

# Does Socially Responsible Investing Change Firm Behavior?\*

Davidson Heath<sup>1</sup>, Daniele Macciocchi<sup>2</sup>, Roni Michaely<sup>3</sup> and Matthew C. Ringgenberg<sup>1</sup>

<sup>1</sup>University of Utah, Salt Lake City, UT, USA, <sup>2</sup>University of Miami, Coral Gables, FL, USA and

<sup>3</sup>Faculty of Business and Economics, The University of Hong Kong, Hong Kong, China

## Abstract

Using micro-level data, we examine the behavior of socially responsible investment (SRI) funds. SRI funds select firms with lower pollution, more board diversity, higher employee satisfaction, and better workplace safety. Yet, both in the cross-section and using an exogenous shock to SRI capital, we find that SRI funds do not significantly change firm behavior. Moreover, we find little evidence that they try to impact firm behavior using shareholder proposals. Our results suggest that SRI funds are not greenwashing, but they are impact washing; they invest in a portfolio of firms with better environmental and social conduct but do not follow through on their promise of impact.

\*We thank our discussants Marco Ceccarelli, Yonca Ertimur, Kornelia Fabisik, Jessica Jeffers, Dirk Jenter, Oğuzhan Karakas, Melissa Prado, Ellen Quigley, Enrichetta Ravina, Cara Vansteenkiste, and Josef Zechner. We also thank Rui Albuquerque, John Barrios, Asaf Bernstein, Matthias Breuer, Minxia Chen, Lauren Cohen, Mike Cooper, Shaun Davies, Alex Edmans, Fabrizio Ferri, Henry Friedman, Simon Gloßner, Umit Gurun, Michael Halling, Mirko Heinle, Sehoon Kim, Karl Lins, John Matsusaka, Dhanaanjay Nanda, Yihui Pan, Zacharias Sautner, Holger Spamann, Mitch Towner, Ed Van Wesep, and Tracy Wang for helpful comments. We also thank virtual conference and seminar participants at the American Finance Association 2022 Annual Meeting, Annual Conference on Financial Market Regulation, the 2nd Boca Corporate Finance and Governance Conference, Chapman University, Columbia University (Accounting), the COP26 Climate Finance conference, the Corporate Governance and Executive Compensation Research Series, ESSEC—Amundi Chair Webinar, the European Winter Finance Summit, the Financial Accounting and Reporting Section (FARS), 1st Conference in Sustainable Finance at the University of Luxembourg, Georgetown University, the 2022 Global Corporate Governance Colloquium, the Hong Kong University of Science and Technology, the 2022 ICVG Conference, the 2022 Kelley Accounting Research Symposium (KARS), Paris December Finance Meeting, Singapore Management University, UCLA (Accounting), the University of Illinois Chicago, University of Georgia, the University of Miami, the University of Miami Winter Warm-up Conference, Virginia Tech, and the 2021 UMass Boston—EM Normandie Conference on Corporate Social Responsibility. We thank Glassdoor, Inc. ([www.Glassdoor.com](http://www.Glassdoor.com)) and the Environmental Protection Agency for providing data and for helpful conversations. All errors are our own. ©2020–2023.

**Keywords:** Corporate social responsibility (CSR), environmental, social, and governance (ESG), institutional investors, socially responsible investing (SRI)

**JEL classification:** G12, G14

Received October 19, 2022; accepted January 20, 2023 by Editor Alex Edmans.

## 1. Introduction

Over the last decade, there has been a significant increase in the popularity of socially responsible investment (SRI) funds. These funds claim to incorporate environmental and social (E&S) issues into the selection of their portfolio firms and the majority of them also claim to impact the E&S behavior of their portfolio firms. Yet, despite the increasing popularity of SRI funds and their stated objectives about selection and impact, it is unclear whether these funds deliver on their promises. In this article, we provide novel evidence on the extent to which SRI funds: (i) select firms with better E&S behavior and (ii) improve firms' E&S behavior.

In our sample, 100% of SRI funds claim to invest in companies with good E&S performance and 81% also claim to engage portfolio firms to improve their E&S conduct. While there is growing literature examining SRI funds, it is unclear whether SRI funds act in accordance with their claims. Given SRI funds' stated objectives about selection and impact, there are three main possibilities. First, SRI funds might behave similarly to non-SRI funds in both selection and impact ("greenwashing"). Second, SRI funds might select firms with better E&S performance, but make no impact on firm behavior ("impact washing"). Third, SRI funds might successfully improve the E&S performance of their portfolio firms.

On the one hand, the recent growth in capital allocated to SRI funds could make them effective at influencing firm behavior through the threat of exit (Edmans, 2009; Edmans and Manso, 2010) or via voting and engagement—possibly in conjunction with other investors (Doidge *et al.*, 2019; Dimson, Karakaş, and Li, 2021). Survey evidence suggests that SRI funds do view engagement as a tool for addressing climate risks (Krueger, Sautner, and Starks, 2020), which is one E&S dimension. On the other hand, the cost of engaging with portfolio firms and changing their behavior is likely higher than the cost of pure portfolio selection based on observable E&S performance. Thus, SRI funds may lack the incentive to engage as well as the expertise, resources, or stewardship personnel (Bebchuk and Tallarita, 2020). Furthermore, for the threat of exit to have an impact, it should be capable of significantly changing the stock price of affected firms (Heinkel, Kraus, and Zechner, 2001). Recent evidence suggests that the impact of SRI funds on a firm's cost of capital is too small to meaningfully affect the firm's investment decisions (Berk and van Binsbergen, 2021). Moreover, Edmans, Levit, and Schneemeier (2022) argue that pure divestment is not likely to be effective; instead, SRI funds should hold firms that have taken corrective actions in order to reward such actions. In sum, it is an open question whether SRI funds select firms based on their E&S conduct and/or successfully improve the E&S conduct of their portfolio firms.

To examine whether SRI funds act in accordance with their claims, we examine eighteen firm-level variables that measure a wide variety of real E&S attributes. On the environmental dimension, we examine seven measures using data from the Environmental Protection Agency (EPA), which include carbon emissions, toxic releases, and investment to reduce

future pollution. On the social dimension, we examine two measures of workplace safety using data from the Occupational Safety and Health Administration (OSHA), two measures of diversity on the board of directors using data from BoardEx and Institutional Shareholder Services (ISS), and seven measures of employee satisfaction using data from Glassdoor, Inc. We find that SRI funds do select firms with better E&S conduct, but SRI funds do not improve the E&S behavior of their portfolio firms. Thus, the real impact of SRI funds is inconsistent with their claimed impact.

We begin by examining the portfolio selection of SRI funds using cross-sectional regressions on the relation between holding decisions and firm characteristics. First, we look at firm-level pollution using data from the EPA. Evidence in [Muller \(2021\)](#) indicates that firm-level pollution poses a broad range of reputational and regulatory risks for asset managers. Also, many investors state that they consider firm-level pollution when making investment decisions. Consistent with this, we find that more SRI fund ownership is associated with lower water and air pollution by firms, and more investment in pollution abatement activities. The results are economically large: a one-standard deviation increase in SRI fund ownership is associated with sixty-five log points of lower total emissions scaled by total sales. In other words, SRI funds select firms that pollute less.

We next examine whether SRI fund ownership is related to employee well-being. We use self-reported employee reviews about their firms from Glassdoor, Inc. and workplace safety data from OSHA. We find that more SRI fund ownership is associated with better firm-level outcomes for stakeholders: Employees at firms with more ownership by SRI funds rate their firm better and experience fewer workplace injuries. We also examine broader social dimensions such as gender and racial diversity on the board of directors. We find that firms with more SRI fund ownership have a higher proportion of women on their board of directors.

We also find that SRI funds select firms based on the level of their E&S performance, but not on improvements to their E&S performance. Put differently, SRI funds choose to hold the “best behaving” companies, but they do not choose to hold companies that have recently improved their E&S conduct unless the improvements led to the company becoming one of the best-behaving companies. This result suggests that SRI funds may not have a meaningful impact on firm behavior because they do not reward firms for improving. Accordingly, we next test whether SRI funds do have an impact on firm behavior.

To disentangle possible selection effects from treatment effects, we develop a new research design that exploits discontinuities in Morningstar “star ratings” as an exogenous shock to SRI fund capital. These star ratings are widely used by investors, and they have been shown to affect the flow of investor capital to a given fund ([Del Guercio and Tkac, 2008](#); [Reuter and Zitzewitz, 2021](#)). Importantly, it is nearly impossible for funds to manipulate their rating, and discontinuities in the ratings lead to discontinuities in capital allocation.<sup>1</sup>

Using our Morningstar research design, we test whether SRI funds impact firm behavior. While SRI funds do hold firms that pollute less, we find no evidence that they change their environmental behavior. Specifically, an exogenous increase in SRI capital leads to zero significant changes in total pollution or investment in pollution abatement activities. Next, we examine measures of employee well-being and board diversity. We find that an exogenous

1 [Duong and Meschke \(2020\)](#) and [Kim \(2021\)](#) examine whether funds can manipulate their star ratings and find that year-end manipulation disappeared after 2002 because of scrutiny from the Securities and Exchange Commission (SEC). Our sample focuses exclusively on year-end ratings in the period after 2002 when manipulation is not a concern.

increase in SRI capital leads to zero significant changes in employee well-being or board diversity. Furthermore, when we split our estimates between funds that do claim to engage with their portfolio firms and funds that do not, we find that the estimated treatment effects for both types of funds are nearly identical and again near zero. Taken together, our results show that SRI funds do select firms that behave in a relatively more environmentally and socially responsible manner, but they do not significantly improve the E&S conduct of their portfolio firms. Put differently, we find strong evidence of selection effects but zero evidence of any treatment effects.

We conduct a number of additional tests to validate our finding of zero treatment effects. First, we examine longer-run firm outcomes using data observed 2 and 3 years post-treatment, and again find no evidence of any significant effects. Second, we examine whether SRI funds attempt to change firm behavior by examining proxy voting data. [Dikolli \*et al.\* \(2022\)](#) show that SRI funds vote in favor of E&S shareholder proposals. Yet, it is unclear whether these votes are pivotal and whether SRI funds use shareholders' proposals to control the agenda of the annual meeting and attempt to change firms' E&S behavior. We find that an exogenous increase in ownership by SRI funds does not lead to more E&S shareholder proposals, nor does it increase the likelihood of such proposals passing.<sup>2</sup> Third, we show that our nonresults are not due to low statistical power. To examine this possibility, we compute the minimum detectable effect size (MDES) as in [Bloom \(1995\)](#), which measures the magnitude of effect that a given estimator could reliably detect. Throughout our analyses, the MDES indicates that we have enough power to reliably detect a meaningful change in real outcomes. SRI funds simply do not cause any meaningful changes.

