Mutual Fund Trading and ESG Stock Resilience During the COVID-19 Stock Market Crash[1]

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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. Using proprietary monthly holdings data from Morningstar, we show that Environmental, Social, and Governance (ESG) funds traded in a way consistent with catering to their clientele, thus helping to stabilize the market for ESG stocks, but interestingly non-ESG funds also provided support for ESG stocks. First, all funds experiencing inflows further helped to stabilize the market during the crash by increasing net purchases per dollar of inflows. This behaviour was more pronounced for ESG funds. Second, non-ESG funds experiencing outflows increased their net sales per dollar of outflow only for non-ESG stocks, resulting in a tilting of their portfolios towards ESG stocks.

Keywords: Environmental and social responsibility, clientele effects, fund flows, investor horizon, stock market crash
JEL Classifications: G01, G12, G23, G32, M14

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1. Introduction

Recent research on Environmental, Social, and Governance (ESG) investments suggests that there is an ESG clientele in asset management. Hartzmark and Sussman (2019) show that investors respond to new sustainability ratings with inflows to funds categorized as high sustainability, even though there is no difference in fund performance. Bauer, Ruof, and Smeets (2021) document that a majority of individual investors in a Dutch pension fund are willing to increase investments based on United Nations' Sustainable Development Goals even at the expense of financial returns. In addition, Bollen (2007) and Renneboog, Ter Horst, and Zhang (2008) show that investors in Socially Responsible Investment funds are less sensitive to fund performance than investors in conventional mutual funds. In this paper, we ask whether fund managers' trading behavior in response to market conditions incorporates the existence of an ESG clientele.

The setting of our analysis is the stock market crash during the first quarter of 2020. With the onset of the COVID-19 pandemic, stock prices declined on average by close to 30 percent during the crash, but performance varied significantly across firms. Stocks with high ESG ratings performed better during the stock market collapse with higher returns and lower volatility, relative to non-ESG stocks (see e.g., Albuquerque, Koskinen, Yang, and Zhang 2020, and Ding, Levine, Lin, and Xie 2021). We study whether the existence of an ESG clientele for some funds helped to stabilize segments of the stock market during the COVID-19 crash of 2020. Specifically, we ask if the trading behavior of the mutual funds that cater to an ESG clientele differed from that of other funds, even if both funds experienced the same level of flows.

We expect that trading by ESG funds and conventional funds differed during the crash relative to the pre-crash period. First, and given the evidence in Bollen (2007) and Renneboog, Ter Horst, and Zhang (2008), we hypothesize that in a declining market, as was the case of the COVID-19 crash, fund managers may sell stock in anticipation of future outflows, but less so if they cater to an ESG clientele. Accordingly, aggregate net sales by conventional funds are expected to increase during the crash by more than net sales by ESG funds, for the same

level of current outflows.

Second, Pastor and Vorsatz (2020) show that ESG-oriented funds on average encountered inflows, whereas other funds experienced outflows during the stock market crash. If fund managers merely pass flows through by scaling portfolios up or down, then ESG and conventional funds will not change the relative composition of their net sales during the crash viz-à-viz their pre-crash trading, per dollar of flows. Alternatively, we hypothesize that ESG funds buy more (sell less) of ESG stocks than non-ESG stocks compared to conventional funds, for the same level of fund inflows (outflows), during the crash relative to the pre-crash period in order to cater to their clientele.

These hypotheses emphasize the discretionary trading behavior of fund managers as they condition on fund flows, in the spirit of Alexander, Cici, and Gibson (2006). Thus, under these hypotheses, the behavior of ESG funds in response to their clientele would be consistent with having a stabilizing effect in the ESG segment of the stock market over and above the effect of fund flows into that segment documented by Pastor and Vorsatz (2020).

The stock market crash of 2020 was a sudden, unanticipated event, unrelated to underlying pre-existing economic conditions. It is therefore an ideal laboratory to study how the stock market valued firms' pre-pandemic characteristics during the time of great uncertainty, and the loyalty of mutual funds to their portfolios as a whole and to certain stocks in particular. Our main data source is a proprietary data set from Morningstar with portfolio holdings collected monthly. 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 the publicly available quarterly data. We measure net sales as the monthly gross sales minus gross purchases normalized by lagged total dollar holdings and measure fund flows also normalized by total net assets. In the absence of gross flow data, we define inflows as fund flows if they are positive, and outflows as the absolute value of fund flows if they are negative. Our fund-level ESG metrics are based on whether the fund prospectus designates the fund as an ESG fund, or if a fund has four or five Globe sustainability ratings

from Morningstar.[2] 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 are from Thomson Reuters Refinitiv. Our final sample contains 1,699 unique funds with total net assets of $3.1 trillion, representing about 400,000 stock positions.

We start by examining aggregate fund-level net sales as a function of funds' ESG orientation, a stock market crash dummy, fund inflows and outflows, and fund inflows and outflows interacted with the crash and fund ESG-orientation dummies, fund size, and aggregate stock market return and volatility. We highlight two findings. First, the sensitivity of net sales to fund outflows increased during the crash relative to normal times for non-ESG funds, but not for ESG funds. This doesn't mean that ESG funds avoided net sales, but rather that they did not change the dollar value of net sales per dollar of outflows from normal times to crash. Second, the sensitivity of net sales to fund inflows decreased for all funds during the crash relative to normal times, being lowest for ESG funds. In other words, all funds increased their *net buying* of stocks per dollar of inflows during crash relative to normal times, with ESG funds buying stocks more aggressively during the crash per dollar of inflows relative to everyone else relative to normal times. Overall, at the aggregate fund-portfolio level, ESG funds decreased the sensitivity of net sales to fund flows from normal times to crash more so than non-ESG funds consistent with our first hypothesis.

We further look into the trading patterns across ES and non-ES stocks by fund category. We have two main findings. First, net buying of ES and non-ES stocks increased for ESG and non-ESG funds in response to fund inflows during the crash relative to normal times, with ESG funds having the greatest sensitivity to inflows. The finding that net-sales of ES stocks by ESG funds were more sensitive to inflows than those of non-ESG funds during the crisis (and

[2] Hartzmark and Sussman (2019) demonstrate the relevance of Globe ratings by showing that flows increased for funds with high Globe ratings and decreased for funds with low Globe ratings after the ratings were introduced in 2016.

higher than in normal times) is evidence consistent with fund managers catering to their clientele. In addition, we know from prior research (Pastor and Vorsatz 2020) that during the crash ESG-oriented funds were the ones that experienced most inflows, which can be interpreted as a direct consequence of a clientele effect. The cumulation of these findings may have contributed to ES stock price resiliency during the crash months of February and March.

