

Mutual Fund Loyalty and ESG Stock Resilience During the COVID-19 Stock Market Crash

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Abstract

This paper studies the trading behavior of U.S. actively-managed equity mutual funds during the COVID-19 market crash. We show that Environmental, Social, and Governance (ESG) funds helped to stabilize the market by contributing to the resiliency of ESG stocks, but interestingly non-ESG funds also provided support for ESG stocks. First, ESG funds reduced net sales during the crash, controlling for fund flows. Second, all funds experiencing inflows helped to stabilize the market during the crash by increasing net purchases, but the behaviour was more pronounced for ESG funds. Third, funds experiencing outflows also played a key role contributing to the relative stability of ESG stocks as both ESG and non-ESG funds sold more aggressively their non-ESG stocks. We are able to uncover these results, because we use monthly holdings data from Morningstar, instead of the commonly used quarterly data.

Keywords: Environmental and social responsibility, institutional investors, fund flows, trading horizon, COVID-19, stock market crash, investor loyalty

JEL Classifications: G01, G12, G23, G32, M14

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1. Introduction

Did trading by actively managed mutual funds help to stabilize segments of the stock market during the COVID-19 crash of 2020? Stock prices declined on average by close to 30 percent during the crash, but performance varied significantly across firms. Stocks with high Environmental, Social, and Governance (ESG) ratings performed better during the stock market collapse in February and March, with higher returns and lower volatility, relative to non-ESG stocks (Albuquerque, Koskinen, Yang, and Zhang 2020, Ding, Levine, Lin, and Xie 2020, and Garel and Petit-Romec 2021).² We also know that ESG-oriented actively managed mutual funds experienced fund inflows during the crisis period whereas other funds manifested increases in fund outflows (Pastor and Vorsatz 2020). This paper connects these two streams of evidence by asking if the trading behavior of ESG and non-ESG actively-managed equity mutual funds, especially in response to fund flows, contributed to the observed resiliency of ESG stocks during the crash.

The differential behavior of ESG and non-ESG funds during the market crash can be motivated from evidence presented in Bollen (2007) and Renneboog, Ter Horst, and Zhang (2008). As these authors show, investors in Sustainable and Responsible Investments funds are less sensitive to fund performance than investors in conventional mutual funds. *Ergo*, we postulate that this behavior facilitates ESG-oriented fund managers to weather storms by avoiding fire sales and displaying loyalty towards their portfolio stocks.

The stock market crash of 2020 was a sudden, unanticipated event, unrelated to underlying economic conditions. It is therefore an ideal laboratory to study the resilience of stocks during times of great uncertainty, and the loyalty of mutual funds to their

²For contrary evidence showing that ESG ratings didn't affect stock returns during the COVID-19 crash, see Bae, El Ghoul, Gong, and Guedhami (2021).

portfolios as a whole and to individual stocks in particular. In our tests, we use a similar empirical model to that of [Cella, Ellul, and Giannetti \(2013\)](#). They examine the trading behavior of institutional investors in normal times and in turmoil periods. We study the trading behavior of U.S. actively-managed equity mutual funds during the first six months in 2020, paying special attention to the market crash months of February and March. Our main data source is a proprietary data set from Morningstar with portfolio holdings collected at the monthly frequency, in contrast to the commonly used, and publicly available quarterly data. The use of monthly data allows us to identify February and March of 2020 as the stock market crash months, as opposed to the first quarter, which would be the case if we were limited to using quarterly data (for the timing of the market crash, see [Ramelli and Wagner 2020](#)). Our fund-level ESG metrics are whether the fund prospectus designates the fund as an ESG fund or if a fund has four or five globe sustainability ratings from Morningstar. When we use stock-level ESG metrics, we ignore the ‘G’ component to focus on non-governance aspects of ESG as is commonly done in the literature (e.g. [Albuquerque, Koskinen, and Zhang 2019](#)). The stock-level ESG data is from Thomson Reuters Refinitiv.

Our main dependent variable is fund-level net sales. We first examine net sales as a function of funds’ ESG-orientation and size, a stock market crash dummy, as well as aggregate stock market returns and volatility. We find that ESG orientation and fund size are associated with lower net sales during the first half of 2020. In some of the specifications these effects are larger during the crash period of February and March. We next add fund inflows and outflows as explanatory variables, and also interact them with the crash period and fund ESG orientation. We highlight four findings. First, not surprising, fund flows (and their interaction terms) are major determinants of net sales leading to a doubling of the regression R-squares. Second, ESG orientation of funds is strongly negatively associated with net sales during the crash once we control for fund

flows. Third, the negative effect of inflows on net sales is always more pronounced for ESG-funds compared to other funds, whether in the crash period or not. Fourth, there is no difference in behavior between ESG-oriented and other funds in response to outflows: outflows increased net sales for both ESG-oriented and other funds, whether in the crash period or not.

Examining stock level holdings is important since we know that both ESG-oriented and other funds hold both ES and non-ES stocks in their portfolios. Ultimately, we are interested in uncovering the reason for why ES stocks exhibited resiliency during the crash. Fund managers' portfolio allocation decisions may have contributed to the observed ES stock resiliency, in addition to mutual fund investor behavior. We have two main findings. First, we find no difference in net sales for ESG and non-ESG funds toward ES versus non-ES stocks in response to fund inflows. Since we know from prior research ([Pastor and Vorsatz 2020](#)) that during the crash ESG-oriented funds were the ones that experienced inflows, we conclude that inflows to ESG-funds is a major reason why ES-stocks exhibited resiliency during the crash months of February and March. Second, while there is no difference in behavior between ESG funds and other funds in response to outflows in terms of their *aggregate* net sales as indicated above, we find that funds' behavior displays significant heterogeneity toward ES and non-ES stocks. In particular, sensitivity of net sales to fund outflows increased during the crash for non-ES stocks for all fund types, but most remarkably, this is not true for ES stocks. The sensitivity of net sales to outflows for ES stocks remained largely unchanged in the crash period for ESG-oriented and other funds. Recall that non-ESG funds were the ones that mostly experienced outflows. This implies that non-ESG funds contributed significantly to the observed resiliency of ES stocks.

In summary, resilience of ES stocks is due to inflows into ESG funds and due to changes in non-ESG funds' behavior in response to outflows. Of note, our results apply

equally to whether we label a fund as ESG-oriented based on the fund's prospectus or on Morningstar's globe ratings that use actual portfolio data. We therefore find no clear evidence of greenwashing by actively managed funds during the period of analysis.

We also study the behavior of Low Carbon Designated funds, a Morningstar classification. The study of these funds is warranted because of the increased focus on climate change and the role of corporations in mitigating it. An additional reason is that low carbon funds have experienced especially strong inflows, as shown by [Ceccarelli, Ramelli, and Wagner \(2021\)](#). The overall results are similar to our previous results. Our main finding is that the difference in net sales sensitivity to outflows between low carbon and other funds is even larger during the crash than the difference identified above under other ESG-fund designations. There are two reasons for this: First, the sensitivity of net sales to fund outflows *decreases* for low carbon funds during the crash for both ES and non-ES stocks, compared to our previous results. Second, the sensitivity of net sales to outflows for other funds increases, especially for non-ES stocks.

An alternative resilience hypothesis relies on the role of fund investment horizon. [Starks, Venkat, and Zhu \(2020\)](#) find that investors with longer trading horizons prefer ES stocks. As [Cella et al. \(2013\)](#) have shown, during market turmoil periods, long-term institutional investors sell shares to a lesser extent than short-term investors. We therefore hypothesize that the resiliency of ES stocks is associated with greater long-term investor ownership, in addition to fund flows. We proxy a fund's investor horizon with its churn ratio as in [Cella et al. \(2013\)](#) and others. In our tests, investor horizon has no significant impact on our main results. These results are consistent with those found in [Albuquerque et al. \(2020\)](#).

We document the importance of using monthly data for our study by replicating the analysis using quarterly holdings data, which is the commonly available data to researchers that rely on Schedule 13F data. We show that our results become markedly

weaker or even disappear altogether. Thus, monthly holdings data is needed to uncover the behavioral differences between ESG-oriented and other funds during the crisis. We also extend the period of analysis including all of 2019 data. We do this for two reasons. First, it allows us to better identify any existing pre-trends, and second, it gives a better chance for the exercise that uses quarterly data to identify the trading of mutual fund managers. We find no significant change in results.

In related literature, [Glossner, Matos, Ramelli, and Wagner \(2021\)](#) find that institutional investors - investment advisors, mutual and pension funds - favored stock with low debt and high cash balances during the COVID-19 market crash, but not stocks with better ES performance. That is, firm-level ES ratings are unrelated to aggregate changes in mutual fund ownership. This last result contrasts with what we find. The difference, we believe, is due to the more granular monthly holdings data that we have access to, but more research is needed to identify the disparities. Using monthly data in contrast to quarterly data is important given the significant monthly variations in fund flows observed in the the first quarter of 2020 (see [Pastor and Vorsatz 2020](#)).

Our results regarding the higher sensitivity of net sales to fund outflows for non-ES stocks during the crash is consistent with herding behavior. Herding behavior in the crisis was significantly stronger for non-ES stocks. There is a large literature that studies the potential for destabilizing trading behavior of institutional investors. [Lakonishok, Shleifer, and Vishny \(1992\)](#) and [Wermers \(1999\)](#) find no significant herd behavior for the average stock in U.S. equity markets. [Choe, Kho, and Stulz \(1999\)](#) find evidence of herding behavior by foreign investors in Korea before the 1997 East Asian crisis, but not so during the crisis itself. [Cella et al. \(2013\)](#) find evidence consistent with short-term investors amplifying market-wide negative movements. In addition, [Lakonishok et al. \(1992\)](#) and [Wermers \(1999\)](#) also show that there is some evidence of herding in small stocks. Our work shows that both ESG and non-ESG actively-managed equity funds

acted in a way that attenuated the effects of the crash for ES firms.

The rest of the paper is structured as follows. Section 2 describes the data and the empirical methodology. Section 3 reports the baseline results. Section 4 describes results for low carbon funds. Section 5 examines funds' investment horizon. Section 6 describes robustness checks and Section 7 concludes.

2. Data and empirical methodology

2.1. Data sources and sample

Our main data source for mutual fund holdings is Morningstar historical holdings, a proprietary dataset that provides monthly portfolio holdings collected from mutual funds and exchange traded funds domiciled in more than 50 countries.³ The only other paper we know that makes use of the same dataset is [Maggiori, Neiman, and Schreger \(2020\)](#). The data are collected from open-end funds that invest in equities, fixed income, and other asset classes (e.g., commodities, convertible bonds, and housing properties). The funds report all positions held such as stocks, bonds, cash, and alternative investments, including also derivative positions. We obtain monthly portfolio information from December 2019 to June 2020 for all actively-managed U.S. equity mutual funds with disclosed ISIN identifier available for their portfolio stocks. We focus on 2020 data to be comparable with other papers on the COVID crisis. From Morningstar Direct, we obtain information on characteristics of the U.S. mutual funds in our sample, such as the Morningstar global category classification, net fund flows, and total net assets.

From the universe of funds in Morningstar historical holdings dataset, we select those funds for which we have at least 80% of the portfolio disclosed. The data are then merged with Morningstar Direct using FundID to identify the legal domicile. We remove

³Across the world, funds report typically at the monthly frequency and, when not, then almost always quarterly.

all funds not domiciled in the U.S.. We have 6,989 unique funds representing \$29.2 trillion total net assets (TNA). We then remove index funds using the corresponding Morningstar Direct data point that identifies active versus passive funds, leaving us a sample of 6,630 unique funds with \$20.4 trillion TNA. After dropping non-equity fund categories (e.g., allocation, fixed income), we obtain 3,176 unique mutual funds with \$6.9 trillion TNA. This sample contains all funds with available quarterly data. We take out all the funds that do not have data at the monthly frequency, resulting in a sample of 1,717 unique actively-managed mutual funds with \$3.1 trillion of TNA. As a final filter, we remove funds for which we cannot compute the churn ratio (which requires at least 25 months of past data). Our final sample has 1,699 unique mutual funds with TNA of \$3.1 trillion as of December 2019.

We also collect information on funds' environmental, social, and governance performance from Morningstar Direct using the ISIN identifier for the portfolio holdings. In particular, we obtain several ESG indicators: we denote as ESG funds those that report being ESG funds in their prospectus. Alternatively, ESG funds are those with 4 or 5 Morningstar Sustainability Globe ratings as of January 2020. As a third definition, which we discuss later in the paper, ESG funds are those that receive a Low Carbon Designation from Morningstar as of January 2020.

Figure 1 displays average cumulative fund flows from January 2020 to June 2020 for both ESG funds (if funds have 4 or 5 Globe ratings) and non-ESG funds (if funds have less than 4 Globe ratings) using monthly data. The average fund flows are weighted by fund total net assets. ESG funds generally experienced an increase in net flows during this period, except in March. In contrast, non-ESG funds experienced a pronounced decline in net flows through the whole period, especially starting in March. These patterns have been shown elsewhere ([Pastor and Vorsatz 2020](#)). Understanding the consequences of the sharp reversal in fund flows in March for ESG funds and the sharp decline in the

same month for non-ESG flows is one of the objectives of this study. The exogenous crash that occurred in February and March, 2020 is an ideal event where we can test for the loyalty of ESG and non-ESG mutual funds to ESG stocks and to non-ESG stocks, and for which we need the higher frequency data on portfolio holdings.

Figure 1 here

Firm specific ESG metrics are obtained from Thomson Reuters' Refinitiv. We focus on the average of the environment and social scores in 2019, denoted by ES, and omit the governance score following [Albuquerque et al. \(2020\)](#). Appendix Table A1 provides detailed definitions of the variables of interest and control variables. Table 1 provides descriptive statistics for our full sample and for subsamples by ESG-fund designation. Note that there are many more funds classified as ESG based on Globe ratings than there are based on prospectus declarations, a possible sign that more funds are converting to ESG funds.

Table 1 here

2.2. Empirical strategy

Recent evidence suggests that ESG fund investors are more loyal than other investors as they demonstrate less sensitivity to fund performance ([Renneboog et al. 2008](#), and [Bollen 2007](#)). When the market is losing value quickly, like in the COVID-19 market crash, if the fund manager anticipates investor withdrawals, then she will sell her holdings in order to meet the expected withdrawals. *Mutatis mutandis*, if the fund manager thinks that investors are not as sensitive to fund performance, then she will be able to display some loyalty towards her holdings and avoid fire sales in her portfolio stocks. We therefore expect that the resiliency of ESG stocks during the market crash is due to fund managers response to fund flows. This is to her advantage as she avoids potential

fire sales. To test this hypothesis, we use the heterogeneity in fund flows into ESG and non-ESG actively-managed U.S. equity mutual funds (see Figure 1) during the stock market crash of 2020.

Our first test looks into monthly fund-level net sales as the dependent variable. We are interested in understanding what led ESG and non-ESG funds to sell stocks during February and March of 2020. Our unit of observation is fund-month. Due to the granularity of our dataset at fund and ISIN level on quantities and prices, we compute, for each stock, the dollar monthly net sales (i.e., gross sales minus gross purchases) carried out by mutual fund i during month t as a percentage of the fund's TNA at the end of the month $t - 1$, and add all the stock net sales for the same fund. We include in this calculation all equities, U.S. and non-U.S. traded by U.S. mutual funds.

