How Do Mutual Funds Respond to Salient Pollution Events?

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Abstract

We examine how salient chemical spills affect fund managers' investment decisions and portfolio allocations. By analyzing 36 chemical spill incidents from 2000 to 2019, we find that funds based in the same designated market area as the spill increase their investments in high-ESG stocks. They adjust their portfolios by reallocating existing investments from low- to high-ESG stocks rather than purchasing new stocks. The actions of fund managers are linked to local political inclination, public environmental awareness, and a desire to enhance their funds' social reputation. Moreover, funds in the affected areas outperform other funds after chemical spills and improve the environmental scores of the firms in their portfolios over the following two years.

Keywords: Toxic Chemical Spills, Mutual Funds, ESG Investments, Portfolio Management.

JEL classification: G11, G23, Q53.

1. Introduction

In the past decade, demand for sustainable investment has surged, reflecting a growing awareness of the need to address environmental, social, and governance (ESG) concerns through financial means. The shift is driven by an increasing recognition of the risks posed by climate change, resource depletion, and social inequality, as well as the opportunities presented by sustainable business practices. As a result, financial markets are experiencing a significant transformation, with many sustainable investment options becoming available.

In the literature, whether investors prioritize traditional investment performance or whether they value ESG performance more has been a subject of interest. Hartzmark and Sussman (2019), using the publication of the sustainability rating by Morningstar in March 2016, show that mutual funds with the highest sustainability rating experienced significant fund inflows, and the funds with the lowest sustainability rating experienced outflows. While Hartzmark and Sussman (2019) argue that sustainability is viewed as a positive indicator of future performance, their results cannot rule out the possibility that investors follow the ratings because of their performance rather than sustainability. Nevertheless, the findings suggest that mutual funds increase their holding of sustainable stocks to attract flows after attention-grabbing ESG events.

Motivated by the increasing significance of sustainability ratings in mutual funds, we examine the impact of attention-grabbing environmental events on these ratings. Specifically, we investigate how toxic chemical spills influence ESG ratings of mutual funds and their holdings of sustainable stocks. Our study is distinct from previous research in two important ways: (1) we analyze changes in ratings to determine if they result from adding more high-ESG-rated stocks or rebalancing the portfolio towards existing high-ESG stocks, and (2) we assess whether political inclinations and public awareness of environmental issues influence funds' post-event investments in high-ESG stocks.

Fund managers rebalance their portfolios by adjusting their existing holdings - selling assets that have become overweight and buying those that are underweight or buying new stocks that satisfy the investment criteria. In the context of ESG investing, rebalancing might involve increasing investments in companies with high ESG ratings or divesting from those with poor ESG performance. Different rebalancing strategies can impact fund performance, contributing to the debate on the relationship between sustainability ratings and fund performance. Gantichev, Giannetti, and Li (2024) demonstrate that fund managers are not skilled in effectively trading stocks that would improve their funds' sustainability ratings. Funds aiming to boost their sustainability ratings typically underperform in the high-sustainability stocks they purchase, while stocks sold for poor sustainability ratings tend to perform well. Consequently, high sustainability ratings are often linked with poor performance. Our study seeks to provide further insights into fund managers' actions to achieve and maintain better sustainability ratings.

We obtain information on toxic chemical spills from the U.S. Coast Guard's National Response Center (NRC) database. The NRC database provides detailed information on each spill, including the date, location (such as county and zip code), causes, and the number of evacuated individuals. We define mutual funds affected by a toxic chemical spill if they are located within the same designated market area (DMA) as the incident. Using fund-quarter data from 2000 to 2019, we find that funds located in the affected DMAs (treated funds) tend to increase their holdings of high-ESG stocks compared to other funds. Specifically, there is an increase in the proportion of high-ESG market value by 0.33 percentage points, high-ESG shares by 0.4 percentage points, and high-ESG stocks by 0.35 percentage points. These translate to a 1.87% increase in high-ESG market value (equivalent to around 57,000 shares from the mean) and a 1.07% increase in the number of high-ESG shares (approximately 4 million USD from the mean). In contrast, the change in the number of high-ESG stocks remains statistically insignificant. The results suggest that fund managers increase holdings of existing high-ESG

stocks rather than acquiring new stocks. Moreover, funds divest from stocks with low ESG scores following these events. Overall, the evidence suggests that fund managers rebalance their portfolios by selling low-ESG stocks and increasing holdings of existing high-ESG stocks. These findings are stronger in the second quarter following the events, suggesting that fund managers need more than one quarter to adjust their holdings. Furthermore, the analysis reveals that treated funds predominantly increase their investments in stocks with high environmental or social scores, with no significant change in stocks with high governance scores.

The delegated philanthropy theory (Bénabou and Tirole, 2010) suggests that the extent to which fund managers respond to prominent pollution events varies depending on the local environments and stakeholders. We next investigate whether changes in mutual funds' post-event high-ESG investments vary with local political inclinations and environmental awareness of the local population. We utilize the proportion of votes for a Democrat candidate in a fund's county as a proxy for political influence. According to our findings, the positive sensitivity of high-ESG investments to chemical spills is particularly pronounced for funds located in counties with a Democrat majority. To test whether fund managers' actions are affected by public opinions, we use public concerns about environmental issues sourced from Yale Climate Opinion Maps to proxy the influences from the public. We find that the public concern for environmental issues positively influences funds' holdings of high-ESG stocks after chemical spills.

Gantchev et al. (2024) argue that funds in the top or bottom 10%, according to their ESG scores, are more likely to improve their social image through high-ESG investments, as they are on the border of ESG ratings. We confirm this by documenting a significantly positive coefficient when we interact the border fund dummy with our treatment variables. We further argue that salient events will attract investors' attention to ESG investments, which will boost stock prices. We, thereby, expect that treated funds' high-ESG investments lead to superior risk-adjusted

returns, controlling for fund flows. The regression analysis shows that treated funds outperform other funds after chemical spills. In addition, in alignment with existing literature, we document that funds play a role in enhancing firms' ESG performance after chemical spills. Particularly, we observe that a firm's post-event environmental score tends to improve when it is held to a greater extent by treated funds. However, contrary to this pattern, we do not find a similar enhancement in social and governance scores.

Prior studies show that fund managers pursue better sustainability ratings to attract inflows. This paper contributes to the rapidly growing ESG literature by providing new insights into how fund managers rebalance their portfolio holdings to achieve better sustainability ratings. The findings contribute to the debate on the relationship between a fund's aspiration to achieve better sustainability ratings and the fund's performance. Two papers are closely related to ours. Huynh, Li, and Xia (2024) study mutual funds' carbon divestments. We contribute by documenting funds' high-ESG investments and highlighting the difference between investments in high- and low-ESG stocks, noting that funds are more aggressive in the latter. Nofsinger, Sulaeman, and Varma (2019) document that institutional investors have selective preferences regarding firms' ESG performance. In our paper, the use of toxic chemical spills offers several advantages. First, they act as environmental shocks, helping to establish a causal relationship. Second, while chemical spills have a direct environmental impact, they also signal irresponsible social behaviours of firms relating to human rights, health and safety, and community impact. Therefore, we can use these events to analyze whether there are different impacts on environmental, social, and governance concerns. Although our sample includes 36 significant chemical spills, more are recorded in the database. These ESG-related incidents repeat and keep reminding us of the importance of ESG concerns in our society. Each of them enhances our understanding of how to address these concerns effectively.

The remainder of this paper is organized as follows. Section 2 discusses potential rationales behind the impact of chemical spills on funds' high-ESG investments and develops related hypotheses. Section 3 elaborates on data sources, the sample, and the DID regression model used in this paper. Section 4 presents baseline results followed by the dynamics of the treated effect and separate tests on environment-, social-, and governance-investments. Section 5 investigates the cross-sectional differences based on political influences, public awareness of environmental issues, and funds' willingness to improve their social images. In Section 6, we conduct several robustness checks and two further tests regarding fund return and firm ESG performances. Finally, Section 7 concludes.

2. Literature Review and Hypothesis Development

In the past decade, investor focuses on ESG considerations has significantly increased. In the United Nations Global Compact's survey, 69% of CEOs expect investor interest to become a crucial factor in shaping ESG initiatives (Kim et al., 2019). The U.S. SIF Foundation reports from 2014 to 2018 reveal a notable surge in professionally managed assets in the U.S. market influenced by socially responsible investment principles, climbing from $6.56 trillion to $12 trillion. These assets grew from $6.56 trillion to $12 trillion, doubling from 15% to about 30% of all professionally managed assets in five years.

It is well documented that mutual funds respond to investor expectations by seeking to improve their performance to attract investor inflows. In the context of ESG investing, we argue that attention-grabbing ESG events can affect mutual funds' aspiration to achieve a better sustainability rating. There are several reasons behind this conjecture. First, investing in high-ESG stocks could reflect fund managers' efforts to enhance fund performance (Gantchev et al., 2024). Several studies provide evidence that sustainability-caring firms lead to high firm values, better reputations, comparative advantages, and lower financial constraints (Saeidi et al., 2015;

Li et al., 2018; Wong and Zhang, 2022). Kempf and Osthoff (2007) demonstrate a remarkable abnormal return through a long-short strategy based on firms' ESG scores; Krüger (2015) finds that investors react positively to positive ESG news that signals firms' intentions to do good. Similarly, Hou, Peng, and Xiong (2009) suggest that stock prices rise with increasing attention. Salient environmental events are likely to attract investors' attention to high-ESG firms. Hence, when receiving local news about the events, it is rational for fund managers to expect better performance of high-ESG stocks. Furthermore, Chu et al. (2021) observe that firms increase innovation expenses in response to chemical spills. While low-ESG companies are likely to face significant costs to enhance their environmental practices, high-ESG companies may not encounter such concerns, thus positioning them to potentially outperform in the aftermath of such events.

Moreover, increases in high-ESG investments following salient pollution events may also reflect fund managers' considerations that extend beyond the risk-return factor. Renneboog, Ter Horst, and Zhang (2011) find that socially responsible institutional investors prioritize ethical and social issues over mere fund performance. Previous research investigates various manager characteristics influencing portfolio allocations, noting that factors such as hometown bias, birth month, and early life experiences significantly affect their investment choices (e.g., Pool, Stoffman, and Yonker, 2012; Lu, Ray, and Teo, 2016; Bai, Ma, Mullally, and Solomon, 2019).

If environmental events draw investors' attention to high-ESG firms, fund managers might enhance their social image and reputation by shifting their portfolios towards these firms (Di Giuli and Kostovetsky, 2014; Riedl and Smeets, 2017). The advantages could stem from private benefits or increased commissions from managing larger funds. Additionally, Huynh et al. (2024) suggest that environmental issues could directly affect the daily lives and health of institutional fund managers, prompting them to support innovations by investing more in high-

ESG stocks. Even without direct benefits or costs, a sense of justice and the feeling of doing good may motivate fund managers to invest in high-ESG stocks after becoming aware of pollution events. Using delegated philanthropy theory and transaction-cost arguments, Kim et al. (2019) assert that institutional investors with closer access to local information respond more actively to environmental issues. We posit that funds located within the same media coverage area as salient pollution events are incentivized to achieve a better sustainability rating due to investors' preference for sustainable investments. Therefore, we propose the following hypothesis.

Hypothesis 1 (H1): Following a salient environmental event, mutual funds located in the same local media coverage of the scene invest more in high-ESG firms relative to funds outside the media coverage.

An important research question that arises from the first hypothesis is: how do funds achieve higher social performance? Fund managers can rebalance their portfolios by selling or buying assets, adjusting existing holdings, and incorporating new investments and shifts in the sector and industry. However, it may be costly for fund managers to invest in new stocks because not only do fund managers have a mandate to follow, but new stocks may also not be consistent with the preferences of existing investors. Therefore, we hypothesise that mutual funds are more likely to increase their holdings in existing stocks with high ESG scores rather than purchasing new ones. In response to pollution events, we expect fund managers to rebalance their portfolios by divesting from low-ESG stocks to maintain the total assets under management.

Hypothesis 2a (H2a): Following a salient environmental event, relative to funds outside the media coverage, mutual funds located in the same local media coverage of the scene invest more into existing high-ESG stocks instead of purchasing new ones.

Hypothesis 2b (H2b): Following a salient environmental event, mutual funds located in the same local media coverage of the scene disinvest low-ESG stocks relative to funds outside the media coverage.

The delegated philanthropy theory suggests that the extent to which fund managers respond to prominent pollution events varies depending on the local environments and stakeholders (Di Giuli and Kostovetsky, 2014). Hong and Kostovetsky (2012) indicate that the political party affiliation of fund managers significantly influences portfolio allocations and choices. Additionally, Shu, Sulaeman, and Yeung (2012) find that local culture impacts the volatility of fund portfolios, suggesting that public sentiment can affect investment decisions. Therefore, we hypothesize that changes in mutual funds' post-event investments in high-ESG stocks would vary based on the local political inclinations and the environmental awareness of the local population.