Our article contributes to the recent literature that assesses the credibility of E&S investment products. Prior studies focus on institutional investors that are signatories of the Principles for Responsible Investment (PRI) ([Gibson Brandon \*et al.\*, 2022](#); [Kim and Yoon, 2022](#); [Liang, Sun, and Teo, 2022](#)), SRI mutual funds ([Raghuandan and Rajgopal, 2022](#)), impact venture capital funds ([Barber, Morse, and Yasuda, 2021](#)), and ESG bonds ([Kim \*et al.\*, 2022](#)). The general conclusion of this literature is that SRI products do not invest in firms with higher E&S performance. Our findings differ for a number of reasons. First, we examine funds with a stated E&S objective, whereas [Gibson Brandon \*et al.\* \(2022\)](#), [Kim and Yoon \(2022\)](#), and [Liang \*et al.\* \(2022\)](#) examine funds that are PRI signatories—but many of these funds do not claim to be SRI funds. We expand the evidence in these studies by showing that funds that claim to be SRI funds, and thus have E&S fiduciary duties, act differently than PRI signatories. According to the [Forum for Sustainable and Responsible Investing \(2022\)](#), SRI funds, both by number of funds and assets under management, are approximately 150% larger than the market for alternative E&S investment products including private equity funds, venture capital funds, and hedge funds. As such, our findings speak to a large portion of the market for E&S investment products.

Second, we examine real firm outcomes, whereas the existing literature largely focuses on E&S ratings. Yet, E&S ratings may be less relevant to examine real changes in firm behavior. [Berg, Fabisik, and Sautner \(2020\)](#) show that some rating agencies modify their data ex post, while [Berg, Koelbel, and Rigobon \(2022\)](#) document that E&S ratings often differ

2 This finding complements the voting results in [Michaely \*et al.\* \(2021\)](#) who find that SRI funds behave strategically: they vote in favor of E&S proposals when they are unlikely to pass, but they vote against them when their vote is likely to be pivotal.

significantly for the same firm across different rating agencies and are better correlated with some underlying metrics than others. We avoid these issues by focusing on real E&S outcomes that cover the key pillars of SRI. Yet, our conclusions are not dependent on the list of real outcomes that we select. When we directly examine E&S ratings in our framework, we continue to find that SRI funds select higher-rated firms, but the treatment effects are insignificant and in fact slightly negative. This finding is consistent with that of [Gibson Brandon \*et al.\* \(2022\)](#), who find that PRI signatories in the EU select firms with better ratings, and with [Raghunandan and Rajgopal \(2022\)](#), who find that SRI funds invest in firms with worse track records for labor and environmental violations but with higher E&S ratings. To reconcile their results, [Raghunandan and Rajgopal \(2022\)](#) show that labor and environmental violations are not correlated with E&S ratings. In contrast, instead of examining violations, we examine actual pollution, workplace safety, board diversity, and employee satisfaction. In an untabulated analysis, we find that our E&S real outcomes are highly correlated with E&S ratings, which helps explain the differences between our findings and those in [Raghunandan and Rajgopal \(2022\)](#) and suggests that our E&S real outcomes are meaningful for studying SRI fund behavior.

Third, we develop a carefully identified novel research design using discontinuities in the Morningstar star ratings. This allows us to go a step further than prior studies to examine whether SRI funds impact the behavior of their portfolio firms.

Overall, all our results point to the same conclusion—SRI funds operate primarily as stock selectors, but they do not have real effects on their portfolio firms. While the majority of SRI funds have the stated goals of selecting better behaved firms and improving firm conduct, we find that they only succeed at the former. This is consistent with the predictions in [Edmans \*et al.\* \(2022\)](#) that selection strategies are not effective in promoting socially responsible behavior unless firms tilt their portfolios toward “brown” stocks that have taken corrective actions. While the literature has shown that investors do care about E&S issues ([Riedl and Smeets, 2017](#)), it is also evident that fund flows respond to third-party rating agencies and these ratings reward stock selection more than engagement ([Hartzmark and Sussman, 2019](#); [Gantchev, Giannetti, and Li, 2021](#)). As a consequence, SRI fund managers have weak incentives to exert costly efforts to improve firm behavior.

## 2. Data

To examine the relation between socially responsible investing and E&S corporate behavior, we combine micro-level data from a wide variety of public and private sources, as discussed below. Detailed definitions of all our variables and their construction are presented in the [Supplementary Appendix](#).

We construct a firm-year panel for the period from 2010 to 2019.<sup>3</sup> From the Morningstar database, we collect all mutual funds with available star ratings. To identify an SRI fund, we use data from three sources: Bloomberg, Morningstar, and the US Sustainable Investment Forum (US SIF) membership list. First, using the Bloomberg terminal, we hand-collect mutual funds that identify themselves as “socially responsible” or “SRI” funds. Second, we obtain data from Morningstar Socially Conscious data set, which indicates if a fund identifies itself as selectively investing based on certain E&S principles. Third, the Forum for Sustainable and Responsible Investment (US SIF) is a US-based

3 The beginning and ending of our sample period vary for some tests based on data availability.

membership association that advances impact investing across all asset classes. We take the union of the three lists and manually match funds with those in the Center for Research in Security Prices (CRSP) Survivor-Bias-Free US Mutual Fund Database, from which we retrieve information about each fund's asset under management (AUM), turnover ratio, management fees, expense ratio, and portfolio holdings, which allow us to measure the percentage of a firm's ownership held by SRI funds (SRI Investment).

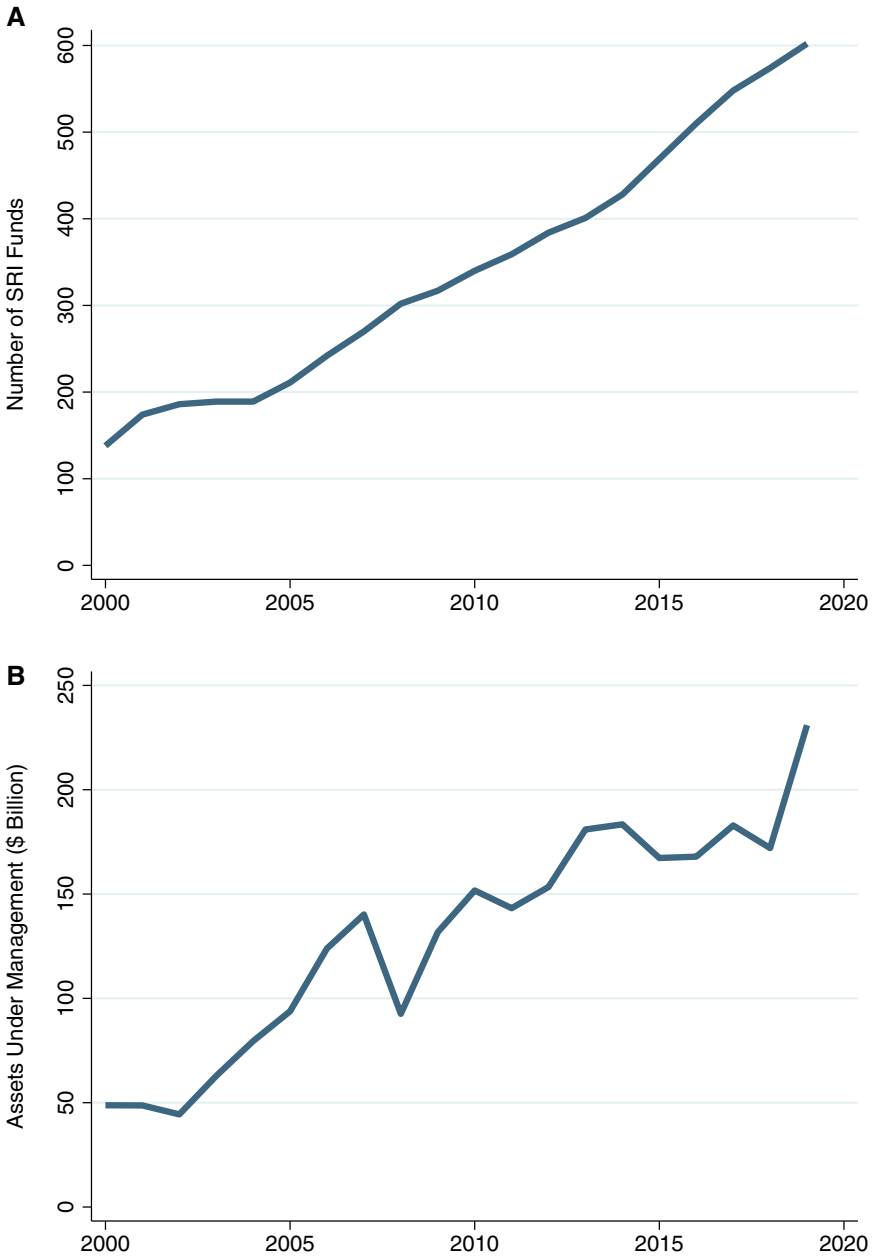
Figure 1 shows a substantial growth in SRI funds' number and AUM over time. While the upward trend shows a growing interest in socially responsible investing—in 2019, our sample comprises 602 SRI funds—the total AUM in SRI funds remains modest, approximately \$240 billion as of December 2019. The average firm-year in our sample has 0.27% of its market capitalization owned by SRI funds (Table I).

To examine corporate behavior on E&S issues, we collect firm-year-level data from several sources and construct eighteen micro-level variables (seven environmental and eleven social) that measure a wide spectrum of firms' E&S behavior, ranging from carbon emissions, to water pollution, to workplace safety and diversity. Our article is among the first to use novel micro-level data to examine firm behavior.