The main independent variables in our panel regressions are fund flows. We construct two variables: $Inflows_{i,t}$ equals fund i 's fund flow at time t if fund flow is positive and zero otherwise; and $Outflows_{i,t}$ equals the absolute value of fund i 's fund flow at time t if fund flow is negative and zero otherwise. These net fund flow variables separate funds based on whether they experienced relatively more gross inflows or more gross outflows.⁴ Figure 2 plots the weighted average of Inflows (top panel) and of Outflows (bottom panel) as well as the TNA of the funds experiencing one or the other. The figure shows that Inflows took a hit in February for both ESG and non-ESG funds, but especially for non-ESG funds. Inflows recovered quickly by March, whereas Outflows were slower to respond, plummeting in March. This evidence highlights the importance of separating the two components of fund flows and also of having monthly frequency data. As also seen from Table 1, the average fund flows for the whole sample are more negative for non-ESG funds compared to ESG funds. The figure also shows that the

⁴It would also be interesting to use gross inflows and gross outflows for each fund, so as to observe the response by the same fund to inflows and outflows, but these data are not available.

funds experiencing Outflows have double the TNA compared to funds encountering Inflows, which is consistent with a declining industry trend. Note also that non-ESG funds are mostly responsible for this phenomenon (see [Pastor and Vorsatz 2020](#)), which, as argued before, partly motivates our research.

Figure 2 here

We interact each of the independent variables of interest with fund level ESG and a dummy, denoted by $Crash_t$, that equals one for the stock market crash months of February and March and equals zero otherwise. In these regressions, we include as control variables fund size and its interactions with ESG and Crash, the market return and the volatility of the market return, besides quarter and fund fixed effects. The choice of control variables is motivated by [Cella et al. \(2013\)](#). Note that [Cella et al. \(2013\)](#) control for investor horizon in their tests. We do not control for investor horizon at this point to avoid making the tables even longer. Instead, we have a separate section dedicated to investor horizon later in the paper. Preempting our results, we show in that section that none of our results regarding fund flows change once we control for investor horizon. In addition, we show that investor horizon has a small impact in the resilience of ES stocks.

Our initial hypothesis assumes that funds trade their portfolio stocks in an uniform fashion, whether they are ESG or non-ESG funds. However, ESG and non-ESG funds may have both ES stocks and non-ES stocks in their portfolios.⁵ Consider the decision of a fund manager experiencing outflows and having to liquidate some of her portfolio while watching the crash unfolding and seeing ES stocks falling by less than non-ES stocks. The fund manager may choose to sell the ES-stocks in her portfolio as these are

⁵[Gantchev, Giannetti, and Li \(2021\)](#) demonstrate that all mutual fund managers are aware of potential benefits to owning ESG stocks.

the ones losing less value through the crash. However, keeping the non-ES stocks that may be falling in value faster would result in larger losses going forward. The manager would then prefer to sell the non-ES stocks in the portfolio continuing the herd-like behavior on those stocks and supporting the value of ES-stocks in a self-fulfilling way. We turn to data to inform us on the net contribution of these two effects.

Testing the hypothesis that funds sold non-ES stocks more aggressively than ES stocks in response to fund outflows requires a decomposition of fund portfolios along the ES characteristics. We therefore study the portfolio stocks that funds chose to trade during the stock market crash. We split each fund's portfolio into ES stocks and non-ES stocks. The top quartile of stocks with the highest ES ratings are classified as ES stocks, and the rest as non-ES stocks. We compute net sales of ES stocks and of non-ES stocks in the same fashion that we did for aggregate net sales. We run two sets of regressions, one for net sales of ES stocks and another for net sales of non-ES stocks. In each of these regressions, the unit of observation is fund-month. We use the same set of controls as we did for the regressions of aggregate net sales as well as the main variables of interest, Inflows and Outflows on their own and interacted with fund ESG orientation.

3. Results

3.1. Fund-level net sales

We start by inspecting the trading behavior of actively managed equity mutual funds in the U.S. by studying aggregate net sales at the fund level. Table 2 presents the results. The table contains the ordinary least squares regression results under eight specifications. In columns (1) through (4), we use the fund's own prospectus designation as an ESG fund to identify ESG and non-ESG funds. In columns (5) through (8), we label a fund as an ESG-oriented fund if the fund has 4 or 5 Morningstar Globes. There are two main differences between using the fund's prospectus information versus the Globe

ratings. Prospectus information is dated and requires truthful revelation,⁶ whereas Morningstar's Globe ratings are updated monthly on the basis of the fund's actual portfolio holdings over the last twelve months. For these reasons, we take the results in columns (5) through (8) as more reliable, but there is not much difference across the two designations. For each ESG/non-ESG fund designation, we report four sets of regressions, with and without market return and market return volatility, and with and without fund fixed effects. The reason to consider results while excluding the market variables is that they could subsume the Crash dummy, since in our short sample the crash period coincides with the larger negative returns and higher volatility months of the sample. We report robust standard errors, clustered by fund.

Table 2 here

The table shows that ESG funds sold less stocks over the full period of analysis. Also, during the crash, all funds sold more stocks than average. The interaction between the crash dummy and ESG is negative, but it is only significant when funds are classified based on the prospectus information. Thus the evidence that ESG funds sold less in the crisis unconditionally is weak (though this result becomes statistically significant when we also control for fund flows below). Larger funds sell less stocks during the period, especially so during the crash months. The effect of fund size is economically much smaller when we control for fund fixed effects. Funds sold more stocks when returns were low, an effect that prevails even after controlling for the Crash dummy months. The effect of volatility of aggregate stock market returns on sales is not robust and changes with fund fixed effects. With fund fixed effects, funds sold relatively less stocks when volatility was high controlling for all else.

⁶This concern follows from [Gibson, Glossner, Krueger, Matos, and Steffen \(2020\)](#) who report that U.S.-domiciled institutions that publicly commit to ESG policies appear to engage in greenwashing.

Overall, there is only weak evidence that ESG-oriented funds experienced less net sales during the crash. We next turn to the effect of fund flows on the behavior of ESG and non-ESG funds.

Table 3 presents the results from estimating regression models of Net Sales that include Inflows and Outflows and their interactions with the Crash and fund-ESG dummies, as well as the controls used in Table 2. Columns (1) and (2) use the prospectus ESG declaration and columns (3) and (4) use Morningstar Globe ratings. Again, we repeat the regressions with and without market return and return volatility as controls, but these variables have little effect over our main findings. All regressions include fund and quarter fixed effects and we report robust, White corrected standard errors, clustered by fund.

Panel A presents the estimated coefficients. The first thing to note is the significant increase in the R-squares of the regressions relative to those of Table 2, doubling in some instances. Controlling for Inflows and Outflows is therefore critical to understand fund Net Sales. The presence of multiple interaction terms complicates the interpretation of the effects. For that reason, we construct Panel B that summarizes the main effects associated with fund flows by presenting the estimated linear combinations of coefficients describing the sensitivity of ESG and non-ESG fund Net Sales to Inflows and to Outflows in both normal and crash times. The results across the four regressions are quite similar, so we focus on column 4. Consider first the sensitivity of non-ESG and ESG fund Net Sales to Inflows. Non-ESG funds became significantly more sensitive to Inflows during the crash, buying aggressively during the crash if they experienced Inflows (the estimated coefficient goes from close to zero and insignificant in normal times to -0.99 during the crash). ESG funds display greater sensitivity to Inflows than non-ESG funds during the normal period and also during the crash (the estimated coefficient goes from -0.88 in normal times to -1.21 during the crash). Overall, while the difference

between the two fund types shrinks during the crash, ESG funds still buy relatively more in response to inflows.

Table 3 here

Non-ESG funds Net Sales also became more sensitive to Outflows during the crash (an increase from 0.98 to 1.23), though the change in sensitivity is not as large as with Inflows. ESG funds became less sensitive to fund outflows during the crash (from a sensitivity of 1.01 to 0.86) when using Morningstar Globe ratings, but more sensitive when using ESG prospectus (see columns 1 and 2). This difference across prospectus based ESG and non-ESG funds in response to Outflows is a possible sign of greenwashing.

Overall, the behavior of ESG and non-ESG funds is particularly different when responding to Inflows whether in the crash or outside it, with ESG funds being more aggressive buyers when receiving inflows.

3.2. Net sales of ES and of non-ES stocks

In this subsection, we separate net sales of ES stocks from net sales of non-ES stocks for each fund. The results are in Table 4. Panel A contains the ordinary least squares regression results for the two ESG-fund designations. In columns (1) and (2), we use the fund's own prospectus designation, and in columns (3) and (4), we label a fund as an ESG fund if the fund has 4 or 5 Morningstar Globes. For each ESG/non-ESG fund designation, we report results for the subsample of non-ES stocks (columns 1 and 3) and for the subsample of ES stocks (columns 2 and 4). The regressions have fund and quarter fixed effects and control for market return and market volatility. Standard errors are robust, White corrected and clustered by fund.

Table 4 here

As with the previous Table (Table 3), the presence of multiple interaction terms complicates the interpretation of the effects and we give in Panel B the relevant linear combinations of the parameters from Panel A. We use panel B to discuss the results. We focus on the results with ESG fund orientation determined using Globe ratings (columns 3 and 4) for brevity. There is an increased sensitivity to Net Sales of both ES and non-ES stocks to Inflows during the crash, with the increase being larger for non-ESG funds (for non-ESG funds, the sensitivity increases from 0.003 to -0.885 for ES stocks and from -0.002 to -0.95 for non-ES stocks), but it is present in both types of funds (for ESG funds, from -0.65 to -1.00 for ES stocks and from -0.89 to -1.34 for non-ES stocks). This evidence mimics the patterns found for how aggregate Net Sales respond to inflows in and out of the crisis as documented in Table 3. If anything, ESG funds are relatively more aggressive during the crash in buying non-ES stocks in response to inflows.

Turning now to Outflows, we observe that ESG funds sensitivity of Net Sales of both ES and non-ES stocks remained almost the same during the crash compared to normal times. There is only a modest decrease in sensitivity of Net Sales of ES-stocks in response to Outflows, a sign that ESG funds contributed to the resilience of ES stocks when faced with outflows. Perhaps more surprising is the finding that non-ESG funds sold non-ES stocks more aggressively in response to Outflows than they did for ES stocks. For non-ESG funds, during the crash, the sensitivity of Net Sales of ES stocks to Outflows increased from 0.82 to 0.89, and the sensitivity of Net Sales of non-ES stocks to Outflows increased from 1.01 to 1.24. The crash appears to have resulted in a tilting of portfolios of non-ESG funds away from non-ES stocks and into ES stocks. This evidence suggests that non-ESG funds contributed to an increased resilience of ES stocks and also contributed to the herd-like behavior associated with the wide selling of non-ES stocks.

Overall, we find evidence that during the crash fund managers discriminated in

favor of ES stocks mostly when they were responding to Outflows: ESG funds sold relatively less ES stocks in response to Outflows during the crash compared to normal times, whereas non-ESG funds sold relatively more non-ES stocks during the crash compared to normal times in response to Outflows.

4. Low Carbon Designation

Morningstar gives a fund a Low Carbon Designation (a dummy variable) based on a proprietary assessment of the 12-month average portfolio carbon risk score. This designation is useful for investors looking to identify low-carbon funds in the universe of funds. We note that in our sample only 17% of the fund-month observations are Low Carbon and have a high Globe rating, and that 54% of the fund-month observations have both Low Carbon Designation and a low Globe rating (untabulated). We conclude that these two designations have differential information for investors.

The Low Carbon Designation is especially interesting, because we are not able to classify funds based on their ES designation, because Morningstar classifies funds as ESG funds, i.e. including governance attributes. By using Low Carbon Designation we can focus on one of the most important dimensions for institutional investors in the 'E' component, namely the climate risk associated with carbon emissions. As [Pastor and Vorsatz \(2020\)](#) indicate, investors appeared to favor environmental funds even more so during the crash.

We therefore redo the analysis in Tables 3 and 4 identifying ESG funds as funds with a Low Carbon Designation. The results are shown in Table 5. Panel A gives the ordinary least squares estimates corresponding to the regressions that replicate Table 3 (columns 1 and 2) and those corresponding to the regressions that replicate Table 4 (columns 3 and 4).

Table 5 here

Again, because of the many interaction terms, we report in Panel B of Table 5 the relevant linear combinations. There are two main results to highlight. First, Net Sales of ES stocks by Low Carbon funds become significantly less responsive to Outflows during the crash (the sensitivity of Net Sales of ES stocks to Outflows by Low Carbon funds drops to 0.48 from 0.85 compared to the drop for high Globe rated funds from 0.89 to 0.75 from Panel B of Table 4). Net Sales by Low Carbon funds of non-ES stocks also become less sensitive to Outflows though the effect is smaller (from 0.84 in normal times to 0.68 during the crash).

Second, Net Sales of both non-ES stocks and ES stocks by non-Low Carbon funds increased their sensitivity to Outflows during the crash, especially so for non-ES stocks (for ES stocks the sensitivity increases from 0.82 to 1.01 during the crash whereas for non-ES stocks the sensitivity increases from 1.05 to 1.38 during the crash).

Overall, Low Carbon Designation funds compared to other funds behave in a manner consistent with the behavior of funds with high Globe ratings versus funds with low ratings. Low Carbon funds provide resilience to ES stocks (and also to a lesser extent to non-ES stocks) when dealing with outflows, whereas non-Low Carbon funds are particularly aggressive in selling non-ES stocks.

5. Alternative resilience mechanism: Fund investment horizon

In this section, we study a second mechanism for fund loyalty towards ESG stocks. The basic hypothesis is motivated by the work of [Cella et al. \(2013\)](#) who show that during market turmoil periods long-term institutional investors churn their portfolios less than other investors. As these investors tend to have a preference for ESG stocks ([Starks et al. 2020](#)), we hypothesize that investor loyalty is tied to investors' trading horizon.

Following [Cella et al. \(2013\)](#), we proxy the trading horizon of institutional investors by their churn ratio, a turnover measure formalized by [Gaspar, Massa, and Matos \(2005\)](#), and denote it by *Churn Ratio*.⁷ A high Churn Ratio indicates a short trading horizon. As we can see from [Table 1](#), the average Churn Ratio for all mutual funds in our sample is 0.113. The Churn Ratio for ESG funds is lower (0.083 for prospectus definition, 0.104 for high Globe ratings, and 0.103 for Low Carbon Designation). Hence, non-ESG funds on average have shorter trading horizons consistent with [Starks, Venkat, and Zhu \(2020\)](#). Also note that since our turnover variable is computed monthly, it is a more precise measure and different from previous studies, which typically rely on quarterly data.

The results are shown in [Tables 6 and 7](#). The first table presents the results for aggregate Net Sales and the second table presents the results for Net Sales of ES stocks and of non-ES stocks. First, introducing Churn Ratio does not affect in any way the results discussed so far. This can be best seen by inspecting Panel B of both tables.