Second, non-ESG funds increased net sales of non-ES stocks per dollar of outflows during the crash relative to normal times. Most remarkably, though, for the same funds, net sales of ES stocks per dollar of outflows did not change in the crash relative to normal times. We also find no change in net sales for ESG funds per dollar of outflows for either ES and non-ES stocks from normal times to crash, though the sensitivity of net sales of non-ES stocks is significantly higher than that of ES stocks for ESG funds through the sample, consistent with the clientele-catering hypothesis. Our findings suggest that the clientele hypothesis has an additional indirect effect through the choices of non-ESG funds. Non-ESG funds contributed to the panic selling of non-ES stocks during the crash (increasing their relative holdings of ES stocks) by selling their non-ES stocks more aggressively either under the expectation that ESG funds would be catering to their clientele and be hesitant in selling their ES stocks, or simply in response to the observed price resilience of ES stocks.

In summary, the trading patterns of mutual fund managers of ESG and non-ESG funds are consistent with the existence of an ESG clientele effect at the fund level. They are also consistent with the ESG clientele manifesting itself in the market for the underlying assets as evidenced in the price resilience of ES stocks. We emphasize that our effects are *not mechanic* in the sense that fund managers did not simply pass through the flows they received from investors. By looking at the differential sensitivity of net sales to flows, our analysis compares the changes in trading behavior from normal times to the crash across ESG and non-ESG funds, conditioning on the level of flows.

One potentially confounding effect is that firm-level ES is a proxy for other pre-determined characteristics that fund managers cared for during the crisis.

These other firm characteristics may have been perceived by fund managers as being associated with a smaller exposure to fire sales in a down market. We consider whether investors had a preference during the crash for stocks with high cash, low leverage, or stocks that are associated with long-term investor ownership. Including these variables does not significantly change our results.

An alternative story for the relatively better performance of ES stocks during the crash 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 or instead of the way that mutual fund managers trade in response to fund flows.[3] We proxy a fund's investor horizon with its (lagged) churn ratio, a measure of portfolio turnover, as in Cella et al. (2013) and others. In our tests, investor horizon has no significant impact on our main results, nor does it significantly help predict the behavior of net sales during the COVID-19 stock market crash.

We also study the behavior of Low-Carbon-Designated funds, a Morningstar classification based on portfolio holdings like the Globe sustainability ratings. The study of these funds is warranted because of the increased focus on climate change and the role of corporations in mitigating it. For example, Anderson and Robinson (2021) show that investors with environmental fears rebalance their retirement portfolios towards more sustainable investments. 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 for ESG funds despite the fact that only 17% of the fund-month observations in our sample have both Low-carbon designation and a high Globe rating. Our main finding is that the difference in net sales sensitivity to outflows between low-carbon and other funds was even larger during the crash than the

[3] Starks, Venkat, and Zhu (2020) find that investors in ESG firms demonstrate greater patience in response to bad news as compared to other stocks in their portfolios.

difference identified above under other ESG-fund designations. There are two reasons for this: First, the sensitivity of net sales to fund outflows decreased for low-carbon funds during the crash, especially for ES stocks, compared to our previous results, which is consistent with a clientele effect. Second, the sensitivity of net sales to outflows increased for other funds, and especially for non-ES stocks.

We document the importance of using monthly data for our study by replicating the analysis using quarterly holdings data, which are 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 are needed to uncover the behavioral differences between ESG-oriented and other funds during the crisis. The evidence suggests that some changes in portfolio holdings may be transitory, though this conclusion may be confounded by the existence of window dressing in quarterly data, which results from the availability of information from quarterly filings. We also extend the period of analysis by including all of 2019 data. We do this for two reasons. First, it allows us to better control for any existing pre-trends. Second, the longer sample coupled with quarter fixed effects allow us to benchmark our results against the same quarters in 2019. We find no significant change in results when we start the sample in January 2019.

The rest of the paper is structured as follows. The next section discusses the related literature. Section 3 describes the data and the empirical methodology. Section 4 reports the baseline results and Section 5 describes the results for low-carbon funds. Section 6 examines funds' investment horizons. Section 7 describes robustness checks and Section 8 concludes.

2. Related literature

Investor clienteles in mutual funds have been identified in ESG versus non-ESG funds (Hartzmark and Sussman 2019, Bollen 2007, and Renneboog et al. 2008), value versus growth mutual funds (Blackburn, Goetzmann, and Ukhov 2007), dividends (Harris, Hartzmark, and Solomon 2015), and direct-sold versus

broker-sold funds (Del Guercio and Reuter 2014). In addition, Zhang (2021) shows that mutual funds and 13f institutions are less prone to sell overpriced stocks with high ESG scores. Evidence for ESG preferences for individual investors has lately also been documented by Bauer et al. (2021). Huang, Karolyi, and Kwan (2021) show that when investors pay more attention to ESG issues they are less likely to sell and more likely to buy stocks with high ESG ratings. ESG preferences may sometimes be misconceived: Rzeznik, Hanley, and Pelizzon (2021) show that investors incorrectly bought stocks when Sustainalytics inverted their ESG ratings, erroneously believing that higher rating meant improved ESG performance. Humphrey et al. (2021) show in an experiment that about half of the subjects demonstrate a significant preference for responsible investing by halving their allocation to stocks associated with negative ES externalities. Our results contribute to the study of the effects of clienteles in the market for underlying assets by describing how fund managers trade in response to their ESG clientele during a stock market crash.

Our results regarding the higher sensitivity of non-ESG fund net sales to outflows for non-ES stocks during the crash are consistent with herding behavior: every additional $1 of outflow, if outflows are above inflows, from non-ESG funds was converted into additional $1.24 of net sales of non-ES stocks during the crash for those funds. 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 stocks, but that the trading behavior of non-ESG funds toward non-ES stocks is consistent with positive feedback trading.

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 first quarter of 2020 documented by Pastor and Vorsatz (2020) that we also observe in our sample. Like us, Gantchev, Giannetti, and Li (2021) report that mutual funds are aware of the benefits of catering to an ESG clientele. They show that mutual funds increased their holdings of sustainable stocks after the introduction of Morningstar's Globe ratings, thus improving their ratings, arguably in the hopes of receiving flows from an ESG clientele.