To examine firm environmental behavior, we obtain detailed facility-chemical-level pollution data from the EPA's Toxic Release Inventory database and from the EPA's Greenhouse Gas Reporting Program database. The vast majority of the recent literature on the "E" aspect of E&S investing focuses on greenhouse gas emissions and largely ignores other measures of environmental performance. In contrast, we rely directly on the EPA data that provide granular information about chemical-level emissions at the production facility (on-site), about the emissions transferred on a different location (off-site), as well as disaggregated information broken out into air, ground, and water pollution. The "air" measure we construct includes carbon dioxide, which is the primary greenhouse gas related to global warming. In Table I, we report the descriptive statistics for the EPA data. On average, firms in our sample release 6.5 billion pounds of chemicals per year into the air, 130 thousand pounds into the water, 680 thousand pounds into the land. In the regression models, we scale the firm-year pollution measure by firm sales, in order to capture differences in pollution per dollar of output produced.<sup>4</sup>

Furthermore, from the EPA Pollution Prevention database, we collect information about a firm's yearly investments in pollution-reducing activities. Firms document their investments to reduce emissions in their annual filings to the EPA. The EPA does not require firms to report the dollar amounts spent on these investments, but firms must disclose what types of actions they take according to several categories of pollution reduction activities. We combine these disclosures into two variables: *Abatement*, which takes the value of one if the firm reports an abatement activity across any category and is zero otherwise; and *logAbatements*, which is the log of abatement actions that a firm discloses in a given year. Firms in our sample invest in 3.6 abatement activities every year, on average, and 43% of firm-years show a nonzero investment in pollution-reducing activities. Finally, we examine a holistic measure of firms' exposure to climate risk using data from Sautner, *et al.* (2022) (*CCExposure*). This measure is based on a machine-learning algorithm that identifies a firm's annual climate change exposure from earnings conference calls. Our sample mean (1.00) is consistent with Sautner *et al.* (2022).

4 Scaling by cost of goods sold or using unscaled emissions yields similar results.



**Figure 1.** Growth in SRI funds and assets over time. Panel A: Number of SRI funds and Panel B: SRI AUM. The figure plots the number of SRI funds (Panel A) and the total AUM in those funds (Panel B) in the CRSP Mutual Fund Database, as of December each year.

We also aim to examine each firm’s social behavior. To do so, we use four different data sources. We obtain seven measures of employee satisfaction based on employee reviews from Glassdoor, Inc., which is a worldwide leader in providing insights about jobs and

**Table I.** Summary statistics

The table presents summary statistics for key variables used in our analyses. For each variable, we present the mean, the standard deviation, the first decile, the median, and the 10th decile. Definitions and constructions for all variables are in the [Supplementary Appendix](#).

Variable	Mean (1)	St. Dev. (2)	p10 (3)	Median (4)	p90 (5)
SRI Investment (%)	0.27	0.66	0.00	0.05	0.67
SRI Investment (Active) (%)	0.26	0.66	0.00	0.04	0.67
SRI Investment (Passive) (%)	0.00	0.01	0.00	0.00	0.01
Total releases (B pounds)	6.50	28.37	0.00	0.00	9.60
Air (B pounds)	6.50	28.37	0.00	0.00	9.60
Water (M pounds)	0.13	1.11	0.00	0.00	0.05
Land (M pounds)	0.68	4.04	0.00	0.00	0.39
Num_Abatements	3.64	15.37	0.00	0.00	8.00
Abatement	0.43	0.49	0.00	0.00	1.00
CCExposure	1.00	2.67	0.00	0.27	1.93
Overall	3.27	0.68	2.49	3.28	4.00
Careeropps	3.02	0.66	2.25	3.00	3.79
Srleader	2.92	0.73	2.03	2.91	3.83
Worklife	3.30	0.68	2.50	3.32	4.04
Culture	3.22	0.75	2.33	3.24	4.07
CEO	0.29	0.41	-0.19	0.32	0.82
Outlook	0.24	0.41	-0.25	0.25	0.75
Hospitalization	1.86	2.63	0.00	1.00	4.00
Amputation	0.52	1.05	0.00	0.00	1.00
Gender Div.	0.16	0.11	0.00	0.14	0.30
Racial Div.	0.11	0.12	0.00	0.10	0.25

companies. From the U.S. Department of Labor, OSHA, we obtain data on workplace safety. In [Table I](#), we find that firms report an average of 1.86 employee injuries that require hospitalization, and 0.52 employee injuries that require amputations. In the regression models, we scale firm-year injuries by each firm's number of employees (in thousands) to capture differences in size across firms. Finally, in light of the results in [Fried \(2021\)](#), we consider gender diversity as an important social outcome (rather than a governance outcome) and use BoardEx data to measure the percentage of women on the board of directors (*Gender Div*). We also use data from ISS database to measure racial diversity on the board of directors (*Racial Div*). In our sample, firms have on average 16% of their board represented by women and 11% of their board represented by non-Caucasian directors ([Table I](#)). Finally, we also examine data on shareholder proposals and voting outcomes using the ISS Voting Analytics database.

### 3. SRI Fund Portfolio Selection

We begin our analysis by examining the portfolio selection choices of SRI funds. First, we use ordinary least squares (OLS) regressions with year-fixed effects to examine the relation between SRI fund holdings and environmental (Section 3.1) and social outcomes (Section



3.2). Then, in Section 3.3, we provide more nuanced analyses on portfolio selection to examine whether SRI funds select firms based on recent improvements in E&S performance, or whether they only care about the overall level of E&S performance.

### 3.1 SRI Funds and Corporate Environmental Behavior

We first examine firm-level emissions using microdata from the EPA, which allows us to understand whether a firm's actual pollution is related to SRI portfolio selection strategies. The results from our OLS analyses are reported in Table II. We find strong evidence that SRI funds select firms that pollute less. A one-standard deviation increase in SRI ownership is associated with 65% lower total emissions scaled by total sales or 2.51 billion pounds fewer emissions per year (Column 1). The results are similar when we separate toxic and nontoxic emissions. This finding indicates that SRI funds provide investors with a portfolio of firms that pollute significantly less than the average firm.

The granularity of the EPA data allows us to go a step further and examine different pollution mechanisms—namely air, water, and ground. Most industrial pollution involves air emissions. We examine the relation between SRI funds and different types of emissions in Columns 2–4 of Table II. We find that SRI funds invest in firms that produce lower air and water emissions.

To triangulate our analyses and shed further light on the channels that drive portfolio selection by SRI funds, we also examine firm investments in pollution-reducing activities (i.e., abatements) and exposure to climate risk. Columns 5 and 6 of Table II show the association between SRI ownership and firms' investment in pollution abatement activities. At the extensive margins, we observe that SRI funds tend to hold firms that are 2.2% more likely to invest in pollution abatements. Finally, in Column 7, we find that SRI ownership is strongly negatively associated with a firm's exposure to climate risk. Consistent with

**Table II.** Selection Effects: SRI funds and corporate environmental behavior

The table presents estimates of the relation between SRI fund investment and firm total pollution (Total releases), air pollution (Air), water pollution (Water), land pollution (Land), investments in pollution abatement (Abatement and logAbatements), and climate change exposure (CCEXposure). SRI Investment is the percentage of a firm's ownership held by SRI funds (to facilitate the interpretation of the results, the measure is standardized). Definitions for all variables are in the Supplementary Appendix. Robust standard errors, clustered at the firm level, are shown in parentheses with unadjusted and Romano and Wolf (2005)  $p$ -values shown below. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

	Total releases	Air	Water	Land	Abatement	logAbatements	CCEXposure
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SRI Investment	-0.650 (0.179)	-0.689 (0.197)	-0.684 (0.162)	-0.340 (0.286)	0.022 (0.012)	0.032 (0.040)	-0.061 (0.023)
Unadjusted $p$	0.003***	0.005***	0.001***	0.236	0.067*	0.421	0.009***
Romano–Wolf $p$	0.011**	0.015**	0.004***	0.440	0.227	0.440	0.072*
Observations	3,863	3,704	1,885	1,222	3,579	1,526	15,004
Adjusted $R^2$	0.014	0.012	0.038	-0.000	0.015	0.013	0.002
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sautner *et al.* (2022), who show that firms with higher carbon intensity are more exposed to climate risk, we observe that SRI funds select firms that pollute less and those firms that have 6.1% lower climate risk exposure.

One concern related to statistical inference is that we examine the association between SRI ownership and firms' behavior across a large number of outcome variables. If uncorrected, this multiple testing can lead to a large number of false-positive findings (Heath *et al.*, 2021).<sup>5</sup> To account for this, we present both naive (i.e., unadjusted) *p*-values for each estimate as well as *p*-values adjusted for multiple testing using the Romano–Wolf procedure (Romano and Wolf, 2005). We find that after adjustment for multiple testing, the main associations of SRI with the key measures of total pollution (Column 1), airborne and water pollution (Columns 2 and 3), and climate risk exposure (Column 7) remain significant at conventional levels. Taken together, our results show robust evidence that SRI funds select firms that pollute less.

### 3.2 SRI Funds, Employee Well-Being, and Board Diversity

Next, we examine whether SRI funds select firms with better employee well-being by looking at workplace safety and employee satisfaction, which has been shown to be positively correlated with shareholder returns (Edmans, 2011). In our analysis, we use private data on several dimensions of employee satisfaction provided by Glassdoor, Inc. and public data on workplace accidents available through the Department of Labor OSHA. The results are shown in Panel A of Table III.

Across the board, we find positive relations, both overall and in regard to career opportunities, confidence in senior leadership, work/life balance, corporate culture, confidence in the CEO, and future outlook. These positive associations are statistically significant at conventional levels for three of the seven measures individually, while after adjustment for multiple testing, only the association with employees' future outlook remains statistically significant. Thus, while the evidence is weaker statistically than for environmental behavior, the evidence is still suggestive that SRI funds do tend to invest in firms with higher employee satisfaction.

We also examine the relation between SRI fund ownership and workplace safety. For accidents that resulted in either hospitalizations (Column 8) or amputations (Column 9), we observe negative associations. The association with fewer hospitalizations is statistically significant both individually and after adjustment for multiple testing. Thus, we conclude that SRI funds invest in firms with significantly better workplace safety.

Finally, we examine gender and racial diversity in the workplace. Many institutional investors have publicly committed to increase board diversity. In Panel B of Table III, we find that SRI funds select firms with a higher percentage of women on the board of directors. A one-standard deviation increase in SRI ownership is associated with 0.6 percentage points more women on the board but is not associated with more non-Caucasian board members. The association of SRI investing with gender diversity is statistically significant both individually and after adjustment for multiple testing. These findings are consistent with Gow, Larcker, and Watts (2020), who show that shareholders are more likely to support gender-diverse candidates than racially diverse candidates. While the economic

5 In our setting, the probability of making at least one Type I error using a critical value of 5% is  $1 - (1 - 5\%)^{18} = 60\%$ , where eighteen is the number of outcomes (assuming independence of tests and all of the null hypotheses are true).