[Tables 6 and 7](#) here

Second, Churn Ratio itself does not have a consistent effect on Net Sales across our various ESG designations. For example, panel B of [Table 6](#) shows that high Globe rated funds with high Churn ratios sell less under normal times (a coefficient of -0.311 in column 4) relative to other funds, but no similar significance arises for other ESG fund designations. Panel B of [Table 7](#) shows that high Churn Ratio in non-ESG funds is associated with lower Net Sales of non-ES stocks relative to ESG funds across all ESG

⁷For each mutual fund, we compute the churn ratio every month. The trading horizon is then measured by the average churn ratio over the last 36 months (a minimum of 25 months is required). By averaging across different stocks held by a mutual fund, the churn ratio removes idiosyncratic firm-level shocks that may affect investors' holding periods. At the same time, by averaging over a long time period, we mitigate the effect of investor-specific shocks that may generate deviations in the investor's holding period from its preferred horizon.

designations outside of the crash, but that behavior stopped during the crash. There are no other significant patterns in our data.

6. Robustness checks

6.1. Using quarterly data

In this section, we discuss results using quarterly data. We build our quarterly data from our monthly dataset. Mean Net Sales in the first quarter of 2020 represent 4.5% of fund TNA, and in the second quarter of 2020 mean Net Sales equal -1.5% of fund TNA.⁸ In this section, we redefine the Crash dummy to equal one for the first quarter of the 2020 and zero otherwise. The Globe ratings and Low Carbon designations are measured as of December of 2019.

The results are reported in Tables 8 and 9 with the same controls and interactions as in Tables 3 and 4, respectively. Again, we focus on the panel B of each of these tables to discuss the results.

Tables 8 and 9 here

Table 8 presents the results for aggregate Net Sales. The most salient finding relative to what we have highlighted previously is that the sensitivity of Net Sales to Inflows and Outflows during the crash was almost identical for ESG and non-ESG funds across all ESG designations. This behavior stands in sharp contrast when using monthly data where ESG funds were significantly more aggressive buyers in response to Inflows during the crash than non-ESG funds. The increase in sensitivity of Net Sales for ESG

⁸If instead we build a dataset using quarterly data without the restriction that funds have to have monthly data available in Morningstar, we end up with more funds in our sample (2,914 versus 1,568), but with numbers for Net Sales that are almost virtually identical (mean Net Sales in first quarter of 2020 of 4.5% and in the second quarter of 2020 of -1.1%). The results, using this larger sample, are almost identical to those reported in this paper.

funds from normal times to crash is also markedly larger for both Inflows and Outflows compared to when we use monthly data.

Table 9 presents the results decomposing aggregate net sales into Net Sales of ES stocks and of non-ES stocks. We still find that ESG funds sold more aggressively their non-ES stocks during the crash in response to Outflows. However, the difference is modest and disappears when using the Low-Carbon designation (using the Low Carbon Designation and columns (5) and (6) in panel B, the sensitivity of Net Sales of ES stocks to Outflows was 0.43 during the crash, same as the sensitivity of net sales of non-ES stocks to Outflows). Importantly, we no longer can establish the result that non-ESG funds also contributed to the resilience of ES stocks by selling more aggressively their non-ES stocks during the crash in response to Outflows. In fact, with quarterly data, the opposite pattern arises (for example, using the Low Carbon Designation and columns (5) and (6), the sensitivity of Net Sales of ES stocks to Outflows was 0.43 during the crash, and the sensitivity of Net Sales of non-ES stocks to Outflows was 0.39 during the crash for non-ESG funds).

We conclude that the higher frequency monthly data that we use for our main analysis is needed to uncover the behavior of fund managers as the crisis progressed and they responded to fund inflows and outflows.

6.2. *Investor horizon as an alternative hypothesis*

We studied above the role of investor horizon as another mechanism to provide resilience to ES stocks. Here, we inspect the possibility that investor horizon constitutes an alternative story to our findings. What we have in mind is that fund flows during the crash were attracted not to the ESG-oriented funds, but instead to the investment horizon of the funds. ESG orientation is then a confounding effect of this alternative hypothesis. To test this result we re-estimate Table 7 including the triple interaction $\text{Crash} \times \text{Inflows}$

× Churn ratio and Crash × Outflows × Churn Ratio. If these triple interactions remove the explanatory power of the respective triple interactions with ESG, then we conclude that our main results were not due to ESG-fund orientation but investor horizon.

The results are presented in Table 10. Again, we turn to panel B for an analysis of the linear combinations of the effects. To evaluate some of these linear combinations, when needed, we use the mean value of the relevant variable. The results in panel B are almost identical to those presented in Table 7. Our conclusions remain the same: The behavior of especially ESG, but also non-ESG funds, contributed to the resilience of ES stocks during the crash as response to fund Inflows. The behavior of ESG and non-ESG funds also contributed to the resilience of ES stocks in response to fund Outflows during the crash, but for different reasons. Namely, ESG funds sold less ES stocks during the crash when experiencing Outflows, whereas non-ESG funds sold more non-ES stocks, compared to normal times.

Table 10 here

6.3. *Extended time period*

In a last robustness check, we extend the period of analysis by 12 months back to January 2019. We conduct this analysis so as to potentially better control for any prior trends for funds that were ESG and non-ESG in the main sample period.⁹ We keep the shorter time series as our main focus to be in line with other papers on COVID that share the goal of better isolating the crisis. Roughly speaking, the larger data set from January 2019 through June 2020 (where we use December 2018 to calculate the first net sales observations) leads to a tripling of the number of fund-month observations from 9,448 in Table 3 to 28,949 in the new Table 11.

⁹We thank Alex Wagner for suggesting this additional analysis.

Tables 11 and 12 here

We proceed with a couple of redefinitions. ESG funds are classified in the following way: prospectus definitions are unchanged; Globe rating and low-carbon designation definitions are fixed in windows of 6 months, that is we use the December 2018 values of these variables to classify funds from January 2019 through June 2019, then use the June 2019 value to classify funds in the months of July 2019 through December 2019, and so on. Note that because the fund-ESG classification is changing when we use the extended time series, we include a fund-ESG dummy in the regressions. Firms are classified as ES firms based on last available observation before January 2019, which is then kept fixed for the full sample as in Table 4.

Tables 11 and 12 show that the results presented earlier are virtually unchanged. Without going into much detail, we still find that both ESG and non-ESG funds increase their sensitivity to inflows in the crash period, with the change being particularly large for non-ESG funds, but with ESG funds still displaying greater sensitivity of net sales to inflows. There is no significant difference in the sensitivity of net sales across ES or non-ES stocks.

In response to fund outflows, ESG funds and non-ESG funds increased their sensitivity of net sales to outflows during the crash period though the magnitude of the change is smaller than the change in sensitivity to fund inflows. This pattern hides a more significant finding, already encountered above, that non-ESG funds sell much more aggressively their non-ES stocks than they do their ES stocks in response to outflows during the crash.

Overall, ESG and non-ESG funds responded more aggressively to Inflows during the crash, with ESG funds being the most aggressive buyers. This behavior contributed some resiliency of ES stocks, since ESG funds experienced greater inflows. As with our

main results, non-ESG funds added significant resilience to ES stocks, since those funds sold relatively more non-ES stocks in response to Outflows than ES stocks during the crash compared to normal times.

Finally, we replicate the results using quarterly data in this extended time series data set. Table 13 replicates Table 8 and Table 14 replicates Table 9. We repeat this analysis in an effort to understand whether a longer time horizon helps to find effects even with quarterly data, since our main analysis only has two quarters of data, one pre-crash and another during the crash. We construct our quarterly data from monthly data using the procedure outlined in subsection 6.1.

Tables 13 and 14 here

The use of quarterly data produces significantly different results, as it did with the shorter time series in the main analysis, highlighting the need to study higher frequency data to understand how mutual fund managers traded during the crash. Using quarterly data, Table 13, panel B, shows that ESG and non-ESG funds *decreased* their sensitivity of net sales to inflows during the crash. Likewise, both fund types *decreased* their sensitivity to Outflows. This puzzling behavior in light of massive withdrawals and a stock market crash contrasts with the evidence presented above using monthly data. Also inconsistent with our main findings, Table 14, panel B, shows that when using quarterly data non-ESG funds sold more aggressively their ES stocks during the crash than their non-ES stocks in response to fund Outflows.

7. Conclusion

In this paper, we use the exogenous stock market crash of February and March, 2020, to study the trading behavior of U.S. actively-managed equity mutual funds. We classify all funds as either ESG or non-ESG funds according to their prospectuses and

Morningstar Globe ratings. We want to shed light on why ES stocks and ESG funds performed relatively well during the market collapse, as documented by [Albuquerque et al. \(2020\)](#) and [Pastor and Vorsatz \(2020\)](#), among others. In particular, we study how fund flows and investor trading horizon affected net sales for mutual funds. Our main findings are that ESG funds, and to a lesser extent non-ESG funds, contributed to the documented resilience of ES stocks by buying them aggressively in response to fund inflows. Surprisingly, we find that both ESG and non-ESG funds sold more aggressively their non-ESG stocks in response to fund outflows, thus also contributing to the relatively better performance of ES stocks during the crash.

Overall, our results provide credence to the claim that mutual fund loyalty contributed to the relatively good performance of ES stocks during the turbulent period of February and March, 2020. We document the importance of using monthly data to uncover these results, as results become less pronounced or even disappear when we use quarterly data. We also document that our results are somewhat stronger when we separate funds not by their ESG orientation, but by a Low Carbon Morningstar designation.

While we show the importance of using monthly data to understand the trading behavior and the preferences of institutional investors, having even higher frequency data would help to better understand which investors first demonstrated resilience towards ES stocks and which ones were the followers. It is unclear that progress can be made along this line given the severe data limitations.

It would be interesting to examine these issues and mechanisms using European actively managed equity mutual fund data, since ESG investing is more prevalent in Europe and actively managed funds are more dominant than in the U.S. We leave that for further study.

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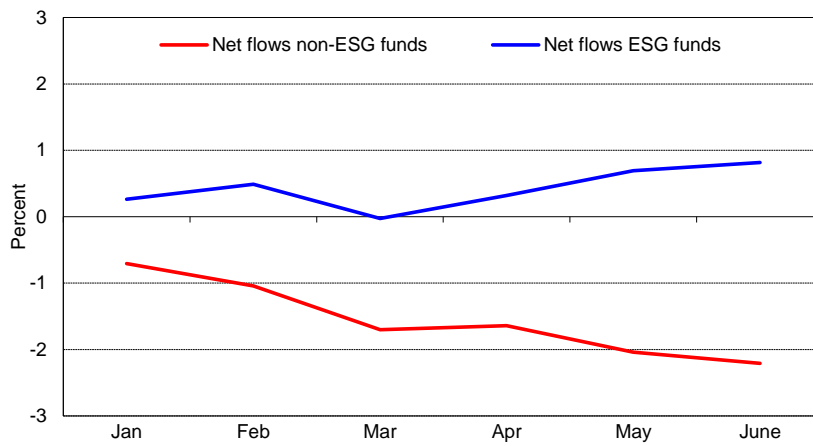
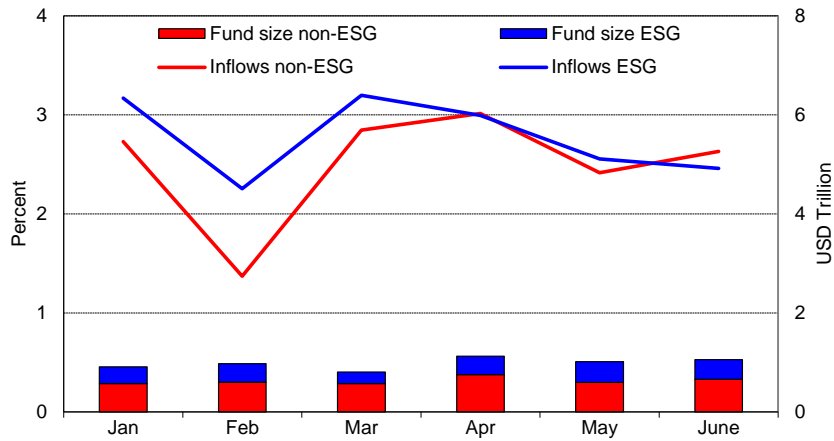
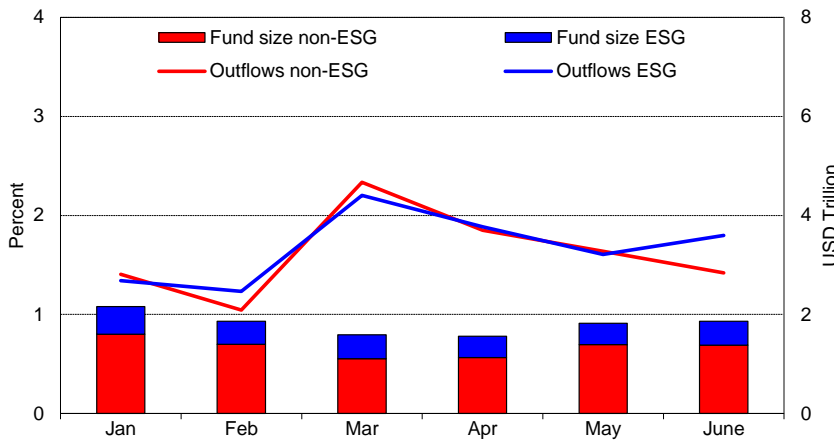


Figure 1: Fund flows and sustainability rating. This figure plots aggregate cumulative net fund flows from January 1 to June 30, 2020, using monthly fund flows, for two fund categories, those that receive by Morningstar 4 or 5 Globes (ESG funds) and those with less than 4 Globes (non-ESG funds).



(a) Inflows



(b) Outflows

Figure 2: Inflows and Outflows and sustainability rating. Panel A (Panel B) plots the weighted average of monthly Inflows (Outflows), weighted by lagged fund total net assets, from January 1 to June 30, 2020, for two categories of funds, those that receive by Morningstar 4 or 5 Globes (ESG funds) and those with less than 4 Globes (non-ESG funds).

