european corporate governance institute

Revealed Beliefs about Responsible Investing: Evidence from Mutual Fund Managers

Finance Working Paper N° 883/2023
Revised December 2023

Vitaly Orlov
University of St. Gallen and Swiss Finance Institute
Stefano Ramelli
University of St. Gallen and Swiss Finance Institute
Alexander F. Wagner
University of Zurich, Swiss Finance Institute, CEPR and ECGI

© Vitaly Orlov, Stefano Ramelli and Alexander F. Wagner 2023. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

This paper can be downloaded without charge from:
https://doi.org/10.67929/ecgi-fin-883-2023

european corporate governance institute

ECGI Working Paper Series in Finance

Revealed Beliefs about Responsible Investing: Evidence from Mutual Fund Managers

Working Paper N° 883/2023

December 2023

Vitaly Orlov
Stefano Ramelli
Alexander F. Wagner

We thank Tobias Bauckloh, Ryan Bubb, Caitlin Dannhauser, Francois Degeorge, Tinghua Duan, Alberta Di Giuli, Francesco Franzoni, Juan-Pedro Gomez, Florian Hoffmann, Alexander Kempf, Nadya Malenko, Matt Levine, Hao Liang, and Arthur Romec as well as participants at seminars at the University of Piraeus, Swiss Finance Institute, the Centre for Financial Research at the University of Cologne, and KU Leuven and at the Indonesian Financial Management Association Conference for their insightful comments. We also thank Zachary Matteucci, Simon Wettstein, and Vithujan Shanmugaratnam for their excellent research assistance. The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

© Vitaly Orlov, Stefano Ramelli and Alexander F. Wagner 2023. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Abstract

We explore the relationship between US mutual fund managers' incentives to deliver high returns and their portfolio Environmental, Social, and Governance (ESG) performance. Mutual funds with managerial ownership (``skin in the game'') exhibit lower ESG performance than otherwise similar funds. This effect is stronger for managers paid to maximize assets under management. Co-investing managers are less likely to buy high-ESG stocks after exogenous shocks in the flow incentives to hold such assets. Overall, the results suggest that fund managers, on average, do not consider ESG selection an enhanced form of portfolio management to maximize risk-adjusted returns.

Keywords: ESG, portfolio management, investor beliefs, mutual funds, skin-in-the-game, sustainability

JEL Classifications: G11, G23

Vitaly Orlov*
Assistant Professor of Finance
University of St. Gallen
Unterer Graben 21
CH-9000 St.Gallen, Switzerland
phone: +41 78 724 47 46
e-mail: vitaly.orlov@unisg.ch

Stefano Ramelli
Assistant Professor
University of St. Gallen
Unterer Graben 21
9000 St. Gallen, Switzerland
phone: +41 71 224 7029
e-mail: Stefano.ramelli@unisg.ch

Alexander F. Wagner
Professor of Finance
University of Zurich
Plattenstr. 14
CH-8032 Zürich, Switzerland
phone: +41 446 343 963
e-mail: alexander.wagner@bf.uzh.ch

*Corresponding Author

s:fi
RESEARCH

Swiss Finance Institute Research Paper Series N°22-98

Revealed Beliefs about Responsible Investing: Evidence from Mutual Fund Managers

Vitaly Orlov
University of St. Gallen

Stefano Ramelli
University of St. Gallen, and Swiss Finance Institute

Alexander F. Wagner
University of Zurich, Swiss Finance Institute, ECGI, and CEPR

Revealed Beliefs about Responsible Investing: Evidence from Mutual Fund Managers *

Vitaly Orlov[†], Stefano Ramelli[‡], and Alexander F. Wagner[§]

December 14, 2023

Abstract

We explore the relationship between US mutual fund managers' incentives to deliver high returns and their portfolio Environmental, Social, and Governance (ESG) performance. Mutual funds with managerial ownership ("skin in the game") exhibit lower ESG performance than otherwise similar funds. This effect is stronger for managers paid to maximize assets under management. Co-investing managers are less likely to buy high-ESG stocks after exogenous shocks in the flow incentives to hold such assets. Overall, the results suggest that fund managers, on average, do not consider ESG selection an enhanced form of portfolio management to maximize risk-adjusted returns.

JEL Classification: G11, G23
Keywords: Agency costs, ESG, portfolio management, investor beliefs, mutual funds, skin in the game, sustainability

*We thank Tobias Bauckloh, Ryan Bubb, Caitlin Dannhauser, Francois Degeorge, Tinghua Duan, Alberta Di Giuli, Francesco Franzoni, Juan-Pedro Gomez, Florian Hoffmann, Alexander Kempf, Nadya Malenko, Matt Levine, Hao Liang, and Arthur Romec as well as participants at seminars at the University of Piraeus, Swiss Finance Institute, the Centre for Financial Research at the University of Cologne, and KU Leuven and at the Indonesian Financial Management Association Conference for their insightful comments. We also thank Zachary Matteucci, Simon Wettstein, and Vithujan Shanmugaratnam for their excellent research assistance. The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

[†]University of St. Gallen and Swiss Finance Institute. E-mail: vitaly.orlov@unisg.ch
[‡]University of St. Gallen and Swiss Finance Institute. Email: stefano.ramelli@unisg.ch
[§]University of Zurich, CEPR, ECGI, and Swiss Finance Institute. Email: alexander.wagner@bf.uzh.ch.

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.

[1] Institutional 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).

This paper employs a revealed beliefs approach to shed light on how fund managers – a group of presumably sophisticated investors – perceive ESG investment strategies.

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 portfolio selection choices, we aim 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 1,214 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

[2]For 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. The observed effect is economically sizable. A one-standard-deviation higher USD amount of managerial ownership is associated with almost one-quarter of a one-standard-deviation lower peer-adjusted ESG performance.

This negative relationship holds when controlling for fund family, fund, and manager fixed effects and with alternative measures of managerial ownership and portfolio sustainability. The results also hold controlling for differences in fund managers' compensation contracts. Interestingly, 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. All these results confirm the effects of fund managers' skin in the

game on portfolio sustainability.

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). Two additional pieces of evidence further support 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 Sus-

[3]In 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.

tainability 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. Second, skin-in-the-game managers shifted their portfolios less toward high-ESG stocks during the Covid-19 financial market turbulence, a period when demand for sustainable investments surged.

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

[4]Our 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).

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

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 portfolio sustainability – fund managers' skin in the game.

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.

[6]Morningstar'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%.

[7]Starting 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.

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.

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 1,214 funds. Our final sample covers 22,770 observations, which is 96.10% of all fund-quarter observations of US broadly diversified domestic equity mutual funds.[8]

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

[8]The remaining 3.90% of fund-quarter observations without managerial ownership details primarily occur due to funds being merged or seizing 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, Cochardt, and Orlov (2022) and search for managerial family background information, specifically the number 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 $802,460 (or 0.31% of assets under management). The average fund in our sample has about $6 billion in assets under management, comes from a family of funds that has $9.5 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 7.32% of assets to firms with severe and high ESG issues and 22.89% 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 around $760,000 in the first quarter of 2015 to around $850,00 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.[9] 32% of fund managers have their compensation tied exclusively to financial performance.

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

[9]In 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 Skin in the game 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 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) through (3)) or *Ln(1+$Ownership)* (specifications (4) through (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 family, and manager/team fixed effects, depending on the specification.[10] Further below, we consider other fixed effects and also 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 family fixed effects, managerial-owned funds have one-third of one standard deviation lower sustainability performance ($1.26/3.86 = 0.53$).

