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Does Socially Responsible Investing Change Firm Behavior?

Finance Working Paper N° 762/2021
Revised February 2023

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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 SRI funds do not significantly change firm behavior. Moreover, we find little evidence they try to impact firm behavior using shareholder proposals. Our results suggest 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.

Keywords: Corporate Social Responsibility (CSR), Environmental, Social, and Governance (ESG), Institutional Investors, Socially Responsible Investing (SRI)

JEL Classifications: G12, G14

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Does Socially Responsible Investing Change Firm Behavior?

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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 SRI funds do not significantly change firm behavior. Moreover, we find little evidence they try to impact firm behavior using shareholder proposals. Our results suggest 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.

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I. 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 paper, we provide novel evidence on the extent to which SRI funds: (1) select firms with better E&S behavior and (2) improve firm 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 a 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 & Manso, 2010) or via voting and engagement – possibly in conjunction with other investors (Doidge, Dyck, Mahmudi, & Virani, 2019; Dimson, Karakaş, & Li, 2021). Survey evidence suggests that SRI funds do view engagement as a tool for addressing climate risk (Krueger, Sautner, & 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

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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 & Tallarita, 2020). Further, for the threat of exit to have an impact it should be capable of significantly changing the stock price of affected firms (Heinkel, Kraus, & Zechner, 2001). Recent evidence suggests the impact of SRI funds on firm's cost of capital is too small to meaningfully affect firm investment decisions (Berk & 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 18 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) that 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 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-

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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 investing 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 65 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

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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 & Tkac, 2008; Reuter & Zitzewitz, 2021). Importantly, it is nearly impossible for funds to manipulate their rating, and discontinuities in the ratings lead to discontinuities in capital allocation.[1]

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 increase in SRI capital leads to zero significant changes in employee well-being or board diversity. Further, 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 two and three 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, Frank, Guo, and Lynch (2022) show that SRI funds vote in favor of E&S shareholder proposals. Yet it is

[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 SEC scrutiny. Our sample focuses exclusively on year-end ratings in the period after 2002 when manipulation is not a concern.

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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 firm 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.[2] Third, we show that our non-results 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 paper contributes to the recent literature that assesses the credibility of E&S investment products. Prior studies focus on institutional investors that are PRI signatories (Gibson Brandon, Glossner, Krueger, Matos, & Steffen, 2022; Kim & Yoon, 2022; Liang, Sun, & Teo, 2022), SRI mutual funds (Raghunandan & Rajgopal, 2022), impact venture capital funds (Barber, Morse, & Yasuda, 2021), and ESG bonds (Kim, Kumar, Lee, & Oh, 2022). The general conclusion of this literature is that socially responsible investment 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 ap-

[2]This finding complements the voting results in Michaely, Ordonez-Calafi, and Rubio (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.

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proximately 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 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 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

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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 they only succeed at the former. This is consistent with predictions in Edmans et al. (2022) that selection strategies are not effective in promoting socially responsible behavior unless firms tilt their portfolios towards "brown" stocks that have taken corrective actions. While the literature has shown that investors do care about environmental and social issues (Riedl & 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 & Sussman, 2019; Gantchev, Giannetti, & Li, 2021). As a consequence, SRI fund managers have weak incentives to exert costly effort to improve firm behavior.

II. 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 Sections A1 and A2 of the Internet Appendix.

We construct a firm-year panel for the period from 2010 to 2019.[3] 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

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

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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 U.S.–based 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 percent of its market capitalization owned by SRI funds (Table I).

To examine corporate behavior on environmental and social issues, we collect firm-year level data from several sources and construct 18 micro-level variables (7 environmental and 11 social), that measure a wide spectrum of firms' E&S behavior, ranging from carbon emissions, to water pollution, to workplace safety and diversity. Our paper 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 Environmental Protection Agency (EPA)'s Toxic Release Inventory (TRI) database and from the EPA's Greenhouse Gas Reporting Program (GHGRP) database. The vast majority of the recent literature on the "E" aspect of E&S investing focuses on green-

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house gas emissions and largely ignores other measures of environmental performance. By contrast, we rely directly on the EPA data, which provides 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 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.[4]

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 fillings 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 percent 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, van Lent, Vilkov, and Zhang (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

[4]Scaling by cost of goods sold (COGS) or using unscaled emissions yield similar results.

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sample mean (1.00) is consistent with Sautner et al. (2022).

We also aim to examine each firm's social behavior. To do so, we use four different data sources. We obtain 7 measures of employee satisfaction based on employee reviews from Glassdoor, Inc., which is a worldwide leader in providing insights about jobs and companies. From the U.S. Department of Labor, Occupational Safety and Health Administration (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 Institutional Shareholder Services (ISS) database to measure racial diversity on the board of directors (*Racial Div*). In our sample, firms have on average 16 percent of their board represented by women and 11 percent 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.

III. SRI Fund Portfolio Selection

We begin our analysis by examining the portfolio selection choices of SRI funds. First, we use OLS regressions with year fixed effects to examine the relation between SRI fund holdings and environmental (Section III.A) and social outcomes (Section III.B). Then, in Section III.C we provide more nuanced analyses on portfolio selection to examine whether

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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.

A. SRI Funds and Corporate Environmental Behavior

We first examine firm-level emissions using micro data 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 percent 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 non-toxic 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 to 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

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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 have 6.1 percent lower climate risk exposure.

One concern related to statistical inference is that we examine the association between SRI ownership and firm behavior across a large number of outcome variables. If uncorrected, this multiple-testing can lead to a large number of false positive findings (Heath, Ringgenberg, Samadi, & Werner, 2021).[5] 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 & 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 (Column7) remain significant at conventional levels. Taken together, our results show robust evidence that SRI funds select firms that pollute less.

B. 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–Occupational Safety and Health Administration (OSHA). The results are shown in Table III Panel A.

Across the board, we find positive relations, both overall and in regard to career opportu-

[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 18 is the number of outcomes (assuming independence of tests and all of the null hypotheses are true).

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nities, 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 3 of the 7 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 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

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evidence that SRI funds offer their investors a portfolio of firms with better E&S conduct.

C. 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 & 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 firm 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:

$$FirmHeldbySRIFund_{i,t} = \beta_1 FirmOutputQuintile_{i,t} + \beta_2 \Delta FirmOutputQuintile_{i,t} + FE_t + \epsilon_{i,t} \tag{1}$$

where *FirmOutputQuintile* is the quintile in which firm i resides when sorted on the level of the E&S outcome variable of interest, $\Delta FirmOutputQuintile$ 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

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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 ($\Delta FirmOutputQuintile$), 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.

IV. 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

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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, C, and 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.

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.