Hypothesis 3 (H3): The impact of a salient environmental event on a mutual fund's high-ESG investments varies across different local political inclinations and public environmental awareness.

3. Data and Methodology

3.1. Data

3.1.1. Funds' stock investments

To analyze funds' stock investments, we gather quarterly data on funds' stock holdings from Thomson Reuters Mutual Funds Holdings (s12). Information regarding fund managers' locations and other characteristics is sourced from CRSP Mutual Funds. Following the methodologies of Amihud and Goyenko (2013) and Huynh et al. (2024), we filter out index funds whose names contain terms such as "index," "ind," "S&P," "DOW," "Wilshire," and/or "Russell." Additionally, we exclude funds with total net assets below 15 million USD and those that have, on average, less than 70% of assets in common stocks over their lifespan. Due to potential reporting discrepancies, a single fund listed in Thomson Reuters s12 may have multiple entries in CRSP. To address this, we aggregate the total net assets across all CRSP funds and compute weighted averages for other variables with total net assets as the weights. The merged dataset covers the period from 2000 to 2019.

3.1.2. ESG scores

We gather firms' ESG scores from MSCI KLD, a database that evaluates a firm's ESG performance annually by identifying strengths and weaknesses across a set of ESG indicators. Each indicator is assessed using a binary variable for both strength and weakness. To derive the overall ESG score for a firm in a given year, we subtract the weakness from the strength for each indicator and sum up the net values across all indicators. Those indicators fall under three main categories: environmental, social, and governance. Thus, we also aggregate the indicators within each category to calculate separate scores for environmental, social, and governance performance. We then merge the ESG score data with firms' year-end market capitalization from CRSP to compute size-adjusted scores. To ensure data consistency and

reliability, we follow Cao et al. (2023) and exclude stocks not traded on NYSE, AMEX, and NASDAQ, as well as penny stocks with prices below five dollars.

3.1.3. Toxic chemical spills

We compile data on toxic chemical spills from the U.S. Coast Guard's National Response Center (NRC) database, which has the recording of such incidents since 1990. The NRC database offers detailed information on each spill, including the date, location (such as county and zip code), causes, and the number of evacuated individuals. Initially, we choose all incidents with complete county information. We then follow Tian et al. (2024) and focus only on significant and salient events that resulted in at least 1000 evacuations, which corresponds to the 99th percentile value of evacuations from 2001 to 2018 (we exclude the year before and after the sample period of the fund ownership data to establish a one-year event window for analysis). This selection yields 63 events.

3.1.4. Designated market areas

In our narrative, the central focus lies on fund managers' responses to local news of toxic chemical spills. In other words, we would like to study the impact of informationally exposing to chemical spills. Therefore, we utilize these incidents' media coverage area, rather than geographical distance, to differentiate between treated and control funds. In the US, a DMA covers a group of counties that share access to the same television and radio stations and other media outlets like newspapers and internet content. To facilitate this, we obtain publicly available links mapping counties to their respective DMAs from Kaggle.[1] There are, in total, 210 DMA in the U.S., and 92 out of them are analyzed in our sample.

[1] https://www.kaggle.com/datasets/kapastor/google-trends-countydma-mapping

3.2. Methods

3.2.1 Stacked DID regression

We use the final fund-quarter sample from 2000 to 2019 to test changes in funds' preferences for high-ESG stocks. We run a stacked DID regression because chemical spills occur at varying times and locations. Each chemical spill event serves as a cohort for the analysis.

For each event, we first include all observations from four quarters before to four quarters after the event. Then, we omit the quarter in which the event occurs to reduce noise, ensuring that fund managers have at least one quarter to react to the event.[2] The treated group consists of funds located within the same DMA as the event, while the control group comprises funds outside this DMA.[3]

Next, to ensure comparability, we implement several restrictions: i) we require all funds to have at least one observation before and after the event, ensuring data availability for both periods; ii) Control funds are restricted to those with the same CRSP objective code as the treated fund, enhancing similarity in investment objectives; iii) control funds located within the same DMA as any of the events during the sample period are dropped. After implementing these restrictions, the final sample decreases to 36 chemical spill events. Figure B1 plots the geographical distribution of the 36 chemical spills. The In total, there are 2550 funds, 1155 out of which are treated funds, and there are, on average, 485 (73) funds (treated funds) in each event.

The stacked DID assesses the change in high-ESG investments of treated funds before and after the event compared to control funds.

[2] Several spills occur in the last month of the quarter. We also obtain consistent results when including the event quarter.

[3] If the spill events are reported only locally, treated funds are the only ones to receive the local news, making the treatment clean. However, even if the news spread to the whole country later on, the treated funds remain to be the earliest recipients of the shock, and because control funds are those outside the incident DMA, they justify our definition of the treatment.

The regression model is specified as follows.

$$HighESG\ Investment_{cit} = \beta_1 Treatment_{ci} \times Post_{ct} + \sum_{k=1}^{7} \gamma_k X_{cit_{-1}} + d_{ci} + d_{ct} + \varepsilon_{cit} \quad (1)$$

In Equation (1), the subscripts referring to cohort (c), fund (i), and quarter (t). The dependent variable $HighESG\ Investment_{cit}$ is one of four measures of a fund i's investments on high-ESG stocks in quarter t. The primary independent variable of interest is $Treatment_{ci} \times Post_{ct}$, which captures the interaction between the treatment status of the fund and the time period after the event. Treatment is a dummy taking one if a fund is located within the same DMA of a chemical spill. Post is a dummy taking one for all observations after the quarter when a chemical spill occurs. Following the prior literature, we include a set of fund characteristics as controls: fund age, manager tenure, total net assets, expense ratio, turnover ratio, quarterly return, and fund flow. We take a one-quarter lag for all controls to mitigate potential simultaneous bias. Additionally, we take the logarithm of total net assets because the variable is highly right-skewed, and we winsorize all other continuous variables between the 1st and 99th percentiles. Further, we include cohort-fund fixed effects (d_{ci}) to control time-invariant differences between the treated and control funds within each event and cohort-quarter fixed effects (d_{ct}) to capture time trends. Note that because of the inclusion of the fixed effects, both $Treatment_{ci}$ and $Post_{ct}$ are omitted from the regression. The standard errors are adjusted for heterogeneity. The coefficient of interest is β_1, which represents the treatment effect. Our hypothesis posits that funds would increase their investments in high-ESG stocks following salient chemical spills. Therefore, we expect β_1 to be positive.

Next, we explore the dynamics of the treatment effect by creating one dummy for each quarter in the event window. Then, we regress $HighESG\ Investment_{it}$ on the interactions between the treatment dummy and each of the quarter dummies. The regression model is specified as follows.

$$HighESG\ Investment_{cit} = \sum_{\tau=-4,\tau\neq 0,-1}^{4} \beta_\tau Treatment_{ci} \times Post_{ct_\tau} + \sum_{k=1}^{7} \gamma_k X_{cit_{-1}} + d_{ci} + d_{ct} + \varepsilon_{cit} \quad (2)$$

In Equation (2), $Post_{ct_\tau}$ takes the value of one if a fund's investment is observed in quarter t_τ. Note that the first quarter before the event is omitted because of collinearity and is thus the reference quarter. Insignificant coefficients of the interactions involving pre-event quarters (i.e., β_{-4}, β_{-3}, and β_{-2}) indicate no difference in high-ESG investments between the two groups before the events, thus satisfying the parallel trend assumption. The coefficients of the interactions involving post-event quarters (i.e., β_1, β_2, β_3, and β_4) illustrate the timing and duration of the treatment effect. For instance, an insignificant β_1 would suggest that funds take more than a quarter to adjust their portfolios towards high-ESG stocks, and an insignificant β_4 would indicate the adjustment is temporary.

3.2.2 Variable construction

We use four variables to measure a fund's investments in high-ESG stocks. Our first variable is the market value of the fund's high-ESG stocks scaled by the total value of all ESG-rated stocks the fund held in a quarter. To identify high-ESG stocks, we first follow Cao et al. (2023) to adjust firms' ESG scores by their market capitalisation. Specifically, in each quarter, we sort all fund-held stocks into ten groups based on their year-end market capitalisation. We then calculate an average score for each decile. A firm's size-adjusted ESG score is derived by subtracting the average score of the firm's size decile from its raw score.[4] Next, we categorize stocks into three groups each quarter based on their size-adjusted ESG scores, and we follow Cao et al. (2023) to use cut-off points of the 15th and 85th percentiles to mitigate the impact of

[4] Here, we use a firm's year-end ESG score instead of its previous-year-end score. We do so out of two reasons. First, it proxies fund managers' expectation/forward-looking measure on a firm's ESG performance. Second, it largely captures changes that a firm implemented to improve its ESG policy following a chemical spill; using the previous-year-end scores would miss these changes.

zeros.[5] We define high-ESG stocks as those falling in the top group in each quarter. The first variable is specified as follows.

$$\%\ HighESG\ Value_{it} = \frac{Value\ of\ High\ ESG\ Stocks_{it}}{Total\ Value\ of\ Stocks_{it}} \quad (3)$$

The value of high-ESG stocks can be decomposed into the product of the number of high-ESG shares and the average price of high-ESG stocks. Thus, to understand the contribution of the quantity of high-ESG stocks to the overall value of the investment, we create our second measure by dividing the number of high-ESG shares by the total ESG-rated shares:

$$\%\ HighESG\ Shares_{it} = \frac{\#\ of\ High\ ESG\ Shares_{it}}{Total\ \#\ of\ Shares_{it}} \quad (4)$$

Furthermore, to test whether funds adjusted their portfolio by purchasing new stocks, our third measure is the number of high-ESG stocks divided by the total number of ESG-rated stocks held by the fund:

$$\%\ HighESG\ Stocks_{it} = \frac{\#\ of\ High\ ESG\ Stocks_{it}}{Total\ \#\ of\ Stocks_{it}} \quad (5)$$

Our last variable proxies for a fund's overall ESG performance. It is inspired by Hwang et al. (2022) who define institutional investors' ESG scores. Similarly, we calculate the weighted-average ESG score of a fund's portfolio across all ESG-rated stocks, denoted as $Portfolio\ ESG\ Scores_{it}$. The weight is the value of each stock. The last variable proxies for overall ESG performance.

Regarding the control variables, we include fund age, manager tenure, total net assets, expense ratio, turnover ratio, quarterly return, and fund flow. Total net assets, expense ratio, and turnover ratio are collected from CRSP Mutual Funds. Fund age is the number of years from the date the fund was first offered to the current date, manager tenure is the number of years

[5] In Table B1, we adjust ESG scores based on the Fama-French 10 industry classification and re-run the regressions in Table 2. The results are largely unchanged.

from the date the fund's current manager took control to the current date, and fund flow is the growth rate of a fund's total net assets adjusting its quarterly return.

4. Baseline Results

4.1 Summary statistics

Table 1 presents the summary statistics for the key variables used in this study. Note that the statistics are calculated in the sample of stacked events. On average, funds' investments in high-ESG stocks range from 23% to 26%. The average size-adjusted portfolio ESG score is 0.224 and is right-skewed. Additionally, funds invest more in stocks with high environmental scores compared to those with high social or governance scores. The average total value of ESG-rated stocks is approximately $0.2 billion, comprised of about 5 million shares across 91 stocks. The average quarterly cumulative return is 1.8%, with over 25% of funds experiencing negative returns as low as -2.3%. In our sample, the average fund age is 13 years, and the average tenure of the current manager is 8 years.

[insert Table 1 here]

4.2 Funds' ESG investments after salient chemical spill events

Table 2 presents our baseline results using different specifications of Equation (1). In Columns (1) – (4), we only include the interaction term and cohort-fund fixed effects, utilising various measures of funds' ESG investments. Then, in the subsequent four columns, we introduce other control variables. Finally, we employ the most stringent specification by including cohort-quarter fixed effects.

Across all specifications and for all ESG investment measures, the coefficients of $Treatment_{ci} \times Post_{ct}$ are positive and statistically significant at a 1% level. This is consistent with our hypothesis: relative to funds outside local media coverage, funds exposed

to the news of salient chemical spills adjust their portfolios towards high-ESG stocks after the events. The last column also confirms a post-event increase in overall ESG scores of treated funds' portfolios compared to control funds.

Regarding control variables, we observe that smaller and more mature funds with more tenured managers allocate more weight to high-ESG stocks, while fund flows dampen ESG investments.