ESG stocks and mutual funds have been shown to have performed better during previous stock market crashes (for stocks, see Lins, Servaes, and Tamayo 2017 and for funds, see Nofsinger and Varma 2014). Several recent papers examine ESG ratings and stock returns during the initial phases of the COVID-19 pandemic. Albuquerque et al. (2020) show using U.S. data that firms with high E and S scores fared better during the crash. Ding, Levine, Lin, and Xie (2021) provide international evidence that E and S polices had positive impact on stock returns. Garel and Petit-Romec (2021) show that only E scores had a positive effect on stock returns. Bae, El Ghoul, Gong, and Guedhami (2021) and Demers, Hendrikse, Joos, and Lev (2021) find no evidence that ES ratings affected stock returns. One reason for the discrepancy in results in these two last papers is their use of market-based measures of firm size as a control variable, which tend to absorb in a forward-looking manner the effect of other variables. In addition, control variables are more important when using cross-sectional regressions as in Bae et al. (2021) and Demers et al. (2021), but not when conducting difference-in-difference regressions as Albuquerque et al. (2020) do for their main analysis.

3. Data and empirical methodology

3.1. 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.[4] 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, also including 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 identifiers available for their portfolio stocks. We focus on 2020 data to be comparable with other papers on the COVID crisis, but later do a robustness analysis that includes 2019 data. From Morningstar Direct, we obtain information on the 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 the Morningstar historical holdings dataset, we select those funds for which at least 80% of the portfolio is disclosed. We then merge the data with Morningstar Direct using FundID to identify the legal domicile. We remove 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 of the funds that do not have monthly data, resulting in a sample of 1,717 unique actively

[4] Across the world, funds report to Morningstar typically on a monthly basis and, when not, then almost always quarterly.

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. This sample contains just under a monthly average of 400,000 stock-level portfolio positions.

We also collect several indicators of funds' environmental, social, and governance performance from Morningstar Direct. First, we denote as ESG funds those that report being ESG funds in their prospectus. Second, 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. There are two main differences between using the fund's prospectus information versus the Globe ratings or Low-Carbon designation. Prospectus information is dated and requires truthful revelation to be credible, a concern that 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. Morningstar's Globe ratings and Low-Carbon designation instead are updated monthly on the basis of the fund's actual portfolio holdings over the previous 12 months. The assumption that portfolio holdings reveal the preference of fund managers is consistent with Gantchev, Giannetti, and Li (2021) who demonstrate that mutual fund managers are aware of potential benefits of owning ESG stocks. Except perhaps for funds whose portfolios screen certain stocks such as the 'sin' stocks, all other funds are expected to have a mix of ESG and non-ESG stocks in their portfolios. Studying how funds trade ESG stocks and others is the purpose of this study. In our sample, in January of 2020, TNA of funds that identify as ESG in their prospectus is $64 billion, TNA of funds with 4 or 5 Globe ratings is $909 billion, and TNA of funds with Low-carbon designation is $988 billion.

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. Fund flows

are normalized by TNA and average fund flows are weighted by fund TNA. 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 asymmetric behavior of fund flows in March for ESG funds and 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 clientele hypothesis, and for which we need the higher frequency data on portfolio holdings.

Figure 1 here

The main independent variables in our panel regressions are fund flows, which are normalized by TNA. We treat fund flows as exogenous to the fund manager, within the period. 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.[5] When we discuss the effect of Inflows and Outflows on Net Sales below, we note that the interpretation should reflect the truncated nature of the flow variables: we measure the marginal change in Net Sales resulting from a marginal increase in inflows (outflows), if fund inflows (outflows) are greater than outflows (inflows). Sporadically, below, we shall remind the reader of how to interpret the estimated sensitivities of net sales to flows.

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

[5]It 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.

March. Outflows were slower to respond, peaking in March. This evidence highlights the importance of having monthly frequency data and of separating the two components of fund flows as different funds were responding to differential investor behavior through the crash. 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 (for all ESG categories). The figure also shows that the funds experiencing Outflows have double the TNA compared to funds encountering Inflows, which is consistent with a declining industry trend; 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

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). We identify ES stocks if they are in the top quartile of ES score. One noteworthy aspect regarding Refinitiv ES scores is that they are calculated relative to an industry benchmark. It is therefore not expected that a single industry will drive the results in our paper. For example, the oil and gas industry is typically thought to have low environmental performance, but the firms in that industry need not have low E scores because of the relative scoring. Nonetheless, in a robustness analysis available in the online appendix, we omit the oil and gas industry. We do so mostly because oil prices experienced a sharp decline in the first half of 2020, so outflows from the industry could be related to the oil price change and not with it scoring low on ES. We obtain similar results to our main analysis.

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

3.2. Empirical strategy

3.2.1. Using aggregate fund-level net sales

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, Bollen 2007, and Zhang 2021). When the market loses value quickly, such as in the COVID-19 market crash, if the fund manager anticipates investor withdrawals, then she will sell her holdings in order to meet some amount of the expected future withdrawals so as to avoid selling later at even lower prices. *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, controlling for current fund flows.

The first test looks into monthly aggregate, fund-level net sales as the dependent variable. Due to the granularity of our dataset at fund and ISIN level on quantities and prices, we are able to compute net sales for each stock and then aggregate to fund level as in Cella et al. (2013). $NetSales_{t,i}$ equals the sum across all stocks held by fund i of gross sales minus gross purchases during month t as a percentage of the fund's total dollar holdings at the end of month $t-1$ (there is only a small discrepancy between the denominator used for net sales–total dollar holdings– and that used for fund flows–total net assets–and we will assume these are the same quantities when we interpret the magnitude of the coefficient estimates below). We include in this calculation all equities, U.S. and non-U.S., traded by U.S. mutual funds.

We interact each of the independent variables of interest, Inflows and Outflows, with a fund-level ESG dummy and a dummy, denoted by $Crash_t$, that equals one for the stock market crash months of February and March and equals zero otherwise. By interacting with flows, we analyze the sensitivity of net sales of ESG and non-ESG funds, conditional on the same level of flows. By further interacting with crash, we can compare how the trading sensitivities changed during the crisis. 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. 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 on the resilience of ES stocks.

3.2.2. Using net sales of ES and non-ES stocks

The previous regression specification, which looks at aggregate net sales, does not distinguish between ES and non-ES stocks. However, as discussed above ESG and non-ESG funds may have both ES stocks and non-ES stocks in their portfolios. 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 relatively more of the non-ES stocks, for the same level of outflows. If non-ES stocks keep falling in value faster, then postponing their sales will result in larger losses in case of continued redemptions going forward. The manager would then prefer to sell the non-ES stocks in the portfolio, continuing the herd-like behavior regarding those stocks and supporting the value of ES stocks in a self-fulfilling way (see Wermers 1999 for evidence of mutual fund herd behavior). For ESG funds, this behavior would amplify their clientele effect. For non-ESG funds, this behavior would be reinforced if the fund manager expects ESG funds to respond to a clientele effect.