A. 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

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fund's percentile ranking, within its category, on the basis of their returns over a three, five, and ten 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 U.S. equity funds in the Morningstar database with at least $50 million in 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 three years of pre-treatment observations and at least one 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 II. The treated fund is matched with a control fund that: (1) is in the same Morningstar category as the treated fund; (2) has assets under management within +/- 50% of the treated fund; (3) has lagged three, five, and ten year adjusted returns that are within +/-50 basis points of the treated fund; (4) is a non-SRI fund; and, most crucially, (5) 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 three, five, and ten 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

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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-year, 5-year, and 10-year Morningstar 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 Internet Appendix Section A3.1 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-year, 5-year, 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 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, three years pre-treatment to three years post-treatment. Formally, we examine regressions of the form:

$$logAUM_{i,t} = \beta_(Treated \times Post) + FE_i + FE_t + \epsilon_{i,t}, \tag{2}$$

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The estimates include both fund-by-cohort fixed effects, which sweep out any non-time-varying differences across funds, and year fixed effects which sweep out common trends in fund assets.[6] 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 Internet 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 which 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 (2021)'s 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 pretreatment holdings of each U.S. 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.

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the merged CRSP/Compustat data.[7] 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 pretreatment 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 $\Delta SRI\,\widehat{Investment}$, 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:

$$y_{j,t} = \beta * \Delta SRI\,\widehat{Investment}_{jt} + FE_j + FE_t + \epsilon_{j,t}, \tag{3}$$

where $y_{j,t}$ is a measure of environmental or social behavior. All estimates include firm fixed effects, which sweep out any non-time-varying differences across firms, and year fixed effects which sweep out time trends. In Sections A3.1 and A3.2 of the Internet 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

[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 Internet Appendix Section A6, and find that SRI funds, on average, do allocate inflows pro rata to their existing portfolio.

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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.

B. 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.[8]

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 un-

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

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derpowered. To examine this possibility, for each of our estimates we compute the minimum detectable effect size (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.

C. 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

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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 Table VII, Panel B, 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 percent, so our research design can—and does—reliably detect a change in board diversity of 0.4 percent. 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.

D. 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

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arising from different objectives of SRI funds (i.e., selection vs. impact). Second, we examine the long-run impact of SRI funds on firm's E&S conduct. Third, we take a step back and examine public evidence of SRI funds engagement with portfolio firms.

D.1. 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 they select firms with good E&S performance and/or claims 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.[9] Also, of the 108 funds that claim impact, the vast majority claim both environmental and social 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—i.e., 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)

[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.*"

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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 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.

D.2. 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 one year might not be enough time to observe a treatment effect. To account for this possibility, we examine changes in firm behavior at longer (two- and three-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 minimum detectable effect size (MDES) suggests that our estimates remain well-powered to detect meaningful changes in corporate policy. We conclude that—even at the two- and three-year horizon—there is no evidence that SRI funds change E&S conduct of their portfolio firms.

D.3. 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

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change firm E&S behavior. Hence, we study whether SRI funds use shareholder 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 Act Rule 14a-8 states that a shareholder may submit a proposal if they own at least $2,000 of a stock for three years or $15,000 for two years or $25,000 for one 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 et al. (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 5-6). Finally, we also find that there is no change in the items that are withdrawn (Columns 7-8).

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 were 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

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in behavior). The insignificant effect of SRI fund ownership on E&S shareholder proposals withdrawn indicates that behind-the-scene engagement with management is not effective in this setting.

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, Macciocchi, Michaely, & Ringgenberg, 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 assets under management ($25 billion of $240 billion total AUM in SRI funds).[10] Thus, the two recent booms in passive investing and socially responsible investing (SRI) are largely separate.

V. 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-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

[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 firm.

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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 & 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.

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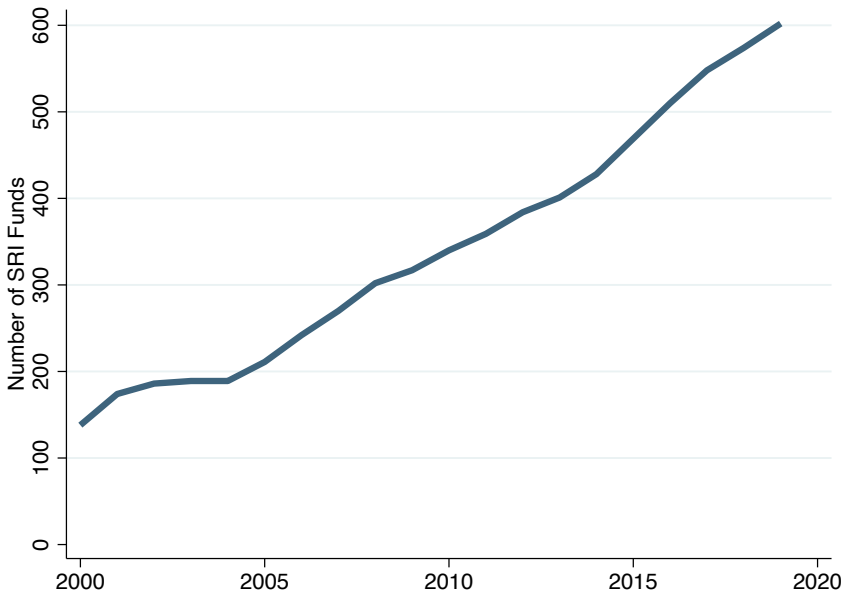
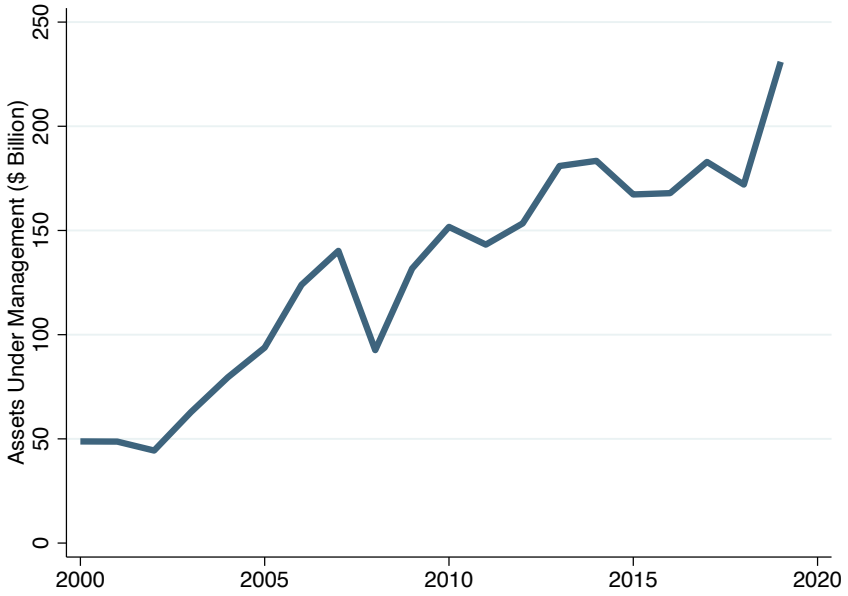


Panel A: Number of SRI funds



Panel B: SRI Assets Under Management

Figure 1. Growth in SRI Funds and Assets over Time

The figure plots the number of SRI funds (Panel A) and the total assets under management in those funds (Panel B) in the CRSP Mutual Fund Database, as of December of each year.