Table 1: Summary statistics

The table shows descriptive statistics of the variables used in the analysis. The sample includes all U.S. actively-managed equity funds with monthly holdings data available from Morningstar historical holdings in the period from December 2019 through June 2020. Appendix Table A1 provides a description of the variables.

| Panel A: Institutional investors | N | Mean | SD | P05 | Median | P95 |
|----------------------------------|-------|---------|--------|---------|---------|---------|
| All Mutual Funds | | | | | | |
| Net Sales | 9,448 | 0.0094 | 0.0722 | -0.0704 | 0.007 | 0.0929 |
| Churn Ratio | 9,448 | 0.113 | 0.0745 | 0.0386 | 0.0974 | 0.2332 |
| Fund Flows | 9,448 | -0.0022 | 0.3706 | -0.0676 | -0.0068 | 0.0635 |
| Inflows | 9,448 | 0.0155 | 0.3674 | 0 | 0 | 0.0635 |
| Outflows | 9,448 | 0.0177 | 0.0421 | 0 | 0.0068 | 0.0676 |
| Fund size | 9,448 | 19.5741 | 2.0147 | 16.1351 | 19.683 | 22.8088 |
| Market return | 9,448 | -0.0073 | 0.0809 | -0.1448 | -0.0004 | 0.1282 |
| Market return volatility | 9,448 | 0.0172 | 0.0125 | 0.0049 | 0.0127 | 0.0493 |
| ESG (prospectus) | | | | | | |
| Net Sales | 379 | -0.0066 | 0.0645 | -0.0878 | -0.0017 | 0.0641 |
| Churn Ratio | 379 | 0.0834 | 0.0449 | 0.021 | 0.0765 | 0.156 |
| Fund Flows | 379 | 0.0085 | 0.0547 | -0.0453 | 0.0004 | 0.0843 |
| Inflows | 379 | 0.0198 | 0.0404 | 0 | 0.0004 | 0.0843 |
| Outflows | 379 | 0.0113 | 0.0302 | 0 | 0 | 0.0453 |
| Fund size | 379 | 19.1007 | 1.8099 | 16.3451 | 19.1653 | 22.1605 |
| Market return | 379 | -0.0079 | 0.0807 | -0.1448 | -0.0004 | 0.1282 |
| Market return volatility | 379 | 0.0172 | 0.0126 | 0.0049 | 0.0127 | 0.0493 |
| ESG (4 and 5 Globes) | | | | | | |
| Net Sales | 3,095 | 0.0049 | 0.0713 | -0.0792 | 0.0054 | 0.0851 |
| Churn Ratio | 3,095 | 0.1037 | 0.0621 | 0.0376 | 0.0907 | 0.2103 |
| Fund Flows | 3,095 | -0.0018 | 0.0655 | -0.0625 | -0.0052 | 0.0754 |
| Inflows | 3,095 | 0.0146 | 0.0454 | 0 | 0 | 0.0754 |
| Outflows | 3,095 | 0.0164 | 0.0418 | 0 | 0.0052 | 0.0625 |
| Fund size | 3,095 | 19.4668 | 1.9735 | 16.3004 | 19.4287 | 22.6998 |
| Market return | 3,095 | -0.0084 | 0.0807 | -0.1448 | -0.0004 | 0.1282 |
| Market return volatility | 3,095 | 0.0169 | 0.0123 | 0.0049 | 0.0127 | 0.0493 |

(continued)

| ESG (Low Carbon Designation) | | | | | | |
|-------------------------------------|-------|---------|--------|---------|---------|---------|
| Net Sales | 2,829 | 0.0035 | 0.0656 | -0.0755 | 0.0058 | 0.0695 |
| Churn Ratio | 2,829 | 0.103 | 0.0598 | 0.0381 | 0.0905 | 0.1995 |
| Fund Flows | 2,829 | -0.0013 | 0.0618 | -0.0516 | -0.0058 | 0.0714 |
| Inflows | 2,829 | 0.0133 | 0.0448 | 0 | 0 | 0.0714 |
| Outflows | 2,829 | 0.0145 | 0.0379 | 0 | 0.0058 | 0.0516 |
| Fund size | 2,829 | 19.8522 | 2.0047 | 16.3906 | 19.902 | 22.9891 |
| Market return | 2,829 | -0.0053 | 0.0809 | -0.1448 | 0.0199 | 0.1282 |
| Market return volatility | 2,829 | 0.0173 | 0.0124 | 0.0049 | 0.0127 | 0.0493 |

Table 2: Determinants of monthly mutual fund net sales

The table reports regressions for Net Sales at the fund level. The dependent variable is Net Sales, the total dollar sales less total dollar purchases made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

| VARIABLES | ESG (prospectus) | | | | ESG (Globe ratings) | | | |
|--------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| ESG | -0.0130*** (0.0042) | -0.0131*** (0.0042) | | | -0.0061** (0.0019) | -0.0061** (0.0021) | | |
| Crash | 0.0729*** (0.0177) | 0.0477*** (0.0171) | 0.0551*** (0.0191) | 0.0466** (0.0189) | 0.0715 (0.0529) | 0.0469 (0.0457) | 0.0518*** (0.0181) | 0.0434** (0.0179) |
| Crash \times ESG | -0.0158** (0.0074) | -0.0157** (0.0074) | -0.0197** (0.0081) | -0.0199** (0.0082) | -0.0017 (0.0009) | -0.0013 (0.0017) | -0.0041 (0.0032) | -0.0043 (0.0032) |
| Fund size | -0.0021*** (0.0006) | -0.0021*** (0.0006) | -0.1334*** (0.0148) | -0.1401*** (0.0187) | -0.0018*** (0.0003) | -0.0018*** (0.0003) | -0.1294*** (0.0148) | -0.1366*** (0.0188) |
| Crash \times Fund size | -0.0031*** (0.0009) | -0.0029*** (0.0009) | -0.0034*** (0.0009) | -0.0033*** (0.0009) | -0.0030 (0.0022) | -0.0029 (0.0023) | -0.0032*** (0.0009) | -0.0031*** (0.0009) |
| Market return | | -0.0956*** (0.0219) | | -0.1290*** (0.0207) | | -0.0974** (0.0345) | | -0.1301*** (0.0206) |
| Market return volatility | | 0.6039*** (0.0774) | | -0.2682** (0.1358) | | 0.5627*** (0.0546) | | -0.2819** (0.1345) |
| Observations | 9,463 | 9,463 | 9,454 | 9,454 | 9,343 | 9,343 | 9,340 | 9,340 |
| R-squared | 0.023 | 0.033 | 0.359 | 0.362 | 0.021 | 0.030 | 0.360 | 0.364 |
| Fund FE | No | No | Yes | Yes | No | No | Yes | Yes |
| Quarter FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 3: Determinants of mutual fund net sales:
The role of inflows and outflows

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | |
|---------------------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| Crash | 0.0948*** (0.0144) | 0.0838*** (0.0140) | 0.0993*** (0.0129) | 0.0893*** (0.0129) |
| Crash \times ESG | -0.0706*** (0.0264) | -0.0693*** (0.0264) | -0.0597** (0.0252) | -0.0609** (0.0249) |
| Crash \times Inflows | -0.9461*** (0.0725) | -0.9557*** (0.0736) | -0.9729*** (0.1037) | -0.9913*** (0.1054) |
| Crash \times Inflows \times ESG | 0.3221* (0.1724) | 0.3047* (0.1769) | 0.6447*** (0.1297) | 0.6626*** (0.1323) |
| Crash \times Outflows | 0.1475 (0.1340) | 0.1255 (0.1358) | 0.2850*** (0.0900) | 0.2548*** (0.0903) |
| Crash \times Outflows \times ESG | 0.0334 (0.1465) | 0.0126 (0.1484) | -0.4160* (0.2408) | -0.4042* (0.2381) |
| Crash \times Fund size | -0.0044*** (0.0007) | -0.0044*** (0.0007) | -0.0047*** (0.0006) | -0.0047*** (0.0006) |
| Crash \times Fund size \times ESG | 0.0032** (0.0013) | 0.0032** (0.0013) | 0.0030*** (0.0011) | 0.0030*** (0.0011) |
| Inflows | -0.0052 (0.0062) | -0.0052 (0.0062) | -0.0028 (0.0038) | -0.0028 (0.0038) |
| Inflows \times ESG | -0.7920*** (0.0710) | -0.7719*** (0.0754) | -0.8774*** (0.0889) | -0.8780*** (0.0894) |
| Outflows | 1.0176*** (0.0437) | 1.0224*** (0.0436) | 0.9720*** (0.0537) | 0.9794*** (0.0542) |
| Outflows \times ESG | -0.0349 (0.0594) | -0.0218 (0.0572) | 0.0328 (0.0636) | 0.0287 (0.0634) |

(continued)

| | | | | |
|--------------------------|------------------------|------------------------|------------------------|------------------------|
| Fund size | -0.0543*** (0.0098) | -0.0512*** (0.0121) | -0.0544*** (0.0117) | -0.0484*** (0.0137) |
| Fund size × ESG | 0.0316** (0.0155) | 0.0278* (0.0153) | 0.0342** (0.0169) | 0.0339** (0.0167) |
| Market return | | -0.1148*** (0.0146) | | -0.0960*** (0.0128) |
| Market return volatility | | 0.0292 (0.0868) | | 0.1240 (0.0832) |
| Observations | 9,448 | 9,448 | 9,334 | 9,334 |
| R-squared | 0.676 | 0.679 | 0.732 | 0.734 |

Panel B: *t*-tests on linear combinations of parameters

| | (1) | (2) | (3) | (4) |
|--|------------|------------|------------|------------|
| Sensitivity of net sales by non-ESG funds to: | | | | |
| Inflows/Normal | -0.0052 | -0.0052 | -0.0028 | -0.0028 |
| Inflows/Crash | -0.9513*** | -0.9609*** | -0.9757*** | -0.9941*** |
| Outflows/Normal | 1.0176*** | 1.0224*** | 0.972*** | 0.9794*** |
| Outflows/Crash | 1.1652*** | 1.1479*** | 1.257*** | 1.2342*** |
| Sensitivity of net sales by ESG funds to: | | | | |
| Inflows/Normal | -0.7972*** | -0.7771*** | -0.8802*** | -0.8808*** |
| Inflows/Crash | -1.4213*** | -1.4281*** | -1.2083*** | -1.2095*** |
| Outflows/Normal | 0.9828*** | 1.0006*** | 1.0048*** | 1.0081*** |
| Outflows/Crash | 1.1638*** | 1.1387*** | 0.8738*** | 0.8586*** |

Table 4: Determinants of mutual fund net sales of ES and non-ES stocks

The table reports regressions for Net Sales at the fund level (Panel A) and t -test on linear combinations of parameters (Panel B). The dependent variables in Panel A are Net Sales of ES stocks (non-ES stocks), total dollar sales less total dollar purchases of ES stocks (non-ES stocks) made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | |
|-------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | | (2) | |
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| Crash | 0.0512*** (0.0148) | 0.0331* (0.0178) | 0.0667*** (0.0167) | 0.0232 (0.0220) |
| Crash × ESG | -0.1292* (0.0692) | 0.0592 (0.0535) | -0.0733** (0.0303) | 0.0100 (0.0335) |
| Crash × Inflows | -0.9314*** (0.0793) | -0.8365*** (0.1048) | -0.9524*** (0.0987) | -0.8882*** (0.1391) |
| Crash × Inflows × ESG | -0.0221 (0.2383) | 0.5251*** (0.1376) | 0.5049*** (0.1688) | 0.5424*** (0.1929) |
| Crash × Outflows | 0.1227 (0.1564) | -0.0198 (0.1322) | 0.2327** (0.1176) | 0.0747 (0.1248) |
| Crash × Outflows × ESG | 0.0149 (0.3247) | 0.0765 (0.2527) | -0.2437 (0.2765) | -0.2131 (0.2475) |
| Crash × Fund size | -0.0026*** (0.0007) | -0.0017* (0.0009) | -0.0034*** (0.0008) | -0.0013 (0.0011) |
| Crash × Fund size × ESG | 0.0068* (0.0035) | -0.0036 (0.0026) | 0.0034** (0.0014) | -0.0004 (0.0016) |
| Inflows | -0.0032 (0.0042) | 0.0020 (0.0032) | -0.0016 (0.0026) | 0.0030 (0.0021) |
| Inflows × ESG | -0.7282*** (0.1375) | -0.7121*** (0.0669) | -0.8902*** (0.1393) | -0.6594*** (0.1615) |
| Outflows | 1.0320*** (0.0654) | 0.8614*** (0.0706) | 1.0070*** (0.0798) | 0.8204*** (0.0857) |
| Outflows × ESG | 0.3719 (0.2375) | -0.1949* (0.1119) | -0.0078 (0.1009) | 0.0666 (0.1060) |

(continued)

| | | | | |
|--------------------------|------------------------|------------------------|------------------------|------------------------|
| Fund size | -0.0333*** (0.0097) | -0.0290*** (0.0095) | -0.0245** (0.0113) | -0.0278*** (0.0102) |
| Fund size × ESG | 0.0576** (0.0241) | 0.0015 (0.0183) | 0.0063 (0.0142) | 0.0109 (0.0180) |
| Market return | -0.1200*** (0.0187) | -0.0540** (0.0221) | -0.1072*** (0.0180) | -0.0504** (0.0217) |
| Market return volatility | 0.2242** (0.0917) | -0.1549 (0.1007) | 0.3092*** (0.0900) | -0.1036 (0.1000) |
| Observations | 18,241 | | 18,058 | |
| R-squared | 0.438 | | 0.461 | |

Panel B: *t*-tests on linear combinations of parameters

| | Sensitivity of Net Sales of | | | |
|-----------------------------|-----------------------------|------------|---------------|------------|
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| | (1) | (2) | (3) | (4) |
| by non-ESG funds to: | | | | |
| Inflows/Normal | -0.0032 | 0.002 | -0.0016 | 0.003 |
| Inflows/Crash | -0.9346*** | -0.8346*** | -0.954*** | -0.8852*** |
| Outflows/Normal | 1.032*** | 0.8614*** | 1.007*** | 0.8204*** |
| Outflows/Crash | 1.1547*** | 0.8415*** | 1.2397*** | 0.895*** |
| by ESG funds to: | | | | |
| Inflows/Normal | -0.7313*** | -0.7101*** | -0.8918*** | -0.6564*** |
| Inflows/Crash | -1.6848*** | -1.0216*** | -1.3393*** | -1.0022*** |
| Outflows/Normal | 1.4039*** | 0.6664*** | 0.9992*** | 0.887*** |
| Outflows/Crash | 1.5415*** | 0.7231*** | 0.9882*** | 0.7485*** |

Table 5: Determinants of mutual fund net sales: Low Carbon Designation

The table reports regressions for Net Sales at the fund level (Panel A) and t -test on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. In columns (1) and (2), the dependent variable is aggregate fund Net Sales, in column (3) it is Net Sales of non-ES stocks and in column (4) it is Net Sales of ES stocks. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (Low Carbon) | | | |
|---------------------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| | | | non-ES stocks | ES stocks |
| Crash | 0.0926*** (0.0141) | 0.0822*** (0.0139) | 0.0429*** (0.0164) | 0.0295 (0.0215) |
| Crash \times ESG | -0.0505** (0.0246) | -0.0502** (0.0246) | -0.0149 (0.0283) | 0.0013 (0.0309) |
| Crash \times Inflows | -0.9775*** (0.0905) | -0.9915*** (0.0920) | -0.9459*** (0.0871) | -0.9075*** (0.1226) |
| Crash \times Inflows \times ESG | 0.6581*** (0.1275) | 0.6671*** (0.1301) | 0.4158** (0.2113) | 0.6015*** (0.1999) |
| Crash \times Outflows | 0.3446*** (0.0577) | 0.3149*** (0.0580) | 0.3216*** (0.0971) | 0.1809* (0.1044) |
| Crash \times Outflows \times ESG | -0.5733*** (0.2179) | -0.5600*** (0.2155) | -0.4858** (0.2450) | -0.5523*** (0.2122) |
| Crash \times Fund size | -0.0044*** (0.0007) | -0.0044*** (0.0007) | -0.0023*** (0.0008) | -0.0016 (0.0011) |
| Crash \times Fund size \times ESG | 0.0025** (0.0010) | 0.0025** (0.0010) | 0.0007 (0.0013) | 0.0001 (0.0015) |
| Inflows | -0.0033 (0.0043) | -0.0033 (0.0043) | -0.0023 (0.0033) | 0.0027 (0.0025) |
| Inflows \times ESG | -0.8619*** (0.0990) | -0.8613*** (0.0995) | -0.8494*** (0.2195) | -0.5688*** (0.1768) |
| Outflows | 1.0173*** (0.0503) | 1.0256*** (0.0505) | 1.0535*** (0.0775) | 0.8217*** (0.0809) |
| Outflows \times ESG | -0.1439* (0.0838) | -0.1545* (0.0843) | -0.2105 (0.1287) | 0.0326 (0.1347) |
| Fund size | -0.0601*** | -0.0539*** | -0.0326*** | -0.0270*** |