**Table III.** Selection effects: SRI funds, employee well-being, and board diversity

The table presents estimates of the relation between SRI fund investment and a firm's employee well-being using data provided by Glassdoor, Inc. and OSHA (Panel A), and board gender and racial diversity (Panel B). SRI Investment is the percentage of a firm's ownership held by SRI funds (to facilitate the interpretation of the results, the measure is standardized). Definitions for all variables are in the [Supplementary Appendix](#). Robust standard errors, clustered at the firm level, are shown in parentheses with unadjusted and [Romano and Wolf \(2005\)](#) *p*-values shown below. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

Panel A: Employee well-being

	Overall	Careerops	Srleader	Worklife	Culture	CEO	Outlook	Hospitalization	Amputation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SRI Investment	0.004 (0.006)	0.008 (0.006)	0.006 (0.007)	0.006 (0.006)	0.013 (0.007)	0.007 (0.004)	0.012 (0.004)	-0.042 (0.014)	-0.009 (0.007)
Unadjusted <i>p</i>	0.511	0.179	0.390	0.319	0.082*	0.058*	0.001***	0.002***	0.192
Romano-Wolf <i>p</i>	0.781	0.645	0.693	0.680	0.450	0.387	0.078*	0.090*	0.645
Observations	12,113	12,038	12,032	12,042	10,701	11,566	10,628	1,251	1,251
Adjusted <i>R</i> <sup>2</sup>	0.035	0.027	0.013	0.011	0.012	0.010	0.014	-0.001	-0.001
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Board diversity

	Gender Div. (1)	Racial Div. (2)
SRI Investment	0.006 (0.001)	0.000 (0.002)
Unadjusted <i>p</i>	0.001***	0.882
Romano-Wolf <i>p</i>	0.019**	0.878
Observations	15,661	9,898
Adjusted <i>R</i> <sup>2</sup>	0.117	0.006
Year FE	Yes	Yes

magnitudes of these findings may seem small, the effects are meaningful relative to the unconditional mean values (in our sample, 16% of board members are women).

These findings show that SRI funds do invest in firms with greater employee well-being and better gender diversity on the board of directors. Overall, our results show strong evidence that SRI funds offer their investors a portfolio of firms with better E&S conduct.

### 3.3 Do SRI Funds Select Firms That Are Good or Improving?

Next, we examine whether SRI funds select the “best behaving” companies or companies that have shown recent improvements in their E&S conduct. This analysis is particularly relevant not only because it provides more nuances on our selection analysis but also because it will inform our analysis of SRI funds' impact. On the one hand, recent studies show that fund flows respond to funds' E&S ratings ([Hartzmark and Sussman, 2019](#)), which are a function of firms' E&S ratings. As a result, to maximize flows, SRI fund managers should simply select stocks that already have good E&S behavior. On the other hand, [Edmans et al. \(2022\)](#) argue that instead of investing in the best-behaving firms, SRI

investors would have a bigger impact if they invested in firms that have taken corrective actions, in order to reward such actions and further improve firms' E&S conduct.

To explore this mechanism, we examine the relation between SRI fund holdings and the level and change of real outcome variables for firms. Specifically, we examine OLS regressions of the form:

$$\text{FirmHeldbySRIFund}_{i,t} = \beta_1 \text{FirmOutputQuintile}_{i,t} + \beta_2 \Delta \text{FirmOutputQuintile}_{i,t} + FE_t + \epsilon_{i,t} \quad (1)$$

where *FirmOutputQuintile* is the quintile in which firm *i* resides when sorted on the level of the E&S outcome variable of interest,  $\Delta \text{FirmOutputQuintile}$  is the quintile in which firm *i* resides when sorted on the change in the E&S outcome variable of interest, and  $FE_t$  indicates year-fixed effects. In all models, the dependent variable *FirmHeldbySRIFund* is an indicator variable that takes the value one if a firm is held by an SRI fund and zero otherwise.

The results are shown in [Table IV](#). We find that SRI funds hold firms that invest more in pollution abatement, have greater board gender diversity, and have better employee satisfaction. However, when we examine changes in real outcomes ( $\Delta \text{FirmOutputQuintile}$ ), none of the results are positive and statistically significant (and two are significant in the wrong direction).

This finding indicates that SRI funds select stocks in a manner consistent with their incentives to maximize fund flows: SRI funds do not invest in firms with recent improvement in their E&S behavior, but they choose stocks that already behave well. Put differently, all else equal, we find that recent improvements in E&S conduct do not result in higher ownership by SRI funds. Based on the arguments in [Edmans \*et al.\* \(2022\)](#), this result suggests that SRI funds might not have a meaningful impact on firm behavior because their holding decisions do not reward improvements in behavior. We directly test this point in the next section.

#### 4. SRI Fund Portfolio Impact

Examining whether SRI funds change firm behavior is critical given that the majority of the SRI funds in our sample state in their filings that they actively engage with portfolio firms and seek to make an impact. Accordingly, we begin by examining the unconditional correlations between SRI investment and changes in a firm's E&S conduct in the broad cross-section of data, to see if any relevant pattern emerges before imposing any restrictions related to research design choices.

Panel A of [Figure 2](#) presents a scatter-plot of yearly changes in the total EPA emissions at the firm level (i.e., the change in firm's total emissions from year *t* to year *t* + 1) on the vertical axis, against total holdings by SRI funds in year *t* as a fraction of the firm's total market capitalization on the horizontal axis. The blue line shows the local polynomial best-fit line. At all levels of SRI fund investment, ranging from 0% to over 8% of the firm's market capitalization, there appears to be zero association with subsequent changes in the firm's EPA emissions. Panels B–D of [Figure 2](#) present the same broad comparisons for pollution abatement investments, overall Glassdoor rating, and gender diversity on the board of directors. The conclusion is the same; across all levels of SRI fund investment, there appears to be zero association with subsequent changes in the firm's E&S behavior, even for firms with high levels of SRI fund investment.

**Table IV.** Relation between SRI fund ownership and levels and changes of E&S output

The table presents results from a linear probability model on the relation between ownership by SRI funds and the level and change of firm E&S output. In all models, the dependent variable is an indicator variable that takes the value one if a firm is owned by at least one SRI fund and zero otherwise. The independent variables are quintile rankings of the level and change of firm E&S output. In Column 1, firms are sorted into quintiles on the level (Firm Output Quintile) and change ( $\Delta$ Firm Output Quintile) in pollution. In Column 2, the sorting variable is investment in pollution abatement, in Column 3, the sorting variable is board gender diversity, and in Column 4, the sorting variable is Glassdoor overall employee satisfaction. Robust standard errors, clustered at the firm level, are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

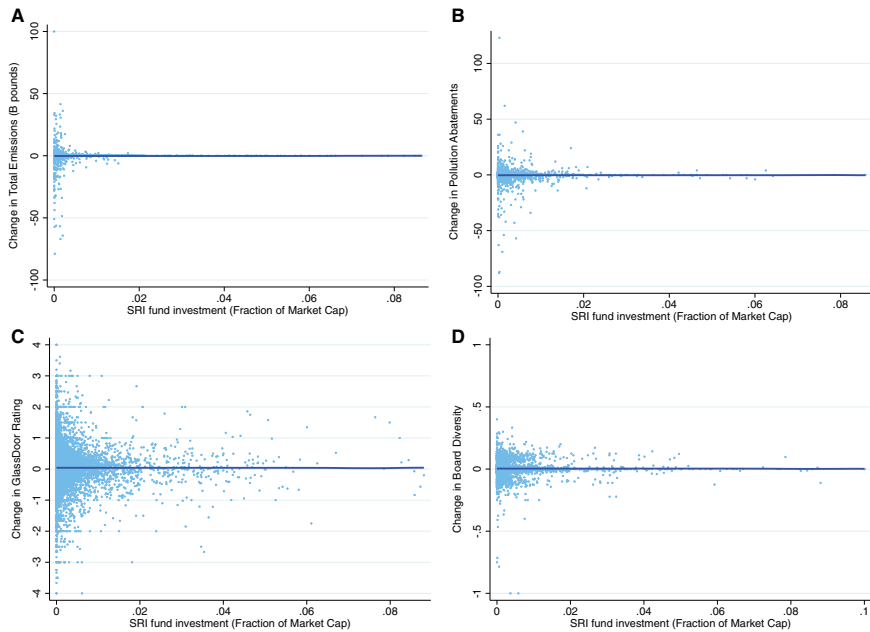
Sorting variable:	(1)	(2)	(3)	(4)
	Dependent Variable = $\mathbb{1}_{[FirmHeldbySRIFund]}_t$			
	Total releases	Num_Abatements	Gender Div.	Overall
Firm Output Quintile <sub><i>t</i></sub>	0.010 (0.007)	0.022*** (0.008)	0.066*** (0.004)	0.033*** (0.005)
$\Delta$ Firm Output Quintile <sub><i>t-1-t</i></sub>	-0.001 (0.004)	-0.011** (0.005)	0.001 (0.002)	-0.011*** (0.003)
Observations	4,878	2,959	13,281	9,902
Adjusted R <sup>2</sup>	0.029	0.021	0.073	0.036
Year FE	Yes	Yes	Yes	Yes

The analysis reported in Figure 2, while being informative about the broad cross-section, is subject to typical endogeneity concerns about reverse causality and omitted variable bias. Different firm policies might attract different types of investors, and firm characteristics, such as managerial quality, may jointly affect ownership and firm behavior. To isolate the treatment effect of SRI funds, we develop a research design that exploits plausibly exogenous variation in the amount of capital allocated to SRI funds, which we explain next.

#### 4.1 The Morningstar Research Design

To address the endogeneity in the relation between SRI fund ownership and firm outcomes, we use Morningstar star ratings to generate exogenous variation in SRI fund ownership. Morningstar is an investment research company that provides independent ratings of investment funds. Each month, Morningstar ranks the universe of investment funds using a proprietary algorithm that evaluates funds based on their risk-adjusted returns within an investment category. The best-performing funds receive five stars, while the worst-performing funds receive one star. The star rankings are a complex and nonlinear function of each fund's percentile ranking, within its category, on the basis of their returns over a 3, 5, and 10-year lagged basis, adjusted for the fund's return volatility over the same period. Crucially, these are the only inputs that determine funds' star ratings.