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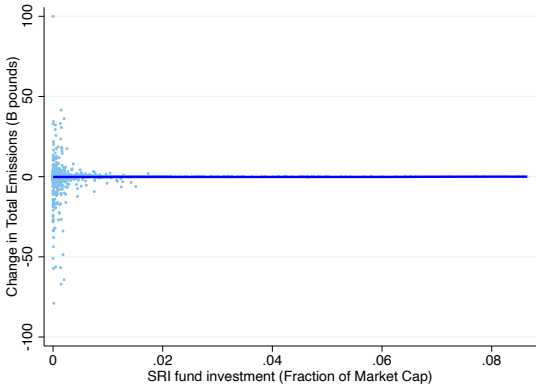
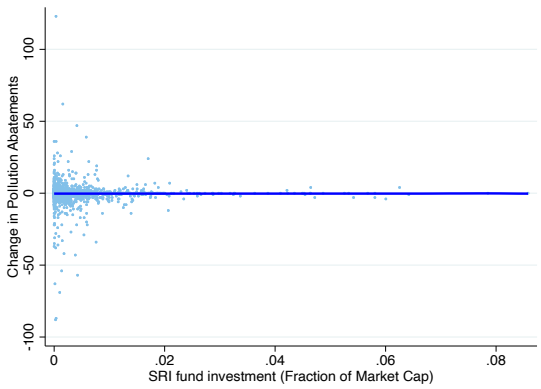
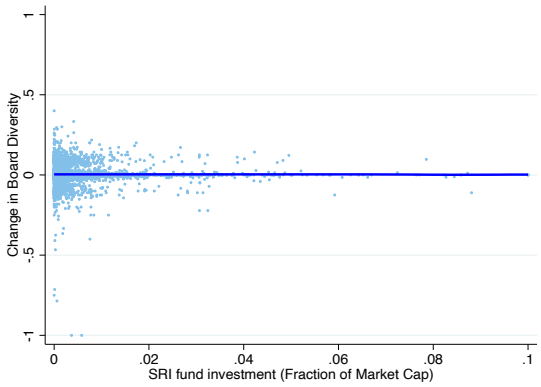


(a) Change in EPA Total Emissions



(b) Change in Pollution Abatements

(c) Change in Glassdoor Overall Ratings



(d) Change in Board Gender Diversity

Figure 2. Yearly Changes in Firm SRI Outcomes and SRI Fund Investment
The figure plots the yearly change (from t to t+1) for four major categories of firm E&S performance, against the total level of SRI fund investment in the firm at time t. Figure (a) plots changes in total EPA emissions in billions of pounds of pollutant. Figure (b) plots changes in pollution abatement activities by the firm. Figure (c) plots changes in the overall employee rating on Glassdoor. Figure (d) plots changes in board gender diversity. The blue lines present the local polynomial best-fit.

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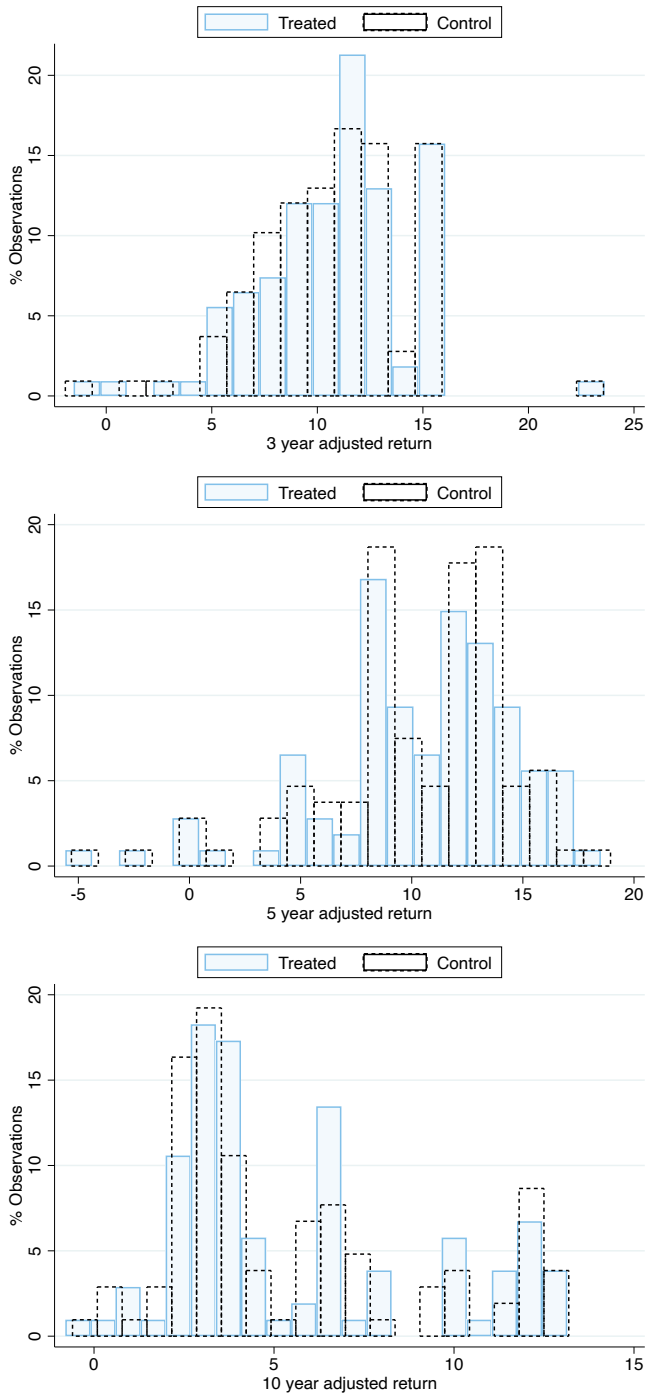

Figure 3. Treated vs. control fund lagged returns

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

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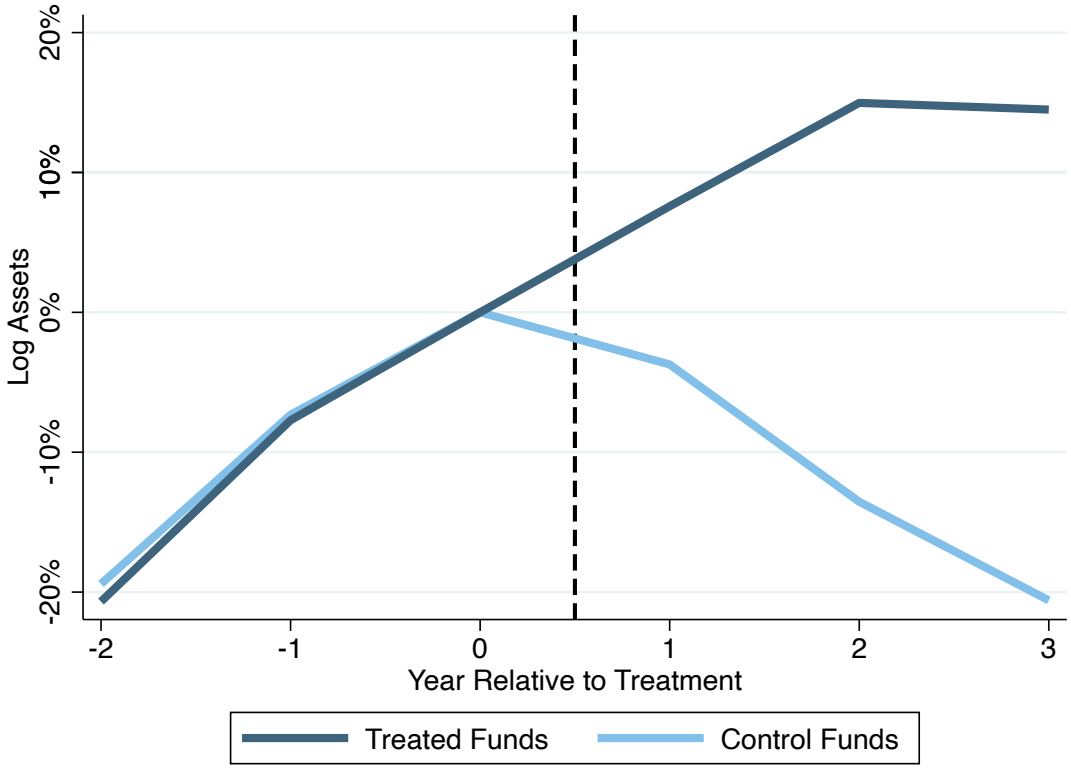