Alternatively, the fund manager may choose to pass through the observed outflows keeping the current portfolio weights. While this may appear to be a neutral strategy, in fact it is not as non-ES stocks are losing value faster and the observed current weights are already tilted to ES stocks relative to pre-crash levels. To rebalance the portfolio weights to pre-crisis levels, these funds would have to sell relatively more of ES stocks. As a third possibility, the fund manager may choose to sell the ES stocks in her portfolio so as to keep the realized losses

at a minimum. We turn to data to inform us on the net contribution of these three effects.

Testing the hypothesis that funds sold non-ES stocks more aggressively than ES stocks for the same level of 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 estimate one single regression equation by augmenting the previous model with a dummy variable that identifies ES versus non-ES stocks and interact this dummy with all our variables. The single estimation produces the same coefficient estimates as would be obtained by running two separate regressions one for net sales of ES stocks and the other for net sales of non-ES stocks.[6] It has the advantage over estimating two separate regressions that we can construct hypothesis tests on the difference of coefficients across equations. In the regressions we run, 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, and the crash dummy. Again, the interaction with flows gives the sensitivity of net sales by ESG and non-ESG funds, conditional on the same level of flows, whereas the interaction with crash gives us a comparison of the trading sensitivities across normal times and the crisis.

4. Results

4.1. Aggregate fund-level net sales

We start inspecting the trading behavior of actively managed equity mutual funds in the U.S. by studying aggregate net sales at the fund level. Table

[6]The implementation uses the Stata command *reghdfe* (see Correia 2017).

2 presents preliminary 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 Globe ratings. 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 for considering 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 decreased net sales over the full sample period. Also, all funds sold more stocks during the crash than they did on average. The interaction between the crash dummy and ESG is negative, but it is insignificant when funds are classified based on Globe ratings (this result becomes statistically significant when we also control for fund flows). Larger funds sold less stocks during the period, especially so during the crash months. The effect of fund size is economically much larger 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 fewer stocks when volatility was high, controlling for all else.

We next turn to the effect of fund flows on the behavior of ESG and non-ESG funds. Controlling for fund flows is important as we wish to analyze discretionary trading of fund managers beyond the trading induced by flows. 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 standard errors, clustered by fund.

Panel A presents the estimated coefficients. First, there is a significant increase in the R-squares of the regressions relative to those of Table 2, doubling in some instances. Since changes in fund cash holdings minus net sales equal fund flows, it is not surprising that fund flows are an important determinant of net sales as they would also be of changes in cash. For this reason also, we ignore changes in cash in the analysis as they would simply reflect this accounting identity.[7] Second, controlling for fund flows, ESG funds sold less stock during the crash than did non-ESG funds independently of the definition of ESG fund used.

The presence of multiple interaction terms complicates the interpretation of other effects. For that reason, we construct Panel B, which 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 with the difference being significant at the 1% level (untabulated t-test)). We should take some care in interpreting these coefficients because Inflows and Outflows are truncated versions of fund flows. The coefficient on Inflows should be viewed as indicating the marginal increase in net sales per dollar of inflows, if

[7] A different issue arises because of the possibility that funds that have more cash end up responding differently during the crisis (Chernenko and Sunderam (2016)). In the online appendix, we show that accounting for this possibility by interacting the fund ESG dummy with the crash dummy and with the level of fund cash holdings does not significantly alter the results.

fund flows are positive. Thus, a zero coefficient pre-crisis means that net sales did not respond to marginal inflows that are in excess of outflows.[8] 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 with the difference being significant at the 1% level (untabulated t-test)).

Overall, while the difference between the two fund types shrinks during the crash, ESG funds still buy relatively more in response to inflows (the difference of sensitivities in crash $-0.2154 = -1.2095 - (-0.9941)$ is significant at the 10% level (untabulated t-test)). For every additional \$1 of inflow, if inflows are larger than outflows, ESG funds increased net-purchases by \$1.2095 during the crash. As funds could instead have kept some of the inflows as cash, the observed response of ESG funds to inflows is consistent with the clientele hypothesis and with the resilience of ES stocks.

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, with the difference being significant at the 1% level (untabulated t-test)), though the change in sensitivity from normal times to crash is not as large as that with Inflows. For every additional \$1 of outflow, if outflows are larger than inflows, non-ESG funds increased net-sales by \$1.23 during the crash, contributing to a faster market decline. ESG funds became less sensitive to fund outflows during the crash (from a sensitivity of 1.01 to 0.86, though the difference is insignificant (untabulated t-test)) when using Morningstar Globe ratings, but more sensitive when using ESG prospectus (see columns 1 and 2). This difference across ESG definitions, prospectus versus globe ratings, in terms of net sales response to Outflows is a possible sign of

[8] Still, it is unexpected that net sales of non-ESG funds did not respond more strongly to fund inflows (in excess of outflows) during normal times. One explanation for the finding is that non-ESG funds were experiencing a historical decline in fund inflows during our period of analysis and fund managers were more risk averse in immediately investing these extra funds.

greenwashing. As we will show, the evidence that uses the Low-carbon designation, which relies on portfolio holdings like the Globe ratings classification, is similar to that found for the Globe ratings ESG definition.

Overall, both ESG and non-ESG funds bought more stock during the crash in response to inflows, though the effect is more pronounced for ESG funds. Non-ESG funds also sold more stock if they experienced outflows during the crash. This evidence is consistent with our first hypothesis.

4.2. Net sales of ES and 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. Recall that the estimation is done using a single regression and interacting all the variables with a dummy variable for ES stocks, which allow us to conduct hypothesis testing comparing coefficients across equations. Thus, the number of observations almost doubles, because practically all funds hold both ES and non-ES stocks.