(continued)

| | | | | |
|--------------------------|----------|------------|------------|-----------|
| | (0.0099) | (0.0116) | (0.0101) | (0.0089) |
| Fund size × ESG | 0.0468** | 0.0423** | 0.0162 | 0.0053 |
| | (0.0207) | (0.0208) | (0.0162) | (0.0205) |
| Market return | | -0.0990*** | -0.1133*** | -0.0456** |
| | | (0.0131) | (0.0183) | (0.0220) |
| Market return volatility | | 0.1026 | 0.2599*** | -0.1129 |
| | | (0.0785) | (0.0877) | (0.0964) |
| Observations | 9,444 | 9,444 | 18,233 | |
| R-squared | 0.719 | 0.719 | 0.451 | |

Panel B: *t*-tests on linear combinations of parameters

| | Sensitivity of Net Sales | | | |
|-----------------------------|--------------------------|------------|------------------|--------------|
| | | | of non-ES stocks | of ES stocks |
| | (1) | (2) | (3) | (4) |
| by non-ESG funds to: | | | | |
| Inflows/Normal | -0.0033 | -0.0033 | -0.0023 | 0.0027 |
| Inflows/Crash | -0.9808*** | -0.9948*** | -0.9481*** | -0.9048*** |
| Outflows/Normal | 1.0173*** | 1.0256*** | 1.0535*** | 0.8217*** |
| Outflows/Crash | 1.3619*** | 1.3406*** | 1.375*** | 1.0026*** |
| by ESG funds to: | | | | |
| Inflows/Normal | -0.8652*** | -0.8646*** | -0.8517*** | -0.5661*** |
| Inflows/Crash | -1.1846*** | -1.189*** | -1.3818*** | -0.8721*** |
| Outflows/Normal | 0.8735*** | 0.8712*** | 0.843*** | 0.8543*** |
| Outflows/Crash | 0.6447*** | 0.6261*** | 0.6788** | 0.4828** |

Table 6: Determinants of mutual fund net sales: Churn Ratio

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low Carbon) | |
|---------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Crash | 0.0532*** (0.0130) | 0.0403*** (0.0125) | 0.0627*** (0.0128) | 0.0502*** (0.0128) | 0.0531*** (0.0136) | 0.0408*** (0.0135) |
| Crash × ESG | -0.0431* (0.0257) | -0.0430* (0.0258) | -0.0438** (0.0221) | -0.0442** (0.0219) | -0.0278 (0.0197) | -0.0276 (0.0197) |
| Crash × Inflows | -0.9932*** (0.0711) | -1.0059*** (0.0723) | -1.0078*** (0.1019) | -1.0307*** (0.1035) | -1.0307*** (0.0874) | -1.0483*** (0.0888) |
| Crash × Inflows × ESG | 0.3559** (0.1743) | 0.3398* (0.1794) | 0.6435*** (0.1299) | 0.6652*** (0.1325) | 0.6914*** (0.1275) | 0.7033*** (0.1299) |
| Crash × Outflows | 0.1042 (0.1338) | 0.0774 (0.1356) | 0.2499*** (0.0948) | 0.2146** (0.0954) | 0.3067*** (0.0575) | 0.2719*** (0.0578) |
| Crash × Outflows × ESG | 0.0488 (0.1466) | 0.0237 (0.1480) | -0.4059* (0.2417) | -0.3920 (0.2386) | -0.5712** (0.2270) | -0.5574** (0.2239) |
| Crash × Churn ratio | 0.1717*** (0.0242) | 0.1760*** (0.0244) | 0.1371*** (0.0298) | 0.1440*** (0.0300) | 0.1716*** (0.0258) | 0.1763*** (0.0260) |
| Crash × Churn ratio × ESG | -0.0818 (0.0626) | -0.0744 (0.0622) | -0.0215 (0.0531) | -0.0233 (0.0526) | -0.0985** (0.0478) | -0.0971** (0.0479) |
| Crash × Fund size | -0.0033*** (0.0006) | -0.0032*** (0.0006) | -0.0036*** (0.0006) | -0.0036*** (0.0006) | -0.0034*** (0.0007) | -0.0033*** (0.0007) |
| Crash × Fund size × ESG | 0.0024** (0.0012) | 0.0024** (0.0012) | 0.0023** (0.0010) | 0.0024** (0.0010) | 0.0020** (0.0009) | 0.0020** (0.0009) |
| Inflows | -0.0051 (0.0061) | -0.0051 (0.0061) | -0.0027 (0.0037) | -0.0027 (0.0038) | -0.0032 (0.0042) | -0.0032 (0.0042) |
| Inflows × ESG | -0.7976*** (0.0754) | -0.7776*** (0.0786) | -0.8669*** (0.0895) | -0.8678*** (0.0902) | -0.8630*** (0.1017) | -0.8628*** (0.1024) |
| Outflows | 1.0240*** (0.0440) | 1.0300*** (0.0439) | 0.9783*** (0.0542) | 0.9869*** (0.0548) | 1.0202*** (0.0506) | 1.0299*** (0.0508) |
| Outflows × ESG | -0.0371 (0.0599) | -0.0240 (0.0571) | 0.0275 (0.0631) | 0.0230 (0.0630) | -0.1277 (0.0786) | -0.1379* (0.0789) |

(continued)

| | | | | | | |
|--------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Churn ratio | -0.1096 (0.1400) | -0.1204 (0.1402) | 0.0025 (0.1786) | -0.0123 (0.1776) | -0.1463 (0.1312) | -0.1469 (0.1333) |
| Churn ratio × ESG | -0.1688 (0.2199) | -0.1332 (0.2237) | -0.3203 (0.2331) | -0.2987 (0.2301) | -0.4037 (0.4001) | -0.4104 (0.4023) |
| Fund size | -0.0544*** (0.0097) | -0.0499*** (0.0118) | -0.0542*** (0.0114) | -0.0471*** (0.0133) | -0.0609*** (0.0096) | -0.0532*** (0.0112) |
| Fund size × ESG | 0.0331** (0.0153) | 0.0293** (0.0149) | 0.0325** (0.0165) | 0.0323** (0.0162) | 0.0538** (0.0229) | 0.0493** (0.0230) |
| Market return | | -0.1189*** (0.0147) | | -0.0988*** (0.0128) | | -0.1018*** (0.0133) |
| Market return volatility | | 0.0676 (0.0855) | | 0.1532* (0.0820) | | 0.1413* (0.0794) |
| Observations | 9,448 | 9,448 | 9,334 | 9,334 | 9,444 | 9,444 |
| R-squared | 0.683 | 0.685 | 0.736 | 0.738 | 0.723 | 0.725 |

Panel B: *t*-tests on linear combinations of parameters

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|------------|------------|------------|------------|------------|------------|
| Sensitivity of net sales by non-ESG funds to: | | | | | | |
| Inflows/Normal | -0.0051 | -0.0051 | -0.0027 | -0.0027 | -0.0032 | -0.0032 |
| Inflows/Crash | -0.9982*** | -1.011*** | -1.0105*** | -1.0334*** | -1.0339*** | -1.0515*** |
| Outflows/Normal | 1.024*** | 1.03*** | 0.9783*** | 0.9869*** | 1.0202*** | 1.0299*** |
| Outflows/Crash | 1.1282*** | 1.1074*** | 1.2282*** | 1.2014*** | 1.3269*** | 1.3018*** |
| Churn ratio/Normal | -0.1096 | -0.1204 | 0.0025 | -0.0123 | -0.1463 | -0.1469 |
| Churn ratio/Crash | 0.0621 | 0.0556 | 0.1397 | 0.1317 | 0.0253 | 0.0294 |
| Sensitivity of net sales by ESG funds to: | | | | | | |
| Inflows/Normal | -0.8027*** | -0.7827*** | -0.8697*** | -0.8706*** | -0.8661*** | -0.8659*** |
| Inflows/Crash | -1.4399*** | -1.4488*** | -1.2339*** | -1.236*** | -1.2055*** | -1.211*** |
| Outflows/Normal | 0.9869*** | 1.006*** | 1.0058*** | 1.0099*** | 0.8926*** | 0.892*** |
| Outflows/Crash | 1.1399*** | 1.1071*** | 0.8497*** | 0.8324*** | 0.628 | 0.6065** |
| Churn ratio/Normal | -0.2783 | -0.2537 | -0.3178** | -0.311** | -0.55 | -0.5573 |
| Churn ratio/Crash | -0.1885 | -0.1521 | -0.2022 | -0.1903 | -0.477 | -0.478 |

Table 7: Determinants of mutual fund net sales of ES and non-ES stocks: Churn Ratio

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases of ES stocks (columns (1), (3), and (5)) and of non-ES stocks (columns (2), (4), and (6)) made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low Carbon) | |
|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| Crash | 0.0187 (0.0152) | 0.0199 (0.0175) | 0.0415** (0.0180) | 0.0068 (0.0220) | 0.0111 (0.0172) | 0.0196 (0.0214) |
| Crash \times ESG | -0.1228* (0.0716) | 0.0704 (0.0546) | -0.0665** (0.0310) | 0.0134 (0.0332) | 0.0044 (0.0289) | -0.0111 (0.0310) |
| Crash \times Inflows | -0.9809*** (0.0793) | -0.8582*** (0.1074) | -0.9912*** (0.0972) | -0.9091*** (0.1421) | -1.0011*** (0.0864) | -0.9261*** (0.1258) |
| Crash \times Inflows \times ESG | 0.0060 (0.2471) | 0.5434*** (0.1442) | 0.5061*** (0.1683) | 0.5354*** (0.1944) | 0.4505** (0.2107) | 0.6001*** (0.1983) |
| Crash \times Outflows | 0.0866 (0.1553) | -0.0352 (0.1331) | 0.2034* (0.1213) | 0.0570 (0.1286) | 0.2867*** (0.0961) | 0.1690 (0.1054) |
| Crash \times Outflows \times ESG | -0.0216 (0.3351) | 0.0864 (0.2866) | -0.2366 (0.2768) | -0.2130 (0.2484) | -0.4764* (0.2464) | -0.5699*** (0.2118) |
| Crash \times Churn ratio | 0.1340*** (0.0318) | 0.0545** (0.0254) | 0.0940** (0.0368) | 0.0603* (0.0354) | 0.1381*** (0.0350) | 0.0412 (0.0278) |
| Crash \times Churn ratio \times ESG | 0.0530 (0.1223) | -0.0511 (0.1770) | 0.0038 (0.0746) | 0.0124 (0.0506) | -0.0844 (0.0619) | 0.0526 (0.0610) |
| Crash \times Fund size | -0.0017** (0.0007) | -0.0013 (0.0008) | -0.0027*** (0.0008) | -0.0008 (0.0011) | -0.0015* (0.0008) | -0.0014 (0.0011) |
| Crash \times Fund size \times ESG | 0.0064* (0.0034) | -0.0039 (0.0026) | 0.0031** (0.0014) | -0.0006 (0.0016) | 0.0002 (0.0013) | 0.0005 (0.0015) |
| Inflows | -0.0031 (0.0041) | 0.0020 (0.0032) | -0.0015 (0.0026) | 0.0031 (0.0021) | -0.0022 (0.0032) | 0.0027 (0.0024) |
| Inflows \times ESG | -0.7559*** (0.1473) | -0.7017*** (0.0698) | -0.8817*** (0.1391) | -0.6534*** (0.1614) | -0.8505*** (0.2219) | -0.5555*** (0.1770) |
| Outflows | 1.0393*** (0.0656) | 0.8642*** (0.0707) | 1.0117*** (0.0803) | 0.8234*** (0.0859) | 1.0563*** (0.0780) | 0.8215*** (0.0812) |
| Outflows \times ESG | 0.3810 | -0.2018* | -0.0066 | 0.0689 | -0.1972 | 0.0471 |

(continued)

| | | | | | | |
|--------------------------|------------|------------|------------|------------|------------|------------|
| | (0.2373) | (0.1119) | (0.1009) | (0.1059) | (0.1217) | (0.1272) |
| Churn ratio | -0.2388* | -0.1741 | -0.3850** | -0.1738 | -0.2324 | -0.2230** |
| | (0.1412) | (0.1086) | (0.1862) | (0.1491) | (0.1476) | (0.0898) |
| Churn ratio × ESG | -0.8474 | 0.4779 | 0.1697 | 0.0547 | -0.3223 | 0.3510 |
| | (0.6569) | (0.4671) | (0.2273) | (0.2080) | (0.2953) | (0.3454) |
| Fund size | -0.0329*** | -0.0290*** | -0.0240** | -0.0275*** | -0.0326*** | -0.0280*** |
| | (0.0098) | (0.0097) | (0.0113) | (0.0104) | (0.0101) | (0.0086) |
| Fund size × ESG | 0.0652*** | -0.0008 | 0.0055 | 0.0106 | 0.0235 | 0.0049 |
| | (0.0250) | (0.0191) | (0.0142) | (0.0179) | (0.0179) | (0.0199) |
| Market return | -0.1243*** | -0.0557** | -0.1110*** | -0.0532** | -0.1163*** | -0.0477** |
| | (0.0187) | (0.0221) | (0.0180) | (0.0217) | (0.0184) | (0.0219) |
| Market return volatility | 0.2497*** | -0.1492 | 0.3219*** | -0.0959 | 0.2875*** | -0.1134 |
| | (0.0925) | (0.1019) | (0.0905) | (0.1010) | (0.0891) | (0.0953) |
| Observations | 18,241 | | 18,058 | | 18,233 | |
| R-squared | 0.441 | | 0.462 | | 0.453 | |

Panel B: *t*-tests on linear combinations of parameters

| | Sensitivity of Net Sales of | | | | | |
|-----------------------------|-----------------------------|------------|---------------|------------|---------------|------------|
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| by non-ESG funds to: | | | | | | |
| Inflows/Normal | -0.0031 | 0.002 | -0.0015 | 0.0031 | -0.0022 | 0.0027 |
| Inflows/Crash | -0.984*** | -0.8561*** | -0.9927*** | -0.906*** | -1.0033*** | -0.9234*** |
| Outflows/Normal | 1.0393*** | 0.8642*** | 1.0117*** | 0.8234*** | 1.0563*** | 0.8215*** |
| Outflows/Crash | 1.1259*** | 0.829*** | 1.2151*** | 0.8803*** | 1.3431*** | 0.9905*** |
| Churn ratio/Normal | -0.2388* | -0.1741 | -0.385** | -0.1738 | -0.2324 | -0.223** |
| Churn ratio/Crash | -0.1048 | -0.1195 | -0.291 | -0.1135 | -0.0943 | -0.1818* |
| by ESG funds to: | | | | | | |
| Inflows/Normal | -0.759*** | -0.6997*** | -0.8832*** | -0.6503*** | -0.8526*** | -0.5528*** |
| Inflows/Crash | -1.7339*** | -1.0145*** | -1.3683*** | -1.024*** | -1.4032*** | -0.8788*** |
| Outflows/Normal | 1.4203*** | 0.6624*** | 1.005*** | 0.8923*** | 0.8591*** | 0.8686*** |
| Outflows/Crash | 1.4853*** | 0.7136*** | 0.9719*** | 0.7363*** | 0.6694** | 0.4677** |
| Churn ratio/Normal | -1.0863* | 0.3038 | -0.2153 | -0.1191 | -0.5547** | 0.1279 |
| Churn ratio/Crash | -0.8993 | 0.3073 | -0.1175 | -0.0464 | -0.501** | 0.2218 |