[insert Table 2 here]

In terms of magnitude, the proportions of high-ESG market value, high-ESG shares, and high-ESG stocks increase by 0.33 percentage points, 0.4 percentage points, and 0.35 percentage points, respectively (Columns (9) – (12)). The increments are small relative to the means of the corresponding variables. One of the reasons is the scaling. To show the magnitude of the increase intuitively, we test changes in levels of high-ESG investments rather than the proportions by replacing the dependent variables with $Value\ of\ High\ ESG\ Stocks_{cit}$, $\#\ of\ High\ ESG\ Shares_{cit}$, and $\#\ of\ High\ ESG\ Stocks_{cit}$.[6] The first three columns in Table 3 present the results. We take the logarithm of the dependent variables to reduce right-skewedness. The results confirm a positive adjustment towards high-ESG stocks. However, one notable difference suggests how funds adjust their portfolios. Specifically, while all interaction term coefficients are positive, only the first two are statistically significant. This finding reveals that treated funds hold more high-ESG shares, while the number of high-ESG stocks remains unchanged. This suggests that, following chemical spills, treated funds are more likely to increase their holdings of existing high-ESG stocks. This finding is sensible because it is typically easier and less risky for fund managers to augment their stakes in existing high-ESG stocks rather than overhaul their portfolios by acquiring new ones.[7] Interpreting the results,

[6] We use proportions instead of levels in most of the regressions because scaling high-ESG investments allows for more meaningful comparisons across funds.

[7] Another reason could be the limited number of high-ESG stocks for funds to buy from as the high-ESG stocks are defined as the top 15%.

we observe an 8.71% increase in the market value of high-ESG stocks and a 7.38% increase in the number of high-ESG shares held by treated funds after the events compared to control funds. Multiplying these percentage changes by the median value of each variable, we find that the increase in high-ESG shares is approximately 62,866, and the increase in the market value of high-ESG stocks is about 2.5 million USD.

[insert Table 3 here]

Overall, our results confirm that fund managers increase their holdings in existing high-ESG stocks rather than purchasing new ones, confirming *H2a*. We next change the dependent variables to $Log\,(Total\,Value\,of\,Stocks_{cit})$, $Log\,(Total\,\#\,of\,Shares_{cit})$, and $Log\,(Total\,\#\,of\,Stocks_{cit})$, testing the hypothesis of rebalancing (*H2b*). The coefficients of the interaction terms in the last three columns of Table 3 are all insignificant. This indicates no change in overall portfolios. The previously observed increase in high-ESG shares suggests disinvestments in low-ESG stocks. To provide more direct evidence of disinvestment, we test the treatment effect on funds' low-ESG portfolios, defining low-ESG stocks as those in the bottom 15% according to their size-adjusted ESG scores. Table 4 presents the results. The dependent variables are proportions in the first three columns and levels in the rest. In all regression specifications, the coefficients of the interaction term are significantly negative. Notably, the coefficient in the regression of $Log\,(\#\,of\,Low-ESG\,Stocks_{cit})$ is also significantly negative. Overall, the results suggest that treated funds adjust their portfolios by divesting from low-ESG stocks and augmenting them with high-ESG ones; also, these funds are more aggressive in selling low-ESG stocks than in purchasing high-ESG ones.

[insert Table 4 here]

4.3 The dynamics of the treatment effect

We then explore the dynamics of the treatment effect by estimating Equation (2). Table 5 presents the coefficients of interest, β_τ, which are plotted in Figure 1 over the event window. For all measures of fund high-ESG investments, the coefficients in the first three rows are not statistically significant. Thus, there is no difference between the treated and control funds before the events, indicating that the parallel trend assumption is likely to hold.

[insert Figure 1 here]

Turning to the post-event effects, the coefficient of $Treatment_{ci} \times Post_{ct_1}$ is insignificant in the first quarter while the rest are all significantly positive. This suggests that it takes more than one quarter for fund managers to adjust and rebalance their portfolios after they hear about chemical spills. Another notable observation from the results is that the treatment effect gradually diminishes in both magnitude and statistical significance in the last quarter of the event window, although it remains statistically significant.

[insert Table 5 here]

4.4 Separating environmental, social, and governance

We next investigate the impact of chemical spill events on funds' investments in stocks with high environmental, social, and governance scores separately. The testing procedure is the same as that used to produce Table 2, except that we use scores in each sub-category instead of the total ESG scores to sort stocks and use weighted-average environmental (social) (governance) score to calculate a fund's overall score.

Table 6 presents the results. The findings reveal that treated funds' investments in stocks with high environmental scores (Columns (1) – (4)) increase after chemical spills relative to control funds. This aligns with the results of Huynh et al. (2024), who document funds' carbon disinvestments in response to local air pollution. However, they find an insignificant impact of

air pollution on funds' investments in high social-score firms. In contrast, our results in Columns (5) – (8) reveal that funds also adjust their portfolios towards stocks with high social scores after the chemical spills. This difference between our finding and that of Huynh et al. (2024) could stem from the discrepancy in causes between chemical spills and air pollution. While air pollution is likely the result of firms' scheduled operations, most of the chemical spill events in our sample are caused by accidents, equipment failures, and operating errors, according to NRC reports. Consequently, chemical spills are more likely to prompt investors to condemn firms' irresponsible behaviours related to human rights, workplace conditions, health and safety, and community impact, all of which are encompassed in social scores. Lastly, consistent with the previous literature, funds' response to investing in stocks with higher corporate governance scores is limited (Columns (9) – (12)).

[insert Table 6 here]

5. Cross-sectional Analyses

According to our findings, funds respond to chemical spill events by rebalancing their existing portfolios from low- to high-ESG stocks. We next investigate whether funds' post-event high-ESG investments could be affected by the local environments where the funds are located, using political inclinations and environmental awareness.

5.1 The influence of political inclination

First, we examine whether local political inclination influences fund managers' behaviours following chemical spills. To test, we collect U.S. presidential election data from 2000 to 2020, and we use the proportion of votes for the Democratic candidate in a fund manager's county to represent the political environment. We then include the proportion of votes – *Democrat* – in

Equation (2) to form a triple interaction term.[8] Democrats are often associated with greater concern for environmental issues and social responsibilities (Hong and Kostovetsky, 2012; Bernstein et al., 2022). Table 7 displays the results.[9] Because elections are discontinuous, it is unclear which election can represent local political inclinations each quarter. Therefore, we create two proxies – in the first four columns, we obtain the voting data from the most recent election, while in the following four columns, we use the votes from the closest election before the event. Both Democrat measures have a median of more than 0.5.

Across all measures for high-ESG investments, the coefficients of the triple interaction term are significantly positive, while those of the double interaction term are primarily negative. This outcome suggests that funds located in counties with a higher proportion of Democrat votes tend to exhibit a stronger reaction to chemical spills. This highlights the influence of local political inclination on funds' allocations to high-ESG firms following chemical spills.

[insert Table 7 here]

5.2 The influence of the public's environmental beliefs

Next, we test whether our baseline results vary across counties with varying levels of environmental beliefs. We utilize data from the Yale Climate Opinion Maps (Howe et al., 2015; Marlon et al., 2022), which provides estimates of county-level fractions of the population that agree with specific issues regarding global warming. These estimates are based on nationally representative surveys conducted since 2010. We select three survey questions, available from 2010 to 2019, that are relevant to our study: "Estimated percentage who are somewhat/very worried about global warming", "Estimated percentage who think global warming will start to

[8] The findings (also in Section 5.2) are consistent if we run the baseline regressions in subsamples, constructed according to the median value of the corresponding variables (e.g., the proportion of Democrat votes) in each even and each quarter, instead of adding a triple interaction term. However, we are not able to conduct a subsample analysis to verify the findings in Section 5.3 because the sample size including only the border funds is too small.
[9] The individual variables of the triple interaction term are included in the regressions but not reported in the table.

harm people in the United States now/within 10 years", and "Estimated percentage who think that global warming is caused mostly by human activities". The first two questions are also employed in Duan and Li (2024), while the last one is pertinent to our research as salient chemical spills are primarily caused by human activities rather than natural disasters. We anticipate observing stronger treatment effects in counties with higher fractions of the population agreeing with one of the three survey questions.

The county-level data is limited from 2010 to 2014 for most of the counties. Thus, for each survey question, we average the county-level fractions across all years and use them to represent time-invariant beliefs across different counties. We find more than a 0.95 correlation between the average value and the 2014 value for each survey question. We then interact the average fractions with $Treatment_{ci} \times Post_{ct}$. Table 8 presents the results. For all measures of funds' high-ESG investments and all three survey questions, coefficients of the triple interaction terms are positive and statistically significant. This supports the hypothesis that the public's beliefs regarding environmental issues positively influence funds' allocations to high-ESG stocks following chemical spills.

[insert Table 8 here]

5.3 The influence of funds' willingness to improve their social image

Last, we test another heterogeneity arising from funds' willingness to improve their social image. Gantchev et al. (2024) define border funds as those with portfolio ESG scores within +/- 2.5% of the cut-offs for the top and bottom Morningstar globe ratings (i.e., the top/bottom 7.5% - 12.5% of funds based on portfolio ESG scores). They argue that border funds are more likely to improve their social image by tilting their portfolios towards high-ESG firms, as these funds are on the verge of upgrading or downgrading. For example, funds in the 12.5th percentile can benefit from an upgrade in their ESG status with minimal effort of engaging in

high-ESG investments, thereby attracting more investors. Therefore, we expect border funds to be more sensitive to local news about environmental events. In Table 9, we interact the product of the treatment dummy and the post dummy with *Top Border Fund*, *Bottom Border Fund*, and *Border Fund*, which identify funds in the top 7.5th to 12.5th percentiles, bottom 7.5th to 12.5th percentiles, and both, respectively. In all regressions, the coefficients of the triple interaction terms are significantly positive. The results indicate that improving social image is one of the rationales behind the observed increase in high-ESG investments following chemical spills.

[insert Table 9 here]

6. Robustness and Further Tests

6.1 Robustness tests

Table 10 presents the results of several robustness checks. First, we double cluster standard errors at the cohort-fund and cohort-quarter levels (Columns (1) – (4)). In the paper, we focus on studying the impact of informational exposure to chemical spills. Thus, in the second robustness test (Columns 5-8), we exclude the funds located in the same county as a given chemical spill. Our results show increases in funds' portfolio scores and their high-ESG investments, and we interpret this as funds' responses to chemical spills. If stocks change their ESG scores in response to the events, either ESG investments or overall scores of funds' portfolios will change accordingly, even if funds themselves do not take any action to increase their ESG investments. To rule out this alternative interpretation, in the third one (Columns 9-12), we exclude stocks in a given quarter located in the same DMA as the event from a fund's

portfolio.[10][11] The results are largely unchanged in all three robustness tests. In unreported tests, we find robust results when we cluster standard errors at the cohort-county and cohort-quarter levels or exclude the funds that are within a 25-mile radius of the incident scene based on zip codes.

[insert Table 10 here]

6.2 Propensity score matching

Next, we use propensity score matching to further reduce the difference between the treated and control groups. Specifically, for a given event, we run a logit regression with all controls in Equation (2) and calculate propensity scores for all fund-quarter observations. We apply a one-to-five nearest-neighbor matching. Then, we estimate Equation (2) in Columns (9) – (12) of Table 10 using the matched sample. The sample size is reduced by more than half, but the main finding remains the same.

6.3 Staggered DID

Lastly, we re-evaluate the treatment effect using a staggered DID regression. In the staggered DID regression, the interaction term between $Treatment_{ci}$ and $Post_{ct}$ identifies fund-quarter observations when the funds are located in the same DMA of a chemical spill after the spill; it equals zero for the fund-quarter observations when the funds are in the same DMA but before a spill or all other remaining observations. The results in the last four columns in Table 10 confirm our previous findings of a positive treatment effect on funds' high-ESG investments.

[10] We use firms' historical locations from Loughran-McDonald header data, downloading from https://sraf.nd.edu/sec-edgar-data/10-x-header-data/.

[11] Also, in Table B2, we re-define the event window. In KLD, a firm's ESG score is only updated at the annual frequency. Therefore, if we restrict the event window within the year of each chemical spill, we can test funds' ESG investments with their stocks' ESG scores fixed. The results in Table B2 confirm that there is still an increase in funds' portfolio ESG scores. However, due to the restriction on the event window, though coefficients in the regressions of the proportion of high-ESG value and stocks are positive, they are not statistically significant. In contrast, the results of regressions of low-ESG investments are largely similar to our baseline results.

6.4 Additional evidence on the timing of funds' responses

Next, we conduct a placebo test in which the spills are assumed to have occurred two years earlier. Table 11 present the results. It shows that there are no significant changes in funds' ESG investments across all four measures, suggesting that funds' responses to environmental events are effective at the time of occurrence and are not driven by other earlier confounding events.

[insert Table 11 here]

6.5 Fund performance after chemical spills

Next, we conduct two additional tests on the consequences of high-ESG investments following chemical spills. First, we examine funds' performance. One expects that chemical spills might bring more attention from inventors, boosting prices of high-ESG stocks. Thus, it would be rational for treated funds to expect better performance, capitalising on their unique knowledge gained from local news about chemical spills.

