Sustainable Mutual Fund Performance and Flow in the Recent Years Through the COVID-19 Pandemic

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Abstract

Sustainable investing has gained significant momentum over the past few years. In this paper, we study the performance and flows of sustainable equity mutual funds in recent years through the COVID-19 pandemic. We find that the high-sustainable funds perform better than low-sustainable ones by between 1.32% and 6.96% annually. This outperformance significantly increases during the COVID-19 pandemic-induced market crash and the post-crash pandemic. Similarly, we find that high-sustainable funds attract significantly more investments (or suffer less outflow) than the low-sustainable funds by between 5.28% and 5.76% per annum. These flow differences increase considerably during the market crash, consistent with the ‘flight-to-quality’ effect. We also find that the high-sustainable funds attract significantly more investment during the post-crash pandemic than before the crash. This suggests that investors consider sustainable investing a necessity (not a luxury good), and their taste/attitude towards sustainable investing has changed – now they prioritize ‘investing with a conscience.’

Keywords:

Sustainability, Mutual Funds, Performance, Flow, COVID-19 Pandemic

JEL Classification:

G11, G23, M14

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1 Introduction

Sustainable investing has gained significant momentum over the recent years. Out of the $51.4 trillion managed professionally at the beginning of 2020, almost a third (about $17.1 trillion) is invested in sustainable assets. The number of sustainable funds available to U.S. investors has experienced a nearly fourfold increase over the past ten years. Many new sustainable funds have been launched, existing funds have been repurposed, and many more funds now consider ESG factors to some degree in their investment process.

The rapid growth in sustainable investing has attracted more scrutiny on the performance of these investments. In this paper, we evaluate the performance and flow of sustainable mutual funds in recent years and examine if the COVID-19 pandemic has any impact on them. The empirical evidence regarding sustainable mutual fund performance in the earlier literature is mixed and inconclusive. Nofsinger and Varma (2014) and Dong et al. (2019) find that socially responsible or high-CSR mutual funds underperform during non-crisis periods and outperform during market crises. Gil-Bazo et al. (2010) and Reddy et al. (2017) find that ethical funds or socially responsible investing (SRI) funds outperform conventional funds. Other studies find no statistical difference in the performance between sustainable and conventional funds (e.g., Hamilton et al., 1993; Statman, 2000; Schröder, 2004; Bauer et al., 2005; and Renneboog et al., 2008).

These earlier studies suffer from the fact that there were not many sustainable funds to draw an inference from. Also, there was no comprehensive metric to classify sustainable funds. These limitations are addressed with the recent increase in the number of sustainable mutual funds and Morningstar’s publication of sustainable mutual fund ratings (globe ratings) since March 2016. A few recent works, such as Hartzmark and Sussman (2019), Pástor and Vorsatz (2020), and Dolvin et al. (2019), use these new globe ratings. Our paper adds to this strand of literature. We use data

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2 According to Morningstar Sustainable Funds U.S. Landscape Report 2020, “Sustainable investing generally refers to the full consideration of environmental, social, and corporate governance, or ESG, concerns within an investment strategy, both to enhance investment performance and contribute to better societal outcomes.”

3 See 2020 Report on US Sustainable and Impact Investing Trends from the US-based Forum for Sustainable and Responsible Investment (US SIF). At the beginning of 2010, the socially responsible investing (SRI) assets represent $3.07 trillion (about 12%) of $25.2 trillion of professionally managed assets, and these numbers increased to $8.7 trillion (nearly 22%) of $40.3 trillion at the beginning of 2016. It grew to about $17.1 trillion (almost 1/3) of $51.4 trillion at the beginning of 2020.

4 Refer to Morningstar Sustainable Funds U.S. Landscape Report 2020.
from seventeen months before the COVID-19 pandemic-induced market crash through the post-crash pandemic until June 2021. To the best of our knowledge, ours is the first paper that includes data from the later months of the pandemic.