Table 8: Determinants of mutual fund aggregate net sales: Quarterly data

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases made by fund i during quarter t as a percentage of the total dollar holdings of fund i at the end of quarter $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in the first quarter of 2020. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low Carbon) | |
|---------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Crash | 0.2315*** (0.0615) | 1.4302** (0.5695) | 0.3318*** (0.0438) | 1.5796*** (0.5236) | 0.2986*** (0.0454) | 1.2997** (0.5823) |
| Crash \times ESG | -0.3194** (0.1416) | -0.3145** (0.1392) | -0.3391*** (0.1130) | -0.3505*** (0.1129) | -0.2992*** (0.0987) | -0.2947*** (0.1001) |
| Crash \times Inflows | -0.5194 (0.3383) | -0.4676 (0.3507) | -0.2690* (0.1584) | -0.2125 (0.1568) | -0.3536** (0.1578) | -0.3076** (0.1558) |
| Crash \times Inflows \times ESG | -1.3867** (0.5824) | -1.3940** (0.5815) | -0.7209 (0.5875) | -0.7441 (0.5925) | -0.7495 (0.6006) | -0.7442 (0.6129) |
| Crash \times Outflows | 0.4018* (0.2323) | 0.3888 (0.2382) | 0.1911 (0.1184) | 0.1771 (0.1203) | 0.1999* (0.1100) | 0.1889* (0.1105) |
| Crash \times Outflows \times ESG | 1.0961* (0.5612) | 1.0010* (0.5500) | 0.6030 (0.4330) | 0.6123 (0.4374) | 0.7774* (0.4543) | 0.7699* (0.4640) |
| Crash \times Fund size | -0.0121*** (0.0017) | -0.0127*** (0.0017) | -0.0148*** (0.0021) | -0.0155*** (0.0020) | -0.0133*** (0.0021) | -0.0138*** (0.0021) |
| Crash \times Fund size \times ESG | 0.0055 (0.0062) | 0.0052 (0.0061) | 0.0090*** (0.0032) | 0.0096*** (0.0031) | 0.0052 (0.0032) | 0.0051 (0.0032) |
| Inflows | -0.7783** (0.3485) | -0.8296** (0.3576) | -1.0426*** (0.1780) | -1.1052*** (0.1737) | -0.9660*** (0.1686) | -1.0068*** (0.1646) |
| Inflows \times ESG | 0.8848 (0.5726) | 0.9297 (0.5747) | 0.7138 (0.6197) | 0.7586 (0.6228) | 0.7594 (0.6554) | 0.7459 (0.6692) |
| Outflows | 0.4222* (0.2423) | 0.4428* (0.2475) | 0.6599*** (0.0922) | 0.6808*** (0.0934) | 0.6197*** (0.0940) | 0.6374*** (0.0936) |
| Outflows \times ESG | -0.7262* (0.4171) | -0.6884* (0.4157) | -0.6753 (0.4557) | -0.6809 (0.4607) | -0.8436 (0.5252) | -0.8331 (0.5347) |
| Fund size | -0.4415* (0.2409) | -0.4178* (0.2484) | -0.2071*** (0.0688) | -0.1861*** (0.0707) | -0.2823*** (0.0800) | -0.2596*** (0.0798) |
| Fund size \times ESG | -1.0608*** (0.3954) | -1.0537*** (0.3993) | -0.7295 (0.4460) | -0.7299 (0.4515) | -0.7051 (0.4604) | -0.7015 (0.4699) |

| (continued) | | | | | | |
|--------------------------|-------|-----------|-------|-----------|-------|-----------|
| Market return | | 3.1360** | | 3.2478** | | 2.6256* |
| | | (1.4669) | | (1.3515) | | (1.5087) |
| Market return volatility | | 6.6561*** | | 6.4059*** | | 5.8272*** |
| | | (2.0803) | | (1.8513) | | (2.0749) |
| Observations | 3,136 | 3,136 | 3,094 | 3,094 | 3,136 | 3,136 |
| R-squared | 0.807 | 0.809 | 0.828 | 0.829 | 0.815 | 0.816 |

Panel B: *t*-tests on linear combinations of parameters

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|------------|------------|------------|------------|------------|------------|
| Sensitivity of net sales by non-ESG funds to: | | | | | | |
| Inflows/Normal | -0.7783** | -0.8296** | -1.0426*** | -1.1052*** | -0.966*** | -1.0068*** |
| Inflows/Crash | -1.2977*** | -1.2972*** | -1.3117*** | -1.3177*** | -1.3196*** | -1.3144*** |
| Outflows/Normal | 0.4222* | 0.4428* | 0.6599*** | 0.6808*** | 0.6197*** | 0.6374*** |
| Outflows/Crash | 0.824*** | 0.8316*** | 0.851*** | 0.8579*** | 0.8196*** | 0.8263*** |
| Sensitivity of net sales by ESG funds to: | | | | | | |
| Inflows/Normal | 0.1064 | 0.1002 | -0.3288 | -0.3466 | -0.2066 | -0.2609 |
| Inflows/Crash | -1.7996*** | -1.7614*** | -1.3187*** | -1.3032*** | -1.3096*** | -1.3127*** |
| Outflows/Normal | -0.3041 | -0.2456 | -0.0154 | -0.0002 | -0.2239 | -0.1957 |
| Outflows/Crash | 1.1938** | 1.1442** | 0.7787*** | 0.7892*** | 0.7534*** | 0.7631*** |

Table 9: Determinants of mutual fund net sales of ES and non-ES stocks: Quarterly data

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases of ES stocks (columns (1), (3), and (5)) and of non-ES stocks (columns (2), (4), and (6)) made by fund i during quarter t as a percentage of the total dollar holdings of fund i at the end of quarter $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in the first quarter of 2020. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low Carbon) | |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| Crash | -0.9227 (0.7278) | 0.5481 (0.8274) | -0.7029 (0.6865) | 0.2686 (0.7999) | -0.9129 (0.6983) | 0.7076 (0.8173) |
| Crash × ESG | -1.2534*** (0.2825) | -0.0595 (0.2088) | -0.2639** (0.1062) | 0.0506 (0.1196) | -0.1897* (0.0973) | 0.1700 (0.1112) |
| Crash × Inflows | -0.0335 (0.2166) | -0.2256 (0.2795) | -0.1041 (0.2927) | -0.0712 (0.3614) | -0.0890 (0.2731) | -0.4857 (0.3676) |
| Crash × Inflows × ESG | -2.8218*** (0.7257) | -3.0978*** (0.7915) | 0.0987 (0.3847) | -0.4448 (0.4587) | -0.2948 (0.3375) | 0.7062* (0.4119) |
| Crash × Outflows | 0.0165 (0.1107) | 0.3191*** (0.1162) | 0.0157 (0.1332) | 0.0858 (0.1405) | 0.0567 (0.1342) | 0.4128*** (0.1282) |
| Crash × Outflows × ESG | 2.0314*** (0.5609) | 1.5544*** (0.5584) | -0.0553 (0.2137) | 0.5522*** (0.1835) | 0.0051 (0.2228) | -0.7113*** (0.2246) |
| Crash × Fund size | -0.0137*** (0.0023) | 0.0003 (0.0032) | -0.0163*** (0.0029) | 0.0039 (0.0039) | -0.0141*** (0.0029) | 0.0012 (0.0040) |
| Crash × Fund size × ESG | 0.0495*** (0.0136) | -0.0194** (0.0092) | 0.0141*** (0.0047) | -0.0072 (0.0058) | 0.0087* (0.0045) | -0.0043 (0.0054) |
| Inflows | -1.1396*** (0.2108) | -0.6107** (0.2982) | -0.9600*** (0.2525) | -0.5302 (0.3429) | -1.0124*** (0.2393) | -0.2843 (0.3571) |
| Inflows × ESG | 1.1748 (0.7825) | 2.8337*** (0.8280) | -0.6281* (0.3587) | -0.3038 (0.4627) | -0.3711 (0.3233) | -1.1371*** (0.4349) |
| Outflows | 0.3828*** (0.1010) | 0.0950 (0.1155) | 0.3442*** (0.1167) | 0.3129** (0.1366) | 0.3423*** (0.1109) | 0.0180 (0.1178) |
| Outflows × ESG | -1.6792*** (0.5421) | -1.3373** (0.5311) | 0.2109 (0.2084) | -0.4951*** (0.1682) | 0.0266 (0.2137) | 0.7106*** (0.2201) |
| Fund size | -0.1801** (0.0809) | -0.3220*** (0.1183) | -0.2411*** (0.0926) | -0.1816 (0.1341) | -0.2559*** (0.0983) | -0.4695*** (0.1597) |
| Fund size × ESG | -1.6068*** | -2.4461*** | 0.1964 | -0.4885* | 0.0467 | 0.4457* |

| | | | | | | (continued) |
|--------------------------|----------|----------|----------|----------|----------|-------------|
| | (0.3502) | (0.5699) | (0.1936) | (0.2553) | (0.1706) | (0.2284) |
| Market return | -3.0535 | 1.3914 | -2.6142 | 0.7630 | -3.0338* | 1.9078 |
| | (1.8633) | (2.0979) | (1.7603) | (2.0371) | (1.7874) | (2.0720) |
| Market return volatility | 3.3539 | -2.8792 | 3.7019 | -4.4996 | 3.4332 | -2.0928 |
| | (2.4930) | (3.1371) | (2.4093) | (3.0774) | (2.4735) | (3.1558) |
| Observations | 6,146 | | 6,076 | | 6,146 | |
| R-squared | 0.701 | | 0.708 | | 0.698 | |

Panel B: *t*-tests on linear combinations of parameters

| | Sensitivity of Net Sales of | | | | | |
|-----------------------------|-----------------------------|------------|---------------|------------|---------------|------------|
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| by non-ESG funds to: | | | | | | |
| Inflows/Normal | -1.1396*** | -0.6107** | -0.96*** | -0.5302 | -1.0124*** | -0.2843 |
| Inflows/Crash | -1.1731*** | -0.8363** | -1.064*** | -0.6014 | -1.1015*** | -0.7701* |
| Outflows/Normal | 0.3828*** | 0.095 | 0.3442*** | 0.3129** | 0.3423*** | 0.018 |
| Outflows/Crash | 0.3993*** | 0.4141*** | 0.3599*** | 0.3988*** | 0.399*** | 0.4309*** |
| by ESG funds to: | | | | | | |
| Inflows/Normal | 0.0352 | 2.223*** | -1.588*** | -0.8341*** | -1.3836*** | -1.4214*** |
| Inflows/Crash | -2.8201*** | -1.1005*** | -1.5934*** | -1.3501*** | -1.7674*** | -1.201*** |
| Outflows/Normal | -1.2964** | -1.2423** | 0.5551*** | -0.1822* | 0.3689** | 0.7287*** |
| Outflows/Crash | 0.7514*** | 0.6312*** | 0.5154*** | 0.4559*** | 0.4307*** | 0.4302*** |

Table 10: Determinants of mutual fund net sales of ES and non-ES stocks: Churn Ratio or ESG

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases of ES stocks (columns (1), (3), and (5)) and of non-ES stocks (columns (2), (4), and (6)) made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2020 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low Carbon) | |
|--------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| Crash | 0.0253 (0.0165) | 0.0181 (0.0177) | 0.0505*** (0.0182) | 0.0048 (0.0221) | 0.0185 (0.0186) | 0.0196 (0.0214) |
| Crash × ESG | -0.1205* (0.0723) | 0.0761 (0.0544) | -0.0635** (0.0312) | 0.0185 (0.0332) | 0.0081 (0.0298) | -0.0132 (0.0318) |
| Crash × Inflows | -1.4688*** (0.1273) | -1.0655*** (0.1619) | -1.4665*** (0.1284) | -1.0543*** (0.1893) | -1.5443*** (0.1182) | -1.1771*** (0.1751) |
| Crash × Inflows × ESG | 0.1800 (0.2593) | 0.5742*** (0.1596) | 0.5203*** (0.1540) | 0.5523*** (0.1743) | 0.6081*** (0.1588) | 0.6561*** (0.1690) |
| Crash × Outflows | 0.0564 (0.2471) | 0.1997 (0.2230) | 0.2915 (0.1879) | 0.3566* (0.1841) | 0.1854 (0.1633) | 0.3405** (0.1571) |
| Crash × Outflows × ESG | 0.0273 (0.3753) | -0.1332 (0.3016) | -0.2860 (0.2691) | -0.2834 (0.2472) | -0.5698** (0.2658) | -0.5996** (0.2420) |
| Crash × Churn ratio | 0.0385 (0.0482) | 0.0425 (0.0337) | -0.0050 (0.0501) | 0.0543 (0.0450) | 0.0229 (0.0463) | 0.0129 (0.0345) |
| Crash × Churn ratio × ESG | 0.0895 (0.1372) | -0.0946 (0.1776) | 0.0267 (0.0722) | 0.0168 (0.0518) | -0.0170 (0.0685) | 0.1046 (0.0636) |
| Crash × Churn ratio × Inflows | 3.8427*** (0.8554) | 1.7112** (0.7737) | 4.0134*** (0.7156) | 1.4666** (0.6942) | 4.4121*** (0.6773) | 2.1744*** (0.6867) |
| Crash × Churn ratio × Outflows | 0.3698 (1.2130) | -1.4555 (0.8924) | -0.4155 (1.3879) | -1.8130** (0.9058) | 0.8847 (0.9249) | -1.0752 (0.7649) |
| Crash × Fund size | -0.0015** (0.0007) | -0.0012 (0.0008) | -0.0026*** (0.0008) | -0.0007 (0.0011) | -0.0012 (0.0008) | -0.0012 (0.0011) |
| Crash × Fund size × ESG | 0.0060* (0.0034) | -0.0039 (0.0026) | 0.0028** (0.0014) | -0.0008 (0.0016) | -0.0003 (0.0013) | 0.0004 (0.0015) |
| Inflows | 0.3140*** (0.0882) | 0.1976*** (0.0719) | 0.4406*** (0.0616) | 0.2606*** (0.0612) | 0.3955*** (0.0512) | 0.2529*** (0.0571) |