We obtain similar inferences when looking at the continuous measure of managerial own-

[10]For 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. Following 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.

ership (specifications (4) to (6)). Based on the estimated coefficient of 0.09 in the specification (4), a one-standard-deviation higher USD amount of managerial ownership (5.42) is associated with around one-eighth of a standard deviation lower peer-adjusted ESG performance ($5.42 \times 0.09 = 0.49$, $0.49/3.86 = 0.13$). 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. Among funds with some managerial ownership, the relation between the level of ownership and portfolio sustainability performance is less pronounced. However, we will see in Section 3.3 that increases (decreases) in managerial ownership are associated with decreases (increases) in portfolio sustainability.

- Figure 3 -

Next, in specifications (2) and (4) in Table 2, we introduce variables related to managerial compensation structure. This is potentially important because managerial compensation can significantly influence the degree of agency conflicts in mutual funds (Chevalier and Ellison, 1997; Ma, Tang, and Gomez, 2019). We control for three common elements of managerial compensation structure: compensation linked to AUM (*AUM pay*), advisory profitability (*Advisor profit pay*), and the fund's financial performance (*Performance pay*). We also include the indicator *Performance pay only*, equal to one for managers paid exclusively

based on financial performance.[11]

Performance-based compensation could be hypothesized to have an effect similar to managerial ownership. However, note that performance-based compensation is asymmetric: managers receive a bonus for outperforming their benchmarks, but they are not directly financially 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. Indeed, regressions (2) and (5) show that there is no significant direct effect of performance-based pay. However, the main effect of ownership remains robust. The next section will explore how different elements of the remuneration structure interact with managerial ownership.

Finally, in specifications (3) and (6), we include manager/team fixed effects, allowing us to control for fund managers' time-invariant differences in adopting ESG strategies, such as political attitudes, or possible differences between funds primarily targeting retail investors and funds primarily targeting institutional investors.[12] Put differently, these fixed effects identify the managerial ownership effect from managerial turnover within funds. We obtain similar estimates as with other, less stringent specifications.

Overall, these results indicate a negative relationship between a fund's managerial ownership and sustainability performance.

[11]Ma, Tang, and Gomez (2019) show that the probability of having the compensation linked to the advisor's profit (*Advisor profit pay*) is significantly higher if the manager is a founder or co-owner of the advisory firm (twice more likely in our sample). Our results remain unchanged when adding an eponymous manager indicator in our regressions.

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

3.2 Interactions with managers' compensation structure

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, we expect ESG performance to be less influenced by managerial ownership for managers contractually incentivized to focus on financial performance. In Table 3, we consider this interaction effect.

In specifications (1) and (3), we find that for managers exclusively paid 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* × *Performance pay only* and *Ln(1+$Ownership)* × *Performance pay only*.[13] Once controlling for this heterogeneity, we do also find that managers paid exclusively 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*).

- Table 3 -

The regression results in columns (2) and (4) show a statistically significant positive coefficient on *AUM pay*, which means that, accounting for heterogeneity due to ownership, 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

[13]There is very little variation in compensation structure within funds which is why we use fund family fixed effects in this analysis.

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 (2) 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).[14]

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.

3.3 Effects of managerial ownership changes

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

In our sample, we identify 1,097 fund-quarter observations with changes in managerial ownership, with an average change of $69,657. Of these episodes, 647 are increases in owner-

[14]In results available upon request, we also test the effect of having compensation exclusively based on 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.

ship, and 450 are decreases in ownership. 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 4 -

Panel A in Table 4 reports the results of regressions of quarter-ahead changes in sustainability performance on various measures of ownership changes.[15] We find that increases

[15]These 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.

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

3.4 Placebo tests and robustness

In what follows, we briefly discuss the results of placebo tests and an extensive set of robustness checks. The underlying tables can be found in the Appendix.

3.4.1 Placebo tests

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 trading decisions.

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.

3.4.2 Alternative fixed effects

In Appendix Table A4, we augment our primary analyses in Table 2 with alternative sets of fixed effects. First, while we controlled for family fixed effects in the main specification, approaches to ESG topics may differ on a fund level. Thus, we include fund fixed effects in specification (1), Panels A and B. Comparing within funds, we observe even higher magnitudes of the negative ownership effect, suggesting that fund family policies explained part of the sustainability-ownership relationship.

In specification (2), we introduce family-by-quarter-year fixed effects. In specification (3),

we add manager/team-by-quarter-year interaction fixed effects.[16] Finally, in specification (4), we introduce segment-by-quarter-year fixed effects. All the point estimates of interest remain negative and highly statistically significant.

3.4.3 Controlling for manager demographic characteristics

In Appendix Table A5, we replicate our main analysis 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).[17] Accounting for these additional demographic characteristics does not affect our main coefficients of interest.

3.4.4 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

[16]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, corresponding to 8,334 fund-quarter observations.

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

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, *Ln(1+Mean $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 0.18 in the specification (1), a one-standard-deviation higher *Ln(1+Mean $Ownership)* is associated with a decrease in more than one-forth of one standard deviation in ESG performance ($5.42 \times 0.18 = 0.97$, $0.97/3.86 = 0.25$).

Regressions in Panel B look at the effect of total managerial ownership relative to the fund's asset under management (*%Ownership/AUM*). This variable captures fund managers' "skin in the game" relative to all the other fund investors rather than absolute incentives.[18] 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-deviation higher *%Ownership/AUM* (0.75) 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.

[18]For 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.

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).[19] 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).[20]

In this section, we provide further evidence supporting the role of fund managers' beliefs in driving the negative relation between managerial ownership and portfolio ESG performance. According to our interpretation, managers decide their funds' ESG tilt to balance a trade-off between financial performance and higher flows. Hence, ideally, we would study the effects of an exogenous shock in the incentives to deliver higher financial return (skin in the game) on the portfolio ESG exposure. Such an exogenous shock does not seem to be available, at least not over our sample period. Fortunately, we can employ an equivalent exogenous variation in our relationship of interest. In particular, there are exogenous shocks in the incentives to

[19]Managerial actions can reveal beliefs following two potential timings: 1) Managers first co-invest and then actively reduce the fund's ESG tilt, or 2) managers anticipate a fund's high ESG tilt and, hence, decide not to co-invest. Our analyses of ownership changes (section 3.3) and the placebo tests (section 3.4.1) speak in favor of the first timing, but both are perfectly consistent with the "Revealed beliefs" interpretation.

[20]Consistent 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.

hold high-ESG stocks to attract flows. While we expect managers on average to rebalance their portfolios by increasing the ESG score in response to such shocks, we expect fund managers with skin in the game to increase ESG scores less than managers without skin in the game.

First, we consider the publication of Morningstar's Sustainability Globes in March 2016, 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 5, 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* × *PostGlobes* and *Ln(1+$Ownership)* × *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 5 -

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.[21] The difference-in-differences effect is economically important, corresponding to more than 7% of a standard deviation in peer-adjusted sustainability score. We obtain similar inferences when employing the 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.[22] 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 6 -

In Table 6, we regress fund peer-adjusted sustainability scores over the period from 2018-

[21]Besides fund managers' trading decisions, quarterly changes in portfolio ESG scores may also derive 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 5 to fund managers' behavior.

[22]In 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).

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.[23] In specifications (2) and (4), we also interact the control variables with *Covid-19*. Both measures of managerial co-ownership 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.

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 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?

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

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 presumably 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.