Panel A contains the regression results for the two ESG-fund designations. In the two columns labelled (1), we use the fund's own prospectus designation, and in the next two columns, labelled (2), an ESG fund has 4 or 5 Morningstar Globe ratings. For each ESG/non-ESG fund designation, we report results for net sales of non-ES stocks and for net sales of ES stocks. The regressions include fund and quarter fixed effects and control for market return and market volatility. We report robust standard errors 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 provide 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 using Globe ratings (columns 3 and 4) for brevity. There is an increased sensitivity of Net Sales of both ES and non-ES stocks to Inflows during the crash: 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. For ESG funds, the sensitivity increases from −0.65 to −1.00 for ES

stocks and from −0.89 to −1.34 for non-ES stocks. In untabulated tests, we find that for non-ESG funds there is no difference in sensitivities during the crash (i.e., the difference between −0.885 and −0.95 is not statistically significant), but for ESG funds the difference in sensitivities during the crash is significant (i.e., the difference between −1.00 and −1.34 is significant at the 5% level). 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 and is consistent with ESG funds' trading helping the resilience of ES stocks. Interestingly, ESG funds were relatively more aggressive during the crash in buying non-ES stocks in response to inflows. For every additional $1 of inflow, if inflows were larger than outflows, ESG funds increased net-purchases of non-ES stocks by $1.34, possibly as they pursued undervalued non-ES stocks and acted as a stabilizing force also for non-ESG stocks.

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 and shows no difference across stock types (in untabulated tests we find that differences are statistically insignificant whether we use the Globe ratings or the prospectus definition of ESG fund). However, consistent with the clientele-catering hypothesis, the sensitivity of net sales of non-ES stocks to outflows remained higher for ESG funds than the sensitivity of net sales of ES stocks to outflows.

Perhaps more surprising is the finding that non-ESG funds sold non-ES stocks more aggressively in response to Outflows than they did 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 (in untabulated results we find this difference to be statistically insignificant), whereas the sensitivity of Net Sales of non-ES stocks to Outflows increased from 1.01 to 1.24 (in untabulated results we find this difference to be significant at the 5% level). Further, in untabulated results, for non-ESG funds, we find that the difference in sensitivities to Outflows in normal times across non-ES and ES stocks is $1.01 - 0.82 = 0.19$ and not statistically significant, whereas the difference in sensitivities to Outflows during

the crash across non-ES and ES stocks is $1.24 - 0.89 = 0.35$ and statistically significant at the 5% level. Thus, non-ESG funds main trading behavior change during the crash was to sell more aggressively their non-ES portfolio in response to outflows: for every $1 of outflows, if outflows were larger than inflows, non-ESG funds increased net sales of non-ES stocks by $1.24. Combined with the evidence that non-ESG funds experienced greater outflows, the crash appears to have resulted in a significant tilting of the 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, over the direct effect of increased fund flows into the ESG segment of the market and decreased fund flows into the conventional segment of the market.

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 did not significantly change their behavior towards ES stocks, maintaining their preference for ES stocks from pre-crisis levels, whereas non-ESG funds sold relatively more non-ES stocks during the crash compared to normal times for the same level of Outflows.

5. 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 54% of the fund-month observations have both Low-Carbon Designation and a low Globe rating (untabulated). We conclude that these two designations contain differential information for investors.

The Low-Carbon Designation is especially interesting since we are not able classify funds solely based on their ES designation, because Morningstar classifies funds as ESG funds, i.e., including governance attributes. By using the

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 during the crash. In addition, the findings in Ceccarelli, Ramelli, and Wagner (2021) suggest that investors have a preference for low-carbon funds, and Anderson and Robinson (2021) show that environmentally-concerned investors tilt their retirement portfolios towards more sustainable investments.

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 the aggregate Net Sales regressions in Table 3 (columns 1 and 2) and those corresponding to the ES and non-ES stocks 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 decreased from 0.85 to 0.48, a difference that in untabulated results we find to be significant at the 5% level, compared to the decrease 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 became less sensitive to Outflows, though the drop is smaller (from 0.84 in normal times to 0.68 during the crash, and the difference is statistically insignificant as found in untabulated results).

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 increased from 0.82 in normal times to 1.01 during the crash, whereas for non-ES stocks, the sensitivity increased

from 1.05 to 1.38 during the crash, with both changes being statistically significant at least at the 10% level as found in untabulated results). In untabulated results, for non-Low-Carbon funds, we find that the difference in sensitivities of Net Sales to Outflows across non-ES and ES stocks in normal times is $0.23 = 1.05 - 0.82$ and significant at the 5% level, whereas the same difference during the crash is a much larger $0.37 = 1.38 - 1.01$ and statistically significant at the 1% level. For completeness, for Low-Carbon funds, neither difference is statistically significant at the usual levels.

Overall, compared to other funds, Low-Carbon-Designation funds behaved in a manner consistent with the behavior of funds with high Globe ratings versus funds with low ratings. Low-Carbon funds provided resilience to ES stocks (and also to a lesser extent to non-ES stocks) when dealing with outflows, whereas non-Low-Carbon funds were particularly aggressive in selling non-ES stocks, for the same level of flows, also contributing to the relative resilience of ES stocks.

6. Fund investment horizon

In this section, we study another mechanism for fund loyalty towards ES 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 trade their holdings less than other investors. As long-term investors tend to have a preference for ES stocks (Starks et al. 2020), it appears reasonable to hypothesize that investor loyalty toward ES stocks is tied to investors' trading horizon.

Following Cella et al. (2013), we proxy the trading horizon of institutional investors by their churn ratio, a portfolio turnover measure formalized by Gaspar, Massa, and Matos (2005), and denote it by *Churn Ratio*.[9] A high Churn Ratio

[9]For 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). See Appendix A for a definition of the Churn ratio. By averaging across different stocks held by a mutual fund, the churn ratio removes idiosyncratic firm-level shocks that may affect

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 have on average 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 differs 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 across all ESG designations outside of the crash, but that behavior stopped during the crash. There are no other significant patterns in our data.

In addition to the hypothesis studied above, it is possible that managers of long-term funds changed the sensitivity of net sales to fund flows during the crisis, confounding our main results. To test this hypothesis, we re-estimate Table 7 by including the triple interactions Crash $\times$ Inflows $\times$ Churn ratio and Crash $\times$ Outflows $\times$ Churn Ratio. If these triple interactions remove the explanatory power of the respective triple interactions with ESG, then we conclude that our

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.

main results are not due to ESG-fund orientation, but are due to the way long-term investors changed their trading behavior in response to fund flows.

The results are presented in Table 8. Again, we turn to panel B for an analysis of the linear combinations of the effects. To evaluate the linear combinations, we use the mean value of the relevant variables. 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 in 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 8 here

7. Robustness analysis

7.1. 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.[10] 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 9 and 10 with the same controls and interactions as in Tables 3 and 4, respectively. Again, we focus on panel B of each of these tables to discuss the results.

Tables 9 and 10 here

[10]If 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.