We test this by replacing the dependent variable in Equation (2) with funds' quarterly returns, along with three other measures for abnormal returns. We subtract model-predicted returns, using CAPM, Fama-French three-factor model, or Fama-French five-factor model, from each fund's quarterly raw returns to obtain CAPM-adjusted or FF3-adjusted or FF5-adjusted abnormal returns (Fama and French, 1993; Fama and French, 2015). To compute model-predicted returns, we derive the intercept and coefficients (i.e., alpha and betas) of each model by regressing quarterly excess returns on corresponding risk factors over 20 quarters before each event. The results are presented in Table 12, where we examine raw returns in the first column and risk-adjusted returns in the subsequent columns. Except for CAPM-adjusted abnormal returns, we observe positive and significant coefficients of $Treatment_{ci} \times Post_{ct}$ in all regressions. Thus, treated funds outperform other funds after the chemical spill events.

[insert Table 12 here]

6.6 The impact of fund holdings on ESG performance after chemical spills

Dyck et al. (2019) and Kim et al. (2019) find that institutional investors can influence firms' ESG performance. Therefore, our next test examines whether the increase in fund holdings, induced by spill events, can subsequently improve firms' ESG scores. Using the sample of firms' annual ESG scores from KLD, we conduct a similar stacked DID regression to Equation (2).

As multiple funds may hold shares in a single firm, we introduce a continuous variable – *Weighted treatment* – to measure the extent to which the firm is owned by funds located in the same DMA where a chemical spill occurs. To accomplish this, we average, for each firm during each event, the treatment dummy across all funds investing in the firm during the final quarter of a given year. This average is weighted by the shares held by each fund. A higher value of this variable indicates a larger exposure of the firm to actions taken by treated funds.

We adopt a three-year timeframe, including the year when the spill takes place, to carry out this analysis. Table 13 presents the results. In the first column, the dependent variable is the size-adjusted ESG score of a firm. The coefficient of the interaction term shows that the proportion of treated funds ownership does not change the overall ESG performance of a firm after chemical spills. However, when we separate environmental, social, and governance in the next three columns, we find positive effects on firms' environmental and governance scores but not on social scores. Subsequently, when we further decompose the year dummy, we discover that the positive effect on governance scores also presents in the pre-event period, suggesting that chemical spills are not the cause of this effect. In contrast, the improvement of treated fund ownership on a firm's environmental scores appears to be more exogenous. Notably, this effect is statistically significant only during the first and second years following the event.

Building on our earlier findings, upon hearing a salient environmental event, funds not only swiftly readjust their portfolios towards high-ESG stocks in four quarters but also enhance the environmental scores of the stocks they own in the subsequent two years. This suggests a sustained and proactive response by funds to salient environmental events.

[insert Table 13 here]

7. Conclusion

This paper investigates the impact of salient chemical spills on fund managers' decisions regarding fund investments and portfolio allocations. Analysing 36 chemical spill incidents spanning from 2000 to 2019 in the United States, we observe that funds operating within the same DMA as the spill location tend to increase their holdings in high-ESG stocks compared to other funds. Furthermore, treated fund managers tend to adjust their existing portfolios rather than acquire new stocks, reallocating their investments away from relatively low-ESG stocks towards high-ESG ones following such events. This study focuses on funds' investments; future studies can investigate the impact of chemical spills on household or individual investors' preferences for high-ESG investment. Riedl and Smeets (2017) use administrative individual investor data from a mutual fund provider to study the rationale behind funds' high-ESG investments. With such granular data on funds' investors, we suggest future research to explore more details on the rationale behind the observed treatment effect.

Moreover, we document cross-sectional heterogeneities in the treatment effect based on the local political environment, public awareness of environmental issues, and funds' willingness to improve their social images. According to our findings, the positive sensitivity of high-ESG investments to chemical spills is particularly pronounced for funds located in counties with a Democrat majority and counties with a stronger stance regarding environmental issues and for funds improving their social image.

Finally, we find that treated funds outperform control funds after the events. Further research could test whether this better performance is attributable to treated funds' divestment from low-ESG stocks. Lastly, we examine the impact of firms' exposure to chemical spills on their future ESG performance. Future studies could investigate other firm characteristics, such as expenses on green innovations or environmental-friendly investments.

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Table 1 Summary Statistics

	Observation	Mean	SD	p25	Median	p75
% High-ESG Value	130094	25.593	14.091	14.194	24.616	35.837
% High-ESG Shares	130094	26.24	15.384	13.57	24.578	37.472
% High-ESG Stocks	130094	23.839	12.392	14.019	23.077	32.727
Portfolio ESG Scores	130094	.224	0.852	-.267	.104	.668
% High-E Value	130094	39.075	25.734	16.655	36.236	59.773
% High-E Shares	130094	38.805	26.486	15.442	35.643	59.445
% High-E Stocks	130094	36.506	24.932	15.789	31.818	55.263
Portfolio E Scores	130094	.048	0.307	-.109	.048	.228
% High-S Value	130094	25.772	14.349	13.808	24.882	36.432
% High-S Shares	130094	26.56	15.413	13.879	25.084	37.804
% High-S Stocks	130094	23.96	12.550	13.889	23.077	33.333
Portfolio S Scores	130094	.222	0.630	-.168	.1	.564
% High-G Value	129604	17.382	12.599	8.983	14.944	23.029
% High-G Shares	129604	17.397	13.047	8.536	14.911	23.192
% High-G Stocks	129604	17.154	11.352	9.677	15.325	22.43
Portfolio G Scores	129604	-.057	0.172	-.159	-.055	.042
Value of High-ESG Stocks	130094	2.081e+08	635270081.098	7376484	28580856	1.287e+08
# of High-ESG Shares	130094	5307193.8	15312199.148	217117	841578.5	3662300
# of High-ESG Stocks	130094	18.521	30.013	6	11	19
Total Value of Stocks	130094	7.593e+08	2177987113.141	37795513	1.328e+08	5.512e+08
Total # of Shares	130094	19352469	48489384.055	1068170	3979674.5	15284934
Total # of Stocks	130094	91.445	181.929	30	48	77
Quarterly Return	130094	.018	0.098	-.023	.029	.074
CAPM-adjusted Return	79424	-.004	0.039	-.023	-.003	.016
FF3-adjusted Return	79424	-.005	0.037	-.021	-.003	.014
FF5-adjusted Return	79424	-.005	0.042	-.024	-.003	.016
Treatment	130094	.153	0.360	0	0	0
Post	130094	.505	0.500	0	1	1
Democrat	128117	.811	0.392	1	1	1
Worried	130094	65.008	6.948	59.733	67.156	68.719
Timing	130094	53.521	5.641	48.369	54.64	59.611
Human	130094	59.213	6.148	53.711	58.533	62.866
Fund Age	126703	13.181	11.179	5.897	10	16.939
Manager Tenure	126703	7.899	5.491	4	6.417	10.998
Log (Total Net Assets)	130094	5.465	1.820	4.159	5.382	6.768
Expense Ratio	126703	.012	0.004	.009	.012	.014
Turnover Ratio	126703	.76	0.705	.29	.56	.98
Fund Flow	126703	.017	0.139	-.04	-.01	.035

Notes: This table presents summary statistics for the variables used in the paper. The sample consists of fund-quarter observations stacked from a four-quarter window surrounding each of the 36 chemical spill events during 2001-2018. *% High-ESG Value*, *Shares* or *Stocks* are calculated as ratios, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Quarterly Return* is fund returns, accumulated over all month within a quarter. *CAPM-adjusted*, *CAPM-adjusted* or *CAPM-adjusted Return* is a fund's quarterly raw returns minus model-predicted returns using CAPM, FF three-factor model, or FF five-factor model. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. *Democratic* is the proportion of votes for the Democratic candidate in a fund manager's county. *Worried*, *Timing* or *Human* is the average fraction of people in a county who agree with one of the survey questions regarding climate changes. *Top Border Fund*, *Bottom Border Fund*, and *Border Fund* identify funds in the top 7.5th to 12.5th percentiles, bottom 7.5th to 12.5th percentiles, and both, respectively. All other variables are defined in Table A1.

Table 2 Baseline Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores
Post	1.396***	1.627***	1.194***	0.0373***	1.170***	1.305***	1.030***	0.0292***				
	(33.97)	(36.28)	(33.52)	(14.80)	(24.05)	(24.54)	(24.67)	(9.59)				
Treatment × Post	1.300***	1.219***	1.224***	0.0427***	1.213***	1.136***	1.158***	0.0393***	0.332***	0.403***	0.352***	0.0294***
	(11.50)	(10.15)	(12.79)	(6.67)	(10.53)	(9.30)	(11.89)	(6.01)	(2.76)	(3.07)	(3.40)	(4.10)
Fund Age$_{-1}$					0.175***	0.229***	0.132***	0.00653***	0.0759***	0.101***	0.0443**	0.00228
					(7.06)	(8.32)	(6.40)	(3.99)	(3.31)	(3.86)	(2.34)	(1.38)
Manager Tenure$_{-1}$					0.0733***	0.0645***	0.0382***	0.00144*	0.0658***	0.0834***	0.0530***	0.00238***
					(5.47)	(4.28)	(3.27)	(1.80)	(5.25)	(5.79)	(4.89)	(2.94)
Log (Total Net Assets)$_{-1}$					-0.210***	-0.169**	-0.162**	-0.00511	-0.167**	-0.295***	-0.265***	-0.00486
					(-2.93)	(-2.06)	(-2.57)	(-1.17)	(-2.25)	(-3.45)	(-3.97)	(-1.01)
Expense Ratio$_{-1}$					166.0***	153.5***	166.9***	0.612	51.32	87.24**	55.60*	1.738
					(4.32)	(3.71)	(4.92)	(0.27)	(1.40)	(2.17)	(1.68)	(0.76)
Turnover Ratio$_{-1}$					-0.296***	-0.351***	-0.228***	-0.0140**	0.00778	0.132	0.117	0.00294
					(-3.23)	(-3.52)	(-2.83)	(-2.41)	(0.09)	(1.36)	(1.53)	(0.51)
Quarterly Return$_{-1}$					2.922***	3.127***	3.036***	0.124***	2.988***	3.665***	2.859***	-0.218***
					(12.50)	(12.30)	(14.81)	(8.99)	(4.90)	(5.67)	(5.40)	(-6.06)
Fund Flow$_{-1}$					-0.666***	-0.944***	-0.686***	-0.0307***	-0.444**	-0.562***	-0.373**	-0.0169
					(-3.64)	(-4.75)	(-4.15)	(-2.76)	(-2.53)	(-2.90)	(-2.35)	(-1.52)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Observation	130094	130094	130094	130094	126623	126623	126623	126623	126623	126623	126623	126623
Adjusted R^2	0.773	0.776	0.781	0.773	0.775	0.778	0.784	0.775	0.803	0.798	0.808	0.785

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund fixed effects are included in all regressions, and cohort-quarter fixed effects are included in the last three regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 3 Changes in Levels of Fund High-ESG Investments

	(1) Log (Value of High-ESG Stocks)	(2) Log (# of High-ESG Shares)	(3) Log (# of High-ESG Stocks)	(4) Log (Total Value of Stocks)	(5) Log (Total # of Shares)	(6) Log (Total # of Stocks)
Treatment × Post	0.0835***	0.0712***	0.00572	-0.00434	-0.00441	-0.00445
	(2.61)	(2.78)	(1.12)	(-0.82)	(-0.78)	(-1.18)
Fund Age$_{-1}$	-0.00645	-0.00492	0.00213**	-0.00357**	-0.00355**	0.00104
	(-1.02)	(-0.95)	(2.29)	(-2.08)	(-2.08)	(1.59)
Manager Tenure$_{-1}$	0.00699**	0.00686**	-0.000306	0.00230***	0.00213**	-0.00133***
	(2.22)	(2.54)	(-0.53)	(2.61)	(2.28)	(-2.75)
Log (Total Net Assets)$_{-1}$	0.788***	0.770***	0.0240***	0.780***	0.765***	0.0352***
	(29.44)	(33.24)	(6.65)	(63.71)	(63.37)	(13.73)
Expense Ratio$_{-1}$	-15.89*	-10.30	-1.431	-9.958***	-9.737***	-6.298***
	(-1.69)	(-1.37)	(-0.77)	(-4.38)	(-3.99)	(-4.27)
Turnover Ratio$_{-1}$	0.00627	0.00241	0.0102**	-0.0353***	-0.0293***	0.00144
	(0.26)	(0.13)	(2.18)	(-8.72)	(-6.25)	(0.36)
Quarterly Return$_{-1}$	-0.0326	-0.241	0.0469**	-0.0677***	-0.310***	-0.0328*
	(-0.17)	(-1.56)	(2.04)	(-2.61)	(-10.81)	(-1.73)
Fund Flow$_{-1}$	-0.181***	-0.166***	-0.0143*	-0.0141	-0.0209*	0.0193***
	(-3.64)	(-4.17)	(-1.75)	(-1.36)	(-1.95)	(3.19)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	126623	126623	126623	126623	126623	126623
Adjusted R^2	0.800	0.826	0.915	0.982	0.977	0.955