| | (continued) | | | | | |
|------------------------------|-------------|------------|------------|------------|------------|------------|
| Inflows × ESG | -1.2084*** | -0.8528*** | -1.5862*** | -1.2198*** | -1.7812*** | -1.2383*** |
| | (0.4040) | (0.1462) | (0.1429) | (0.1565) | (0.1565) | (0.1531) |
| Outflows | 1.0573*** | 0.8525*** | 1.1642*** | 0.8995*** | 0.9962*** | 0.7257*** |
| | (0.1306) | (0.1356) | (0.1657) | (0.1628) | (0.1355) | (0.1178) |
| Outflows × ESG | 0.5720 | -0.8036** | -0.3849 | -0.3867* | 0.1053 | 0.2761 |
| | (0.5185) | (0.3282) | (0.2586) | (0.2314) | (0.2433) | (0.2205) |
| Churn ratio | -0.0473 | -0.0496 | -0.0262 | 0.0509 | -0.0089 | -0.0698 |
| | (0.1293) | (0.1130) | (0.1751) | (0.1368) | (0.1191) | (0.0965) |
| Churn ratio × ESG | -1.0408* | 0.2256 | -0.3642 | -0.3439 | -0.8057*** | -0.0462 |
| | (0.6124) | (0.4703) | (0.2588) | (0.2158) | (0.2976) | (0.3711) |
| Churn ratio × Inflows | -3.0073*** | -1.8523*** | -4.1986*** | -2.4416*** | -3.7749*** | -2.3718*** |
| | (0.8379) | (0.6831) | (0.5859) | (0.5822) | (0.4857) | (0.5428) |
| Churn ratio × Outflows | -0.3643 | -0.0971 | -1.3058 | -0.6992 | 0.2102 | 0.5885 |
| | (0.7445) | (0.8442) | (0.8511) | (0.9144) | (0.6131) | (0.5486) |
| Churn ratio × Inflows × ESG | 4.4459 | 1.2669 | 5.8348*** | 4.4046*** | 6.4728*** | 4.6487*** |
| | (4.3695) | (1.6833) | (1.3722) | (1.4275) | (1.3053) | (1.2875) |
| Churn ratio × Outflows × ESG | -2.0746 | 7.1303** | 3.4293** | 3.9843*** | -1.1447 | -1.1366 |
| | (3.9614) | (3.0337) | (1.7462) | (1.5430) | (1.5945) | (1.5848) |
| Fund size | -0.0262*** | -0.0231** | -0.0072 | -0.0133 | -0.0210** | -0.0176** |
| | (0.0093) | (0.0101) | (0.0098) | (0.0104) | (0.0087) | (0.0089) |
| Fund size × ESG | 0.0645** | -0.0087 | 0.0011 | 0.0066 | 0.0278** | 0.0051 |
| | (0.0253) | (0.0193) | (0.0117) | (0.0157) | (0.0130) | (0.0166) |
| Market return | -0.1160*** | -0.0487** | -0.1053*** | -0.0480** | -0.1061*** | -0.0388* |
| | (0.0181) | (0.0218) | (0.0176) | (0.0214) | (0.0177) | (0.0215) |
| Market return volatility | 0.3271*** | -0.1031 | 0.4405*** | -0.0199 | 0.4059*** | -0.0414 |
| | (0.0888) | (0.1027) | (0.0812) | (0.0982) | (0.0799) | (0.0939) |
| Observations | 18,241 | | 18,058 | | 18,233 | |
| R-squared | 0.453 | | 0.477 | | 0.470 | |

(continued)

Panel B: *t*-tests on linear combinations of parameters

| | Sensitivity of Net Sales of | | | | | |
|-----------------------------|-----------------------------|------------|---------------|------------|---------------|------------|
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| by non-ESG funds to: | | | | | | |
| Inflows/Normal | -0.0229*** | -0.0074* | -0.0235*** | -0.0074** | -0.0275*** | -0.0097*** |
| Inflows/Crash | -1.0611*** | -0.8835*** | -1.0464*** | -0.9007*** | -1.0774*** | -0.946*** |
| Outflows/Normal | 1.0165*** | 0.8417*** | 1.0198*** | 0.8227*** | 1.0198*** | 0.7909*** |
| Outflows/Crash | 1.1144*** | 0.8802*** | 1.2654*** | 0.9803*** | 1.3043*** | 1.0123*** |
| Churn ratio/Normal | -0.0972 | -0.0789 | -0.1091 | 0.0028 | -0.0604 | -0.0957 |
| Churn ratio/Crash | 0.0035 | -0.0342 | -0.0616 | 0.0503 | 0.0409 | -0.0676 |
| by ESG funds to: | | | | | | |
| Inflows/Normal | -0.7331*** | -0.7199*** | -0.9647*** | -0.7437*** | -1.0834*** | -0.7332*** |
| Inflows/Crash | -1.5913*** | -1.0217*** | -1.4673*** | -1.0847*** | -1.5251*** | -1.0135*** |
| Outflows/Normal | 1.3561*** | 0.8276*** | 1.014*** | 0.8734*** | 0.9968*** | 0.9411*** |
| Outflows/Crash | 1.4813*** | 0.7329*** | 0.9736*** | 0.7476*** | 0.7116** | 0.5629** |
| Churn ratio/Normal | -1.1065* | 0.2802 | -0.3321* | -0.2109 | -0.7905*** | -0.0909 |
| Churn ratio/Crash | -0.9163 | 0.2304 | -0.2579 | -0.1466 | -0.7062*** | 0.0418 |

Table 11: Determinants of mutual fund net sales:
The role of inflows and outflows

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2019 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low carbon) | |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Crash | 0.1144*** (0.0178) | 0.1014*** (0.0170) | 0.1299*** (0.0152) | 0.1192*** (0.0152) | 0.1174*** (0.0178) | 0.1035*** (0.0167) |
| Crash × ESG | -0.0961*** (0.0274) | -0.0941*** (0.0271) | -0.1070*** (0.0277) | -0.1076*** (0.0276) | -0.0725*** (0.0271) | -0.0701*** (0.0269) |
| Crash × Inflows | -0.8818*** (0.0957) | -0.8947*** (0.0957) | -0.9982*** (0.0942) | -1.0109*** (0.0939) | -0.9372*** (0.0950) | -0.9519*** (0.0953) |
| Crash × Inflows × ESG | 0.4600*** (0.1710) | 0.4553*** (0.1731) | 0.9562*** (0.1259) | 0.9631*** (0.1260) | 0.7144*** (0.1220) | 0.7192*** (0.1228) |
| Crash × Outflows | 0.1844 (0.1287) | 0.1548 (0.1273) | 0.2666*** (0.0806) | 0.2416*** (0.0791) | 0.3358*** (0.0633) | 0.3021*** (0.0619) |
| Crash × Outflows × ESG | 0.0423 (0.1471) | 0.0297 (0.1495) | -0.1589 (0.2582) | -0.1540 (0.2571) | -0.4413* (0.2488) | -0.4345* (0.2469) |
| Crash × Fund size | -0.0051*** (0.0008) | -0.0051*** (0.0008) | -0.0059*** (0.0007) | -0.0059*** (0.0007) | -0.0052*** (0.0008) | -0.0052*** (0.0008) |
| Crash × Fund size × ESG | 0.0044*** (0.0013) | 0.0043*** (0.0013) | 0.0049*** (0.0012) | 0.0049*** (0.0012) | 0.0033*** (0.0012) | 0.0032*** (0.0012) |
| Inflows | -0.0925 (0.0860) | -0.0924 (0.0860) | -0.0533 (0.0524) | -0.0532 (0.0524) | -0.0699 (0.0671) | -0.0698 (0.0671) |
| Inflows × ESG | -0.8911*** (0.1284) | -0.8880*** (0.1284) | -0.8995*** (0.0575) | -0.8988*** (0.0574) | -0.8305*** (0.0948) | -0.8299*** (0.0947) |
| Outflows | 1.1043*** (0.0551) | 1.1067*** (0.0551) | 1.1184*** (0.0633) | 1.1202*** (0.0633) | 1.0618*** (0.0587) | 1.0649*** (0.0588) |
| Outflows × ESG | -0.2008** (0.0972) | -0.1931** (0.0965) | -0.2066** (0.0995) | -0.2042** (0.0996) | -0.1361** (0.0634) | -0.1389** (0.0635) |
| Fund size | -0.0063 (0.0120) | -0.0044 (0.0123) | -0.0111* (0.0063) | -0.0096 (0.0064) | -0.0041 (0.0126) | -0.0019 (0.0129) |
| Fund size × ESG | -0.0025 | -0.0029 | -0.0036*** | -0.0036*** | -0.0054** | -0.0054** |

| | | | | | | (continued) |
|--------------------------|----------|------------|-----------|------------|----------|-------------|
| | (0.0139) | (0.0138) | (0.0010) | (0.0010) | (0.0024) | (0.0024) |
| Market return | | -0.0889*** | | -0.0857*** | | -0.0814*** |
| | | (0.0130) | | (0.0132) | | (0.0118) |
| Market return volatility | | 0.2767*** | | 0.1766*** | | 0.3265*** |
| | | (0.0991) | | (0.0634) | | (0.0926) |
| ESG | | | 0.0867*** | 0.0870*** | 0.1187** | 0.1194** |
| | | | (0.0211) | (0.0210) | (0.0491) | (0.0493) |
| Observations | 28,949 | 28,949 | 28,303 | 28,303 | 28,793 | 28,793 |
| R-squared | 0.437 | 0.439 | 0.581 | 0.582 | 0.510 | 0.511 |

Panel B: *t*-tests on linear combinations of parameters

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|------------|------------|------------|------------|------------|------------|
| Sensitivity of net sales by non-ESG funds to: | | | | | | |
| Inflows/Normal | -0.0925 | -0.0924 | -0.0533 | -0.0532 | -0.0699 | -0.0698 |
| Inflows/Crash | -0.9742*** | -0.9871*** | -1.0515*** | -1.0642*** | -1.0071*** | -1.0218*** |
| Outflows/Normal | 1.1043*** | 1.1067*** | 1.1184*** | 1.1202*** | 1.0618*** | 1.0649*** |
| Outflows/Crash | 1.2887*** | 1.2615*** | 1.385*** | 1.3618*** | 1.3976*** | 1.367*** |
| Sensitivity of net sales by ESG funds to: | | | | | | |
| Inflows/Normal | -0.9835*** | -0.9804*** | -0.9528*** | -0.9521*** | -0.9004*** | -0.8997*** |
| Inflows/Crash | -1.4053*** | -1.4198*** | -0.9948*** | -0.9999*** | -1.1232*** | -1.1325*** |
| Outflows/Normal | 0.9035*** | 0.9136*** | 0.9118*** | 0.9159*** | 0.9257*** | 0.9259*** |
| Outflows/Crash | 1.1301*** | 1.0981*** | 1.0195*** | 1.0035*** | 0.8203*** | 0.7935*** |

Table 12: Determinants of mutual fund net sales of ES and non-ES stocks

The table reports regressions for Net Sales at the fund level (Panel A) and t -test on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases of ES stocks (columns (1), (3), and (5)) and of non-ES stocks (columns (2), (4), and (6)) made by fund i during month t as a percentage of the total dollar holdings of fund i at the end of month $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2019 to June 2020. The variable *Crash* takes the value of one in February and March. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Quarter and fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low carbon) | |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| Crash | 0.0516*** (0.0126) | 0.0212 (0.0151) | 0.0694*** (0.0128) | 0.0016 (0.0181) | 0.0424*** (0.0133) | 0.0119 (0.0173) |
| Crash × ESG | -0.0923 (0.0587) | 0.0363 (0.0502) | -0.0796*** (0.0256) | 0.0258 (0.0301) | -0.0104 (0.0252) | 0.0098 (0.0273) |
| Crash × Inflows | -0.9385*** (0.0774) | -0.8088*** (0.1119) | -0.9774*** (0.1025) | -0.8427*** (0.1512) | -0.9335*** (0.0868) | -0.8543*** (0.1341) |
| Crash × Inflows × ESG | 0.1024 (0.2069) | 0.5892*** (0.1590) | 0.6123*** (0.1391) | 0.5935*** (0.1761) | 0.2648 (0.1770) | 0.5243*** (0.1924) |
| Crash × Outflows | 0.0864 (0.1625) | 0.0178 (0.1459) | 0.2486** (0.1175) | 0.2085** (0.1041) | 0.2727*** (0.0957) | 0.2306** (0.0958) |
| Crash × Outflows × ESG | -0.1056 (0.3113) | 0.2314 (0.3229) | -0.2916 (0.2829) | -0.3378 (0.2554) | -0.4160 (0.2656) | -0.4956** (0.2381) |
| Crash × Fund size | -0.0023*** (0.0006) | -0.0010 (0.0007) | -0.0033*** (0.0006) | -0.0003 (0.0009) | -0.0019*** (0.0007) | -0.0008 (0.0008) |
| Crash × Fund size × ESG | 0.0047* (0.0028) | -0.0024 (0.0025) | 0.0039*** (0.0012) | -0.0012 (0.0014) | 0.0005 (0.0011) | -0.0001 (0.0013) |
| Inflows | -0.0148 (0.0155) | -0.0111 (0.0134) | -0.0095 (0.0104) | -0.0061 (0.0093) | -0.0117 (0.0126) | -0.0073 (0.0104) |
| Inflows × ESG | -0.7901*** (0.1275) | -0.8013*** (0.0815) | -0.8843*** (0.0619) | -0.7686*** (0.0726) | -0.6477*** (0.1620) | -0.6093*** (0.1531) |
| Outflows | 1.0057*** (0.0827) | 0.8538*** (0.0638) | 0.9552*** (0.1004) | 0.8358*** (0.0761) | 0.9899*** (0.0967) | 0.8116*** (0.0720) |
| Outflows × ESG | -0.1491 (0.1409) | -0.0320 (0.1417) | 0.0081 (0.1014) | -0.0493 (0.1158) | -0.1524 (0.1048) | -0.0098 (0.0806) |
| Fund size | -0.0041 (0.0028) | -0.0018 (0.0027) | -0.0033 (0.0024) | -0.0004 (0.0027) | -0.0030 (0.0029) | -0.0014 (0.0027) |
| Fund size × ESG | 0.0124** | 0.0046 | -0.0015*** | -0.0012* | -0.0018* | -0.0017 |

(continued)

| | | | | | | |
|--------------------------|------------|------------|------------|------------|------------|------------|
| | (0.0063) | (0.0061) | (0.0006) | (0.0007) | (0.0010) | (0.0011) |
| Market return | -0.0778*** | -0.0412*** | -0.0726*** | -0.0352*** | -0.0732*** | -0.0357*** |
| | (0.0101) | (0.0111) | (0.0097) | (0.0110) | (0.0099) | (0.0109) |
| Market return volatility | 0.3572*** | 0.0306 | 0.3670*** | 0.0496 | 0.3730*** | 0.0502 |
| | (0.0623) | (0.0712) | (0.0606) | (0.0687) | (0.0605) | (0.0692) |
| ESG | | | 0.0371*** | 0.0322** | 0.0440** | 0.0380* |
| | | | (0.0115) | (0.0148) | (0.0196) | (0.0215) |
| Observations | 55,385 | | 54,337 | | 55,093 | |
| R-squared | 0.320 | | 0.356 | | 0.337 | |

Panel B: *t*-tests on linear combinations of parameters

| | Sensitivity of Net Sales of | | | | | |
|-----------------------------|-----------------------------|------------|---------------|------------|---------------|------------|
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| | (1) | (2) | (3) | (4) | (5) | (7) |
| by non-ESG funds to: | | | | | | |
| Inflows/Normal | -0.0148 | -0.0111 | -0.0095 | -0.0061 | -0.0117 | -0.0073 |
| Inflows/Crash | -0.9532*** | -0.8199*** | -0.987*** | -0.8488*** | -0.9452*** | -0.8616*** |
| Outflows/Normal | 1.0057*** | 0.8538*** | 0.9552*** | 0.8358*** | 0.9899*** | 0.8116*** |
| Outflows/Crash | 1.0922*** | 0.8716*** | 1.2037*** | 1.0443*** | 1.2626*** | 1.0422*** |
| by ESG funds to: | | | | | | |
| Inflows/Normal | -0.8049*** | -0.8124*** | -0.8938*** | -0.7747*** | -0.6594*** | -0.6165*** |
| Inflows/Crash | -1.641*** | -1.0321*** | -1.2589*** | -1.0239*** | -1.3281*** | -0.9466*** |
| Outflows/Normal | 0.8567*** | 0.8218*** | 0.9633*** | 0.7865*** | 0.8375*** | 0.8018*** |
| Outflows/Crash | 0.8375*** | 1.071*** | 0.9202*** | 0.6572*** | 0.6943*** | 0.5368** |