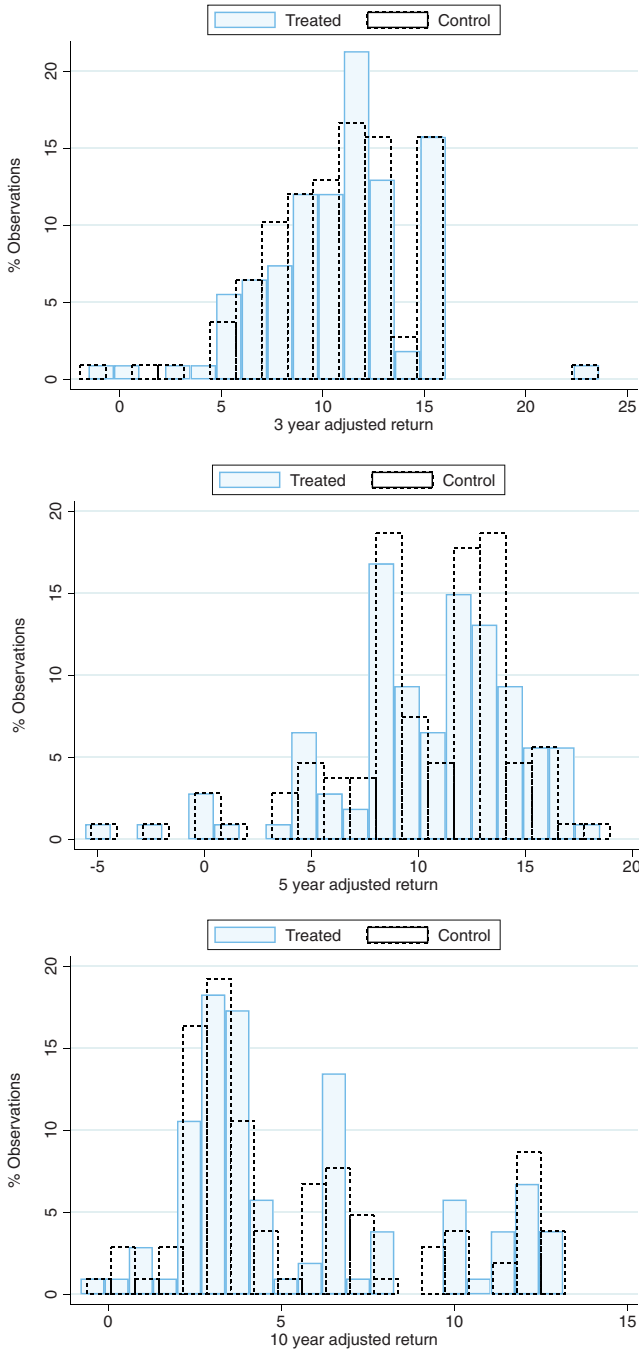
The mapping from lagged returns to Morningstar stars allows us to construct a matched set of funds that are indistinguishable on all observable characteristics—including their investment category and lagged returns in the Morningstar database—but had different Morningstar star ratings. We select all US equity funds in the Morningstar database with at least \$50 million in



**Figure 2.** Yearly changes in the firm SRI outcomes and SRI fund investment. (A) Change in EPA total emissions, (B) change in pollution abatements, (C) change in Glassdoor overall ratings and (D) change in board gender diversity. The figure plots the yearly change (from  $t$  to  $t + 1$ ) for four major categories of the firm E&S performance, against the total level of SRI fund investment in the firm at time  $t$ . Panel (A) plots changes in total EPA emissions in billions of pounds of pollutant. Panel (B) plots changes in pollution abatement activities by the firm. Panel (C) plots changes in the overall employee rating on Glassdoor. Panel (D) plots changes in board gender diversity. The blue lines present the local polynomial best-fit.

AUM. After imposing this filter, our sample contains over 99% of the capital invested in both SRI and non-SRI funds. Since our main sample runs from 2010 to 2019, we select cohorts of treatment and control funds in December of each year from 2012 to 2018, so that each cohort has 3 years of pre-treatment observations and at least 1 year of post-treatment observations. Our matched sets of treated and control funds satisfy the following requirements: The treated fund is an SRI fund as defined in Section 2. The treated fund is matched with a control fund that: (i) is in the same Morningstar category as the treated fund; (ii) has assets under management within  $\pm 50\%$  of the treated fund; (iii) has lagged 3-, 5-, and 10-year adjusted returns that are within  $\pm 50$  basis points of the treated fund; (iv) is a non-SRI fund; and, most crucially, (v) is assigned one fewer star than the treated fund in January of the following year. When a treated fund has multiple candidate control funds that satisfy the requirements above, as happens in the majority of cases, we pick up to three control funds with the closest 3-, 5-, and 10-year adjusted returns to the treated fund, weighted equally.

Thus, we match treated and control funds on all characteristics except their Morningstar star ratings, and we require that the treated fund has a rating that is one star higher than the control fund. Our objective is to isolate variation in fund flows that is due only to the arbitrary cutoffs in the Morningstar star algorithm (and unrelated to fund characteristics or performance). Figure 3 compares the past performance of treated versus control funds. We see that the two distributions are precisely matched in terms of their 3-, 5-, and 10-year Morningstar



**Figure 3.** The treated versus control fund lagged returns. The figure plots the distribution of the variables that determine Morningstar star ratings (3-, 5-, and 10-year adjusted returns) for the treated and control funds, measured as of December prior to the treatment year.

returns—the inputs that determine the Morningstar star ratings. The differences in means between the treated and control groups are 8, 10 and 9 basis points, respectively, and are not statistically significant. The [Supplementary Appendix](#) presents formal tests of the match quality between the matched samples on a variety of fund characteristics, as well as tests of conditional independence of treatment status. We find that treated and control funds are indistinguishable on all characteristics we examine including AUM, turnover, expense ratio, and 3-, 5-, and 10-year returns.

Next, we examine how Morningstar star ratings affect investment in treated and control funds. [Figure 4](#) shows the AUM for treated and control funds in event time relative to the cohort-year. We find that the two groups of funds have similar pre-treatment trends in their AUM, while post-treatment their AUMs diverge sharply. In particular, the AUM of treated funds (which received a higher star rating) increases on average, while the AUM of control funds (which received a lower star rating) decreases on average post-treatment. The results show that investors differentially allocate capital based on Morningstar star ratings despite the funds' similar underlying fundamentals.

[Table V](#) shows the corresponding regression estimates. We estimate cohort difference-in-differences regressions that compare fund AUM for treated and control funds, 3 years pre-treatment to 3 years post-treatment. Formally, we examine regressions of the form:

$$\log AUM_{i,t} = \beta \text{Treated}_i \times \text{Post}_t + FE_i + FE_t + \epsilon_{i,t}, \quad (2)$$

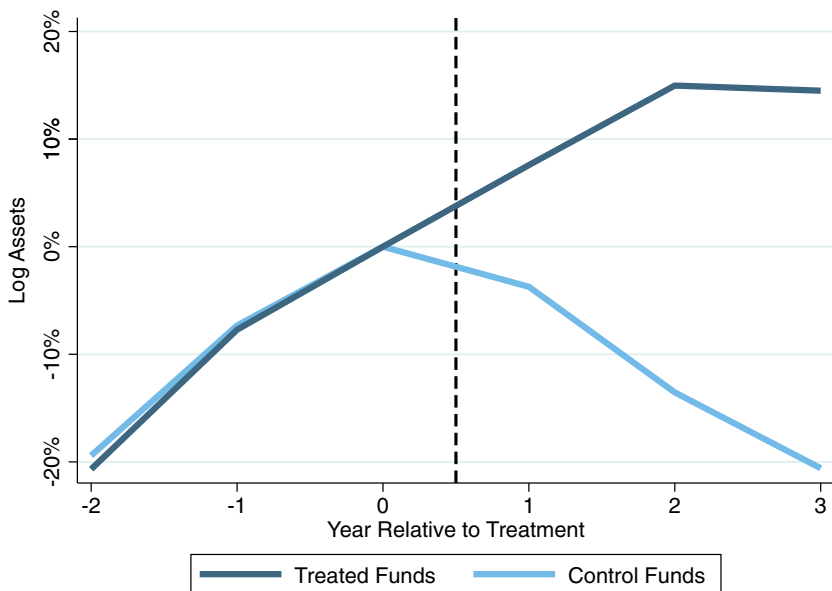
The estimates include both fund-by-cohort fixed effects, which sweep out any nontime-varying differences across funds, and year-fixed effects, which sweep out common trends in fund assets.<sup>6</sup> The results show that treated funds have AUM that is 22.9% higher ( $t = 3.2$ ) than control funds because of the difference in their star ratings. These additional investment dollars, driven by the discontinuous cutoffs in the Morningstar ratings, are plausibly unrelated to the treated funds' performance or objectives.

To support our identification strategy, we present a variety of robustness and falsification checks in the [Supplementary Appendix](#). First, to ensure that our research design is capturing investments into treated funds, driven only by the Morningstar ratings and not by some omitted variable, we conduct a falsification test that finds no significant difference in AUM between treated and control funds post-treatment, either economically or statistically. Second, we address the concern that our results may reflect aggregate trends in fund assets over time. The detrended results are nearly identical to our main specification, which suggests that aggregate trends in fund flows are not an issue in our setting. Finally, we examine whether heterogeneous treatment effects lead to biased estimates using the approach of [Sun and Abraham \(2021\)](#). The implicit weighting function in our setting does not suggest cause for concern, and [Sun and Abraham's \(2021\)](#) robust estimator produces similar results to our baseline estimates.

We next project the treatment effect of 22.9% of fund AUM ([Table V](#)) onto treated funds' holdings as of the December just prior to treatment. That is, for each fund in the matched set, we compute the fitted value of the difference-in-differences estimate for fund assets, and multiply that change by that fund's pre-treatment holdings of each US firm in

6 Note that this specification also sweeps out any differences in the Morningstar assignment variables—that is, controls for funds' lagged returns or category-by-year fixed effects would be collinear with the fund-by-cohort fixed effects.





**Figure 4.** Treated versus control fund assets, pre- versus post-treatment. The figure plots average log fund assets, for the treated and control funds separately, in event-time for 3 years before and after the cohort year. Both series are aligned relative to the cohort year (the last pretreatment year) for ease of comparison.