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. In the first three columns, the dependent variable is *Log (Value of High-ESG Stocks)*, *Log (# of High-ESG Shares)*, or *Log (# of High-ESG Stocks)* which is calculated as levels of investments in high-ESG stocks in logarithm, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. In the next three columns, the dependent variable is *Log (Total Value of High-ESG Stocks)*, *Log (Total # of High-ESG Shares)*, or *Log (Total # of High-ESG Stocks)* which is calculated as levels of investments in all ESG-rated stocks in logarithm. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 4 Changes in Funds' Low-ESG Investments

	(1) % Low-ESG Value	(2) % Low-ESG Shares	(3) % Low-ESG Stocks	(4) Log (Value of Low-ESG Stocks)	(5) Log (# of Low-ESG Shares)	(6) Log (# of Low-ESG Stocks)
Treatment × Post	-0.518***	-0.334***	-0.425***	-0.0796**	-0.0491*	-0.0135**
	(-4.59)	(-2.92)	(-4.13)	(-2.27)	(-1.75)	(-2.40)
Fund Age$_{-1}$	-0.0765***	-0.0877***	-0.0303+	-0.00391	-0.00546	-0.000181
	(-3.82)	(-4.25)	(-1.62)	(-0.64)	(-1.12)	(-0.20)
Manager Tenure$_{-1}$	0.0368***	0.0184	0.0269***	-0.00297	-0.00132	0.000446
	(3.23)	(1.52)	(2.61)	(-0.86)	(-0.47)	(0.65)
Log (Total Net Assets)$_{-1}$	-0.101	-0.0846	0.0123	0.794***	0.774***	0.0296***
	(-1.24)	(-0.97)	(0.18)	(29.53)	(34.48)	(7.58)
Expense Ratio$_{-1}$	50.44	9.484	48.58+	-43.79***	-37.04***	-1.481
	(1.60)	(0.28)	(1.62)	(-3.96)	(-4.17)	(-0.80)
Turnover Ratio$_{-1}$	-0.0424	-0.145*	-0.0971	-0.0471*	-0.0455**	0.00193
	(-0.53)	(-1.77)	(-1.31)	(-1.86)	(-2.26)	(0.40)
Quarterly Return$_{-1}$	3.334***	1.323**	2.352***	0.405*	-0.0208	-0.00545
	(5.85)	(2.34)	(4.24)	(1.81)	(-0.12)	(-0.21)
Fund Flow$_{-1}$	0.182	0.692***	0.192	-0.116**	-0.0788*	0.00929
	(1.09)	(3.78)	(1.28)	(-2.02)	(-1.73)	(1.07)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	126623	126623	126623	126623	126623	126623
Adjusted R^2	0.784	0.732	0.785	0.745	0.769	0.899

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. In the first three columns, the dependent variable is *% Low-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in low-ESG stocks over investments in total ESG-rated stocks, and low-ESG stocks are defined as the bottom 15% of stocks in each quarter according to their size-adjusted ESG scores. The dependent variable in the last three columns is *Log (Value of Low-ESG Stocks)*, *Log (# of Low-ESG Shares)*, or *Log (# of Low-ESG Stocks)* which is calculated as levels of investments in low-ESG stocks in logarithm. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 5 Dynamics of The Treatment Effects

	(1) % High-ESG Value	(2) % High-ESG Shares	(3) % High-ESG Stocks	(4) Portfolio ESG Scores
Treatment ×$Post_{t-4}$	0.0494	-0.210	0.134	-0.00762
	(0.20)	(-0.76)	(0.61)	(-0.53)
Treatment × $Post_{t-3}$	-0.0122	-0.0745	0.0679	-0.0145
	(-0.05)	(-0.31)	(0.35)	(-1.11)
Treatment × $Post_{t-2}$	0.105	0.265	0.0557	-0.0115
	(0.49)	(1.14)	(0.30)	(-0.93)
Treatment × $Post_{t1}$	0.230	0.226	0.266	0.00181
	(1.09)	(0.98)	(1.46)	(0.16)
Treatment × $Post_{t2}$	0.398*	0.431*	0.419**	0.0250**
	(1.83)	(1.82)	(2.23)	(2.00)
Treatment × $Post_{t3}$	0.461**	0.497**	0.503***	0.0305**
	(2.07)	(2.07)	(2.68)	(2.35)
Treatment × $Post_4$	0.389*	0.475*	0.484**	0.0292**
	(1.65)	(1.83)	(2.37)	(2.04)
Sample	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes
Observation	126623	126623	126623	126623
Adjusted R^2	0.803	0.798	0.808	0.785

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. $Post_{t_\tau}$ is a dummy taking one if a fund's investment is observed in quarter t_τ. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Figure 1 Dynamics of the Treatment Effects

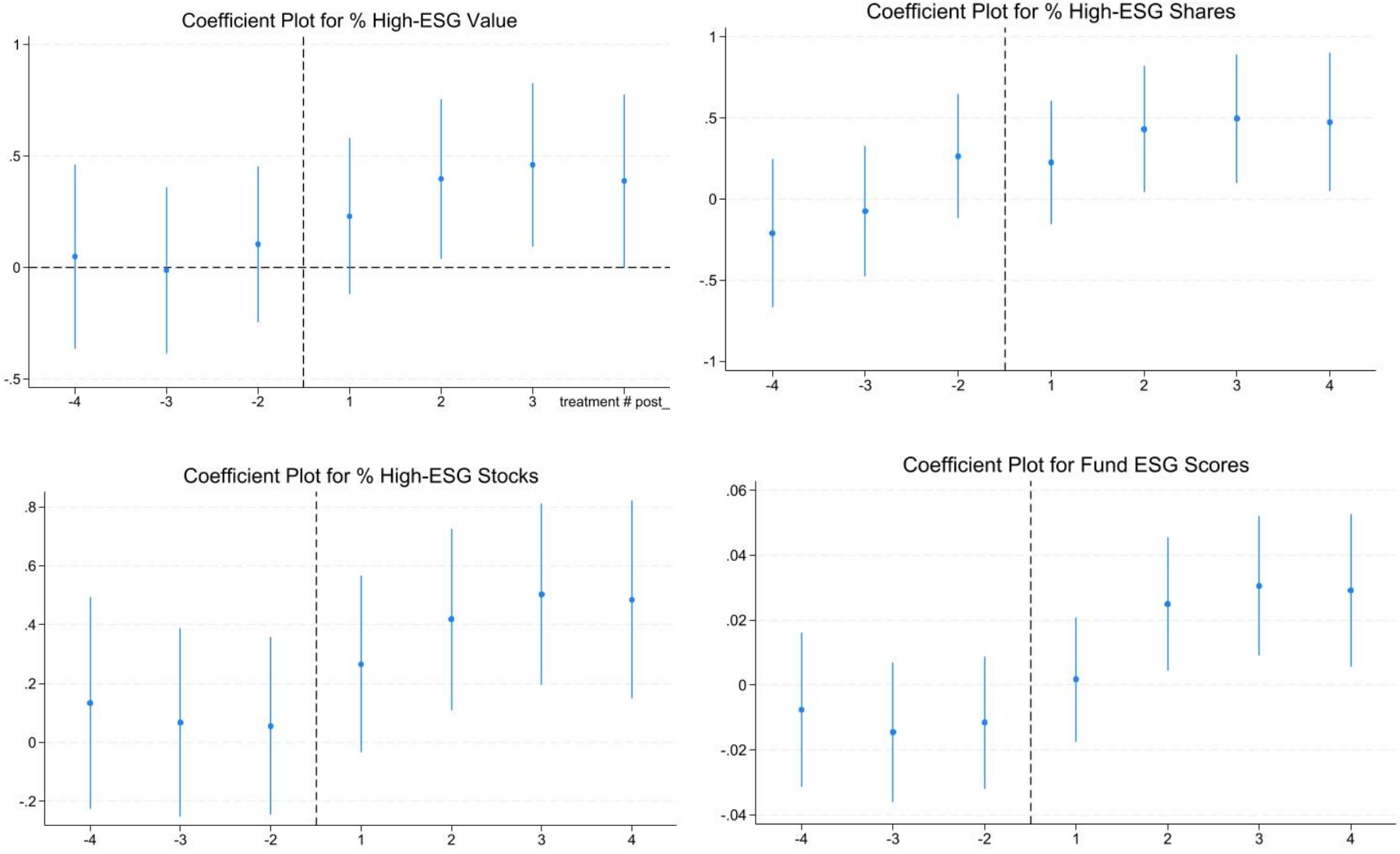

Table 6 Separating environmental, social, and governance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	% High-E Value	% High-E Shares	% High-E Stocks	Portfolio E Scores	% High-S Value	% High-S Shares	% High-S Stocks	Portfolio S Scores	% High-G Value	% High-G Shares	% High-G Stocks	Portfolio G Scores
Treatment × Post	0.311*	0.472***	0.382**	0.0118***	0.310***	0.446***	0.263**	0.0158***	-0.0886	0.156	-0.0359	0.00115
	(1.88)	(2.73)	(2.49)	(4.41)	(2.62)	(3.45)	(2.55)	(2.89)	(-0.57)	(0.94)	(-0.26)	(0.56)
Fund Age$_{-1}$	0.0657**	0.0451+	0.0566**	0.00201***	-0.0288	-0.0241	-0.0482**	0.00191	-0.0970***	-0.0459	-0.0721***	-0.00164***
	(2.41)	(1.61)	(2.27)	(3.73)	(-1.25)	(-0.87)	(-2.45)	(1.51)	(-3.52)	(-1.48)	(-2.75)	(-3.81)
Manager Tenure$_{-1}$	0.0396**	0.0695***	0.0534***	0.000168	0.0567***	0.0596***	0.0517***	0.00210***	-0.0491***	-0.0505***	-0.0277**	0.000209
	(2.19)	(3.71)	(3.19)	(0.62)	(4.45)	(4.23)	(4.61)	(3.19)	(-3.25)	(-3.05)	(-2.01)	(0.98)
Log (Total Net Assets)$_{-1}$	-0.400***	-0.249**	-0.641***	0.00665***	-0.359***	-0.392***	-0.517***	-0.00674*	-0.352***	-0.252**	-0.456***	-0.00489***
	(-3.67)	(-2.13)	(-6.07)	(3.94)	(-4.79)	(-4.61)	(-7.60)	(-1.81)	(-3.59)	(-2.44)	(-5.02)	(-3.50)
Expense Ratio$_{-1}$	57.40	155.6**	3.118	0.642	-3.359	85.68**	11.50	-0.784	-59.43	21.46	-85.61**	1.450**
	(1.02)	(2.57)	(0.06)	(0.86)	(-0.09)	(2.12)	(0.35)	(-0.42)	(-1.40)	(0.47)	(-2.19)	(2.39)
Turnover Ratio$_{-1}$	-0.341***	-0.231*	-0.215*	0.00291	-0.0808	-0.128	0.0107	0.00252	-0.0796	0.0161	0.0181	-0.00270*
	(-2.60)	(-1.66)	(-1.73)	(1.53)	(-0.93)	(-1.33)	(0.14)	(0.56)	(-0.80)	(0.15)	(0.20)	(-1.81)
Quarterly Return$_{-1}$	0.462	1.599*	1.191	-0.0362***	-3.876***	-3.486***	-2.362***	-0.175***	-1.924***	-1.366*	-0.960	-0.0146
	(0.48)	(1.65)	(1.34)	(-2.77)	(-5.92)	(-4.99)	(-4.19)	(-6.42)	(-2.64)	(-1.83)	(-1.52)	(-1.47)
Fund Flow$_{-1}$	0.388	-0.231	-0.0577	-0.00342	-0.125	-0.121	0.00241	-0.0148*	0.0519	-0.331	-0.0747	0.00128
	(1.45)	(-0.82)	(-0.23)	(-0.89)	(-0.71)	(-0.63)	(0.02)	(-1.72)	(0.23)	(-1.34)	(-0.37)	(0.39)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	126623	126623	126623	126623	126623	126623	126623	126623	126164	126164	126164	126164
Adjusted R^2	0.878	0.873	0.883	0.803	0.818	0.807	0.819	0.771	0.580	0.555	0.579	0.605

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-E(S)(G) Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-E(S)(G) stocks over investments in total stocks, and high-E(S)(G) stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted environmental(social)(governance) scores. *Portfolio E(S)(G) Scores* is the weighted-average environmental(social)(governance) score of all stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 7 Heterogeneity in Local Political Inclination