Table 9 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 for Globe rating and Low-carbon designations of ESG. This behavior is in sharp contrast to the observations using monthly data, where ESG funds were significantly more aggressive buyers in response to Inflows during the crash than non-ESG funds. That ESG funds appear unresponsive to either Inflows or Outflows during normal times also stands in sharp contrast with the evidence using monthly data. One way to reconcile the results is that temporal aggregation of fund flows (and of net sales) cannot detect the nuanced fluctuations of net sales in response to flows within the quarter.

Table 10 presents the results decomposing aggregate net sales into Net Sales of ES stocks and of non-ES stocks. One of the most salient finding relative to what we have highlighted previously is that the sensitivity of Net Sales of non-ES stocks to Outflows during the crash is much weaker for ESG and non-ESG funds across all ESG designations. This behavior is in sharp contrast to the observations using monthly data, and is puzzling at least for the non-ESG funds as these were experiencing greater outflows. The explanation could be due to including January as part of the definition of crash or with temporal aggregation of flows. Importantly, we no longer can establish the result that non-ESG funds also contributed to the resilience of ES stocks by selling their non-ES stocks more aggressively 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 are needed to uncover the behavior of fund managers as the crisis progressed and they responded to fund inflows and outflows.

7.2. Preference for other firm characteristics

During the crisis, fund managers may have looked for firms whose predetermined characteristics made them less likely to experience fire sales. To the extent that firm-level ES correlates with some of these characteristics, our results may simply be picking up these other effects. For example, ESG stocks are more likely held by long-term investors, and ESG stocks are also more likely held by firms with higher cash. To account for these effects and others, we introduce in our regressions triple interactions of the dummy Crash, with the fund dummy ESG, and several firm characteristics: cash, leverage, ROA, and firm-level investor horizon. For each of these characteristics, we compute the fund-level average using the respective stock weights. These are the variables that are interacted. We report the results in the online appendix. The results show that including these variables does not significantly change our results.

7.3. Extended time series

In a last robustness check, we extend the period of analysis by 12 months, back to January 2019. We conduct this analysis in order to potentially better control for any prior trends for funds that were ESG and non-ESG in the main sample period.[11] The longer sample also allows us to benchmark our results to the corresponding months of 2019. 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 longer 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 results. The tables in this subsection can be found in the online appendix.

We proceed with some 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 six months; that is, we use the December 2018 values of these variables to classify funds from January 2019

[11] We thank Alex Wagner for suggesting this additional analysis.

through June 2019, then use the June 2019 value to classify funds from July 2019 through December 2019, and so on. Note that because the fund-ESG classification changes 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.

The results from this robustness are virtually the same as in the main analysis. Without going into detail, we still find that both ESG and non-ESG funds increase their sensitivity to inflows in the crash period. The change is 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 in our main analysis above, that non-ESG funds sold their non-ES stocks more aggressively than they did 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 to the resiliency of ES stocks, since ESG funds experienced greater inflows. As with our main results, non-ESG funds added resilience to ES stocks, since those funds sold relatively more non-ES stocks than ES stocks in response to Outflows during the crash, compared to normal times.

Finally, we replicate the results using quarterly data in this extended time series data set. We conduct 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 7.1.

The use of quarterly data produces markedly 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.

8. 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 aim 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, conditional on the same level of inflows. Surprisingly, we find that both ESG and non-ESG funds sold their non-ES stocks more aggressively during the crash, for the same level of outflows, thus also contributing to the relatively better performance of ES stocks during the crash.

Overall, our results are consistent with the joint hypothesis that there is an investor ESG-clientele and that fund managers changed their trading patterns during the crisis in response to that clientele. We document the importance of using monthly data to uncover these results, as results disappear or become very different when we use quarterly data. We document similar results when we separate funds by a Low-Carbon Morningstar designation.

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 they are in the U.S. We leave that for further study.

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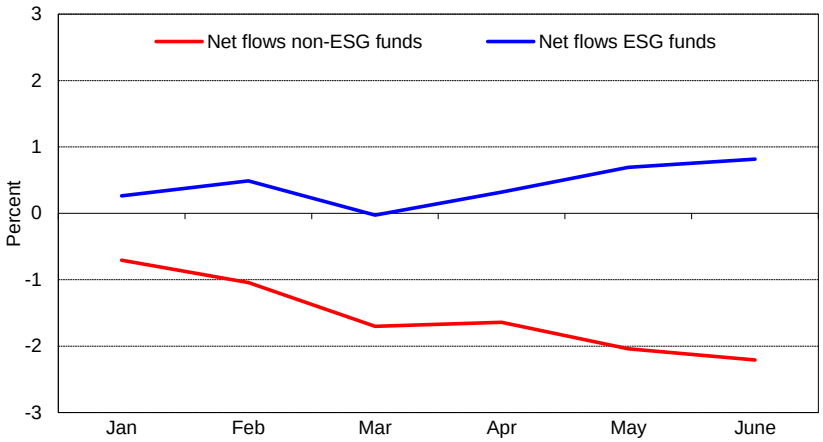
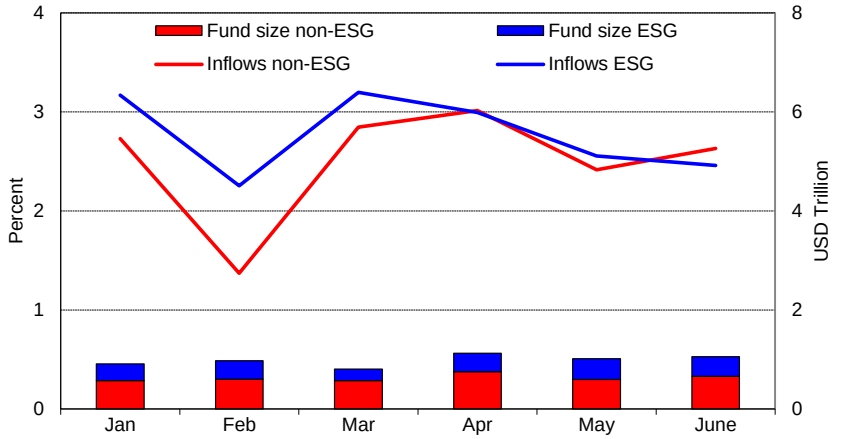
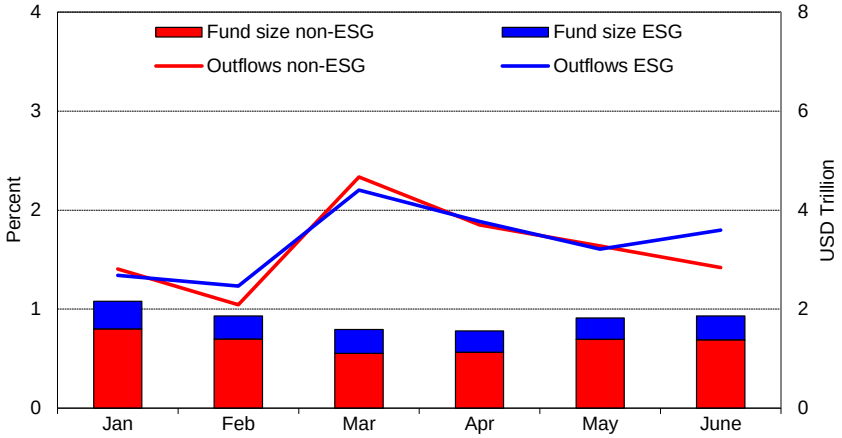