**Table V.** Difference-in-differences regression of fund assets

The table presents the estimated effects of the Morningstar star ratings on fund assets. Specifically, we estimate:

$$\log(AUM)_{i,t} = \beta Treated_i \times Post_t + FE_i + FE_t + \epsilon_{i,t},$$

*Treated* is an indicator that equals one for treated funds, and zero otherwise. Treated funds are SRI funds that have a Morningstar star rating that is one star higher than the matched control fund in January of the treatment year. *Post* is an indicator that equals one after treatment, and zero otherwise.  $FE_i$  is a fund-by-cohort fixed effect, and  $FE_t$  is a year-fixed effect. Robust standard errors, clustered at the fund-cohort level, are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	log(AUM) (1)
Treated × Post	0.229*** (0.072)
Observations	1,161
Adjusted R <sup>2</sup>	0.909
Fund × Cohort FE	Yes
Year FE	Yes

the merged CRSP/Compustat data.<sup>7</sup> Our approach is similar to the instrumental variables analysis in [Bartik \(1991\)](#). The resulting value, fund-by-firm-by-year, is the projected change in investment by that fund in that firm, holding the fund's portfolio composition fixed after treatment (i.e., with no look-ahead bias). For a control fund, this value is zero for all firms and years. For a treated fund, this value is zero in pre-treatment years and a positive fraction of firm value in post-treatment years.

Summing the fitted values by firm-year, we obtain a single fitted value for each firm-year. The value is zero for firms that were never held by a treated fund, and for firms that were held by any treated fund in pre-treatment years. The value is a positive fraction of firm value for firms that were held by at least one treated fund in post-treatment years. Thus, the fitted value, which we denote by  $\widehat{\Delta SRI Investment}$ , represents the predicted change in SRI investment for each firm in the sample that flows from our matched funds difference-in-differences setting. Put differently, it is a difference-in-differences estimator at the firm-year level, with a continuous treatment intensity for each firm-year. We then use this to examine regressions of the form:

$$y_{i,t} = \beta * \widehat{\Delta SRI Investment}_{it} + FE_j + FE_t + \epsilon_{i,t}, \quad (3)$$

where  $y_{i,t}$  is a measure of environmental or social behavior. All estimates include firm-fixed effects, which sweep out any nontime-varying differences across firms and year-fixed effects, which sweep out time trends. In the [Supplementary Appendix](#), we further examine the exogeneity and relevance assumptions, respectively, of our research design; we find that the Morningstar ratings appear to be conditionally independent between our matched funds, and that the fitted values do significantly predict SRI fund investment at the firm-year level. These findings support our identifying assumptions.

#### 4.2 Impact of SRI Funds on Corporate Environmental Behavior

We next use our Morningstar research design to test whether SRI funds have an impact on their portfolio firms. Similar to the selection analysis, we begin by examining the environmental conduct of firms. [Table VI](#) implements our difference-in-differences design that uses exogenous variation in SRI fund ownership to examine EPA pollution data. For all four measures of emissions, the point estimate on the effect of SRI investment is positive, which is inconsistent with emissions reduction. Moreover, none of the estimates is statistically significantly different from zero.

It is possible that significant reductions in pollution take time to occur. Accordingly, we also examine whether SRI ownership leads to investments in pollution abatement activities, which might happen more quickly. If SRI funds aim to reduce pollution in their portfolio firms, then we should observe greater investments in abatement activities of SRI funds' portfolio firms. The results show no effect of SRI funds ownership on abatements at the extensive margin (Column 5) or at the intensive margin (Column 6). We also find no significant effect on climate risk exposure (Column 7) consistent with firms not changing their environmental policies following an increase in SRI ownership.<sup>8</sup>

7 This approach assumes that inflows into treated funds were, on average, allocated *pro rata* to the fund's existing portfolio. We examine this assumption in the [Supplementary Appendix](#) and find that SRI funds, on average, do allocate inflows *pro rata* to their existing portfolio.

8 All of the results remain statistically insignificant after we adjust for multiple testing using the Romano–Wolf procedure ([Romano & Wolf, 2005](#)).

**Table VI.** Treatment effects: SRI funds and corporate environmental behavior

The table presents estimates of the effect of SRI fund investment on firm total pollution (*Total releases*), air pollution (*Air*), water pollution (*Water*), land pollution (*Land*), total off-site pollution (*Off-site*), one-time pollution (*One-time*), investments in pollution abatement (*Abatement* and *logAbatements*), and climate change exposure (*CCExposure*).  $\Delta SRI\widehat{Investment}$  is the predicted change in SRI investment for each firm in the sample from our paired fund-level difference-in-differences regression (to facilitate the interpretation of the results, the measure is standardized). MDES is the minimum detectable effect size (Bloom, 1995). Definitions for all variables are in the [Supplementary Appendix](#). Robust standard errors, clustered at the firm level, are shown in parentheses with unadjusted and Romano and Wolf (2005) *p*-values shown below. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

	Total releases (1)	Air (2)	Water (3)	Land (4)	Abatement (5)	logAbatements (6)	CCExposure (7)
$\Delta SRI\widehat{Investment}$	0.089 (0.064)	0.104 (0.071)	0.077 (0.064)	0.031 (0.098)	0.013 (0.016)	0.019 (0.040)	-0.000 (0.023)
MDES	±0.182	±0.200	±0.181	±0.279	±0.046	±0.114	±0.065
Unadjusted <i>p</i>	0.166	0.141	0.230	0.752	0.420	0.628	0.998
Romano–Wolf <i>p</i>	0.653	0.623	0.701	0.958	0.886	0.958	0.996
Observations	3,836	3,679	1,869	1,183	3,551	1,456	14,973
Adjusted R <sup>2</sup>	0.954	0.960	0.888	0.906	0.508	0.718	0.857
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

In general, we observe that the point estimates in [Table VI](#) are all small in magnitude. One important question for our difference-in-difference estimates is whether our research design is adequately powered to detect a significant treatment effect. If not, then our finding that SRI fund investment has no effect on emissions could be due to our estimates being underpowered. To examine this possibility, for each of our estimates, we compute the MDES following Bloom (1995). The MDES is a simple measure of the magnitude of treatment effect that a given estimator can reliably detect. The MDES of our estimates suggests that our research design is adequately powered to detect meaningful effects on the average firm's total emissions. For example, in the case of the log number of pollution abatements (Column 6), our research design could reliably detect a treatment effect on the order of 11.4% or larger. The number of abatements in our sample has a mean of 3.6 and a standard deviation of 15.4—in logs, it has a mean of 0.70 and a standard deviation of 1.01. Thus, our research design is well-powered since it could reliably detect a treatment effect of a magnitude less than 1/10 of one sample standard deviation.

Importantly, the MDES is also much smaller in magnitude than the selection effects documented in Section III. For example, a one-standard deviation increase in SRI investment is associated with 65% lower total firm emissions on average ([Table II](#), Column 1), compared to the MDES for the treatment effect of 18.2% ([Table VI](#), Column 1). Thus, both economically and statistically, we can rule out that the associations found in [Table II](#) are driven by treatment effects of SRI fund ownership on pollution, abatements, or climate risk.

Our results so far suggest that SRI funds select firms that pollute less. Yet, SRI funds do not improve firm-level pollution. In other words, we do not observe any changes in the environmental behavior of firms due to ownership by SRI funds.

### 4.3 Impact of SRI Funds on Employee Well-Being and Board Diversity

Next, in [Table VII](#), we examine whether SRI fund investment leads to improved employee well-being and board diversity. In Panel A, we find that an exogenous increase in SRI fund ownership is followed by insignificant or small positive changes in employee satisfaction. All seven measures of employee satisfaction increase on average following treatment. Once again, the MDES calculations suggest that our research design is adequately powered. Before adjusting for multiple testing, the treatment effect is statistically significant for three measures, reflecting an improvement in career opportunities, confidence in the CEO, and overall firm outlook. However, the magnitudes of all of these effects are small, and after adjusting for multiple testing, none of them is statistically significant at conventional levels as shown by the Romano–Wolf  $p$ -values. Overall, we cannot reject the null that SRI fund ownership has no causal effect on employee satisfaction and safety. Put differently, while SRI funds invest in firms with higher employee satisfaction and safety, SRI funds do not cause improvements in these outcomes.

As in our selection analyses, we also examine the board of directors' gender and racial diversity. In Panel B of [Table VII](#), we find that an exogenous increase in SRI fund ownership is followed by an increase in the percentage of women on the board of directors, but no significant changes in racial diversity. Again, the MDES calculations suggest that our research design is adequately powered. For example, the MDES for gender diversity is 0.4%, so our research design can—and does—reliably detect a change in board diversity of 0.4%. Yet, after adjusting for multiple testing, the Romano–Wolf  $p$ -value is not significant at conventional levels. Hence, while SRI funds select firms with more diverse boards, they do not increase the proportion of women directors at their portfolio firms.

### 4.4 Additional Analyses

To corroborate our results on SRI funds' impact (or lack of thereof), we conduct three additional sets of tests. First, we examine possible heterogeneity in the treatment effect arising from different objectives of SRI funds (i.e., selection versus impact). Second, we examine the long-run impact of SRI funds on a firm's E&S conduct. Third, we take a step back and examine public evidence of SRI fund's engagement with portfolio firms.

#### 4.4.a. *Heterogeneous treatment effects of SRI funds*

Because our research question examines the selection and impact of SRI funds on portfolio firms, it is important to establish whether these funds claim to select and/or impact their portfolio firms. Accordingly, we read the prospectus for each of the SRI funds in our sample, as well as their annual report, stewardship report, and other fund and fund-family documents, and record whether each fund claims that they select firms with good E&S performance and/or claims that they engage with their portfolio firms. Out of 134 SRI funds in our sample, we find that 134 funds (100%) claim that they select firms with good E&S performance, and 108 funds (81%) claim that they actively engage with their portfolio firms.<sup>9</sup>

9 For example, BlackRock's Investment Stewardship team claims to regularly engage with companies to understand how material environmental factors are considered from the perspective of risk and opportunity (BlackRock, 2020). Similarly, Domini Social Equity Fund (2021) claims to influence corporations through shareholder activism: "In pursuing our clients' sustainability objectives, we seek to influence the actions of corporations on a wide range of social, environmental and governance issues."

