1.16)		
Daughters					-1.00*** (-3.37)	-0.99*** (-3.35)
Observations	4,552	4,552	3,842	3,842	2,644	2,644
R-squared	0.58	0.58	0.63	0.63	0.60	0.60
Constant & controls	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes

Table A6: Robustness: Alternative dependent variables

This table shows the results of OLS regressions of alternative measures of funds' sustainability performance on *Ownership* and $\ln(1+\$Ownership)$, from January 2015 through December 2020. Panel A shows the estimated effect on *Sustainability rank*; Panel B on *Sustainability Globes*; and Panel C on the portfolio exposure to firms with different levels of ESG controversies. t-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

<i>Panel A: With sustainability ranking</i>						
Dep. variable:	Sustainability rank (t+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-1.24*** (-4.89)	-0.70*** (-4.06)	-0.91*** (-4.14)			
$\ln(1+\$Ownership)$				-0.10*** (-4.93)	-0.09*** (-4.44)	-0.06*** (-3.84)
Observations	21,926	21,935	21,597	21,926	21,935	21,597
R-squared	0.52	0.22	0.56	0.52	0.25	0.56
Constant & controls	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other FE	Fund	Family	Manager	Fund	Family	Manager
<i>Panel B: With sustainability Globes</i>						
Dep. variable:	Sustainability Globes (t+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-0.47*** (-4.36)	-0.27*** (-3.67)	-0.33*** (-3.48)			
$\ln(1+\$Ownership)$				-0.04*** (-4.26)	-0.02*** (-3.24)	-0.02*** (-3.27)
Observations	9,935	9,942	9,759	9,935	9,942	9,759
R-squared	0.66	0.27	0.63	0.66	0.27	0.63
Constant & controls	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other FE	Fund	Family	Manager	Fund	Family	Manager
<i>Panel C: With controversies score</i>						
Dep. variable:	Peer adj. share in portfolio (t+1)					
	Severe	High	Significant	Moderate	Low	No contr.
Ownership	0.58*** (4.21)	-0.18 (-0.75)	-0.11 (-0.23)	1.02** (2.22)	-0.62* (-1.81)	-0.71* (-1.73)
Observations	21,132	21,132	21,132	21,132	21,132	21,132
R-squared	0.47	0.58	0.69	0.60	0.54	0.72
Constant & controls	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	A8 Yes	Yes	Yes	Yes

Table A7: Robustness: Alternative ownership variables

This table shows the results of OLS regressions of funds' quarter-ahead peer-adjusted sustainability score on *Mean %Ownership* (Panel A) and *%Ownership/AUM* (Panel B). The sample includes active broadly diversified equity-only U.S. mutual funds from January 2015 through December 2020. The regressions control for lagged fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators). The regressions also include quarter-year fixed effects, and fund, fund family, or manager/team fixed effects. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

<i>Panel A: With Ln(Mean \$Ownership)</i>			
Dep. variable:	Peer-adj. sustainability score (t+1)		
	(1)	(2)	(3)
Ln(1+Mean \$Ownership)	-0.19*** (-5.14)	-0.10*** (-4.44)	-0.12*** (-4.19)
Observations	21,926	21,935	21,597
R-squared	0.50	0.25	0.56
<i>Panel B: With %Ownership/AUM</i>			
Dep. variable:	Peer-adj. sustainability score (t+1)		
	(1)	(2)	(3)
%Ownership/AUM	-0.64** (-2.31)	-0.54*** (-3.55)	-0.31 (-1.32)
Observations	21,723	21,733	21,396
R-squared	0.49	0.24	0.55
Constant & controls	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes
Fund FE	Yes	No	No
Fund family FE	No	Yes	No
Manager/Team FE	No	No	Yes

Table A8: Interpretation placebo tests: Difference-in-differences effects using index funds

This table shows the results of OLS regressions replicating the analyses in Tables 4 and 5 with the sub-sample of explicit index U.S. mutual funds. t -statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)			
	(1)	(2)	(3)	(4)
Panel A: Introduction of Globes				
Dep. variable:	Peer-adj. sustainability score (t+1)			
	(1)	(2)	(3)	(4)
Ownership \times PostGlobes	0.10 (0.60)	0.28 (1.37)		
Ln(1+\$Ownership) \times PostGlobes			0.01 (0.83)	0.03 (1.56)
Ownership	-0.13 (-0.18)	-0.26 (-0.35)		
Ln(1+\$Ownership)			-0.03 (-0.45)	-0.04 (-0.58)
Observations	927	927	927	927
R-squared	0.48	0.50	0.48	0.50
Panel B: Covid-19				
Ownership \times Covid-19	0.66 (1.43)	0.65 (1.15)		
Ln(1+\$Ownership) \times Covid-19			0.06 (1.43)	0.05 (1.11)
Ownership	1.30* (2.11)	1.17 (1.80)		
Ln(1+\$Ownership)			0.08 (1.58)	0.08 (1.36)
Observations	1,379	1,379	1,379	1,379
R-squared	0.22	0.23	0.22	0.22
Constant & controls	Yes	Yes	Yes	Yes
Controls \times Post	No	Yes	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes

Figure A2: Effect of changes in sustainability performance on managerial ownership

This graph shows in binned scatter plots the effect of changes in peer-adjusted sustainability score on quarter-ahead $\text{Ln}(1+\text{\$Ownership})$. The graph controls for fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators) and family and year-quarter fixed effects.