Figure 1: Fund flows and sustainability rating. This figure plots aggregate cumulative net fund flows from January 1 to June 30, 2020 using monthly fund flows, for two fund categories, those that receive by Morningstar 4 or 5 Globe sustainability ratings (ESG funds) and those with less than 4 Globe ratings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

Table 1: Summary statistics

The table shows descriptive statistics for 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 aggregate 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 a 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% (*).

	ESG (prospectus)				ESG (Globe ratings)			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG	-0.0130***	-0.0131***			-0.0061**	-0.0061**		
	(0.0042)	(0.0042)			(0.0019)	(0.0021)		
Crash	0.0729***	0.0477***	0.0551***	0.0466**	0.0715	0.0469	0.0518***	0.0434**
	(0.0177)	(0.0171)	(0.0191)	(0.0189)	(0.0529)	(0.0457)	(0.0181)	(0.0179)
Crash × ESG	-0.0158**	-0.0157**	-0.0197**	-0.0199**	-0.0017	-0.0013	-0.0041	-0.0043
	(0.0074)	(0.0074)	(0.0081)	(0.0082)	(0.0009)	(0.0017)	(0.0032)	(0.0032)
Fund Size	-0.0021***	-0.0021***	-0.1334***	-0.1401***	-0.0018***	-0.0018***	-0.1294***	-0.1366***
	(0.0006)	(0.0006)	(0.0148)	(0.0187)	(0.0003)	(0.0003)	(0.0148)	(0.0188)
Crash × Fund Size	-0.0031***	-0.0029***	-0.0034***	-0.0033***	-0.0030	-0.0029	-0.0032***	-0.0031***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0022)	(0.0023)	(0.0009)	(0.0009)
Market Return		-0.0956***		-0.1290***		-0.0974**		-0.1301***
		(0.0219)		(0.0207)		(0.0345)		(0.0206)
Market Return Volatility		0.6039***		-0.2682**		0.5627***		-0.2819**
		(0.0774)		(0.1358)		(0.0546)		(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 aggregate 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 a 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

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

(continued)

Fund Size	-0.0543***	-0.0512***	-0.0544***	-0.0484***
	(0.0098)	(0.0121)	(0.0117)	(0.0137)
Fund Size × ESG	0.0316**	0.0278*	0.0342**	0.0339**
	(0.0155)	(0.0153)	(0.0169)	(0.0167)
Market Return		-0.1148***		-0.0960***
		(0.0146)		(0.0128)
Market Return Volatility		0.0292		0.1240
		(0.0868)		(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 a 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***	0.0331*	0.0667***	0.0232
	(0.0148)	(0.0178)	(0.0167)	(0.0220)
Crash × ESG	-0.1292*	0.0592	-0.0733**	0.0100
	(0.0692)	(0.0535)	(0.0303)	(0.0335)
Crash × Inflows	-0.9314***	-0.8365***	-0.9524***	-0.8882***
	(0.0793)	(0.1048)	(0.0987)	(0.1391)
Crash × Inflows × ESG	-0.0221	0.5251***	0.5049***	0.5424***
	(0.2383)	(0.1376)	(0.1688)	(0.1929)
Crash × Outflows	0.1227	-0.0198	0.2327**	0.0747
	(0.1564)	(0.1322)	(0.1176)	(0.1248)
Crash × Outflows × ESG	0.0149	0.0765	-0.2437	-0.2131
	(0.3247)	(0.2527)	(0.2765)	(0.2475)
Crash × Fund Size	-0.0026***	-0.0017*	-0.0034***	-0.0013
	(0.0007)	(0.0009)	(0.0008)	(0.0011)
Crash × Fund Size × ESG	0.0068*	-0.0036	0.0034**	-0.0004
	(0.0035)	(0.0026)	(0.0014)	(0.0016)
Inflows	-0.0032	0.0020	-0.0016	0.0030
	(0.0042)	(0.0032)	(0.0026)	(0.0021)
Inflows × ESG	-0.7282***	-0.7121***	-0.8902***	-0.6594***
	(0.1375)	(0.0669)	(0.1393)	(0.1615)
Outflows	1.0320***	0.8614***	1.0070***	0.8204***
	(0.0654)	(0.0706)	(0.0798)	(0.0857)
Outflows × ESG	0.3719	-0.1949*	-0.0078	0.0666
	(0.2375)	(0.1119)	(0.1009)	(0.1060)

(continued)

Fund Size	-0.0333***	-0.0290***	-0.0245**	-0.0278***
	(0.0097)	(0.0095)	(0.0113)	(0.0102)
Fund Size × ESG	0.0576**	0.0015	0.0063	0.0109
	(0.0241)	(0.0183)	(0.0142)	(0.0180)
Market Return	-0.1200***	-0.0540**	-0.1072***	-0.0504**
	(0.0187)	(0.0221)	(0.0180)	(0.0217)
Market Return Volatility	0.2242**	-0.1549	0.3092***	-0.1036
	(0.0917)	(0.1007)	(0.0900)	(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: Net sales by Low-Carbon Designation funds and others