**Table VII.** Treatment effects: SRI funds, employee well-being, and board diversity

The table presents estimates of the effect of SRI fund investment on a firm's employee well-being using data provided by Glassdoor, Inc. and OSHA (Panel A), and the effect of SRI fund investment on board diversity (Panel B).  $\Delta SRI\widehat{Investment}$  is the predicted change in SRI investment for each firm from our paired fund-level difference-in-differences regression (to facilitate the interpretation of the results, the measure is standardized). MDES is the minimum detectable effect size (Bloom, 1995). Definitions for all variables are in the [Supplementary Appendix](#). Robust standard errors, clustered at the firm level, are shown in parentheses with unadjusted and Romano and Wolf (2005) *p*-values shown below. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

Panel A: Employee well-being

	Overall (1)	Careerops (2)	Srleader (3)	Worklife (4)	Culture (5)	CEO (6)	Outlook (7)	Hospitalization (8)	Amputation (9)
$\Delta SRI\widehat{Investment}$	0.015 (0.011)	0.019 (0.011)	0.011 (0.011)	0.010 (0.010)	0.016 (0.013)	0.013 (0.006)	0.014 (0.008)	0.048 (0.034)	-0.028 (0.029)
MDES	±0.030	±0.030	±0.032	±0.028	±0.035	±0.017	±0.024	±0.097	±0.081
Unadjusted <i>p</i>	0.150	0.071*	0.336	0.303	0.194	0.026**	0.088*	0.159	0.333
Romano–Wolf <i>p</i>	0.661	0.569	0.683	0.683	0.683	0.458	0.589	0.661	0.683
Observations	12,017	11,939	11,933	11,944	10,592	11,451	10,512	963	963
Adjusted $R^2$	0.364	0.330	0.333	0.371	0.401	0.343	0.338	0.823	-0.097
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Board diversity

	Gender Div. (1)	Racial Div. (2)
$\Delta SRI\widehat{Investment}$	0.004 (0.001)	0.002 (0.002)
MDES	±0.004	±0.005
Unadjusted <i>p</i>	0.004***	0.177
Romano–Wolf <i>p</i>	0.387	0.683
Observations	15,649	9,807
Adjusted $R^2$	0.774	0.787
Year FE	Yes	Yes
Firm FE	Yes	Yes

Also, of the 108 funds that claim impact, the vast majority claim both E&S impact as objectives. Hence, a natural question arises: do SRI funds that explicitly claim to pursue impact at their portfolio firms behave differently from funds that do not—that is funds that only incorporate E&S factors into their investment strategy?

In [Table VIII](#), we split the predicted level of SRI fund holdings from our Morningstar research design into holdings by funds that do claim impact and holdings by funds that do not. To keep this analysis parsimonious, we focus on our main outcomes of interest: two measures of environmental conduct (total pollution and investment in abatement activities) and two measures of social conduct (overall employee ratings and gender diversity on the board). We find that the estimated treatment effects for both types of funds are nearly

**Table VIII.** Heterogeneous treatment effects of SRI funds ownership

The table presents estimates of the heterogeneity of the effect of SRI funds investment on firm's E&S behavior. We interact the fitted values of SRI fund ownership ( $\widehat{\Delta SRI Investment}$ ) with two indicators for whether SRI funds claim to make an impact on firm behavior (FundClaimsImpact and FundDoesNotClaimImpact). Robust standard errors, clustered at the firm level, are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Total releases	logAbatements	Overall	Gender Div.
FundClaimsImpact	0.047	-0.023	0.012	0.003*
× $\widehat{\Delta SRI Investment}$	(0.062)	(0.038)	(0.010)	(0.002)
FundDoesNotClaimImpact	0.050	0.065	0.002	0.003*
× $\widehat{\Delta SRI Investment}$	(0.058)	(0.054)	(0.013)	(0.001)
F-stat [Coef1 = Coef2]	0.00	1.25	0.24	0.01
Observations	3,836	1,456	12,017	15,649
Adjusted R <sup>2</sup>	0.954	0.718	0.364	0.774
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

identical and again close to zero. These findings indicate that even SRI funds that claim to engage with their portfolio firms do not have any significant impact on their portfolio firms.

#### 4.4.b. Long-run impact of SRI funds on firm E&S conduct

One concern with our analysis of SRI funds' impact is that we regress the level of firms' E&S behavior on the predicted, exogenous change in SRI fund investment from the previous year. Yet, it might take longer to change some firm policies, so 1 year might not be enough time to observe a treatment effect. To account for this possibility, we examine changes in firm behavior at longer (2- and 3-year) horizons. The results are shown in Table IX. Similar to the analysis in Table VIII, for brevity, we focus only on our main outcomes of interest. Again, we find zero treatment effects. Also, again the observed economic magnitude of the coefficients is small and the MDES suggests that our estimates remain well powered to detect meaningful changes in corporate policy. We conclude that—even at the 2- and 3-year horizon—there is no evidence that SRI funds change E&S conduct of their portfolio firms.

#### 4.4.c. SRI fund engagement

In light of our results showing that SRI funds do not impact firm behavior, we take a step back and examine whether SRI funds do engage with portfolio firms, but are unsuccessful. A recent study by Dikolli *et al.* (2022) documents that SRI funds vote in favor of E&S shareholder proposals. Yet, it is unclear whether these votes are pivotal and whether SRI funds use shareholders proposals to control the agenda of the annual meeting and to attempt to change firms' E&S behavior. Hence, we study whether SRI funds use shareholders proposals to impact the E&S conduct of their portfolio firms. Specifically, we examine whether an exogenous increase in SRI investment leads to more E&S shareholder proposals and/or increases the likelihood they pass. Even though most SRI funds are small, Exchange

**Table IX.** Evidence of longer-run effects

The table presents estimates of the effect of SRI fund investment on firm behavior over longer periods of time post-treatment.  $\Delta SRI\widehat{Investment}$  is the predicted change in SRI investment for each firm in the sample from our paired fund-level difference-in-differences regression (to facilitate the interpretation of the results, the measure is standardized). MDES is the minimum detectable effect size (Bloom, 1995). Definitions for all variables are in the [Supplementary Appendix](#). Robust standard errors, clustered at the firm level, are shown in parentheses with unadjusted and Romano and Wolf (2005) *p*-values shown below. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total releases		logAbatements		Overall		Gender Div.	
Relative to treatment year:	<i>t</i> + 2	<i>t</i> + 3	<i>t</i> + 2	<i>t</i> + 3	<i>t</i> + 2	<i>t</i> + 3	<i>t</i> + 2	<i>t</i> + 3
$\Delta SRI\widehat{Investment}$	0.059 (0.063)	0.004 (0.065)	0.053 (0.042)	0.087 (0.047)	0.008 (0.011)	0.003 (0.011)	0.003 (0.001)	0.002 (0.002)
MDES	0.177	0.185	0.119	0.134	0.031	0.030	0.004	0.004
Unadjusted <i>p</i>	0.258	0.743	0.205	0.066*	0.449	0.776	0.033**	0.168
Romano–Wolf <i>p</i>	0.607	0.934	0.607	0.342	0.805	0.934	0.233	0.607
Observations	3,326	2,814	1,317	1,066	10,588	9,070	13,299	10,992
Adjusted <i>R</i> <sup>2</sup>	0.961	0.963	0.725	0.741	0.380	0.395	0.783	0.796
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Act Rule 14a-8 states that a shareholder may submit a proposal if they own at least \$2,000 of a stock for 3 years or \$15,000 for 2 years or \$25,000 for 1 year ([Securities and Exchange Commission, 2020](#)). As such, even smaller SRI funds should be able to submit shareholder proposals to influence firm policies.

In [Table X](#), we present the results from regressing different shareholder-proposal measures on the fitted value of SRI ownership from our Morningstar research design. We find that a one-standard deviation increase in level of investment by SRI funds leads to zero change in the number of E or S items that are proposed by any shareholders (Columns 1–3) or the number of E&S items proposed by SRI funds (Column 4). Moreover, consistent with [Michaely, Ordonez-Calafi, and Rubio \(2021\)](#)—who find that SRI funds vote in favor of E&S proposals when they are unlikely to pass, but they vote against them when their vote is more likely to be pivotal—we find that the E&S items that are proposed are slightly less likely to pass (Columns 5 and 6). Finally, we also find that there is no change in the items that are withdrawn (Columns 7 and 8).

These results show that SRI funds are not acting to improve firm behavior using shareholder proposals on either the extensive or intensive margin. While one could argue that SRI funds affect their portfolio firms in other ways, perhaps via (unobservable) behind-the-scenes engagement with their portfolio firms, our results suggest this is not the case. If behind-the-scenes engagement was effective, we would expect to see changes in either E&S proposals or real-world firm behavior. Yet, we do not. Furthermore, behind-the-scenes engagement often results in the withdrawal of shareholder proposals (after a negotiated change in behavior). The insignificant effect of SRI fund ownership on E&S shareholder proposals withdrawn indicates that behind-the-scenes engagement with management is not effective in this setting.

**Table X.** The effects of SRI Investment on E&S shareholder proposals

The table presents estimates of the effects of SRI fund investment on the number and success of E&S shareholder proposals at portfolio firms. Definitions for all variables are in the [Supplementary Appendix](#). In all models, the independent variable,  $\Delta SRI\widehat{Investment}$ , is the predicted change in SRI investment for each firm in the sample from our paired fund-level difference-in-differences regression (to facilitate the interpretation of the results, the measure is standardized). In Columns 1–3, the dependent variable is the number of shareholder proposals related to E&S issues, environmental issues (E), and social issues (S), respectively. In Column 4, the dependent variable is the number of ES items proposed by SRI funds. In Columns 5 and 6, the dependent variable is the number and fraction of ES proposals that pass, respectively. In Columns 7 and 8, the dependent variable is the number and fraction of ES proposals withdrawn, respectively. Robust standard errors, clustered at the firm level, are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number of ES Items	Number of E Items	Number of S Items	ES Items by SRI Funds	Number of ES Items Passed	Fraction of ES Items Passed	ES Items Withdrawn	Fraction of ES Items Withdrawn
$\Delta SRI\widehat{Investment}$	0.001 (0.006)	0.003 (0.005)	-0.003 (0.003)	0.006 (0.006)	-0.002** (0.001)	-0.000** (0.000)	-0.001 (0.006)	-0.012 (0.009)
Observations	16,192	16,192	16,192	9,119	16,192	15,761	9,119	3,022
Adjusted R <sup>2</sup>	0.461	0.432	0.278	0.256	0.008	0.043	0.113	0.199
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

As a final possibility, we explore whether some of the SRI funds in our sample are passive index funds and therefore lack the incentives and resources to engage with their portfolio firms (Heath *et al.*, 2022). Rows 2 and 3 of [Table I](#) show that virtually all SRI ownership at the firm level is by actively managed SRI funds. As of 2019, the last year in our sample, passively managed SRI funds were a small minority both by number (80 of 602 total SRI funds) and by AUM (\$25 billion of \$240 billion total AUM in SRI funds).<sup>10</sup> Thus, the two recent booms in passive investing and socially responsible investing (SRI) are largely separate.