References

Agarwal, Vikas, Alexander Cochardt, and Vitaly Orlov, 2022, Birth order and fund manager's trading behavior: Role of sibling rivalry, Working Paper.

Agarwal, Vikas, Naveen D. Daniel, and Narayan Y. Naik, 2009, Role of managerial incentives and discretion in hedge fund performance, *The Journal of Finance* 64, 2221–2256.

Agarwal, Vikas, Lei Jiang, and Quan Wen, 2022, Why do mutual funds hold lottery stocks?, *Journal of Financial and Quantitative Analysis* 57, 825–856.

Albuquerque, Rui A., Yrjo Koskinen, and Raffaele Santioni, 2023, Mutual fund trading and ESG clientele during the COVID-19 stock market crash, Working Paper.

Albuquerque, Rui A., Yrjo Koskinen, Shuai Yang, and Chendi Zhang, 2020, Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash, *Review of Corporate Finance Studies* 9, 593–621.

Azar, José, Miguel Duro, Igor Kadach, and Gaizka Ormazabal, 2021, The big three and corporate carbon emissions around the world, *Journal of Financial Economics* 142, 674–696.

Barber, Brad M., Adair Morse, and Ayako Yasuda, 2021, Impact investing, *Journal of Financial Economics* 139, 162–185.

Bauer, Rob, Tobias Ruof, and Paul Smeets, 2021, Get real! Individuals prefer more sustainable investments, *The Review of Financial Studies* 34, 3976–4043.

BlackRock, 2022, BlackRock ESG statement, Available at `www.blackrock.com`.

Bollen, Nicolas P.B., 2007, Mutual fund attributes and investor behavior, *Journal of Financial and Quantitative Analysis* 42, 683–708.

Ceccarelli, Marco, Stefano Ramelli, and Alexander F. Wagner, 2023, Low carbon mutual funds, *Review of Finance* forthcoming.

Chen, Yong, and Wenting Dai, 2023, Seeking green? Mutual fund investment in ESG stocks, Working Paper.

Cheng, Ing-Haw, Sahil Raina, and Wei Xiong, 2014, Wall Street and the housing bubble, *American Economic Review* 104, 2797–2829.

Chevalier, Judith, and Glenn Ellison, 1997, Risk taking by mutual funds as a response to incentives, *Journal of Political Economy* 105, 1167–1200.

Chevalier, Judith, and Glenn Ellison, 1999, Career concerns of mutual fund managers, *The Quarterly Journal of Economics* 114, 389–432.

Costello, Charlie, Rachel Li, Sugata Ray, and Parth Venkat, 2022, Personal convictions and ESG investing, Working Paper.

Cremers, Martijn, Joost Driessen, Pascal Maenhout, and David Weinbaum, 2009, Does skin in the game matter? Director incentives and governance in the mutual fund industry, *Journal of Financial and Quantitative Analysis* 44, 1345–1373.

Cremers, Martijn, Timothy B. Riley, and Rafael Zambrana, 2023, The complex materiality of ESG ratings: Evidence from actively managed ESG funds, Working Paper.

Cronqvist, Henrik, and Frank Yu, 2017, Shaped by their daughters: Executives, female socialization, and corporate social responsibility, *Journal of Financial Economics* 126, 543–562.

Dannhauser, Caitlin D, and Harold D Spilker III, 2023, The modern mutual fund family, *Journal of Financial Economics* 148, 1–20.

Di Giuli, Alberta, Alexandre Garel, and Arthur Petit-Romec, 2023, The voting behavior of women-led mutual funds, Working Paper.

Ding, Wenzhi, Ross Levine, Chen Lin, and Wensi Xie, 2021, Corporate immunity to the COVID-19 pandemic, *Journal of Financial Economics* 141, 802–830.

Döttling, Robin, and Sehoon Kim, 2022, Sustainability preferences under stress: Evidence from mutual fund flows during COVID-19, *Journal of Financial and Quantitative Analysis* Forthcoming.

Dyck, Alexander, Karl V. Lins, Lukas Roth, and Hannes F. Wagner, 2019, Do institutional investors drive corporate social responsibility? International evidence, *Journal of Financial Economics* 131, 693–714.

Elton, Edwin J, 1999, Presidential address: Expected return, realized return, and asset pricing tests, *The Journal of Finance* 54, 1199–1220.

Evans, Richard B., 2010, Mutual fund incubation, *The Journal of Finance* 65, 1581–1611.

Ferrell, Allen, Hao Liang, and Luc Renneboog, 2016, Socially responsible firms, *Journal of Financial Economics* 122, 585–606.

Gantchev, Nickolay, Mariassunta Giannetti, and Rachel Li, 2021, Sustainability or performance? Ratings and fund managers' incentives, Working Paper.

Ghitti, Marco, Gianfranco Gianfrate, and Edoardo Reccagni, 2022, Executive ownership and sustainability performance, Working Paper.

Gibson Brandon, Rajna, Simon Glossner, Philipp Krueger, Pedro Matos, and Tom Steffen, 2022, Do responsible investors invest responsibly?, *Review of Finance* 26, 1389–1432.

Giglio, Stefano, Matteo Maggiori, Johannes Stroebel, Zhenhao Tan, Stephen Utkus, and Xiao Xu, 2023, Four facts about ESG beliefs and investor portfolios, Working Paper.

Gillan, Stuart L., Andrew Koch, and Laura T. Starks, 2021, Firms and social responsibility: A review of ESG and CSR research in corporate finance, *Journal of Corporate Finance* 66, 101889.

Glossner, Simon, Pedro Matos, Stefano Ramelli, and Alexander F. Wagner, 2022, Do institutional investors stabilize equity markets in crisis periods? Evidence from COVID-19, Working Paper.

Gollier, Christian, and Sébastien Pouget, 2014, The "washing machine": Investment strategies and corporate behavior with socially responsible investors, Working Paper.

Hartzmark, Samuel M., and Abigail B. Sussman, 2019, Do investors value sustainability? A natural experiment examining ranking and fund flows, *The Journal of Finance,* 74, 2789–2837.

Heath, Davidson, Daniele Macciocchi, Roni Michaely, and Matthew C. Ringgenberg, 2023, Does socially responsible investing change firm behavior?, *Review of Finance* Forthcoming.

Heinkel, Robert, Alan Kraus, and Josef Zechner, 2001, The effect of green investment on corporate behavior, *Journal of Financial and Quantitative Analysis* 36, 431–449.

Index Industry Association, IIA, 2022, Annual global ESG asset manager survey, Available at `www.indexindustry.org`.

Jensen, Michael C, and William H Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305–360.

Khorana, Ajay, Henri Servaes, and Lei Wedge, 2007, Portfolio manager ownership and fund performance, *Journal of Financial Economics* 85, 179–204.

Krüger, Philipp, Zacharias Sautner, and Laura T. Starks, 2020, The importance of climate risks for institutional investors, *Review of Financial Studies* 33, 1067–1111.

Liang, Hao, Lin Sun, and Melvyn Teo, 2022, Responsible hedge funds, *Review of Finance* 26, 1585–1633.

Lowry, Michelle, Pingle Wang, and Kelsey D. Wei, 2023, Are all ESG funds created equal? Only some funds are committed, Working Paper.

Ma, Linlin, and Yuehua Tang, 2019, Portfolio manager ownership and mutual fund risk taking, *Management Science* 65, 5518–5534.

Ma, Linlin, Yuehua Tang, and Juan-Pedro Gomez, 2019, Portfolio manager compensation in the us mutual fund industry, *The Journal of Finance* 74, 587–638.