	(1) % High-ESG Value	(2) % High- ESG Shares	(3) % High- ESG Stocks	(4) Portfolio ESG Scores	(5) % High- ESG Value	(6) % High- ESG Shares	(7) % High- ESG Stocks	(8) Portfolio ESG Scores
Treatment × Post	-1.349**	-3.094***	-1.209**	-0.0463	-1.008*	-2.944***	-1.006*	-0.0590+
	(-2.02)	(-4.07)	(-2.01)	(-1.13)	(-1.66)	(-4.30)	(-1.87)	(-1.61)
Treatment × Post × Democrat-recent	2.248**	4.676***	2.126***	0.100*				
	(2.54)	(4.72)	(2.70)	(1.88)				
Treatment × Post × Democrat-close					1.885**	4.655***	1.940***	0.122**
					(2.28)	(5.06)	(2.68)	(2.47)
Fund Age$_{-1}$	0.0774***	0.106***	0.0439**	0.00243	0.0773***	0.106***	0.0438**	0.00243
	(3.35)	(3.99)	(2.30)	(1.46)	(3.35)	(3.99)	(2.29)	(1.47)
Manager Tenure$_{-1}$	0.0677***	0.0853***	0.0554***	0.00269***	0.0674***	0.0849***	0.0551***	0.00267***
	(5.34)	(5.85)	(5.05)	(3.29)	(5.32)	(5.83)	(5.03)	(3.27)
Log (Total Net Assets)$_{-1}$	-0.160**	-0.289***	-0.249***	-0.00510	-0.158**	-0.288***	-0.247***	-0.00488
	(-2.14)	(-3.39)	(-3.74)	(-1.06)	(-2.11)	(-3.37)	(-3.71)	(-1.02)
Expense Ratio$_{-1}$	69.30*	109.0***	80.73**	3.244	69.57*	109.8***	81.11**	3.286
	(1.88)	(2.71)	(2.46)	(1.41)	(1.89)	(2.74)	(2.47)	(1.43)
Turnover Ratio$_{-1}$	0.0300	0.158+	0.131*	0.00464	0.0314	0.159+	0.132*	0.00461
	(0.34)	(1.63)	(1.71)	(0.80)	(0.36)	(1.64)	(1.72)	(0.80)
Quarterly Return$_{-1}$	3.058***	3.783***	2.872***	-0.214***	3.061***	3.787***	2.875***	-0.213***
	(4.98)	(5.82)	(5.38)	(-5.91)	(4.99)	(5.82)	(5.39)	(-5.90)
Fund Flow$_{-1}$	-0.432**	-0.542***	-0.368**	-0.0186*	-0.434**	-0.542***	-0.369**	-0.0188*
	(-2.46)	(-2.79)	(-2.31)	(-1.67)	(-2.47)	(-2.79)	(-2.32)	(-1.69)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	124670	124670	124670	124670	124670	124670	124670	124670
Adjusted R^2	0.803	0.798	0.807	0.785	0.806	0.818	0.771	0.818

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. *Democratic-recent(close)* is the proportion of votes for the Democratic candidate in a fund manager's county in the most recent(closest) election. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 8 Heterogeneity in Public's Beliefs of Environmental Issues

	(1) % High-ESG Value	(2) % High-ESG Shares	(3) % High-ESG Stocks	(4) Portfolio ESG Scores	(5) % High-ESG Value	(6) % High-ESG Shares	(7) % High-ESG Stocks	(8) Portfolio ESG Scores	(9) % High-ESG Value	(10) % High-ESG Shares	(11) % High-ESG Stocks	(12) Portfolio ESG Scores
Treatment × Post	-2.253*	-6.207***	-3.065**	-0.126	-2.289	-6.285***	-3.290**	-0.212**	-3.410***	-6.994***	-3.708***	-0.142*
	(-1.69)	(-4.07)	(-2.54)	(-1.50)	(-1.55)	(-3.73)	(-2.42)	(-2.24)	(-2.68)	(-4.87)	(-3.26)	(-1.80)
Treatment × Post × Worried	0.0363*	0.0931***	0.0490***	0.00207*								
	(1.92)	(4.35)	(2.89)	(1.76)								
Treatment × Post × Timing					0.0456*	0.116***	0.0641***	0.00411**				
					(1.77)	(3.99)	(2.72)	(2.52)				
Treatment × Post × Human									0.0578***	0.115***	0.0638***	0.00251**
									(2.92)	(5.18)	(3.63)	(2.07)
Fund Age$_{-1}$	0.0761***	0.103***	0.0458**	0.00219	0.0761***	0.103***	0.0457**	0.00225	0.0761***	0.103***	0.0456**	0.00220
	(3.32)	(3.93)	(2.42)	(1.33)	(3.32)	(3.92)	(2.41)	(1.36)	(3.32)	(3.93)	(2.40)	(1.33)
Manager Tenure$_{-1}$	0.0655***	0.0839***	0.0529***	0.00240***	0.0656***	0.0837***	0.0529***	0.00241***	0.0658***	0.0839***	0.0531***	0.00240***
	(5.22)	(5.82)	(4.87)	(2.96)	(5.23)	(5.80)	(4.88)	(2.98)	(5.24)	(5.82)	(4.89)	(2.96)
Log (Total Net Assets)$_{-1}$	-0.164**	-0.295***	-0.261***	-0.00499	-0.164**	-0.297***	-0.264***	-0.00505	-0.164**	-0.292***	-0.261***	-0.00507
	(-2.20)	(-3.46)	(-3.92)	(-1.04)	(-2.20)	(-3.49)	(-3.96)	(-1.05)	(-2.21)	(-3.43)	(-3.92)	(-1.05)
Expense Ratio$_{-1}$	51.69	89.42**	57.31*	1.730	51.52	88.46**	56.71*	1.772	52.52	90.38**	57.68*	1.749
	(1.40)	(2.22)	(1.73)	(0.75)	(1.40)	(2.20)	(1.71)	(0.77)	(1.43)	(2.25)	(1.74)	(0.76)
Turnover Ratio$_{-1}$	0.00388	0.124	0.113	0.00273	0.00339	0.124	0.113	0.00266	0.00312	0.123	0.112	0.00276
	(0.04)	(1.29)	(1.48)	(0.48)	(0.04)	(1.28)	(1.47)	(0.46)	(0.04)	(1.27)	(1.46)	(0.48)
Quarterly Return$_{-1}$	2.994***	3.671***	2.867***	-0.218***	2.994***	3.671***	2.865***	-0.218***	2.995***	3.674***	2.867***	-0.218***
	(4.91)	(5.68)	(5.41)	(-6.06)	(4.91)	(5.68)	(5.41)	(-6.06)	(4.92)	(5.69)	(5.41)	(-6.06)
Fund Flow$_{-1}$	-0.448**	-0.561***	-0.374**	-0.0171	-0.446**	-0.556***	-0.369**	-0.0169	-0.449**	-0.563***	-0.376**	-0.0171
	(-2.56)	(-2.89)	(-2.36)	(-1.54)	(-2.54)	(-2.87)	(-2.32)	(-1.52)	(-2.56)	(-2.90)	(-2.37)	(-1.53)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	126623	126623	126623	126623	126623	126623	126623	126623	126623	126623	126623	126623
Adjusted R^2	0.803	0.798	0.808	0.785	0.803	0.798	0.808	0.785	0.803	0.798	0.808	0.785

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. *Worried*, *Timing* or *Human* is the average fraction of people in a county who agree with one of the survey questions regarding climate changes. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 9 Heterogeneity in Border Funds

	(1) % High-ESG Value	(2) % High-ESG Shares	(3) % High-ESG Stocks	(4) Portfolio ESG Scores	(5) % High-ESG Value	(6) % High-ESG Shares	(7) % High-ESG Stocks	(8) Portfolio ESG Scores	(9) % High-ESG Value	(10) % High-ESG Shares	(11) % High-ESG Stocks	(12) Portfolio ESG Scores
Treatment × Post	0.240**	0.315**	0.295***	0.0297***	0.225*	0.289**	0.244**	0.0188***	0.145	0.212+	0.193*	0.0202***
	(2.03)	(2.42)	(2.87)	(4.21)	(1.87)	(2.19)	(2.35)	(2.69)	(1.22)	(1.62)	(1.88)	(2.92)
Treatment × Post × Top Border Fund	6.707***	6.293***	4.168***	-0.00714								
	(4.76)	(4.29)	(3.51)	(-0.09)								
Treatment × Post × Bottom Border Fund					1.255**	1.444**	1.532***	0.142***				
					(2.06)	(2.09)	(2.77)	(4.08)				
Treatment × Post × Border Fund									2.531***	2.627***	2.202***	0.111***
									(3.93)	(3.76)	(3.95)	(2.77)
Fund Age$_{-1}$	0.0647***	0.0899***	0.0365*	0.00140	0.0663***	0.0923***	0.0365*	0.00120	0.0735***	0.0987***	0.0423**	0.00216
	(2.87)	(3.48)	(1.95)	(0.87)	(2.94)	(3.56)	(1.95)	(0.78)	(3.22)	(3.77)	(2.24)	(1.33)
Manager Tenure$_{-1}$	0.0716***	0.0897***	0.0571***	0.00282***	0.0622***	0.0799***	0.0504***	0.00201**	0.0644***	0.0822***	0.0519***	0.00213***
	(5.81)	(6.28)	(5.33)	(3.55)	(5.00)	(5.62)	(4.65)	(2.54)	(5.13)	(5.71)	(4.77)	(2.65)
Log (Total Net Assets)$_{-1}$	-0.158**	-0.286***	-0.258***	-0.00404	-0.173**	-0.303***	-0.269***	-0.00540	-0.173**	-0.300***	-0.270***	-0.00553
	(-2.14)	(-3.38)	(-3.89)	(-0.86)	(-2.35)	(-3.63)	(-4.04)	(-1.14)	(-2.33)	(-3.53)	(-4.05)	(-1.15)
Expense Ratio$_{-1}$	45.04	80.47**	50.87	1.168	49.54	85.11**	54.48*	1.443	55.46	91.33**	58.58*	1.933
	(1.24)	(2.04)	(1.55)	(0.52)	(1.37)	(2.15)	(1.67)	(0.64)	(1.51)	(2.28)	(1.78)	(0.84)
Turnover Ratio$_{-1}$	0.00287	0.127	0.114	0.00262	0.0617	0.185*	0.157**	0.00820	0.0270	0.150	0.132*	0.00524
	(0.03)	(1.33)	(1.50)	(0.47)	(0.72)	(1.94)	(2.07)	(1.49)	(0.31)	(1.55)	(1.72)	(0.92)
Quarterly Return$_{-1}$	3.181***	3.870***	2.997***	-0.204***	3.305***	3.976***	3.091***	-0.185***	3.027***	3.698***	2.890***	-0.210***
	(5.30)	(6.08)	(5.71)	(-5.80)	(5.51)	(6.24)	(5.90)	(-5.34)	(4.99)	(5.74)	(5.47)	(-5.90)
Fund Flow$_{-1}$	-0.417**	-0.532***	-0.354**	-0.0145	-0.412**	-0.531***	-0.350**	-0.0137	-0.444**	-0.563***	-0.374**	-0.0165
	(-2.42)	(-2.78)	(-2.24)	(-1.34)	(-2.38)	(-2.77)	(-2.23)	(-1.26)	(-2.54)	(-2.91)	(-2.36)	(-1.49)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	126623	126623	126623	126623	126623	126623	126623	126623	126623	126623	126623	126623
Adjusted R^2	0.808	0.803	0.811	0.793	0.808	0.802	0.811	0.798	0.804	0.799	0.808	0.787