## 5. Conclusion

There is an active debate about the role of institutional investors in society, but to date, there is little evidence on what socially responsible investing funds actually do. In a comprehensive sample of SRI funds, we observe that 100% of funds state that they select portfolio firms on E&S criteria and 81% state that they intend to impact their portfolio firms' behavior. We thus investigate the portfolio selection and impact of SRI funds to see if they act in accordance with their claims. We find that SRI funds are significantly more likely than non-

10 In addition to accounting for only one-tenth of SRI fund assets, passive funds invest in a more diversified portfolio on average, so they account for even less of the average SRI ownership by firms.



SRI funds to hold firms that pollute less, have better workplace safety, have greater board diversity, and have better employee satisfaction. However, we find no evidence that SRI funds have any impact on corporate E&S conduct. Given their stated objectives about selection and impact, our results suggest that while SRI funds may not be “greenwashing” (they do select firms with better E&S conduct), the majority of funds in our sample are “impact washing”. In other words, while 81% of SRI funds claim to impact firm behavior, they do not.

Our findings speak to the current debate about the role of SRI funds in society (Edmans, 2023). SRI funds could have a bigger impact if they invested in “brown” firms and worked to improve their conduct (Edmans *et al.*, 2022). However, the incentives of SRI funds’ managers seem not to be consistent with this notion. Fund flows respond to third-party E&S ratings (Hartzmark and Sussman, 2019), which are a function of the ratings of the firms in each fund’s portfolio. It follows that if SRI fund managers seek to maximize investor flows, SRI funds will primarily select stocks with good E&S performance, but will not hold stocks that recently improved their E&S conduct and will not work to improve E&S conduct. We confirm that SRI funds simply select firms that already have better levels of E&S performance, which is inconsistent with them trying to have a social impact but is consistent with them trying to maximize fund flows. Future research should explore alternative methods of socially responsible investing, and perhaps regulatory responses, to ensure that investors’ good intentions and the fees charged by SRI funds are repaid with real results.

## Data Availability

The data underlying this article are available in the article and in its online [supplementary material](#).

## Supplementary Material

[Supplementary data](#) are available at *Review of Finance* online.

## Conflict of Interest

No conflicts of interest to disclose.

## References

- Barber, B. M., Morse, A., and Yasuda, A. (2021): Impact investing, *Journal of Financial Economics* 139, 162–185.
- Bartik, T. J. (1991): *Who Benefits from State and Local Economic Development Policies?*, Kalamazoo, MI, USA: WE Upjohn Institute for Employment Research Kalamazoo.
- Bebchuk, L. A. and Tallarita, R. (2020): The illusory promise of stakeholder governance, *Cornell Law Review* 106, 91.
- Berg, F., Fabisik, K., and Sautner, Z. (2020): Rewriting history ii: The (un) predictable past of ESG ratings. European Corporate Governance Institute–Finance Working Paper, 708, European Corporate Governance Institute.
- Berg, F., Koelbel, J. F., and Rigobon, R. (2022): Aggregate confusion: the divergence of ESG ratings, *Review of Finance* 26, 1315–1344.

- Berk, J. and van Binsbergen, J. H. (2021). The impact of impact investing. Stanford University Graduate School of Business Research Paper, Law & Economics Center at George Mason University Scalia Law School Research Paper Series No. 22-008, Available at SSRN: <https://ssrn.com/abstract=3909166>.
- BlackRock. (2020). *Emissions, Engagement, and Transition to a Low-carbon Economy*. March 2020. <https://www.blackrock.com/corporate/literature/publication/blk-commentary-engaging-on-emissions.pdf>, accessed on December 17, 2021.
- Bloom, H. S. (1995): Minimum detectable effects: a simple way to report the statistical power of experimental designs, *Evaluation Review* 19, 547–556.
- Del Guercio, D. and Tkac, P. A. (2008): Star power: the effect of morningstar ratings on mutual fund flow, *Journal of Financial and Quantitative Analysis* 907–936.
- Dikolli, S. S., Frank, M. M., Guo, Z. M., and Lynch, L. J. (2022): Walk the talk: ESG mutual fund voting on shareholder proposals, *Review of Accounting Studies* 27, 864–896.
- Dimson, E., Karakaş, O., and Li, X. (2021). Coordinated engagements. European Corporate Governance Institute–Finance Working Paper No. 721, European Corporate Governance Institute.
- Doidge, C., Dyck, A., Mahmudi, H., and Virani, A. (2019): Collective action and governance activism, *Review of Finance* 23, 893–933.
- Domini Social Equity Fund. (2021). *Sustainable, Responsible and Impact Mutual Fund and ETF Chart – Fund Profile: Domini Social Equity Fund*. June 2021. [https://charts.ussif.org/mfpc/fund\\_profile\\_display.php?FundID=94](https://charts.ussif.org/mfpc/fund_profile_display.php?FundID=94), accessed on June 2, 2022.
- Duong, T. X. and Meschke, F. (2020): The rise and fall of portfolio pumping among US mutual funds, *Journal of Corporate Finance* 60, 101530.
- Edmans, A. (2009): Blockholder trading, market efficiency, and managerial myopia, *The Journal of Finance* 64, 2481–2513.
- Edmans, A. (2011): Does the stock market fully value intangibles? Employee satisfaction and equity prices, *Journal of Financial Economics* 101, 621–640.
- Edmans, A. (2023): The end of ESG, *Financial Management* (Forthcoming).
- Edmans, A., Levit, D., and Schneemeier, J. (2022): Socially responsible divestment. European Corporate Governance Institute–Finance Working Paper No. 823, European Corporate Governance Institute.
- Edmans, A. and Manso, G. (2010): Governance through trading and intervention: a theory of multiple blockholders, *The Review of Financial Studies* 24, 2395–2428.
- Forum for Sustainable and Responsible Investing. (2022): *What are Some of the Segments of Sustainable Investing?* <https://www.ussif.org/sribasics>, accessed on December 9, 2022.
- Fried, J. M. (2021): Will Nasdaq’s diversity rules harm investors? *Harvard Business Law Review Online* 12, 1–8.
- Gantchev, N., Giannetti, M., and Li, R. (2021): Sustainability or performance? Ratings and fund managers’ incentives. European Corporate Governance Institute–Finance Working Paper No. 747.
- Gibson Brandon, R., Glossner, S., Krueger, P., Matos, P., and Steffen, T. (2022): Do responsible investors invest responsibly? *Review of Finance* 26, 1389–1432.
- Gow, I. D., Larcker, D. F., and Watts, E. M. (2020). Board Diversity and Shareholder Voting. Rock Center for Corporate Governance at Stanford University Working Paper No. 245, Rock Center for Corporate Governance at Stanford University.
- Hartzmark, S. M. and Sussman, A. B. (2019): Do investors value sustainability? A natural experiment examining ranking and fund flows, *Journal of Finance* 74, 2789–2837.
- Heath, D., Macciocchi, D., Michaely, R., and Ringgenberg, M. C. (2022): Do index funds monitor? *The Review of Financial Studies* 35, 91–131.
- Heath, D., Ringgenberg, M. C., Samadi, M., and Werner, I. M. (2021): Reusing natural experiments, *Journal of Finance* (Forthcoming).

- Heinkel, R., Kraus, A., and Zechner, J. (2001): The effect of green investment on corporate behavior, *Journal of Financial and Quantitative Analysis* 36, 431–449.
- Kim, S. H. (2021): Do Mutual Fund Managers Care About Star Ratings? Evidence from Portfolio Pumping. Working Paper, available at <https://ssrn.com/abstract=3429450>.
- Kim, S., Kumar, N., Lee, J., and Oh, J. (2022): ESG Lending. Working Paper.
- Kim, S. and Yoon, A. (2022): Analyzing active fund managers' commitment to ESG: Evidence from the United Nations principles for responsible investment, *Management Science* (Forthcoming)
- Krueger, P., Sautner, Z., and Starks, L. T. (2020): The importance of climate risks for institutional investors, *The Review of Financial Studies* 33, 1067–1111.
- Liang, H., Sun, L., and Teo, M. (2022): Responsible hedge funds, *Review of Finance* 26, 1585–1633.
- Michaely, R., Ordóñez-Calafi, G., and Rubio, S. (2021): Mutual funds' strategic voting on environmental and social issues. European Corporate Governance Institute–Finance Working Paper No. 774, European Corporate Governance Institute.
- Muller, N. Z. (2021): Measuring firm environmental performance to inform asset management and standardized disclosure. NBER Working Paper No. w29454, NBER.
- Raghunandan, A. and Rajgopal, S. (2022): Do ESG funds make stakeholder-friendly investments? *Review of Accounting Studies* 27, 822–863.
- Reuter, J. and Zitzewitz, E. (2021): How much does size erode mutual fund performance? A regression discontinuity approach, *Review of Finance* 25, 1395–1432.
- Riedl, A. and Smeets, P. (2017): Why do investors hold socially responsible mutual funds? *Journal of Finance* 72, 2505–2550.
- Romano, J. P. and Wolf, M. (2005): Stepwise multiple testing as formalized data snooping, *Econometrica* 73, 1237–1282.
- Sautner, Z., van Lent, L., Vilkov, G., and Zhang, R. (2022): Firm-level climate change exposure, *Journal of Finance* (Forthcoming).
- Securities and Exchange Commission. (2020, September 23). *SEC Adopts Amendments to Modernize Shareholder Proposal Rule*. August 2022. <https://www.sec.gov/news/press-release/2020-220>, accessed on December 9, 2022.
- Sun, L. and Abraham, S. (2021): Estimating dynamic treatment effects in event studies with heterogeneous treatment effects, *Journal of Econometrics* 225, 175–199.