Maxfield, Sylvia, and Liu Wang, 2021, Does sustainable investing reduce portfolio risk? A multilevel analysis, *European Financial Management* 27, 959–980.

Michaely, Roni, Guillem Ordonez-Calafi, and Silvina Rubio, 2021, Mutual funds' strategic voting on environmental and social issues, Working Paper.

Pástor, Ľuboš, and M. Blair Vorsatz, 2020, Mutual fund performance and flows during the COVID-19 crisis, *The Review of Asset Pricing Studies* 10, 791–833.

Pástor, Ľuboš, Robert F. Stambaugh, and Lucian A. Taylor, 2020, Sustainable investing in equilibrium, *Journal of Financial Economics* 142, 550–571.

Pástor, Ľuboš, Robert F. Stambaugh, and Lucian A. Taylor, 2022, Dissecting green returns, *Journal of Financial Economics* 146, 403–424.

Renneboog, Luc, Jenke Ter Horst, and Chendi Zhang, 2008, The price of ethics and stakeholder governance: The performance of socially responsible mutual funds, *Journal of Corporate Finance* 14, 302–322.

Renneboog, Luc, Jenke Ter Horst, and Chendi Zhang, 2011, Is ethical money financially smart? Nonfinancial attributes and money flows of socially responsible investment funds, *Journal of Financial Intermediation* 20, 562–588.

Scheld, Dominik, and Oscar Anselm Stolper, 2023, Got skin in the game? Investor reaction to managers' signaling of private investments in mutual funds, Working Paper.

Sustainalytics, 2021, Overview of Sustainalytics' material ESG issues, Available at: `www.sustainalytics.com`.

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.

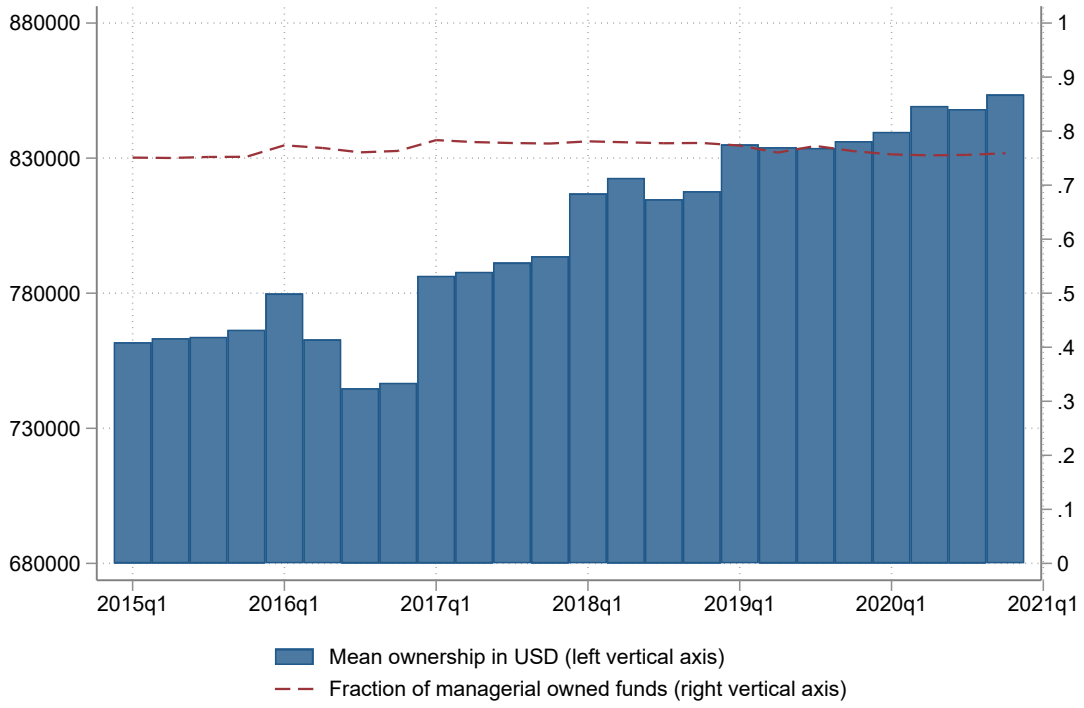
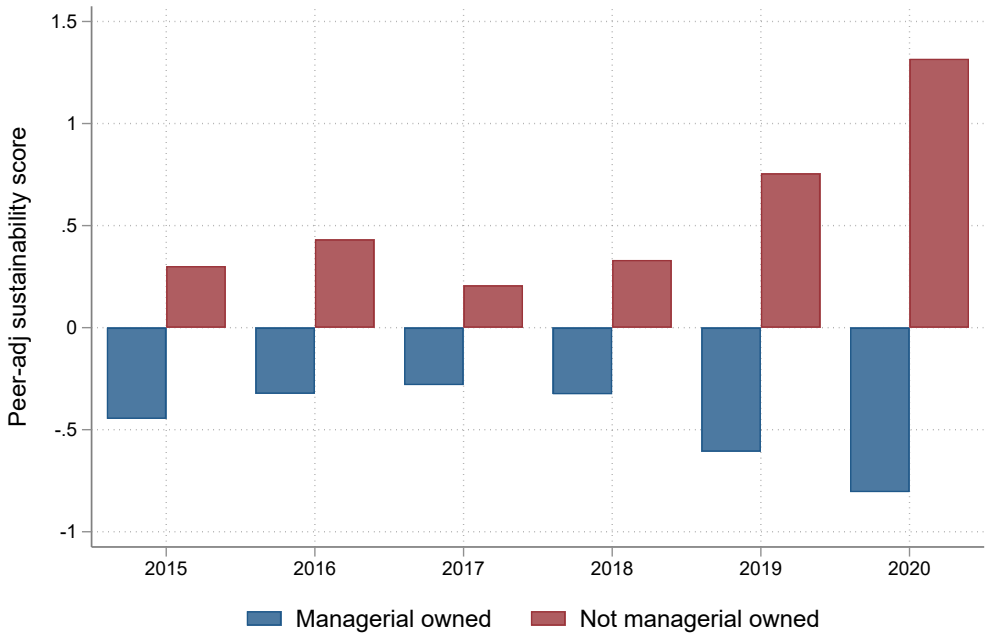


Figure 2: Fund managerial ownership and portfolio sustainability performance
Panel A shows the annual average peer-adjusted sustainability score for mutual funds with and without managerial ownership from the beginning of 2015 through the end of 2020. Panel B shows the distributions of Morningstar sustainability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