Figure 4. Treated vs. control fund assets, pre- versus post-treatment
The figure plots average log fund assets, for treated and control funds separately, in event-time for three years before and after the cohort year. Both series are aligned relative to the cohort year (the last pretreatment year) for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

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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 1st decile, the median, and the 10th decile. Definitions and constructions for all variables are in the Internet Appendix A1 and A2.

Variable	Mean	St. Dev.	p10	Median	p90
	(1)	(2)	(3)	(4)	(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

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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 Internet Appendix Section A2. 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)
SRI Investment	-0.650	-0.689	-0.684	-0.340	0.022	0.032	-0.061
	(0.179)	(0.197)	(0.162)	(0.286)	(0.012)	(0.040)	(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-squared	0.014	0.012	0.038	-0.000	0.015	0.013	0.002
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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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 Internet Appendix Section A2. 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	Careeropps	Srleader	Worklife	Culture	CEO	Outlook	Hospitalization	Amputation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SRI Investment	0.004	0.008	0.006	0.006	0.013	0.007	0.012	-0.042	-0.009
	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.004)	(0.004)	(0.014)	(0.007)
Unadjusted p	0.511	0.179	0.390	0.319	0.082*	0.058*	0.001***	0.002***	0.192
Romano-Wolf p	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 R-squared	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.	Racial Div.
	(1)	(2)
SRI Investment	0.006	0.000
	(0.001)	(0.002)
Unadjusted p	0.001***	0.882
Romano-Wolf p	0.019**	0.878
Observations	15,661	9,898
Adjusted R-squared	0.117	0.006
Year FE	Yes	Yes

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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 (Δ*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 the 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.

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

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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:

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

$Treated$ 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-squared	0.909
Fund × Cohort FE	Yes
Year FE	Yes

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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 Internet Appendix Section A2. 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	0.104	0.077	0.031	0.013	0.019	-0.000
	(0.064)	(0.071)	(0.064)	(0.098)	(0.016)	(0.040)	(0.023)
MDES	±0.182	±0.200	±0.181	±0.279	±0.046	±0.114	±0.065
Unadjusted p	0.166	0.141	0.230	0.752	0.420	0.628	0.998
Romano-Wolf p	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-squared	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

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). $\Delta \widehat{SRI\,Investment}$ 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 Internet Appendix Section A2. 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)	Careeropps (2)	Srleader (3)	Worklife (4)	Culture (5)	CEO (6)	Outlook (7)	Hospitalization (8)	Amputation (9)
$\Delta \widehat{SRI\,Investment}$	0.015	0.019	0.011	0.010	0.016	0.013	0.014	0.048	-0.028
	(0.011)	(0.011)	(0.011)	(0.010)	(0.013)	(0.006)	(0.008)	(0.034)	(0.029)
MDES	±0.030	±0.030	±0.032	±0.028	±0.035	±0.017	±0.024	±0.097	±0.081
Unadjusted p	0.150	0.071*	0.336	0.303	0.194	0.026**	0.088*	0.159	0.333
Romano-Wolf p	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-squared	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)
$\Delta \widehat{SRI\,Investment}$	0.004	0.002
	(0.001)	(0.002)
MDES	±0.004	±0.005
Unadjusted p	0.004***	0.177
Romano-Wolf p	0.387	0.683
Observations	15,649	9,807
Adjusted R-squared	0.774	0.787
Year FE	Yes	Yes
Firm FE	Yes	Yes

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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 environmental and social behavior. We interact the fitted values of SRI fund ownership ($\Delta SRI\widehat{Investment}$) 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) Total releases	(2) logAbatements	(3) Overall	(4) Gender Div.
$FundClaimsImpact$	0.047	-0.023	0.012	0.003*
$\times\ \Delta SRI\widehat{Investment}$	(0.062)	(0.038)	(0.010)	(0.002)
$FundDoesNotClaimImpact$	0.050	0.065	0.002	0.003*
$\times\ \Delta SRI\widehat{Investment}$	(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-squared	0.954	0.718	0.364	0.774
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

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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. $\Delta \widehat{SRI\ Investment}$ 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 Internet Appendix Section A2. 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:	$t+2$	$t+3$	$t+2$	$t+3$	$t+2$	$t+3$	$t+2$	$t+3$
$\Delta \widehat{SRI\ Investment}$	0.059	0.004	0.053	0.087	0.008	0.003	0.003	0.002
	(0.063)	(0.065)	(0.042)	(0.047)	(0.011)	(0.011)	(0.001)	(0.002)
MDES	0.177	0.185	0.119	0.134	0.031	0.030	0.004	0.004
Unadjusted p	0.258	0.743	0.205	0.066*	0.449	0.776	0.033**	0.168
Romano-Wolf p	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 R-squared	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

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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 Internet Appendix Section A2. 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 to 3, the dependent variable is the number of shareholder proposals related to environmental and social issues (ES), 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) Number of ES Items	(2) Number of E Items	(3) Number of S Items	(4) ES Items by SRI Funds	(5) Number of ES Items Passed	(6) Fraction of ES Items Passed	(7) ES Items Withdrawn	(8) Fraction of ES Items Withdrawn
$\Delta SRI\,\widehat{Investment}$	0.001	0.003	-0.003	0.006	-0.002**	-0.000**	-0.001	-0.012
	(0.006)	(0.005)	(0.003)	(0.006)	(0.001)	(0.000)	(0.006)	(0.009)
Observations	16,192	16,192	16,192	9,119	16,192	15,761	9,119	3,022
Adjusted R-squared	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

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Data Availability

The data underlying this article are available in the article and in its online supplementary material.

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Internet Appendix for "Does Socially Responsible Investing Change Firm Behavior?"

Davidson Heath, Daniele Macciocchi, Roni Michaely, and Matthew C. Ringgenberg[1]

This Internet Appendix provides additional information to supplement the analyses provided in the main paper.