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. *Top Border Fund*, *Bottom Border Fund*, and *Border Fund* identify funds in the top 7.5th to 12.5th percentiles, bottom 7.5th to 12.5th percentiles, and both, respectively. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 10 Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Double Cluster by Cohort-fund and Cohort-quarter				*Drop Funds Located in the Same County*				*Drop Stocks Located in the Same DMA*				Propensity Score Matching				Stagged DID Regression			
	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores	% High-ESG Value	% High-ESG Shares	% High-ESG Stocks	Portfolio ESG Scores
Treatment × Post	0.332^{+}	0.403*	0.352*	0.0294**	0.309**	0.307*	0.414***	0.0276***	0.0372***	0.441***	0.552***	0.465***	0.386***	0.453***	0.403***	0.0301***	0.678***	0.662***	0.718***	0.0520***
	(1.61)	(1.72)	(1.86)	(2.01)	(2.14)	(1.94)	(3.33)	(3.26)	(5.09)	(3.60)	(4.14)	(4.41)	(2.91)	(3.13)	(3.55)	(3.83)	(5.38)	(4.91)	(6.79)	(5.73)
Fund Age$_{-1}$	0.0759**	0.101**	0.0443	0.00228	0.0708***	0.100***	0.0421**	0.00222	0.00319*	0.0640***	0.101***	0.0378*	0.141***	0.167***	0.123***	0.00359	0.0499***	0.0249	0.0462***	0.00243**
	(1.97)	(2.31)	(1.51)	(0.77)	(3.11)	(3.86)	(2.26)	(1.32)	(1.91)	(2.80)	(3.82)	(1.94)	(2.92)	(3.10)	(2.96)	(1.24)	(3.48)	(1.55)	(3.87)	(2.30)
Manager Tenure$_{-1}$	0.0658***	0.0834***	0.0530***	0.00238*	0.0612***	0.0800***	0.0493***	0.00214***	0.00266***	0.0651***	0.0926***	0.0507***	0.0747***	0.0747***	0.0586***	0.00162	0.0575***	0.0593***	0.0405***	0.00344***
	(3.57)	(3.93)	(3.34)	(1.87)	(4.78)	(5.40)	(4.43)	(2.59)	(3.10)	(5.06)	(6.21)	(4.52)	(3.29)	(2.92)	(3.12)	(1.24)	(5.36)	(5.19)	(4.49)	(4.48)
Log (Total Net Assets)$_{-1}$	-0.167	-0.295*	-0.265**	-0.00486	-0.139*	-0.248***	-0.248***	0.00127	-0.00579	-0.227***	-0.379***	-0.346***	-0.517***	-0.712***	-0.487***	-0.0307***	-0.317***	-0.284***	-0.241***	-0.0256***
	(-1.07)	(-1.85)	(-2.08)	(-0.47)	(-1.83)	(-2.84)	(-3.65)	(0.26)	(-1.14)	(-2.93)	(-4.26)	(-4.93)	(-3.81)	(-4.77)	(-4.07)	(-3.77)	(-7.28)	(-6.07)	(-6.51)	(-7.99)
Expense Ratio$_{-1}$	51.32	87.24	55.60	1.738	42.69	88.24**	55.88^{+}	2.192	4.142*	117.0***	132.3***	71.26**	83.92	145.6**	102.9*	0.675	35.36	35.62	62.36***	1.160
	(0.92)	(1.39)	(1.09)	(0.49)	(1.13)	(2.13)	(1.64)	(0.93)	(1.72)	(3.03)	(3.10)	(2.05)	(1.39)	(2.25)	(1.91)	(0.18)	(1.40)	(1.32)	(2.95)	(0.64)
Turnover Ratio$_{-1}$	0.00778	0.132	0.117	0.00294	0.0451	0.168*	0.151*	0.00371	0.00142	-0.0393	0.109	0.0757	0.0782	0.367**	0.122	0.00120	0.0120	0.0272	-0.0451	0.0256***
	(0.06)	(0.87)	(1.00)	(0.33)	(0.51)	(1.69)	(1.91)	(0.63)	(0.24)	(-0.44)	(1.10)	(0.96)	(0.53)	(2.24)	(0.96)	(0.13)	(0.19)	(0.40)	(-0.89)	(5.46)
Quarterly Return$_{-1}$	2.988*	3.665**	2.859**	-0.218**	2.392***	3.159***	2.480***	-0.241***	-0.275***	3.108***	4.521***	3.133***	4.726***	6.023***	4.396***	-0.282***	3.584***	2.595***	3.131***	-0.379***
	(1.79)	(2.17)	(2.14)	(-2.54)	(3.92)	(4.86)	(4.62)	(-6.55)	(-7.29)	(4.86)	(6.75)	(5.69)	(4.42)	(5.40)	(4.87)	(-4.61)	(4.39)	(3.04)	(4.71)	(-7.22)
Fund Flow$_{-1}$	-0.444**	-0.562**	-0.373**	-0.0169	-0.456**	-0.572***	-0.384**	-0.0198*	-0.0273**	-0.569***	-0.760***	-0.339**	-0.602**	-0.906***	-0.509*	0.00379	-0.823***	-0.938***	-0.535***	-0.059***
	(-2.19)	(-2.54)	(-2.02)	(-1.28)	(-2.56)	(-2.90)	(-2.37)	(-1.74)	(-2.34)	(-3.07)	(-3.77)	(-2.02)	(-1.97)	(-2.75)	(-1.88)	(0.22)	(-4.41)	(-4.79)	(-3.51)	(-4.30)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund and Cohort-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	126623	126623	126623	126623	120240	120240	120240	120240	124330	124330	124330	124330	52145	52145	52145	52145	115057	115057	115057	115057
Adjusted R^2	0.803	0.798	0.807	0.784	0.805	0.800	0.810	0.786	0.773	0.793	0.791	0.796	0.789	0.783	0.796	0.771	0.622	0.622	0.632	0.517

Notes: This table presents results from stacked difference-in-difference regressions in Columns 1-12 and results from stagged difference-in-difference regressions in the last four columns,. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. Standard errors are double clustered at cohort-fund and cohort-quarter levels in the first four columns, while they are adjusted for heteroskedasticity in the rest columns. In the next four columns, funds that located in the same county as a given event are excluded from the sample. In the following four columns, stocks that located in the same DMA as a given event are excluded from a fund's portfolio. In the following four columns, propensity score matching is used to balance treated and control groups. T-statistics are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 11 A Placebo Test

	(1) Quarterly Return	(2) CAPM-adjusted Return	(3) FF3-adjusted Return	(4) FF5-adjusted Return
Treatment × Post	0.00536	0.00653	-0.153	-0.171
	(0.71)	(0.05)	(-1.10)	(-1.51)
Fund Age$_{-1}$	-0.00116	-0.0189	-0.0324	-0.0345*
	(-0.67)	(-0.80)	(-1.23)	(-1.71)
Manager Tenure$_{-1}$	0.00119	0.0255^{+}	0.0349**	0.0361**
	(1.23)	(1.63)	(2.05)	(2.57)
Log (Total Net Assets)$_{-1}$	-0.0194***	-0.652***	-0.633***	-0.475***
	(-3.38)	(-7.28)	(-6.43)	(-5.83)
Expense Ratio$_{-1}$	12.28***	182.5***	279.8***	161.0***
	(4.67)	(4.15)	(6.00)	(4.10)
Turnover Ratio$_{-1}$	-0.0239***	-0.112	-0.0836	-0.131
	(-3.65)	(-1.13)	(-0.76)	(-1.49)
Quarterly Return$_{-1}$	-0.250***	3.576***	3.849***	4.321***
	(-7.46)	(6.25)	(6.43)	(8.25)
Fund Flow$_{-1}$	-0.00615	-0.363*	-0.328	-0.106
	(-0.47)	(-1.74)	(-1.44)	(-0.55)
Sample	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes
Observation	113673	113673	113673	113673
Adjusted R^2	0.771	0.780	0.784	0.787

Notes: This table presents results from stacked difference-in-difference regressions where each chemical spill is assumed to occur two years earlier. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund fixed effects are included in all regressions, and cohort-quarter fixed effects are included in the last three regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 12 Fund Performance

	(1) Quarterly Return	(2) CAPM-adjusted Return	(3) FF3-adjusted Return	(4) FF5-adjusted Return
Treatment × Post	0.00129*	0.00105	0.00136*	0.00184**
	(1.73)	(1.36)	(1.88)	(2.21)
Fund Age$_{-1}$	-0.000526***	-0.000604***	-0.000427***	-0.000365***
	(-3.70)	(-4.56)	(-3.39)	(-2.71)
Manager Tenure$_{-1}$	-0.0000805	-6.23e-08	0.0000778	0.00000704
	(-1.06)	(-0.00)	(1.05)	(0.08)
Log (Total Net Assets)$_{-1}$	-0.0259***	-0.0208***	-0.0151***	-0.0158***
	(-39.08)	(-22.35)	(-18.68)	(-17.17)
Expense Ratio$_{-1}$	-0.829***	-0.420	-0.327	-0.00776
	(-3.27)	(-1.36)	(-1.09)	(-0.02)
Turnover Ratio$_{-1}$	-0.00321***	-0.00420***	-0.00300***	-0.00536***
	(-4.80)	(-5.75)	(-4.17)	(-6.81)
Quarterly Return$_{-1}$	-0.118***	-0.114***	-0.0245***	-0.0451***
	(-21.93)	(-19.81)	(-4.47)	(-7.34)
Fund Flow$_{-1}$	0.000561	-0.00843***	-0.00874***	-0.00830***
	(0.43)	(-4.88)	(-5.28)	(-4.34)
Sample	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes
Cohort-quarter FE	Yes	Yes	Yes	Yes
Observation	126623	78217	78217	78217
Adjusted R^2	0.838	0.209	0.179	0.191

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *Quarterly Return* which is fund returns, accumulated over all month within a quarter, or *CAPM-adjusted*, *CAPM-adjusted* and *CAPM-adjusted Return* which are a fund's quarterly raw returns minus model-predicted returns using CAPM, FF three-factor model, or FF five-factor model. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table 13 The Impact of Fund Holdings on Firms' ESG Performance

	(1) ESG Scores	(2) E Scores	(3) S Scores	(4) G Scores	(6) E Scores	(7) S Scores	(8) G Scores
Weighted Treatment	0.00900	-0.0398***	0.0804***	-0.0413***	-0.0313**	0.0479	-0.0717***
	(0.26)	(-3.48)	(2.76)	(-2.67)	(-2.26)	(1.29)	(-3.60)
Weighted Treatment × Post	0.0567	0.0358***	-0.0219	0.0542***			
	(1.51)	(2.93)	(-0.70)	(3.21)			
Weighted Treatment × $Post_{t-3}$					-0.0237	0.0965+	0.0448
					(-1.01)	(1.60)	(1.50)
Weighted Treatment × $Post_{t-2}$					-0.0102	0.0128	0.0552**
					(-0.52)	(0.26)	(2.11)
Weighted Treatment × $Post_{t0}$					0.00722	-0.0109	0.0396*
					(0.46)	(-0.26)	(1.71)
Weighted Treatment × $Post_{t1}$					0.0354**	0.00389	0.112***
					(2.10)	(0.09)	(4.37)
Weighted Treatment × $Post_{t2}$					0.0454**	-0.0167	0.102***
					(2.47)	(-0.35)	(3.90)
Weighted Treatment × $Post_{t3}$					0.0269	0.0647	0.0867***
					(1.36)	(1.23)	(2.97)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	372653	372450	372568	313987	372450	372568	313987
Adjusted R^2	0.652	0.657	0.642	0.458	0.657	0.642	0.458

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of firm-year observations stacking 36 chemical spill events during 2001-2018, using a three-year window. Each event is a Cohort. The dependent variable includes *ESG Scores* which is a firm's ESG score each year, and *E(S)(G) Scores* which is a firm's environmental(social)(governance) score each year. Weighted Treatment is calculated as, for each firm in each event, weighted average treatment dummy across all funds investing in the firm in the final quarter of a given year. The weights are the shares held by each fund. *Post* is a dummy taking one for all observations in or after the year when a chemical spill occurs. $Post_{t_\tau}$ is a dummy taking one if a firm's ESG score is observed in year t_τ. All other variables are defined in Table A1. Cohort-fund fixed effects and cohort-quarter fixed effects are included in all regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Appendix A1 Variable Definitions

Label	Definition	Source		Label	Definition	Source
The Dependent Variables						
% High-ESG Value	The percentage of the value of high-ESG stocks to the total value of ESG-rated stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD		% High-ESG Shares	The percentage of the number of high-ESG shares to the total number of ESG-rated shares	Thomson Reuters Mutual Funds Holdings; MSCI KLD
% High-ESG Stocks	The percentage of the number of high-ESG stocks to the total number of ESG-rated stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD		Portfolio ESG Scores	The weighted-average score of all ESG-rated stocks in a fund's portfolio	Thomson Reuters Mutual Funds Holdings; MSCI KLD
% High-E(S)(G) Value	The percentage of the value of stocks with high environmental (social) (governance) scores to the total value of ESG-rated stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD		% High-E(S)(G) Shares	The percentage of the number of stock shares with high environmental (social) (governance) scores to the total number of ESG-rated shares	Thomson Reuters Mutual Funds Holdings; MSCI KLD
% High- E(S)(G) Stocks	The percentage of the number of stocks with high environmental (social) (governance) scores to the total number of ESG-rated stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD		Portfolio E(S)(G) Scores	The weighted-average environmental (social) (governance) score of all ESG-rated stocks in a fund's portfolio	Thomson Reuters Mutual Funds Holdings; MSCI KLD
Value of High-ESG Stocks	The total value of high-ESG stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD		# of High-ESG Shares	The total number of high-ESG shares	Thomson Reuters Mutual Funds Holdings; MSCI KLD
# of High-ESG Stocks	The total number of high-ESG stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD		Total Value of Stocks	The total value of ESG-rated stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD
Total # of Shares	The number of high-ESG shares	Thomson Reuters Mutual Funds Holdings; MSCI KLD		Total # of Stocks	The number of high-ESG stocks	Thomson Reuters Mutual Funds Holdings; MSCI KLD
Quarterly Return	Fund returns, accumulated over all month within a quarter	CRSP Mutual Funds		CAPM-adjusted Return	A fund's quarterly raw returns minus CAPM-predicted returns	CRSP Mutual Funds
FF3-adjusted Return	A fund's quarterly raw returns minus FF3-predicted returns	CRSP Mutual Funds		FF5-adjusted Return	A fund's quarterly raw returns minus FF5-predicted returns	CRSP Mutual Funds
The Main Independent Variables						