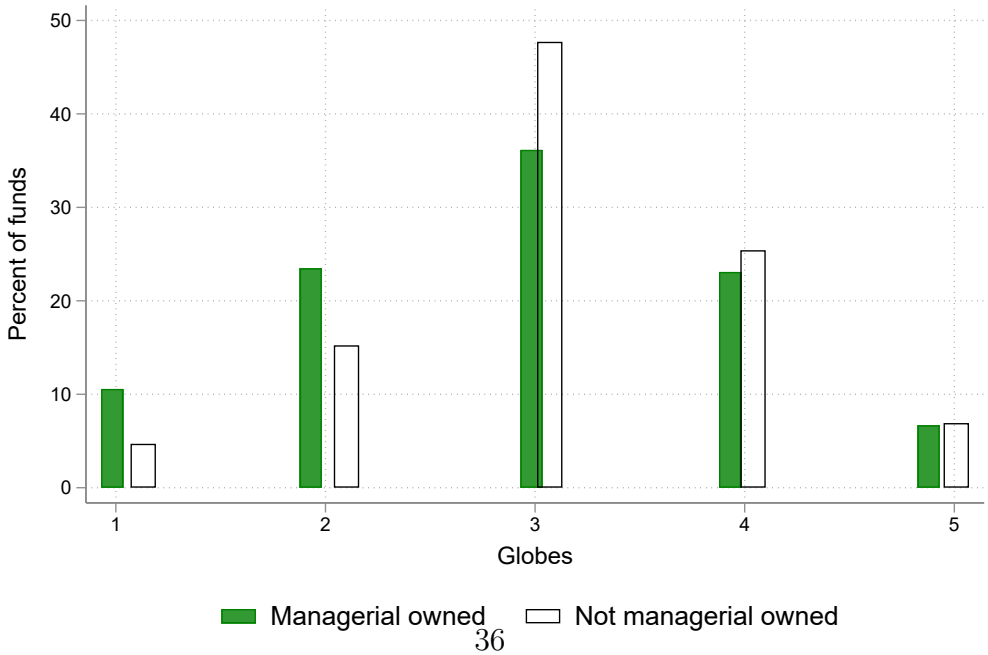


Figure 3: Fund managerial ownership and portfolio sustainability
This binned scatter plot shows the relationship between funds' quarter-ahead peer-adjusted sustainability score and *Ln(1+$Ownership)*. The graph controls for fund characteristics (fund size, fund family size, expense ratio, turnover, fund flows, returns, volatility, and team and female indicators) and family and year-quarter fixed effects.

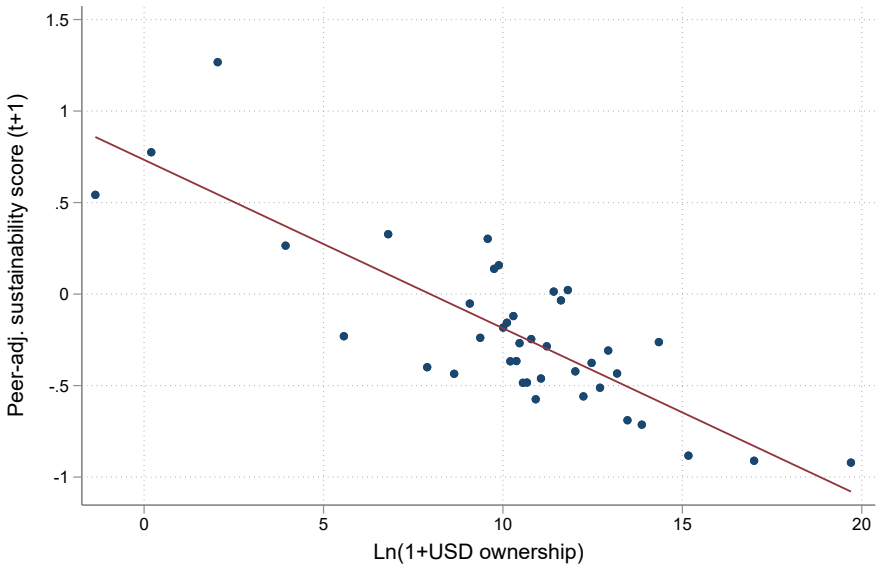
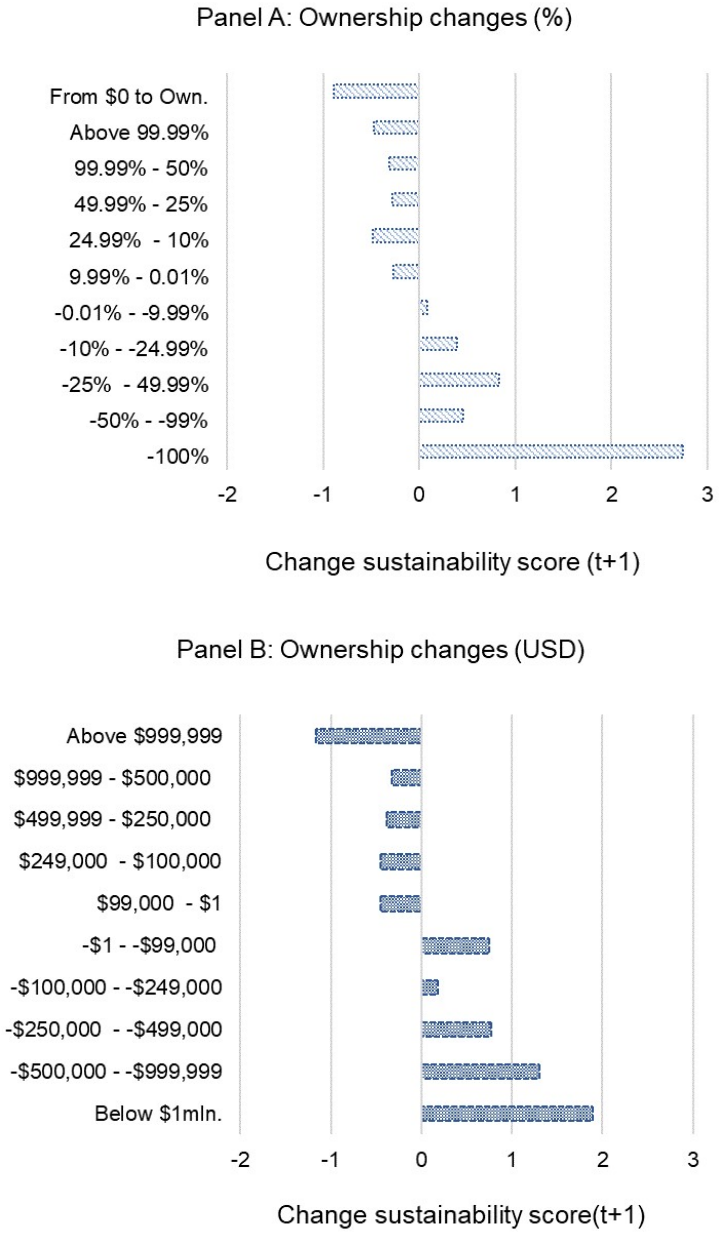


Figure 4: Changes in managerial ownership and changes in sustainability performance