- **Section A1** provides a detailed overview of the environmental and social outcomes examined in our analysis.
- **Section A2** provides definitions of the key variables used in our analyses.
- **Section A3** provides additional evidence supporting our identification assumptions.
- **Section A4** illustrates the falsification test and the detrending test.
- **Section A5** provides evidence on heterogeneous treatment effects.
- **Section A6** examines the relation between our shock and treated fund's portfolio holdings.
- **Section A7** repeats our main analyses using E&S ratings from KLD as the dependent variable.

[1]Citation format: Heath, Davidson, Daniele Macciocchi, Roni Michaely, and Matthew C. Ringgenberg, Internet Appendix for "Does Socially Responsible Investing Change Firm Behavior?" 2022, Working Paper.

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A1. Detailed Description of Data from the EPA, OSHA and Glassdoor, Inc.

We collect micro level data on environmental and social corporate practices from several databases. To examine environmental behavior, from the Environmental Protection Agency (EPA) we obtain data from (1) the Toxic Release Inventory (TRI) database, (2) the EPA Pollution Prevention (P2) database, and (3) the Greenhouse Gas Reporting Program (GHGRP) database. The EPA TRI database contains facility-year level data on the chemical emissions of firms operating in regulated industries that meet a requirement on the minimum number of employees. Specifically, all facilities of private and public companies in the U.S. with more than 10 employees must disclose toxic release data for approximately 600 chemicals since 1987. Facilities in the U.S. are required to report to the EPA the pounds of chemical (grams for dioxin and dioxin-like compounds) released on-site, which are comprised by releases into the ground, air, water, and the total amount of releases transferred off-site. Similarly, the EPA GHGRP database collects detailed emissions data from the largest greenhouse gas emitting facilities in the U.S. (from sources that in general emit 25,000 metric tons or more of carbon dioxide equivalent per year). The GHGRP has collected data annually since 2010.

We use the TRI and the GHGRP databases to create four measures of pollution at the parent company-year level. Our aggregated measure is *Total releases*, which is the total on-site and off-site releases. On site releases are the total quantity of the toxic chemicals released to air, water and land on-site at the facility. We also measure *Air*, which is the total quantity of the chemical released as air emissions at the reporting facility, including greenhouse emissions; *Water*, which is the total quantity of the chemical released on-site as surface water discharges; and *Land*, which is the total quantity of the chemical injected on

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site at the facility to underground injection wells, on-site landfills, surface impoundments, or other.

From the EPA P2 database, we collect information about a facility's yearly investments in pollution reducing activities. Investment data is available from 2011 to 2018 and is divided into two categories: (1) the number of activities each facility undertakes in order to reduce pollution—for example operating process modifications, taking actions to prevent spills and leaks, redesigning products and/or process to reduce pollution, cleaning and degreasing, etc.; and (2) the number of facilities that implemented pollution reducing activities. From the P2 database we create two measures of a firm's propensity and frequency to invest in pollution reducing activities: *logAbatements*, which is the log of the number of abatement actions that a firm discloses in a given year, and *Abatement*, which is an indicator variable equal to 1 if the firm reports an abatement activity across any category, and 0 otherwise.

The EPA data is at the facility-chemical year level. For each facility, the EPA reports the name of the parent company, which is defined as highest-level corporation that owns at least 50 percent of voting shares. In order to merge the EPA data with our sample of funds and portfolio firms, we first combine all the EPA data at the parent-year level. Second, we combine data from the EPA P2 database, the EPA TRI database, and the EPA GHGRP database. Finally, we match the EPA parent name with Compustat firm name and retrieve the company gvkey by conducting a fuzzy match (we remove common suffixes like "Company", "Corp", "Incorporated", "LLC" etc.).

We also measure employee well-being.[2] First, we obtain data on employee reviews from Glassdoor, Inc., which is a worldwide leader in providing insights about jobs and companies.[3]

[2]Similar to the process described above for the EPA data, we aggregate data at the parent company-year level (where necessary) and conduct a fuzzy name match with Compustat.

[3]See `www.glassdoor.com`.

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Glassdoor, Inc. collects employee feedback, company ratings and reviews, CEO approval ratings, salary reports, interview reviews and questions, and benefits reviews from a large spectrum of companies worldwide. From Glassdoor, we obtain seven measures of employee reviews of their companies. First, we obtain five different measures of employee satisfaction that each take on numerical values between 0 (bad) and 5 (good). These ratings are (1) the overall company rating (*Overall*); (2) the rating for the career opportunity within a corporation (*Careeropps*); (3) the rating for senior leadership (*Srleader*); (4) the rating for the corporation's work-life balance (*Worklife*); and (5) the rating for the corporate culture (*Culture*). Finally, we obtain two variables that range from -1 to 1: *CEO*, which is the review for the company's CEO (-1 if the employee disapproves, 0 if no opinion, and 1 if she approves); and *Outlook*, which measures the company outlook (-1 if worse, 0 if same, and 1 if better).

Second, from the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), we obtain data on the workplace safety. Starting in 2015, OSHA requires employers to report all severe work-related injuries, defined as an amputation or in-patient hospitalization. Accordingly, we create two variables. First, we measure *Hospitalization*, which is the annual number of work-related injuries that required hospitalization. Second, we measure *Amputation*, which is the annual number of work-related injuries that required amputation. In the regression models, to assure comparability across firms and consider scale issues, we scale *Hospitalization* and *Amputation* by the company's number of employees (in thousands).

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A2. Variable Definitions

- *SRI investment* is the percentage of a firm's ownership held by SRI funds. The data is from Morningstar, Bloomberg, and the U.S. Sustainable Investment Forum.

- $\Delta SRI\widehat{Investment}$ is the predicted change in SRI investment for each firm in the sample from our paired fund-level difference-in-differences regression. Data is from Morningstar, Bloomberg and the U.S. Sustainable Investment Forum.

- *Total releases* is the total on-site and off-site releases, including greenhouse gas emissions. To assure comparability across firms and consider scale issues, in the regression models we scale emissions by the company's annual sales and compute the log of the ratio. Data is from the EPA Toxic Release Inventory (TRI) database and from the Greenhouse Gas Reporting Program (GHGRP) database.

- *Air* is the total quantity of the chemical released as air emissions, including greenhouse gas emissions. To assure comparability across firms and consider scale issues, in the regression models we scale emissions by the company's annual sales and compute the log of the ratio. Data is from the EPA Toxic Release Inventory (TRI) database and from the Greenhouse Gas Reporting Program (GHGRP) database.

- *Water* is the total quantity of the chemical released as surface water discharges. To assure comparability across firms and consider scale issues, in the regression models we scale emissions by the company's annual sales and compute the log of the ratio. Data is from the EPA Toxic Release Inventory (TRI) database.

- *Land* is the total quantity of the chemical injected to underground injection wells, landfills, surface impoundments, and others. To assure comparability across firms and

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consider scale issues, in the regression models we scale emissions by the company's annual sales and compute the log of the ratio. Data is from the EPA Toxic Release Inventory (TRI) database.