Given the size and length of our sample, we are able to study some of the open questions in the literature, such as how high-sustainable funds perform compared to the low-sustainable ones. We are also able to examine if the COVID-19 pandemic has an impact on the performance and flow of sustainable funds or investors’ taste/attitude towards sustainable investment. The availability of the Morningstar globe ratings and the current COVID-19 pandemic provide us with a unique opportunity to study these questions.

Morningstar started publishing globe ratings on mutual funds in March 2016. Until then, there was no easy way to classify mutual funds as sustainable funds. Morningstar’s first publication includes more than 20,000 mutual funds. The top 10% of funds are assigned five globes (five-globe funds or the highest-sustainable funds), and the bottom 10% are assigned one globe (one-globe funds or the lowest-sustainable funds). Hartzmark and Sussman (2019) treat this announcement as a natural experiment and show that investors value sustainability: five-globe funds receive 24 billion investments, whereas one-globe funds lose 12 billion during the 11 months after the sustainability rating announcement. They run an experiment and find that the participants view sustainability as positively predicting future performance; however, they do not find any supporting evidence in their sample period covering up to 11 months from the publication of the sustainability ratings. We use a longer sample period of recent data (from September 2018 to June 2021) and find that the five-globe domestic equity funds perform better than one-sustainable ones by between 1.32% and 6.96% annually⁵. This suggests that the Morningstar sustainability ratings predict long-term performance, which is not captured by Hartzmark and Sussman’s (2019) shorter data sample.

In another recent paper, Pástor and Vorsatz (2020) find that active equity funds with high sustainability ratings perform well during the COVID-19 pandemic-induced market crisis. Nofsinger and Varma (2014) find that socially responsible mutual funds underperform during non-crisis periods and outperform during market crises compared to matched conventional mutual funds.

⁵ See also Gil-Bazo et al. (2010) and Reddy et al. (2017).
funds. Dong et al. (2019) find that U.S. domestic mutual funds overweighting low-CSR stocks outperform funds underweighting low-CSR stocks, and the outperformance reverses during the 2008-2009 financial crisis. We find similar results as the other studies above – five-globe funds outperform the one-globe funds by between 7.32% and 20.76% per annum during the COVID-19 pandemic-induced market crash and between 6.72% and 14.40% per annum during post-crash pandemic till June 2021. However, unlike the earlier studies, we find that five-globe funds perform better during normal/non-crisis times, though the outperformance is significantly less than during the pandemic.

One of the questions often raised in mutual fund literature is if active fund managers add any value to deserve the fees they charge. A related question will be if the active sustainable funds create any value for their shareholders. We show that active five-globe equity funds perform better than the one-globe funds, and this outperformance increases during the market crash and the post-crash pandemic. These results are noteworthy because they seem limited to only active sustainable funds. Omura et al. (2021) don’t find any superior performance of sustainable exchange-traded funds (ETF) compared to the benchmark indices. Similarly, Pavlova and de Boyrie (2021) do not find superior performance in sustainable ETFs during the crisis. Our findings complement their work and suggest that active sustainable funds, not passive sustainable funds, create value for investors. It further indicates that the market is somewhat inefficient and does not reflect the prices of the sustainable stocks held by high-sustainable funds. It takes time for the mispricing to be corrected, resulting in abnormal profit in the long run. The finding that the performance results are only significant for the active sustainable funds strengthens this argument - active sustainable funds can create value by picking underpricing sustainable stocks.

Our fund performance results are related to the strand of literature that explores if CSR activities/ESG performance create value for firms. A few studies provide empirical evidence that firms investing in a socially responsible manner exhibit higher (or not lower) returns. Berg et al. (2021) find that stocks with higher ESG performance have higher expected returns. Lins et al. (2017) show that firms with high social capital as measured by CSR intensity have 4%-7% higher stock returns than firms with low social capital during the 2008-2009 financial crisis. Albuquerque et al. (2020) find that U.S. stocks with higher environmental and social ratings earn significantly higher returns during the first quarter of 2020 when the market crashes. Kempf and Osthoff (2007)
show that stocks with high socially responsible ratings perform better. Ding et al. (2020) find that the pandemic-induced drop in stock returns is milder among firms with more corporate social responsibility activities. Bae et al. (2021) find that the relation between CSR and stock returns during the pandemic-related crisis is positive when CSR is congruent with a firm’s institutional environment.