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	22,770	0.00	1.00	0.77	1.00	1.00	1.00	0.42
Ln(1+$Ownership)	22,770	0.00	9.21	10.20	13.30	13.86	16.38	5.74
Ln(1+Mean$Ownership)	22,770	0.00	8.36	9.57	12.50	13.38	14.65	5.42
$Ownership (/1,000)	22,770	0.00	10.00	802.46	600.00	1,050.00	13,000.01	1,008.87
%Ownership/AUM	22,401	0.00	0.00	0.31	0.04	0.20	6.12	0.75
Peer-adj. sustainability score	22,780	-32.80	-2.23	-0.22	-0.10	1.89	29.80	3.86
Sustainability rank	22,780	1.00	3.00	5.42	5.00	8.00	10.00	2.88
Globes	9,360	1.00	2.00	2.97	3.00	4.00	5.00	1.04
Severe controversies	21,140	0.00	0.00	1.30	0.00	1.95	18.77	2.21
High controversies	21,140	0.00	0.00	6.02	3.80	10.84	39.32	6.41
Significant controversies	21,140	0.00	3.54	21.82	23.73	36.95	76.76	17.27
Moderate controversies	21,140	0.00	22.95	30.00	30.28	36.87	73.63	10.35
Low controversies	21,140	0.00	10.14	17.98	16.69	25.34	59.95	9.70
No controversies	21,140	0.00	5.83	22.89	13.76	38.64	96.17	21.05
Family size	22,738	0.18	8.09	9.51	10.00	11.07	15.25	2.52
Fund size	22,652	0.00	5.08	6.38	6.44	7.67	12.45	1.89
Fund age	22,780	0.00	15.81	24.10	20.85	27.27	96.53	13.79
Expense ratio	22,332	0.00	0.85	1.02	1.00	1.18	5.35	0.34
Turnover	22,332	0.00	0.25	0.57	0.45	0.74	8.84	0.51
Fund flows	22,580	-1.17	-0.05	0.03	-0.02	-0.00	422.53	3.31
Fund returns	22,668	-0.54	0.00	0.03	0.04	0.07	0.70	0.10
Fund volatility	22,770	0.00	4.83	7.63	6.87	9.72	31.67	3.69
Team	22,770	0.00	1.00	0.76	1.00	1.00	1.00	0.43
Female	22,770	0.00	0.00	0.18	0.00	0.00	1.00	0.38
Fixed pay	22,112	0.00	0.00	0.04	0.00	0.00	1.00	0.19
AUM pay	21,834	0.00	0.00	0.24	0.00	0.00	1.00	0.43
Advisor profit pay	21,834	0.00	0.00	0.56	1.00	1.00	1.00	0.50
Performance pay	22,112	0.00	1.00	0.89	1.00	1.00	1.00	0.31
Performance pay only	22,112	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. *t*-statistics, based on robust standard errors double-clustered at the fund and quarter levels, are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Peer-adj. sustainability score (t+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-1.26***	-1.34***	-1.56***			
	(-4.44)	(-4.56)	(-4.27)			
Ln(1+$Ownership)				-0.09***	-0.10***	-0.12***
				(-4.28)	(-4.39)	(-4.10)
AUM pay		0.21	0.45		0.19	0.47
		(0.54)	(1.06)		(0.50)	(1.12)
Advisor profit pay		-0.73	0.76		-0.73	0.75
		(-1.04)	(1.45)		(-1.04)	(1.44)
Performance pay		-0.49	-0.67		-0.48	-0.70
		(-1.00)	(-1.50)		(-0.97)	(-1.53)
Performance pay only		-0.61	0.69		-0.61	0.69
		(-0.82)	(1.15)		(-0.82)	(1.15)
Family size	-0.16	-0.14	0.38***	-0.17	-0.15	0.38***
	(-0.71)	(-0.58)	(3.06)	(-0.75)	(-0.62)	(3.04)
Fund size	0.02	0.03	-0.09	0.04	0.05	-0.08
	(0.34)	(0.44)	(-1.42)	(0.56)	(0.66)	(-1.22)
Age	-0.01	-0.00	0.01	-0.01	-0.00	0.01
	(-0.86)	(-0.35)	(1.53)	(-0.94)	(-0.43)	(1.35)
Expense ratio	-0.36	-0.37	-0.26	-0.36	-0.38	-0.27
	(-0.79)	(-0.76)	(-0.55)	(-0.80)	(-0.77)	(-0.55)
Turnover	-0.40**	-0.36**	0.14	-0.42**	-0.38**	0.15
	(-2.42)	(-2.12)	(0.68)	(-2.55)	(-2.27)	(0.71)
Flows	-0.02	-0.02	0.07**	-0.02	-0.02	0.07**
	(-0.91)	(-1.02)	(2.71)	(-0.86)	(-0.97)	(2.76)
Return	-1.20	-1.29	-0.02	-1.15	-1.24	-0.01
	(-1.10)	(-1.12)	(-0.03)	(-1.05)	(-1.08)	(-0.01)
Volatility	-0.24***	-0.25***	-0.04	-0.24***	-0.25***	-0.04
	(-4.80)	(-4.80)	(-0.83)	(-4.77)	(-4.77)	(-0.82)
Team	0.22	0.26		0.24	0.27	
	(1.23)	(1.37)		(1.34)	(1.47)	
Female	-0.09	-0.10		-0.09	-0.09	
	(-0.35)	(-0.36)		(-0.33)	(-0.34)	
Observations	21,943	21,043	20,716	21,943	21,043	20,716
R-squared	0.24	0.24	0.57	0.24	0.24	0.57
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	No	Yes	Yes	No
Manager/Team FE	No	No	Yes	No	No	Yes

Table 3: Heterogeneity across managers' compensation structures
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 × Performance pay only	1.27***			
	(2.98)			
Ownership × AUM pay		-1.12**		
		(-2.16)		
Ownership × Advisor profit pay		-0.48		
		(-1.03)		
Ownership × Performance pay		-1.61		
		(-1.21)		
Ln(1+$Ownership) × Performance pay only			0.09***	
			(2.84)	
Ln(1+$Ownership) × AUM pay				-0.09**
				(-2.20)
Ln(1+$Ownership) × Advisor profit pay				-0.03
				(-0.88)
Ln(1+$Ownership) × Performance pay				-0.10
				(-1.08)
Performance pay only	-1.08**		-1.03**	
	(-2.26)		(-2.13)	
AUM pay		1.16**		1.17**
		(2.23)		(2.24)
Advisor profit pay		0.11		0.05
		(0.20)		(0.10)
Performance pay		0.72		0.54
		(0.66)		(0.53)
Ownership	-1.84***	0.71		
	(-4.51)	(0.51)		
Ln(1+$Ownership)			-0.13***	0.04
			(-4.42)	(0.39)
Observations	21,043	21,314	21,043	21,314
R-squared	0.24	0.24	0.24	0.24
Constant & controls	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Family FE	Yes	Yes	Yes	Yes

Table 4: 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 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.

Panel A: Effects of changes in managerial ownership changes on sustainability

Dep. variable:	Change peer-adj. sustainability score (t+1)				
	(1)	(2)	(3)	(4)	(5)
ChangeOwnership	-0.45*				
	(-2.06)				
ChangeLn(1+$Ownership)		-0.03**			
		(-2.19)			
ChangeLn(1+$Ownership) (%)			-0.01*		
			(-1.82)		
OwnershipIncrease				-0.33**	
				(-2.53)	
OwnershipDecrease					0.73*
					(1.79)
Observations	20,777	20,777	20,599	20,777	20,777
R-squared	0.02	0.02	0.02	0.02	0.02
Controls	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Family FE	Yes	Yes	Yes	Yes	Yes

Panel B: Effects of changes in fund sustainability on managerial ownership

Dep. variable:	ChangeOwnership (t+1)	ChangeLn(1+$Ownership) (t+1)
Change peer-adj. sustainability score	-0.00	-0.02
	(-1.09)	(-1.11)
Observations	20,932	20,932
R-squared	0.03	0.02
Controls	Yes	Yes
Quarter-year FE	Yes	Yes
Family FE	Yes	Yes

Table 5: 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 *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 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 × PostGlobes	-0.27	-0.37*		
	(-1.85)	(-2.31)		
Ln(1+$Ownership) × PostGlobes			-0.01	-0.02
			(-1.18)	(-1.87)
Ownership	-0.56**	-0.48*		
	(-2.53)	(-2.14)		
Ln(1+$Ownership)			-0.05**	-0.04*
			(-2.71)	(-2.25)
Observations	6,853	6,853	6,853	6,853
R-squared	0.38	0.39	0.38	0.39
Constant & controls	Yes	Yes	Yes	Yes
Controls × PostGlobes	No	Yes	No	Yes
Family FE	Yes	Yes	Yes	Yes

Table 6: 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 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 × Covid-19	-0.76***	-0.77***		
	(-5.10)	(-3.82)		
Ln(1+$Ownership) × Covid-19			-0.06***	-0.06***
			(-5.20)	(-3.66)
Ownership	-1.64***	-1.63***		
	(-4.60)	(-4.47)		
Ln(1+$Ownership)			-0.12***	-0.12***
			(-4.38)	(-4.26)
Observations	11,074	11,074	11,074	11,074
R-squared	0.29	0.29	0.28	0.29
Constant & controls	Yes	Yes	Yes	Yes
Controls × Covid-19	No	Yes	No	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 $Ownership)	Logarithm of 1 plus a fund's average managerial ownership in USD.	SEC, MC, AE
%Ownership/AUM	Percentage of total managerial ownership over total assets under management, trimmed at the 99th percentile.	SEC, MC, AE
ChangeOwnership	Categorical variable that takes the value of 1 for funds with a positive change in ownership, 0 for no change, and -1 for a negative ownership change.	SEC, AE
ChangeLn(1+$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 *Ln(1+$Ownership)* for observations included in the main sample.