- *Num_Abatements* is the number of abatement actions (investments in pollution reducing activities) that a firm discloses in a given year. Data from the EPA P2 database.
- *logAbatements* is the log of the number of abatement actions (investments in pollution reducing activities) that a firm discloses in a given year. Data from the EPA P2 database.
- *Abatement* is an indicator variable equal to 1 if the firm reports an abatement activity across any category, and 0 otherwise. Data from the EPA P2 database.
- *CCExposure* is the relative frequency with which bigrams related to climate change occur in the transcripts of analyst conference calls. We count the number of such bigrams and divide by the total number of bigrams in the transcripts. We average values of the four analyst earnings conference calls during the year and multiply the ratio by 1,000. Data from Sautner et al. (2022).
- *Overall* is the overall employees' satisfaction score. Data from Glassdoor, Inc.
- *Careeropps* is the employees' score for career opportunities. Data from Glassdoor, Inc.
- *Srleader* is the employees' score for senior leadership. Data from Glassdoor, Inc.
- *Worklife* is the employees' score for work-life balance. Data from Glassdoor, Inc.
- *Culture* is the employees' score for corporate culture (i.e., cultural values). Data from Glassdoor, Inc.

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- *CEO* measures the employees' CEO approval (-1 if disapprove, 0 if no opinion, and 1 if approve). Data from Glassdoor, Inc.

- *Outlook* measures the employees' company outlook (-1 if worse, 0 if same, and 1 if better). Data from Glassdoor, Inc.

- *Hospitalization* is the number of work-related injuries that required hospitalization. To assure comparability across firms and consider scale issues, in the regression models we scale hospitalization by the number of employees (in thousands). Data from the U.S. Department of Labor, OSHA.

- *Amputation* is the number of work-related injuries that required amputation. To assure comparability across firms and consider scale issues, in the regression models we scale amputation by the number of employees (in thousands). Data from the U.S. Department of Labor, OSHA.

- *Gender Div.* is the ratio of women directors to total directors on the board. Data from BoardEx.

- *Racial Div.* is the ratio of non-Caucasian directors to total directors on the board. Data from ISS.

- *Number of ES Items* is the number of shareholder proposals related to environmental and social issues. Data from ISS Voting Analytics.

- *Number of E Items* is the number of shareholder proposals related to environmental issues. Data from ISS Voting Analytics.

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- *Number of S Items* is the number of shareholder proposals related to social issues. Data from ISS Voting Analytics.
- *ES Items by SRI Funds* is the number of E&S items proposed by SRI funds. Data from ISS Voting Analytics.
- *Number of ES Items Passed* is the number of E&S proposals that pass the shareholders vote. Data from ISS Voting Analytics.
- *Fraction of ES Items Passed* is the fraction of E&S proposals that pass the shareholders vote. Data from ISS Voting Analytics.
- *ES Items Withdrawn* is the number of E&S proposals that are withdrawn before the shareholders vote. Data from ISS Voting Analytics.
- *Fraction of ES Items Withdrawn* is the fraction of E&S proposals that are withdrawn before the shareholders vote. Data from ISS Voting Analytics.

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A3. Examining Exogeneity and Relevance Assumptions

A3.1. Exogeneity of Treatment Status

This section presents additional tests of the hypothesis that our matched treated and control funds are indistinguishable, ex ante, on all characteristics except their Morningstar star rating.

Table A1 Panel A shows the comparison between the treated and control fund-cohort-years, measured as of December just prior to treatment. The first row illustrates the main idea behind our research design: Treated funds were assigned exactly a one-star higher rating than the matched control funds. Otherwise, as well as belonging to the same Morningstar fund category in each case, the two groups of funds are very closely matched in terms of their size and fundamentals. In particular, the mean differences in the three, five, and ten year Morningstar returns—the inputs that determine the Morningstar star ratings—are 8, 10 and 9 basis points respectively. None of these differences is economically or statistically significant, as is also evident in Figure 3.

Like a regression discontinuity design (RDD), in our setting unconfounded causal inference rests on conditional independence of treatment status. Because the Morningstar star ratings are determined by lagged fund returns, we cannot use fund ratings directly as our treatment variable. Instead, we construct matched pairs of funds near the star-rating thresholds. If the matched pairs are sufficiently similar ex ante, then lagged fund returns should not predict treatment status within the matched sample.

Table A1 Panel B examines this requirement. The first two columns regress the Morningstar star rating of each fund-year on the fund's lagged Morningstar returns using fund category-by-year fixed effects (the groups within which the star ratings are determined).

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We see that both in the full sample and our matched sample, the lagged Morningstar returns strongly predict a fund's Morningstar star rating, reflected by both their statistical significance and the adjusted R^2 of the estimates.[4] In contrast, in Column 3, the dependent variable is treatment versus control status within the matched sample. Here, the lagged Morningstar returns have *no* predictive power. The coefficients on the individual 3, 5 and 10 year lagged returns are economically small and statistically insignificant. Moreover, the adjusted R^2 of the model is substantially negative. We conclude that our matched funds are similar ex ante on all characteristics including, crucially, the lagged Morningstar returns that determine treatment assignment.

A third test is that if the difference in star ratings between treated and control funds was due *only* to the arbitrary breakpoints of the Morningstar star function, the funds should satisfy the parallel trends requirement—in the absence of their different star ratings, their AUM would have evolved similarly. To examine how our treated and control funds' assets evolve over time, we take each set of matched funds and examine their assets under management in event time for three years before and after the cohort-year. Figure 4 in the main paper shows evidence consistent with the parallel trends assumption.

A3.2. Relevance of Treatment

A subtle concern is that if our identifying assumptions are valid, then it might have been equally likely for any matched SRI fund to land just above or just below the given star cutoff. In fact, if we rerun our matching process for SRI funds on the lower side of the star cutoffs (that is, matching SRI funds that were just below the cutoff to funds that were just above the same cutoff), we match 139 SRI funds that were "treated" in the opposite direction to

[4] In columns 2 and 3 the number of observations is 208 and not 216 because for some fund-years the 5 and 10 year lagged Morningstar return is not available.

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our main sample.

This is potentially a concern if downward-shocked SRI funds' holdings overlap with the holdings of our main sample funds whose assets are shocked upward. For example, if all SRI funds held exactly the same portfolio, then the resulting shocks to SRI investment would (on average) net out to zero. On the other hand, if all SRI funds' holdings were disjoint from one other, then there would be no overlap in the effects of the Morningstar star assignments. SRI funds cover a wide range of fund sectors, and are almost all (by assets) actively managed, so the latter possibility seems plausible.

We examine this possibility in two ways. First, we check the overlap in holdings between upward-shocked (our main sample) and downward-shocked SRI funds. Out of 7,508 firm-years held by treated fund-years in our sample, 4,251 = 47% have any co-holdings at all with downward-shocked funds. Within those co-held stocks, the correlation between their portfolio weight in upward-shocked funds vs downward-shocked funds is insignificant and slightly *negative*, -0.013. Thus, SRI funds hold diverse portfolios both in terms of stock holdings and portfolio weights.

Second, we check the relevance of our treatment condition by regressing the realized level of SRI investment on the predicted level of SRI investment from our diff-in-diff setup. That is, we regress $SRI\ Investment$ on $SRI\ \widehat{Investment}$. The estimated coefficient from this regression is 0.380 with standard error (clustered by firm) = 0.032 and t=12.02, corresponding to an F-statistic of 144.5. In other words, our predicted treatment effects are strongly predictive of the actual realized level of SRI investment, and we conclude that our difference-in-differences research design produces significant and relevant shocks to SRI investment.