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 a 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***	0.0822***	0.0429***	0.0295
	(0.0141)	(0.0139)	(0.0164)	(0.0215)
Crash × ESG	-0.0505**	-0.0502**	-0.0149	0.0013
	(0.0246)	(0.0246)	(0.0283)	(0.0309)
Crash × Inflows	-0.9775***	-0.9915***	-0.9459***	-0.9075***
	(0.0905)	(0.0920)	(0.0871)	(0.1226)
Crash × Inflows × ESG	0.6581***	0.6671***	0.4158**	0.6015***
	(0.1275)	(0.1301)	(0.2113)	(0.1999)
Crash × Outflows	0.3446***	0.3149***	0.3216***	0.1809*
	(0.0577)	(0.0580)	(0.0971)	(0.1044)
Crash × Outflows × ESG	-0.5733***	-0.5600***	-0.4858**	-0.5523***
	(0.2179)	(0.2155)	(0.2450)	(0.2122)
Crash × Fund Size	-0.0044***	-0.0044***	-0.0023***	-0.0016
	(0.0007)	(0.0007)	(0.0008)	(0.0011)
Crash × Fund Size × ESG	0.0025**	0.0025**	0.0007	0.0001
	(0.0010)	(0.0010)	(0.0013)	(0.0015)
Inflows	-0.0033	-0.0033	-0.0023	0.0027
	(0.0043)	(0.0043)	(0.0033)	(0.0025)
Inflows × ESG	-0.8619***	-0.8613***	-0.8494***	-0.5688***
	(0.0990)	(0.0995)	(0.2195)	(0.1768)
Outflows	1.0173***	1.0256***	1.0535***	0.8217***
	(0.0503)	(0.0505)	(0.0775)	(0.0809)
Outflows × ESG	-0.1439*	-0.1545*	-0.2105	0.0326

(continued)

	(0.0838)	(0.0843)	(0.1287)	(0.1347)
Fund Size	-0.0601***	-0.0539***	-0.0326***	-0.0270***
	(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: Investor horizon and aggregate net selling behavior

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 a 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

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

(continued)

Outflows × ESG	-0.0371	-0.0240	0.0275	0.0230	-0.1277	-0.1379*
	(0.0599)	(0.0571)	(0.0631)	(0.0630)	(0.0786)	(0.0789)
Churn ratio	-0.1096	-0.1204	0.0025	-0.0123	-0.1463	-0.1469
	(0.1400)	(0.1402)	(0.1786)	(0.1776)	(0.1312)	(0.1333)
Churn ratio × ESG	-0.1688	-0.1332	-0.3203	-0.2987	-0.4037	-0.4104
	(0.2199)	(0.2237)	(0.2331)	(0.2301)	(0.4001)	(0.4023)
Fund Size	-0.0544***	-0.0499***	-0.0542***	-0.0471***	-0.0609***	-0.0532***
	(0.0097)	(0.0118)	(0.0114)	(0.0133)	(0.0096)	(0.0112)
Fund Size × ESG	0.0331**	0.0293**	0.0325**	0.0323**	0.0538**	0.0493**
	(0.0153)	(0.0149)	(0.0165)	(0.0162)	(0.0229)	(0.0230)
Market Return		-0.1189***		-0.0988***		-0.1018***
		(0.0147)		(0.0128)		(0.0133)
Market Return Volatility		0.0676		0.1532*		0.1413*
		(0.0855)		(0.0820)		(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: Investor horizon and net sales of ES and non-ES stocks

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

(continued)

	(0.0656)	(0.0707)	(0.0803)	(0.0859)	(0.0780)	(0.0812)
Outflows × ESG	0.3810	-0.2018*	-0.0066	0.0689	-0.1972	0.0471
	(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 net sales of ES and non-ES stocks: Churn Ratio and fund flows

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

(continued)

Inflows	0.3140***	0.1976***	0.4406***	0.2606***	0.3955***	0.2529***
	(0.0882)	(0.0719)	(0.0616)	(0.0612)	(0.0512)	(0.0571)
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 9: 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 a 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

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

(continued)

Fund Size × ESG	-1.0608***	-1.0537***	-0.7295	-0.7299	-0.7051	-0.7015
	(0.3954)	(0.3993)	(0.4460)	(0.4515)	(0.4604)	(0.4699)
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 10: 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 a 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	0.5481	-0.7029	0.2686	-0.9129	0.7076
	(0.7278)	(0.8274)	(0.6865)	(0.7999)	(0.6983)	(0.8173)
Crash × ESG	-1.2534***	-0.0595	-0.2639**	0.0506	-0.1897*	0.1700
	(0.2825)	(0.2088)	(0.1062)	(0.1196)	(0.0973)	(0.1112)
Crash × Inflows	-0.0335	-0.2256	-0.1041	-0.0712	-0.0890	-0.4857
	(0.2166)	(0.2795)	(0.2927)	(0.3614)	(0.2731)	(0.3676)
Crash × Inflows × ESG	-2.8218***	-3.0978***	0.0987	-0.4448	-0.2948	0.7062*
	(0.7257)	(0.7915)	(0.3847)	(0.4587)	(0.3375)	(0.4119)
Crash × Outflows	0.0165	0.3191***	0.0157	0.0858	0.0567	0.4128***
	(0.1107)	(0.1162)	(0.1332)	(0.1405)	(0.1342)	(0.1282)
Crash × Outflows × ESG	2.0314***	1.5544***	-0.0553	0.5522***	0.0051	-0.7113***
	(0.5609)	(0.5584)	(0.2137)	(0.1835)	(0.2228)	(0.2246)
Crash × Fund Size	-0.0137***	0.0003	-0.0163***	0.0039	-0.0141***	0.0012
	(0.0023)	(0.0032)	(0.0029)	(0.0039)	(0.0029)	(0.0040)
Crash × Fund Size × ESG	0.0495***	-0.0194**	0.0141***	-0.0072	0.0087*	-0.0043
	(0.0136)	(0.0092)	(0.0047)	(0.0058)	(0.0045)	(0.0054)
Inflows	-1.1396***	-0.6107**	-0.9600***	-0.5302	-1.0124***	-0.2843
	(0.2108)	(0.2982)	(0.2525)	(0.3429)	(0.2393)	(0.3571)
Inflows × ESG	1.1748	2.8337***	-0.6281*	-0.3038	-0.3711	-1.1371***
	(0.7825)	(0.8280)	(0.3587)	(0.4627)	(0.3233)	(0.4349)
Outflows	0.3828***	0.0950	0.3442***	0.3129**	0.3423***	0.0180
	(0.1010)	(0.1155)	(0.1167)	(0.1366)	(0.1109)	(0.1178)
Outflows × ESG	-1.6792***	-1.3373**	0.2109	-0.4951***	0.0266	0.7106***
	(0.5421)	(0.5311)	(0.2084)	(0.1682)	(0.2137)	(0.2201)

(continued)

Fund Size	-0.1801**	-0.3220***	-0.2411***	-0.1816	-0.2559***	-0.4695***
	(0.0809)	(0.1183)	(0.0926)	(0.1341)	(0.0983)	(0.1597)
Fund Size × ESG	-1.6068***	-2.4461***	0.1964	-0.4885*	0.0467	0.4457*
	(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***

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)
Fund size	Total net asset value of the fund in log of USD millions. (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)