Table 13: Determinants of mutual fund aggregate net sales: Quarterly data

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases made by fund i during quarter t as a percentage of the total dollar holdings of fund i at the end of quarter $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2019 to June 2020. The variable *Crash* takes the value of one in the first quarter of 2020. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low Carbon) | |
|---------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Crash | 0.2176*** (0.0216) | 0.1808*** (0.0218) | 0.2649*** (0.0287) | 0.2301*** (0.0288) | 0.2421*** (0.0267) | 0.2054*** (0.0270) |
| Crash \times ESG | -0.0366 (0.0987) | -0.0333 (0.0992) | -0.1544*** (0.0403) | -0.1580*** (0.0402) | -0.1168*** (0.0380) | -0.1176*** (0.0380) |
| Crash \times Inflows | 0.1677** (0.0661) | 0.1557** (0.0662) | 0.1344 (0.0843) | 0.1195 (0.0842) | 0.2082** (0.0883) | 0.1918** (0.0884) |
| Crash \times Inflows \times ESG | -0.1908 (0.1990) | -0.1943 (0.2009) | 0.0339 (0.1098) | 0.0320 (0.1095) | -0.1868* (0.1069) | -0.1749 (0.1075) |
| Crash \times Outflows | -0.0680* (0.0361) | -0.0801** (0.0362) | -0.0753* (0.0437) | -0.0828* (0.0435) | -0.0770* (0.0413) | -0.0911** (0.0415) |
| Crash \times Outflows \times ESG | 0.4117 (0.4324) | 0.4081 (0.4324) | 0.0234 (0.0748) | 0.0105 (0.0750) | 0.0364 (0.0744) | 0.0462 (0.0740) |
| Crash \times Fund size | -0.0082*** (0.0010) | -0.0082*** (0.0010) | -0.0104*** (0.0014) | -0.0104*** (0.0014) | -0.0092*** (0.0013) | -0.0091*** (0.0013) |
| Crash \times Fund size \times ESG | 0.0012 (0.0051) | 0.0011 (0.0051) | 0.0072*** (0.0020) | 0.0074*** (0.0020) | 0.0050*** (0.0018) | 0.0050*** (0.0018) |
| Inflows | -1.3766*** (0.0251) | -1.3553*** (0.0251) | -1.3583*** (0.0253) | -1.3354*** (0.0254) | -1.3933*** (0.0301) | -1.3697*** (0.0300) |
| Inflows \times ESG | 0.1269 (0.0891) | 0.1244 (0.0918) | -0.0316 (0.0427) | -0.0309 (0.0427) | 0.0908** (0.0436) | 0.0822* (0.0438) |
| Outflows | 0.8958*** (0.0133) | 0.9060*** (0.0132) | 0.8994*** (0.0157) | 0.9067*** (0.0153) | 0.8868*** (0.0154) | 0.8997*** (0.0153) |
| Outflows \times ESG | -0.0946 (0.1382) | -0.0775 (0.1423) | -0.0205 (0.0255) | -0.0116 (0.0252) | 0.0468 (0.0304) | 0.0356 (0.0306) |
| Fund size | -0.0073** (0.0029) | -0.0115*** (0.0030) | -0.0083*** (0.0028) | -0.0119*** (0.0029) | -0.0062** (0.0029) | -0.0101*** (0.0030) |
| Fund size \times ESG | -0.0085 (0.0106) | -0.0002 (0.0104) | 0.0001 (0.0010) | -0.0003 (0.0010) | -0.0019 (0.0014) | -0.0016 (0.0014) |

| (continued) | | | | | | |
|--------------------------|-------|------------|----------|------------|----------|------------|
| Market return | | -0.1142*** | | -0.1130*** | | -0.1139*** |
| | | (0.0097) | | (0.0088) | | (0.0096) |
| Market return volatility | | 0.0791 | | 0.0472 | | 0.0833 |
| | | (0.1658) | | (0.1567) | | (0.1652) |
| ESG | | | 0.0033 | 0.0112 | 0.0377 | 0.0324 |
| | | | (0.0204) | (0.0203) | (0.0285) | (0.0275) |
| Observations | 9,374 | 9,374 | 9,194 | 9,194 | 9,344 | 9,344 |
| R-squared | 0.813 | 0.817 | 0.830 | 0.835 | 0.813 | 0.817 |

Panel B: *t*-tests on linear combinations of parameters

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|------------|------------|------------|------------|------------|------------|
| Sensitivity of net sales by non-ESG funds to: | | | | | | |
| Inflows/Normal | -1.3767*** | -1.3553*** | -1.3583*** | -1.3354*** | -1.3933*** | -1.3697*** |
| Inflows/Crash | -1.2089*** | -1.1996*** | -1.224*** | -1.2159*** | -1.1851*** | -1.1779*** |
| Outflows/Normal | 0.8958*** | 0.906*** | 0.8994*** | 0.9067*** | 0.8868*** | 0.8997*** |
| Outflows/Crash | 0.8278*** | 0.826*** | 0.8241*** | 0.8239*** | 0.8098*** | 0.8086*** |
| Sensitivity of net sales by ESG funds to: | | | | | | |
| Inflows/Normal | -1.2498*** | -1.2309*** | -1.39*** | -1.3663*** | -1.3025*** | -1.2875*** |
| Inflows/Crash | -1.2728*** | -1.2695*** | -1.2217*** | -1.2147*** | -1.2811*** | -1.2706*** |
| Outflows/Normal | 0.8013*** | 0.8285*** | 0.8789*** | 0.8951*** | 0.9335*** | 0.9353*** |
| Outflows/Crash | 1.145 | 1.1566*** | 0.827*** | 0.8228*** | 0.8929*** | 0.8905*** |

Table 14: Determinants of mutual fund net sales of ES and non-ES stocks: Quarterly data

The table reports regressions for Net Sales at the fund level (Panel A) and t -tests on linear combinations of parameters (Panel B). The dependent variable in Panel A is Net Sales, total dollar sales less total dollar purchases of ES stocks (columns (1), (3), and (5)) and of non-ES stocks (columns (2), (4), and (6)) made by fund i during quarter t as a percentage of the total dollar holdings of fund i at the end of quarter $t - 1$. The sample is composed of all U.S. actively-managed equity funds. The sample period is from January 2019 to June 2020. The variable *Crash* takes the value of one in the first quarter of 2020. All variables are defined in the Appendix (see Table A1). All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Standard errors are White-corrected for heteroskedasticity and clustered at the fund level. Fund fixed effects included. p -values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*).

Panel A: Coefficient estimates

| VARIABLES | ESG (prospectus) | | ESG (Globe ratings) | | ESG (Low Carbon) | |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| Crash | 0.2113*** (0.0430) | 0.0837* (0.0490) | 0.2475*** (0.0560) | 0.0168 (0.0648) | 0.2145*** (0.0521) | 0.0692 (0.0614) |
| Crash × ESG | -0.4763*** (0.1780) | 0.1889 (0.1344) | -0.1873** (0.0816) | 0.1413 (0.0901) | -0.1025 (0.0762) | 0.0384 (0.0807) |
| Crash × Inflows | 0.1536 (0.1550) | 0.3459* (0.1766) | 0.2962 (0.2878) | 0.6063** (0.3022) | 0.2987 (0.2503) | 0.4362 (0.2809) |
| Crash × Inflows × ESG | -0.8893*** (0.2976) | -0.1349 (0.2657) | -0.2867 (0.3010) | -0.5643* (0.3259) | -0.4836* (0.2713) | -0.1991 (0.3020) |
| Crash × Outflows | -0.2671*** (0.0747) | -0.1565*** (0.0368) | -0.2503** (0.1082) | -0.1391*** (0.0492) | -0.2865*** (0.0852) | -0.1340*** (0.0514) |
| Crash × Outflows × ESG | -0.1870 (0.1798) | 0.0336 (0.1570) | -0.0592 (0.1270) | -0.0539 (0.0694) | 0.0991 (0.1209) | -0.0372 (0.0737) |
| Crash × Fund size | -0.0089*** (0.0019) | -0.0021 (0.0022) | -0.0109*** (0.0024) | 0.0012 (0.0030) | -0.0090*** (0.0023) | -0.0017 (0.0028) |
| Crash × Fund size × ESG | 0.0259*** (0.0090) | -0.0109 (0.0069) | 0.0091** (0.0039) | -0.0066 (0.0043) | 0.0043 (0.0036) | -0.0013 (0.0039) |
| Inflows | -1.5305*** (0.0725) | -1.4893*** (0.0699) | -1.5739*** (0.0601) | -1.5241*** (0.0641) | -1.5979*** (0.0627) | -1.4768*** (0.0620) |
| Inflows × ESG | 0.0587 (0.2311) | 0.0621 (0.2337) | -0.0432 (0.0865) | 0.0417 (0.0953) | 0.1063 (0.1005) | -0.1055 (0.0925) |
| Outflows | 0.6111*** (0.0322) | 0.5667*** (0.0247) | 0.5864*** (0.0367) | 0.5562*** (0.0293) | 0.6060*** (0.0363) | 0.5705*** (0.0275) |
| Outflows × ESG | 0.2869* (0.1684) | 0.1391 (0.1096) | 0.1089* (0.0559) | 0.0740 (0.0472) | 0.0424 (0.0706) | -0.0118 (0.0576) |
| Fund size | -0.0373*** (0.0111) | -0.0115 (0.0128) | -0.0287*** (0.0075) | -0.0055 (0.0094) | -0.0300*** (0.0082) | -0.0086 (0.0098) |

(continued)

| | | | | | | |
|--------------------------|------------------------|----------------------|------------------------|----------------------|------------------------|---------------------|
| Fund size × ESG | 0.0465 (0.0324) | -0.0188 (0.0278) | -0.0008 (0.0020) | 0.0003 (0.0026) | 0.0023 (0.0031) | -0.0006 (0.0029) |
| Market return | -0.1386*** (0.0207) | -0.0140 (0.0300) | -0.1495*** (0.0191) | -0.0061 (0.0300) | -0.1421*** (0.0202) | -0.0138 (0.0301) |
| Market return volatility | 0.1005 (0.3755) | -0.8824* (0.5222) | 0.3189 (0.3446) | -0.9300* (0.5225) | 0.2892 (0.3707) | -0.8203 (0.5245) |
| ESG | | | 0.0141 (0.0410) | 0.0017 (0.0526) | -0.0549 (0.0605) | 0.0131 (0.0582) |
| Observations | 18,669 | | 18,345 | | 18,602 | |
| R-squared | 0.592 | | 0.599 | | 0.593 | |

Panel B: *t*-tests on linear combinations of parameters

| | Sensitivity of Net Sales of | | | | | |
|-----------------------------|-----------------------------|------------|---------------|------------|---------------|------------|
| | non-ES stocks | ES stocks | non-ES stocks | ES stocks | non-ES stocks | ES stocks |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| by non-ESG funds to: | | | | | | |
| Inflows/Normal | -1.5305*** | -1.4893*** | -1.5739*** | -1.5241*** | -1.5979*** | -1.4769*** |
| Inflows/Crash | -1.3769*** | -1.1435*** | -1.2776*** | -0.9178*** | -1.2992*** | -1.0407*** |
| Outflows/Normal | 0.6111*** | 0.5667*** | 0.5864*** | 0.5562*** | 0.606*** | 0.5705*** |
| Outflows/Crash | 0.344*** | 0.4103*** | 0.3361*** | 0.4171*** | 0.3195*** | 0.4364*** |
| by ESG funds to: | | | | | | |
| Inflows/Normal | -1.4718*** | -1.4272*** | -1.617*** | -1.4824*** | -1.4916*** | -1.5824*** |
| Inflows/Crash | -2.2075*** | -1.2163*** | -1.6075*** | -1.4404*** | -1.6765*** | -1.3452*** |
| Outflows/Normal | 0.898*** | 0.7058*** | 0.6953*** | 0.6302*** | 0.6484*** | 0.5586*** |
| Outflows/Crash | 0.444*** | 0.5829*** | 0.3857*** | 0.4372*** | 0.4611*** | 0.3874*** |

Appendix A.

Table A1: Variable definitions.

| | |
|--|--|
| Churn ratio | This variable measures how frequently institutional investors trade the stocks in their portfolios and is constructed as in Gaspar, Massa, and Matos (2005) . (Source: Morningstar historical holdings) |
| Crash | A dummy variable that takes a value of one during February and March 2020 (when global financial markets experienced collapsed) and zero otherwise. |
| ESG Globe Rating | A dummy variable that takes a value of one if the fund receives a Sustainability rating of 4 and 5 Globes and zero otherwise. Morningstar assigns Sustainability Ratings by ranking all scored funds within a Morningstar Global Category by their Historical Sustainability Scores. The ranked funds are then divided into five groups, based on a normal distribution, and each receives a rating from "High" to "Low." Percent Rank Rating Depiction (Top 10%) High – 5 globes; (Next 22.5%) Above Average – 4 globes; (Next 35%) Average – 3 globes; (Next 22.5%) Below Average globes; (Bottom 10%) Low - 1 globe. (Source: Morningstar Direct) |
| ESG Low Carbon Designation | A dummy variable that takes a value of one if the fund has a Low Carbon designation and zero otherwise. This is based on two metrics, Morningstar Portfolio Carbon Risk Score and The Morningstar Portfolio Fossil Fuel Involvement. Funds may receive the Low Carbon Designation, which allows investors to easily identify low-carbon funds within the global universe. To receive the designation, a fund must have a 12-month average Portfolio Carbon Risk Score below 10 and a 12-month average Fossil Fuel Involvement of less than 7% of assets. (Source: Morningstar Direct) |
| ESG Prospectus | A dummy variable that takes a value of one if the fund incorporates environmental, social, and governance (ESG) principles into the investment process or through engagement activities and zero otherwise. (Source: Morningstar Direct) |
| Fund flow | The monthly change in net assets under management less the returns in month t divided by net assets under management in month $t - 1$. (Source: Morningstar Direct) |
| Inflow | This variable is equal to fund flow if positive, otherwise zero. (Source: Morningstar Direct) |
| Market Return | The return of the reference index as defined in the prospectus or provided by Morningstar in month t . (Source: Morningstar Direct) |
| Market Return Volatility | The standard deviation of the market daily returns during month t . (Source: Morningstar Direct) |
| Outflow | This variable is equal to the absolute value of fund flow if negative, otherwise zero. (Source: Morningstar Direct) |
| Net Sales | The net dollar sales, gross dollar sales minus gross dollar purchases, made by mutual fund i during month t as a percentage of the total dollar holdings of the same fund at the end of month $t - 1$. (Source: Morningstar historical holdings) |
| Refinitiv Environment and Social score | A dummy variable that takes a value of one if the stock receives an ES Score above the top quartile of the distribution and zero otherwise. The ES Score is the average between the Environment and the Social scores. (Source: Refinitiv) |

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