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Table A1
Comparison of treated and control funds

The table presents comparisons of treated versus control funds, measured as of the December prior to the treatment year. In Panel A, for each fund we examine Morningstar stars, fund assets, Morningstar returns, and fund turnover and fees. In Columns (1) and (3) we report the mean for treatment and control funds respectively, in Columns (2) and (4) we report the standard deviation for treatment and control funds respectively, and in Columns (5) and (6) we report the difference in means and the associated t-statistics. In Panel B, we report tests of the conditional independence of treatment status. We regress the Morningstar stars (*MS Star Rating* on their inputs (3, 5, and 10 years returns, and fund category-year fixed effects) in the whole sample (Column 1), and matched sample (Column 2). In Column (3) we regress the treatment status on the same inputs described above.

Panel A: Two-Sample Comparison

	Treated Funds		Control Funds			
Variable	Mean	St.Dev.	Mean	St.Dev.	Difference	t-stat
	(1)	(2)	(3)	(4)	(5)	(6)
MS Star Rating	3.88	0.65	2.88	0.65	1.00***	(11.28)
Fund Assets ($M)	952.45	1395.67	894.92	1492.70	57.53	(0.29)
3 year MS Return	10.81	3.59	10.72	3.55	0.08	(0.17)
5 year MS Return	10.35	4.34	10.25	4.28	0.10	(0.16)
10 year MS Return	5.59	3.56	5.50	3.56	0.09	(0.19)
Turnover Ratio	0.33	0.34	0.43	0.82	-0.10	(-1.13)
Management Fee	0.47	0.33	0.48	0.29	-0.01	(-0.21)
Expense Ratio	0.75	0.33	0.83	0.37	-0.08	(-1.58)
Observations	108		108			

Panel B: Testing Conditional Independence

	MS Star Rating	MS Star Rating	Treated
	(1)	(2)	(3)
3 year MS Return	0.09***	0.16*	0.01
	(0.00)	(0.08)	(0.08)
5 year MS Return	0.15***	0.20**	0.01
	(0.01)	(0.08)	(0.08)
10 year MS Return	0.17***	0.29***	0.06
	(0.03)	(0.09)	(0.08)
Funds	All	Matched	Matched
Observations	20,662	208	208
Adjusted R-squared	0.650	0.513	-0.175
MS Fund Category × Year FE	Yes	Yes	Yes

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A4. Falsification Test and Detrending Fund Flows

To further ensure that our research design is capturing investments into treated funds driven only by the Morningstar ratings and not by some omitted variable, we repeat the exact matching exercise described in Section III.A above, but we require treated and control funds to have the *same* Morningstar star rating. This serves as a placebo (or falsification) test since we compare funds that had similar underlying fundamentals, as in our main specification, but that had the *same* Morningstar star rating. Table A2, Column 1 shows the resulting difference-in-differences estimate. In contrast to our first specification, shown in Table V, we find there is no significant difference in AUM between treated and control funds post-treatment, either economically or statistically (0.8%, t=0.1).

Finally, we address the concern that our results may reflect aggregate trends in fund assets over time, rather than the pure effect of the Morningstar star ratings on fund assets. For example, because SRI funds are increasing their assets throughout the sample (both in absolute terms and relative to non-SRI funds), perhaps they were more likely to have higher AUM in later (post-treatment) years independent of their Morningstar rating. To examine this possibility, we orthogonalize each funds' log(AUM) to yearly trends within each Morningstar category, separately for SRI and non-SRI funds. To do this, we demean each fund's log(AUM) by its Morningstar category, interacted with the year, interacted with SRI fund status. Thus, the "Residualized" log(AUM) removes year-by-year trends in assets under management, within each Morningstar investment category each year, for SRI and non-SRI funds separately. Table A2, Column 2 shows the main difference-in-differences estimate, where the outcome variable is the residualized fund AUM. The results are nearly identical to our main specification shown in Table V, which suggests that aggregate trends in fund flows are not an issue in our setting.

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Table A2
Difference-in-differences regression of fund assets

The table presents results for the effects of the Morningstar star ratings on fund assets. Specifically, we estimate regressions of the form:

$$y_{i,t} = \beta(Treated \times Post) + FE_i + FE_t + \epsilon_{i,t},$$

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. *Placebo* is an indicator that equals one for treated funds in our placebo test, for which treatment funds are defined as SRI funds that have a Morningstar star rating equal to the matched control fund in January of the treatment year. Robust standard errors, clustered at the fund-cohort level, are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Falsification log(AUM) (1)	Residualized log(AUM) (2)
Placebo × Post	0.008	
	(0.059)	
Treated × Post		0.213***
		(0.064)
Observations	1,778	1,088
Adjusted R-squared	0.918	0.923
Fund × Cohort FE	Yes	Yes
Year FE	Yes	Yes

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A5. Heterogeneous Treatment Effects in a Staggered Event-Study Setting

A recent set of papers point out potential issues with differences-in-differences estimation, in particular in the presence of heterogeneous treatment effects over time (Borusyak, Jaravel, & Spiess, 2017; Goodman-Bacon, 2021). Sun and Abraham (2021) analyze the case of staggered event-study designs, which applies to our research design using stacked cohorts of treated and control funds. Since the treatment effects of Morningstar ratings on investor capital could plausibly vary over time, we investigate this possibility using the approach of Sun and Abraham (2021).

Figure A1 plots the implicit weighting function of our difference-in-differences estimate for the effect of Morningstar ratings on fund assets. We see that the implicit weights are well-behaved according to their recommended interpretation. In particular, the weights are of the same sign for all cohorts within each event-time group, with one small exception namely observations 2 years post-treatment for the 2017 cohort. Dropping this cohort from our estimates yields nearly identical results. Moreover, when we use the Sun and Abraham (2021) robust estimator, we recover a treatment effect of +0.156 (standard error = 0.061), which is similar in magnitude and significance to our baseline estimates. Thus, there is little concern that heterogeneous treatment effects may be biasing our estimates.