Next, we study if five-globe funds attract more/less investment than the one-globe funds and if the COVID-19 pandemic has any impact. We find that five-globe funds attract more investments (or suffer less outflow) by between 5.28% and 5.76% per annum than the one-globe funds in our full sample. This difference increases considerably to 9.96% per annum during the COVID-19 pandemic-induced market crash and to between 8.04% and 8.64% per annum during the post-crash pandemic till June 2021. This shows that five-globe funds keep attracting more investments beyond 11 months of Morningstar’s announcement of globe ratings (Hartzmark and Sussman, 2019).

The finding that top globe funds do not lose more funds than the one-globe funds during the market crash or the pandemic - a major health and economic crisis- supports the claim that sustainable investing is a necessity that is in demand in both good and bad times, rather than a luxury good that people indulge in only during good times (see also Pástor and Vorsatz, 2020). There is also a discussion in the popular media that the current COVID-19 pandemic will bring a fundamental shift in investing ‘… the pandemic — and the death and destruction left in its wake — will further prioritize investing with a conscience. …’\(^6\) We find some evidence supporting this - investors are investing 8.04% - 8.64% per annum more in the five-globe funds than the one-globe funds during the post-crash pandemic. Hence, it is possible that investors are not only treating sustainable investing as a necessity but also prioritizing more investments into it during the pandemic. This is consistent with the narrative that there may be a change in investors’ taste/attitude towards sustainable investing.

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\(^6\) Please see https://www.cnbc.com/2020/06/07/sustainable-investing-is-set-to-surge-in-the-wake-of-the-coronavirus-pandemic.html
Financial crises coincide with a period of risk aversion or a flight toward safe-haven asset classes/investment strategies (Coudert and Gex, 2008). Parida and Wang (2018) find that Top CSR funds attract about 8.7% more investments during the financial crisis than in the pre-crisis period, whereas bottom CSR funds receive about 9.8% less investment. We find a similar ‘flight-to-quality’ effect during the COVID-19 pandemic-induced market crash - investors withdraw 9.96% more from the one-globe funds than the five-globe funds during the market crash.

Next, we examine if there is any difference in performance and flow between sustainable institutional and retail funds and the impact of the COVID-19 pandemic on them. We categorize intuitional funds as the funds with a large part of their assets under management in the institutional share classes. These share classes have higher minimum investment requirements and lower fees. They attract more sophisticated investors who monitor the fund managers better. This results in superior performance (Evans and Fahlenbrach, 2012). We find that the outperformance of five-globe funds over one-globe funds is higher for the retail funds (between 0.72% and 5.76% per annum) than the institutional funds (between -1.56% and 3.84%) before the COVID-19 market crash. However, this reverses during the market crash and the post-crash pandemic - the outperformance of five-globe funds over one-globe funds is much higher for the institutional funds than the retail funds. This suggests that more investor oversight provided by the institutional investors (Evans and Fahlenbrach, 2012) is especially helpful for the high-sustainable funds during a market crash/pandemic.

Increasingly Institutional investors have ‘ESG Mandates.’ They engage in ESG issues (Barko et al., 2021, Dyck et al., 2019; Hoepner et al., 2020; Ilhan et al., 2020; Krueger et al., 2020) and tend to commit to ESG publicly (Gibson et al., 2020). These investors are less financially constrained and hence, are less likely to act on negative market news rashly than retail investors. In addition, a large chunk of 401(k) investment goes to institutional share classes, and these investors are less sensitive to market changes (see Blanchett et al., 2020). We find that five-globe institutional funds attract significantly more investments (or lose less investment) than the one-globe funds by between 0.74% and 0.82% per month (or between 8.88% and 9.84% per annum). This effect increases considerably during the COVID-19 pandemic-induced market crash to between 18.24% and 20.40% per annum and the post-crash pandemic to between 10.80% and 13.08%. The high-
sustainable retail funds attract more investments (or lose less investment) than the low-sustainable retail funds too. However, it is not statistically significant. Hence, the institutional funds seem to be driving the results. Our results are similar to Döttling and Kim (2021) (who focus on the early part of the pandemic) to the extent that sustainable institutional funds are doing better in attracting more investments (or losing less investment) than the sustainable retail funds.