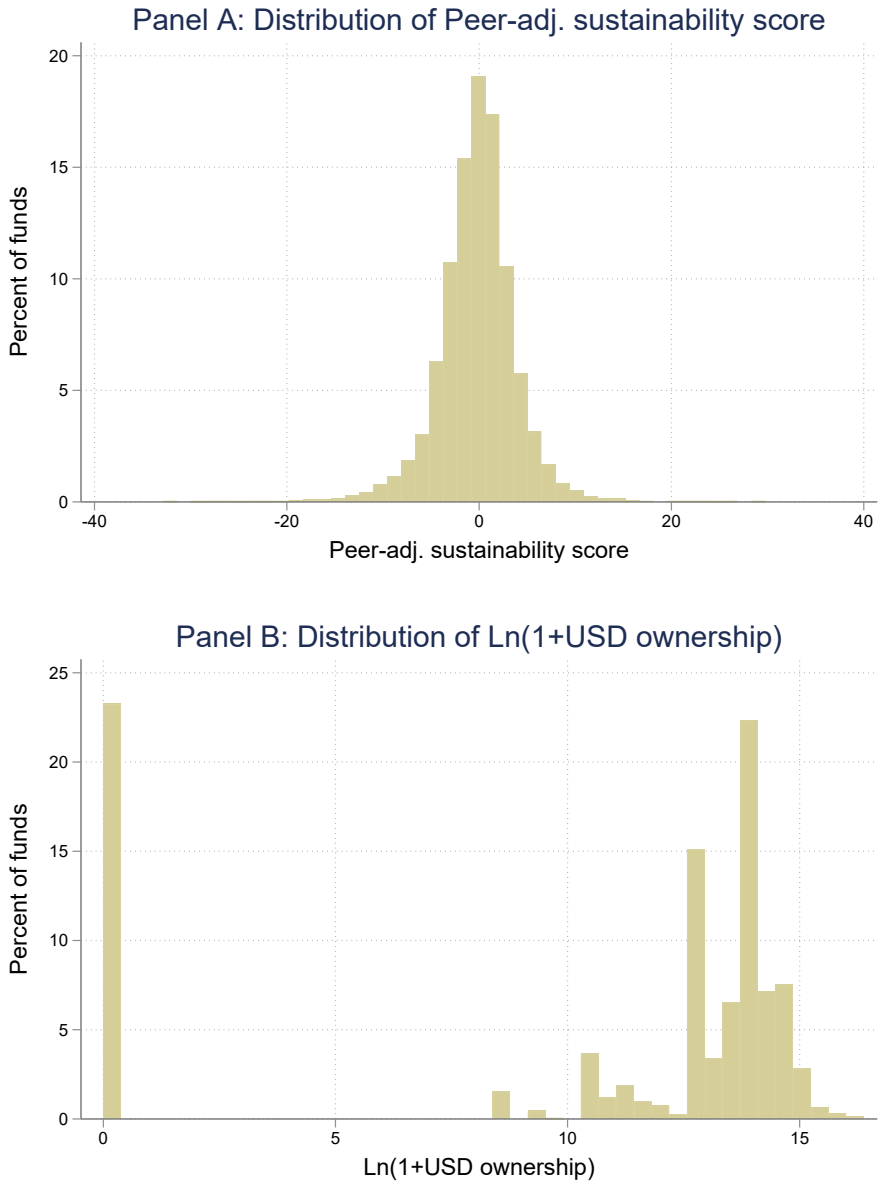


Table A2: Robustness: Placebo tests

This table shows the results of OLS regressions of funds' quarter-ahead peer-adjusted sustainability score on *Ownership* and *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 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)			
	ESG-mandate funds		Index fund	
	(1)	(2)	(3)	(4)
Ownership	0.94		-0.20	
	(1.08)		(-0.44)	
Ln(1+$Ownership)		0.09		-0.02
		(1.19)		(-0.57)
Observations	1,526	1,526	2,873	2,873
R-squared	0.46	0.46	0.30	0.30
Constant & controls	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Family 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 × ESG manager	0.73	0.59	0.25			
	(1.08)	(1.28)	(0.38)			
Ln(1+$Ownership) × ESG manager				0.06	0.05	0.04
				(1.04)	(1.42)	(0.81)
Ownership	-2.13***	-1.32***	-1.52***			
	(-4.83)	(-4.37)	(-4.12)			
Ln(1+$Ownership)			-0.17***	-0.10***	-0.12***	
				(-4.88)	(-4.27)	(-4.12)
ESG manager	-0.14	-0.02		-0.14	-0.11	
	(-0.22)	(-0.06)		(-0.21)	(-0.30)	
Observations	21,933	21,943	21,604	21,933	21,943	21,604
R-squared	0.51	0.24	0.57	0.51	0.24	0.57
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* (Panel A) and *Ln(1+$Ownership)* (Panel B) from January 2015 through December 2020. The specifications are as in Table 2 but with different sets of fixed effects: Fund, (Manager/team × quarter-year, Fund family × quarter-year, or segment × 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.

Dependent variable:	Peer-adj. sustainability score (t+1)			
	(1)	(2)	(3)	(4)
	Panel A			
Ownership	-2.02***	-1.10***	-0.80**	-1.01***
	(-5.10)	(-4.16)	(-2.64)	(-4.83)
Observations	21,933	19,334	8,344	21,946
R-squared	0.51	0.31	0.69	0.05
	Panel B			
Ln(1+$Ownership)	-0.16***	-0.08***	-0.06**	-0.07***
	(-5.11)	(-4.03)	(-2.43)	(-4.53)
Observations	21,933	19,334	8,344	21,946
R-squared	0.51	0.31	0.68	0.05
Fund FE	Yes	No	No	No
Manager/Team x Quarter-year FE	No	Yes	No	No
Fund family x Quarter-year FE	No	No	Yes	No
Segment x Quarter-year FE	No	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.

Dependent variable:	Peer-adj. sustainability score (t+1)					
	Age and tenure controls		Education controls		Demographic controls	
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-1.41***		-1.20**		-1.90***	
	(-2.90)		(-2.29)		(-3.05)	
Ln(1+$Ownership)		-0.10**		-0.08*		-0.14***
		(-2.75)		(-2.01)		(-2.97)
Tenure	0.07**	0.07**				
	(2.30)	(2.31)				
Manager age	-0.04	-0.04				
	(-1.37)	(-1.33)				
MBAmin			-0.18	-0.18		
			(-0.32)	(-0.32)		
Degree year			0.06*	0.06*		
			(2.04)	(1.99)		
Daughters					-0.20	-0.19
					(-0.71)	(-0.66)
Observations	4,567	4,567	3,853	3,853	2,647	2,647
R-squared	0.34	0.34	0.38	0.38	0.40	0.40
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Family 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.