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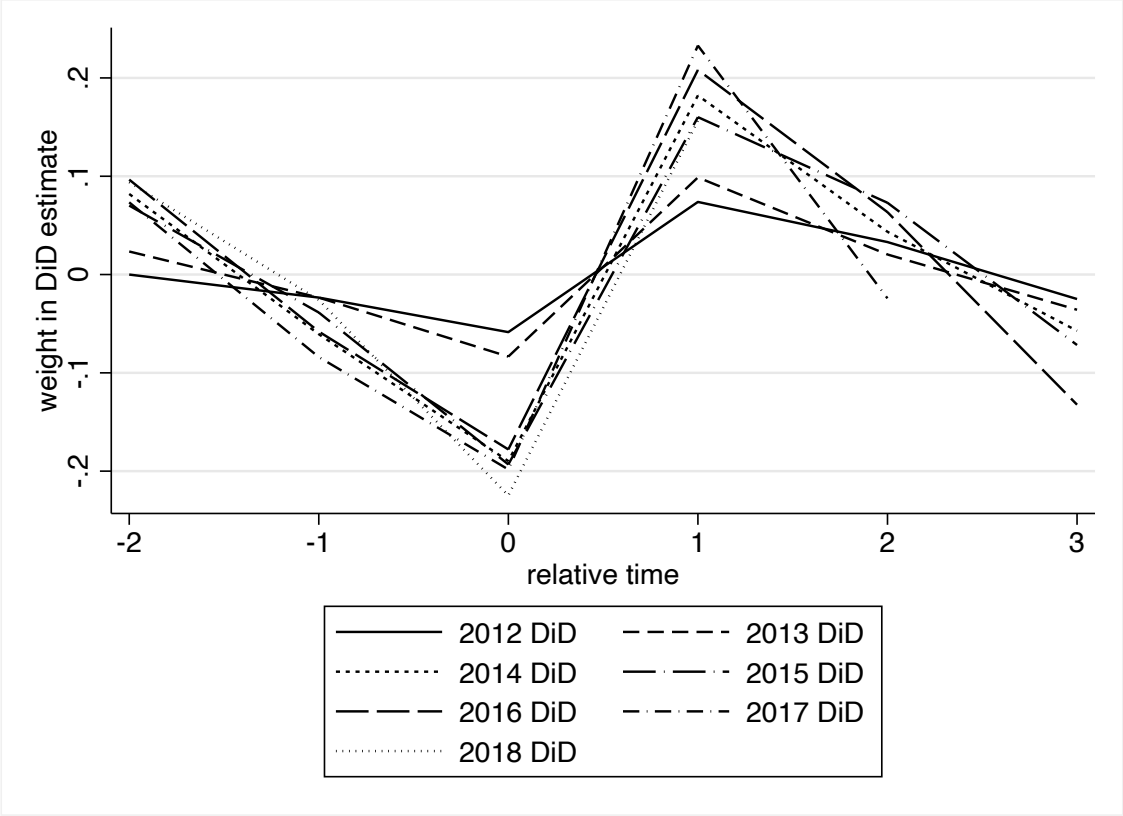

Figure A1. Implicit Weights in the Diff-in-Diff Estimate of Morningstar Star Ratings on Fund AUM

The figure plots the implicit weights estimated by the Sun and Abraham (2021) decomposition of our main difference-in-difference estimator in event time.

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A6. Effects on Treated Funds' Holdings

An important condition of our research design is that SRI funds do not change their portfolio allocation as a result of different star ratings. In particular, did treated funds increase their holdings *pro rata*, or did they channel the inflows into relatively low-ES or relatively high-ES portfolio firms? In this section, we examine the effects of exogenous changes in funds' AUM on treated funds' holdings.

Results are reported in Table A3. This analysis is conducted at the fund by cohort year by portfolio firm level. In Column 1, we regress an indicator variable for whether a firm held is a new holding (that is, a firm that the fund did not hold at all in the previous year) on post-treatment status for treated funds. We find no effect, i.e., funds did not add a new firm to their holdings in post-treatment years. Similarly, in Column 2 we observe that funds do not drop a firm from their holdings in post-treatment years. Thus, the inflows into treated funds are channeled into their existing holdings.

It is still possible that treated funds change the portfolio allocation of their existing holdings, by investing more in some of their portfolio firms and less in others. We examine this possibility in Columns 3-5. Here, the dependent variable is the fraction of the fund's total net assets that each portfolio firm represented. We find that both overall and for high- and low-ES firms separately, the inflows into treated funds were not accompanied by any change in their weights in the fund portfolio.

Overall, we conclude that the inflows into treated funds due to their higher Morningstar star ratings were, on average, allocated *pro rata* to the fund's existing portfolio. This finding supports the validity of our research design.

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Table A3
Effects on Treated Funds' Holdings

The table presents results examining the effects of the Morningstar ratings on fund holdings. Specifically, we estimate regressions of the form:

$$y_{i,t} = \beta(Treated \times Post) + FE_i + FE_t + \epsilon_{i,t},$$

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

	Added Stock	Dropped Stock	% Total Net Assets		
	(1)	(2)	(3)	(4)	(5)
$Treated \times Post$	-0.001	-0.008	0.001	-0.006	0.003
	(0.009)	(0.008)	(0.011)	(0.014)	(0.015)
Firms	All	All	All	High ES	Low ES
Observations	378,354	378,354	218,941	85,879	77,211
Adjusted R-squared	0.023	0.029	0.437	0.378	0.566
Fund × Cohort FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

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A7. Selection and Treatment Effects on Firm E&S Ratings

In this section, we examine the selection and treatment effects of SRI investing on the firm-level E&S ratings from KLD. While micro-level E&S data matter more when estimating real effects, it is unclear whether SRI fund managers directly rely on those data when selecting portfolio firms. In light of the findings in Hartzmark and Sussman (2019), if SRI funds wanted to attract fund flows, they should be selecting on the basis of E&S ratings.

To address this potential issue with our selection analysis, in Table A4 we repeat our main estimates using as outcome variables the firm-year E&S ratings issued by KLD. Consistent with our main results, in Panel A we find a significant positive association between SRI fund investment and the aggregate KLD rating for environmental and social conduct of a firm (*ES_Index*). We also observe a positive association between SRI fund investment and *ES_Index* subcategories, *Env* for environmental ratings and *Soc* for social ratings.

For completeness, in Panel B we use of Morningstar reseach design and examine the impact of SRI funds on KLD ratings. Consistent with our main results, we find that exogenous increases in SRI fund investment are followed by zero, and indeed slightly negative, changes to firm E&S ratings.

Thus, the association of KLD ratings with SRI fund investment (strong positive selection effects, zero treatment effects) is consistent with our main findings. These results suggest two conclusions. First, the KLD firm-year ratings are meaningfully correlated with both the real outcomes that we examine and with funds' selection process, which allows us to reconcile our findings with those prior studies (Gibson Brandon et al., 2022; Kim & Yoon, 2022; Liang et al., 2022; Raghunandan & Rajgopal, 2022). Second, E&S ratings again confirm that SRI funds carry out portfolio selection, but have no real effects on their portfolio firms.

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Table A4
Selection and Treatment Effects on Firm E&S Ratings

The table presents estimates of the effect of SRI fund investment on firm-year E&S ratings issued by KLD. $\Delta \widehat{SRI\,Investment}$ 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 Internet Appendix Section A2. 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: Selection

	(1) ES_Index	(2) Env	(3) Soc
$SRI\ Investment$	0.018	0.004	0.014
	(0.005)	(0.001)	(0.005)
Unadjusted p	0.001***	0.001***	0.004***
Romano-Wolf p	0.001***	0.001***	0.007***
Observations	11,780	11,780	11,780
Adjusted R-squared	0.100	0.088	0.127
Year FE	Yes	Yes	Yes

Panel B: Treatment

	(1) ES_Index	(2) Env	(3) Soc
$\Delta \widehat{SRI\,Investment}$	-0.021	-0.014	-0.006
	(0.012)	(0.003)	(0.011)
Unadjusted p	0.082*	0.001***	0.555
Romano-Wolf p	0.107	0.001***	0.554
MDES	±0.034	±0.007	±0.031
Observations	11,637	11,637	11,637
Adjusted R-squared	0.555	0.547	0.527
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

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