Treatment	A dummy taking one if a fund is located within the same DMA of a chemical spill	CRSP Mutual Funds; Kaggle		Post	A dummy taking one for all observations after the quarter when a chemical spill occurs	Thomson Reuters Mutual Funds Holdings
Democrat-recent(close)	The proportion of votes for the Democratic candidate in a fund manager's county in the most recent(closest) election.			Worried	The average fraction of people who agree with the question "who are somewhat/very worried about global warming" in a fund's county during 2010-2019	Yale Climate Opinion Maps
Timing	The average fraction of people who agree with the question "who think global warming will start to harm people in the United now/within 10 years" in a fund's county during 2010-2019	Yale Climate Opinion Maps		Human	The average fraction of people who agree with the question "who think that global warming is caused mostly by human activities" in a fund's county during 2010-2019	Yale Climate Opinion Maps
Top (Bottom) Border Fund	A dummy taking one if a fund falls in the top (Bottom) 7.5%-12.5% according to portfolio ESG scores	Thomson Reuters Mutual Funds Holdings; MSCI KLD		Border Fund	A dummy taking one if a fund falls in the top or bottom 7.5%-12.5% according to portfolio ESG scores	Thomson Reuters Mutual Funds Holdings; MSCI KLD
Weighted Treatment	For each firm in each event, weighted average treatment dummy across all funds investing in the firm in the final quarter of a given year. The weights are the shares held by each fund.	Thomson Reuters Mutual Funds				
The Control Variables						
Fund Age	the number of years from the date a fund was first offered to the current date	CRSP Mutual Funds		Manager Tenure	the number of years from the date a fund's current manager took control to the current date	CRSP Mutual Funds
Log (Total Net Assets)	The logarithm of a fund's total net assets	CRSP Mutual Funds		Expense Ratio	A fund's expense ratio	CRSP Mutual Funds
Turnover Ratio	A fund's turnover ratio	CRSP Mutual Funds		Fund Flow	The growth rate of a fund's total net assets adjusting its quarterly return	

Figure B1 The Geographical Distribution of the Chemical Spills in The Sample

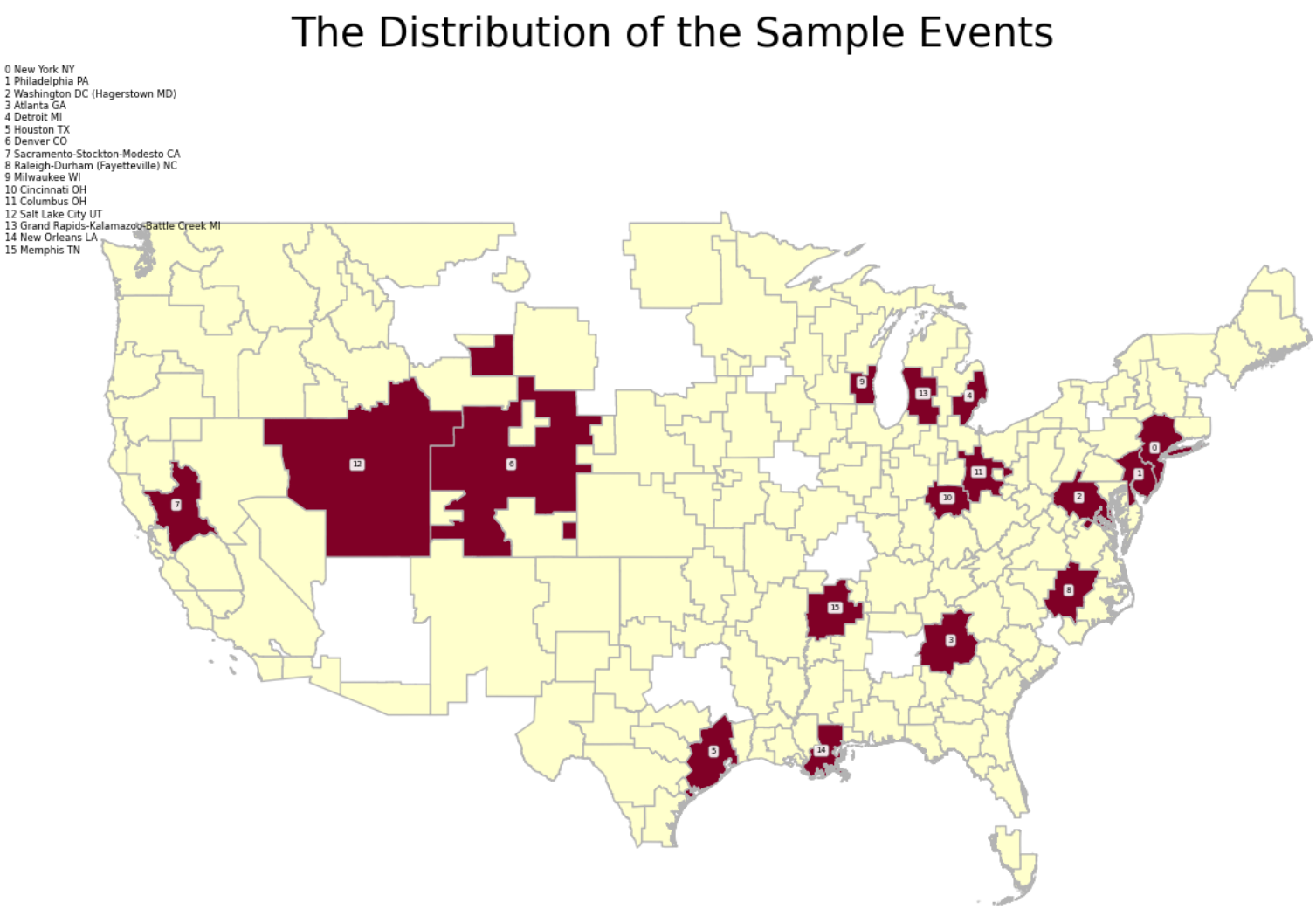

Table B1 The Impact of Chemical Spills on Funds' High-ESG Investments, Using FF10-industry definition to Adjust ESG Scores

	(1) % High-ESG Value	(2) % High-ESG Shares	(3) % High-ESG Stocks	(4) Portfolio ESG Scores	(5) % High-ESG Value	(6) % High-ESG Shares	(7) % High-ESG Stocks	(8) Portfolio ESG Scores	(9) % High-ESG Value	(10) % High-ESG Shares	(11) % High-ESG Stocks	(12) Portfolio ESG Scores
Post	0.187***	2.573***	2.539***	2.195***	0.160***	2.155***	2.065***	1.907***	0	0	0	0
	(47.80)	(53.13)	(48.84)	(50.65)	(35.74)	(39.11)	(34.41)	(38.62)	(.)	(.)	(.)	(.)
Treatment×Post	-0.0509***	0.463***	0.749***	0.281**	-0.0629***	0.339**	0.609***	0.159	0.0447***	0.557***	0.813***	0.422***
	(-4.91)	(3.50)	(5.31)	(2.45)	(-5.92)	(2.53)	(4.24)	(1.37)	(4.76)	(4.12)	(5.52)	(3.52)
Fund Age$_{-1}$					0.0189***	0.327***	0.338***	0.216***	-0.00195	0.0286	0.0467*	-0.0318
					(8.43)	(11.83)	(10.94)	(8.87)	(-1.05)	(1.20)	(1.69)	(-1.54)
Manager Tenure$_{-1}$					0.000983	0.0116	0.0103	0.00713	0.00393***	0.0479***	0.0625***	0.0558***
					(0.76)	(0.72)	(0.59)	(0.49)	(3.70)	(3.31)	(3.86)	(4.16)
Log (Total Net Assets)$_{-1}$					0.0164**	-0.163*	0.106	-0.167**	-0.0142**	-0.218**	-0.319***	-0.275***
					(2.44)	(-1.92)	(1.13)	(-2.16)	(-2.18)	(-2.47)	(-3.06)	(-3.24)
Expense Ratio$_{-1}$					0.242	262.4***	172.8***	255.1***	5.887**	131.5***	116.6***	131.8***
					(0.07)	(5.80)	(3.63)	(6.27)	(2.05)	(3.11)	(2.58)	(3.43)
Turnover Ratio$_{-1}$					-0.0869***	-1.004***	-1.079***	-0.866***	0.0000541	-0.0781	-0.0899	-0.0129
					(-10.13)	(-8.99)	(-8.97)	(-8.48)	(0.01)	(-0.79)	(-0.84)	(-0.14)
Quarterly Return$_{-1}$					0.349***	5.985***	6.131***	5.497***	-0.406***	-0.250	0.178	0.442
					(15.55)	(20.57)	(19.74)	(21.25)	(-8.95)	(-0.35)	(0.24)	(0.70)
Fund Flow$_{-1}$					-0.0298*	-0.483**	-0.719***	-0.579***	-0.00139	-0.150	-0.279	-0.255
					(-1.84)	(-2.25)	(-3.15)	(-2.97)	(-0.10)	(-0.76)	(-1.31)	(-1.42)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Observation	127776	127776	127776	127776	124336	124336	124336	124336	124336	124336	124336	124336
Adjusted R^2	0.807	0.852	0.840	0.856	0.809	0.854	0.842	0.859	0.878	0.884	0.870	0.886

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations stacking 36 chemical spill events during 2001-2018, using a four-quarter window. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their FF10-industry adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund fixed effects are included in all regressions, and cohort-quarter fixed effects are included in the last three regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.

Table B2 The Impact of Chemical Spills on Funds' High-ESG Investments, within the Same Event Year

	(1) Portfolio ESG Scores	(2) % High-ESG Value	(3) % High-ESG Shares	(4) % High-ESG Stocks	(6) % Low-ESG Value	(7) % Low-ESG Shares	(8) % Low-ESG Stocks
Treatment×Post	0.0291**	0.262	-0.0505	0.218	-0.665***	-0.696***	-0.432**
	(2.44)	(1.17)	(-0.21)	(1.09)	(-3.71)	(-3.59)	(-2.57)
Fund Age$_{-1}$	-0.00136	0.0171	0.0850	-0.0113	0.0489	0.0389	0.0815*
	(-0.32)	(0.28)	(1.21)	(-0.21)	(1.04)	(0.79)	(1.75)
Manager Tenure$_{-1}$	-0.00351	-0.0151	-0.00717	0.0257	0.0261	0.0369	0.0732***
	(-1.49)	(-0.42)	(-0.18)	(0.75)	(0.88)	(1.14)	(2.68)
Log (Total Net Assets)$_{-1}$	-0.00251	0.277	0.0859	-0.0606	-0.247	-0.216	-0.102
	(-0.16)	(1.09)	(0.30)	(-0.26)	(-1.10)	(-0.90)	(-0.46)
Expense Ratio$_{-1}$	-9.759	-6.757	-6.443	66.90	-35.54	77.92	0.949
	(-1.24)	(-0.06)	(-0.05)	(0.54)	(-0.34)	(0.63)	(0.01)
Turnover Ratio$_{-1}$	-0.0189	-0.0144	0.00704	0.164	0.281	0.272	0.272
	(-1.01)	(-0.05)	(0.02)	(0.66)	(1.11)	(1.05)	(1.16)
Quarterly Return$_{-1}$	-0.221***	-0.626	0.218	-0.479	2.305***	1.002	1.853***
	(-4.27)	(-0.67)	(0.22)	(-0.52)	(2.96)	(1.18)	(2.62)
Fund Flow$_{-1}$	-0.0192	-0.247	-0.341	0.0890	0.0920	0.624*	0.184
	(-0.76)	(-0.61)	(-0.78)	(0.24)	(0.26)	(1.67)	(0.57)
Sample	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019	2000-2019
Cohort-fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-quarter FE	No	No	No	No	No	No	No
Observation	20196	20196	20196	20196	20196	20196	20196
Adjusted R^2	0.894	0.904	0.900	0.899	0.922	0.896	0.916

Notes: This table presents results from stacked difference-in-difference regressions. The sample consists of fund-quarter observations in the same year of each of 36 chemical spill events during 2001-2018. Each event is a Cohort. The dependent variable is *% High-ESG Value*, *Shares* or *Stocks* which is calculated as ratios of investments in high-ESG stocks over investments in total ESG-rated stocks, and high-ESG stocks are defined as the top 15% of stocks in each quarter according to their size-adjusted ESG scores. *Portfolio ESG Scores* is the weighted-average score of all ESG-rated stocks in a fund's portfolio. *Treatment* is a dummy taking one if a fund is located within the same DMA of a chemical spill. *Post* is a dummy taking one for all observations after the quarter when a chemical spill occurs. All other variables are defined in Table A1. Cohort-fund fixed effects are included in all regressions, and cohort-quarter fixed effects are included in the last three regressions. T-statistics, adjusted for heteroskedasticity, are reported in brackets. +, *, **, and *** indicate that the corresponding p-values are less than 0.11, 0.1, 0.05, and 0.01, respectively.