Panel A: With sustainability ranking						
Dep. variable:	Sustainability rank (t+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-1.20***	-0.67***	-0.88***			
	(-4.83)	(-3.84)	(-4.06)			
Ln(1+$Ownership)				-0.09***	-0.09***	-0.06***
				(-4.89)	(-4.28)	(-3.75)
Observations	21,933	21,943	21,604	21,933	21,943	21,604
R-squared	0.54	0.22	0.58	0.54	0.24	0.58
Constant & controls	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other FE	Fund	Family	Manager	Fund	Family	Manager
Panel B: With sustainability Globes						
Dep. variable:	Sustainability Globes (t+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-0.48***	-0.25***	-0.31***			
	(-4.58)	(-3.57)	(-3.37)			
Ln(1+$Ownership)				-0.04***	-0.02***	-0.02***
				(-4.48)	(-3.14)	(-3.19)
Observations	9,050	9,057	8,906	9,050	9,057	8,906
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
Panel C: With controversies score						
Dep. variable:	Peer adj. share in portfolio (t+1)					
	Severe	High	Significant	Moderate	Low	No contr.
Ownership	1.22**	0.15	-0.05	0.03*	-0.06**	-0.10**
	(2.67)	(0.91)	(-1.65)	(1.85)	(-2.30)	(-2.41)
Observations	20,228	20,228	20,228	20,228	20,228	20,228
R-squared	0.36	0.48	0.63	0.63	0.57	0.70
Constant & controls	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	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.

Panel A: With Ln(Mean $Ownership)			
Dep. variable:	Peer-adj. sustainability score (t+1)		
	(1)	(2)	(3)
Ln(1+Mean $Ownership)	-0.18***	-0.10***	-0.12***
	(-5.11)	(-4.29)	(-4.15)
Observations	21,933	21,943	21,604
R-squared	0.51	0.24	0.57
Panel B: With %Ownership/AUM			
Dep. variable:	Peer-adj. sustainability score (t+1)		
	(1)	(2)	(3)
%Ownership/AUM	-0.62**	-0.55***	-0.34
	(-2.16)	(-3.36)	(-1.44)
Observations	21,716	21,728	21,389
R-squared	0.50	0.23	0.56
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

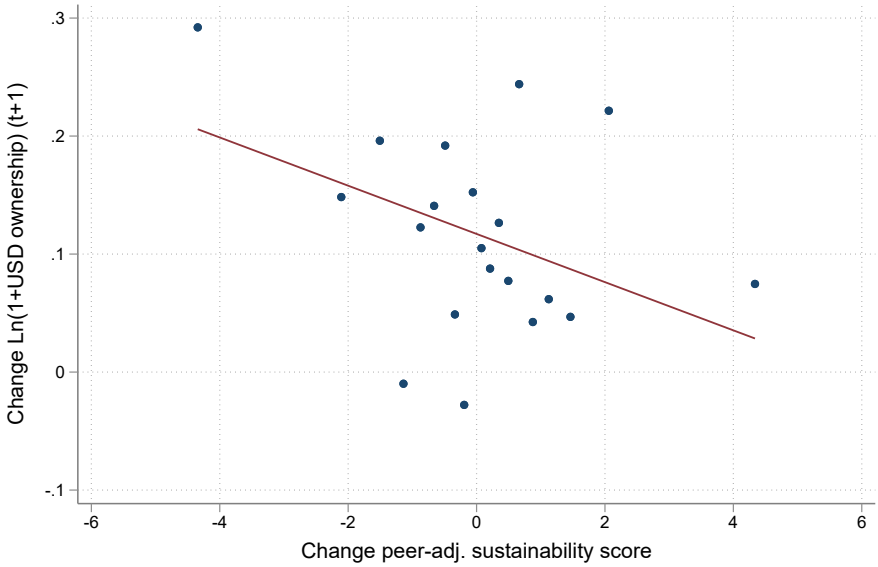
Table A8: Interpretation placebo tests: Difference-in-differences effects using index funds

This table shows the results of OLS regressions replicating the analyses in Tables 5 and 6 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				
Ownership × PostGlobes	0.09	0.18		
	(0.50)	(1.06)		
Ln(1+$Ownership) × PostGlobes			0.01	0.02
			(0.79)	(1.31)
Ownership	0.06	0.04		
	(0.10)	(0.08)		
Ln(1+$Ownership)			-0.01	-0.01
			(-0.15)	(-0.18)
Observations	891	891	891	891
R-squared	0.44	0.46	0.44	0.46
Panel B: Covid-19				
Ownership × Covid-19	-0.20*	-0.14		
	(-2.03)	(-1.21)		
Ln(1+$Ownership) × Covid-19			-0.02	-0.01
			(-1.71)	(-1.17)
Ln(1+$Ownership)			-0.01	-0.01
			(-0.26)	(-0.25)
Ownership	-0.13	-0.13		
	(-0.20)	(-0.20)		
Observations	1,467	1,467	1,467	1,467
R-squared	0.30	0.30	0.30	0.30
Constant & controls	Yes	Yes	Yes	Yes
Controls × Post	No	Yes	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
Family 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 *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.



Swiss Finance Institute

Swiss Finance Institute (SFI) is the national center for fundamental research, doctoral training, knowledge exchange, and continuing education in the fields of banking and finance. SFI's mission is to grow knowledge capital for the Swiss financial marketplace. Created in 2006 as a public–private partnership, SFI is a common initiative of the Swiss finance industry, leading Swiss universities, and the Swiss Confederation.

swiss:finance:institute

c/o University of Geneva, Bd. Du Pont d'Arve 42, CH-1211 Geneva 4
T +41 22 379 84 71, rps@sfi.ch, www.sfi.ch

european corporate governance institute

about ECGI

The European Corporate Governance Institute has been established to improve *corporate governance through fostering independent scientific research and related activities.*

The ECGI will produce and disseminate high quality research while remaining close to the concerns and interests of corporate, financial and public policy makers. It will draw on the expertise of scholars from numerous countries and bring together a critical mass of expertise and interest to bear on this important subject.

The views expressed in this working paper are those of the authors, not those of the ECGI or its members.

www.ecgi.global

european corporate governance institute

ECGI Working Paper Series in Finance

Editorial Board

Editor	Mike Burkart, Professor of Finance, London School of Economics and Political Science
Consulting Editors	Renée Adams, Professor of Finance, University of Oxford
	Franklin Allen, Nippon Life Professor of Finance, Professor of Economics, The Wharton School of the University of Pennsylvania
	Julian Franks, Professor of Finance, London Business School
	Mireia Giné, Associate Professor, IESE Business School
	Marco Pagano, Professor of Economics, Facoltà di Economia Università di Napoli Federico II
Editorial Assistant	Asif Malik, Working Paper Series Manager

www.ecgi.global/content/working-papers

european corporate governance institute

Electronic Access to the Working Paper Series

The full set of ECGI working papers can be accessed through the Institute's Web-site (www.ecgi.global/content/working-papers) or SSRN:

Finance Paper Series	http://www.ssrn.com/link/ECGI-Fin.html
Law Paper Series	http://www.ssrn.com/link/ECGI-Law.html

www.ecgi.global/content/working-papers