The remainder of the paper is organized as follows. Section 2 describes the data used in our study; Section 3 presents the empirical results; section 4 concludes.

2 Data

We obtain data from three sources: fund performance and fund characteristic data are from the CRSP Mutual Fund dataset, sustainability rating data are from Morningstar, and the factor return data are from Kenneth R. French Data Library\(^7\). Our sample is from September 2018 to June 2021 and includes funds that appear in both Morningstar and CRSP datasets. It has 86,057 observations and covers 2,971 actively managed equity mutual funds, with 2531 mutual funds per month on average.

In March 2016, Morningstar published sustainability ratings for mutual funds for the first time. It rates more than 20,000 funds with about $8 trillion assets under management at the share-class level. The fund sustainable rating is a weighted average of the sustainability score of a fund’s underlying holdings. Each holding is given a sustainability score by Sustainalytics\(^8\) based on how a firm scores on environmental, social, and governance (ESG) issues. Every month, Morningstar takes the weighted average sustainability scores of the holdings to form a fund share-class level sustainability score. Next, mutual fund share classes in peer groups (Morningstar Global Category) are ranked based on their sustainability scores:

- The top 10% are categorized as High and given 5 globes
- The next 22.5% are categorized as Above Average and given 4 globes
- The next 35% are categorized as Average and given 3 globes
- The next 22.5% are categorized as Below Average and given 2 globes

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\(^7\) See [https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html](https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

\(^8\) On April 21, 2020, Morningstar, Inc. acquired Sustainalytics.
• The bottom 10% are categorized as Low and given 1 globe

The publication of these globe ratings was designed to be “a reliable, objective way to evaluate how investments are meeting environmental, social, and governance challenges. In short, it helps investors put their money where their values are.”

Until the publication of these rating, there was no clear metrics for the investors to judge if the holdings of a mutual fund meet various sustainability criteria. This globe rating system attracted significant attention at its launch (see Hartzmark and Sussman, 2019).

Like Pástor and Vorsatz (2020) and Pástor et al. (2015), we rely on three main Morningstar category variables in our analysis: the Morningstar Category, the Morningstar Institutional Category, and the Morningstar Global Category, each of which classifies a fund based on its investment style, sector, and geographical orientation. We use the Morningstar Category variable to exclude non-equity funds. Specifically, we exclude bond funds, real estate funds, target funds, and other non-equity funds, keeping only the active equity funds that fall into one or more of the following categories: unclassified funds, international funds, and sector funds. We use the Morningstar Institutional Category variable for clustering standard errors and the Morningstar Global Category for style fixed effects in all our regressions.

We exclude funds with less than $15 million in total net assets (TNA) for a given month (see Pástor and Vorsatz, 2020). If a fund has multiple share classes, we compute the fund-level variables by aggregating them across the different share classes. We sum the TNAs of the different share classes for the fund-level TNA. For other quantitative attributes of funds (e.g., returns, expense ratio, turnover ratio, etc.), we take the TNA-weighted average of the share classes’ attributes. We define fund age as the age of the earliest share class and the fund-level sustainability rating as the minimum globe ratings among all fund share classes. Similarly, we define the fund-level star rating as the minimum star rating among all fund share classes. The dummy variable Front Load equals 1 if the fund has a front load and 0 otherwise.

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9 See http://news.morningstar.com/articlenet/article.aspx?id=745467.
10 For robustness check, we employ two other sustainability measures at the fund level – the sustainability rating of the share class with the highest TNA and the TNA-weighted average sustainability rating.
We use three models to estimate the fund's risk-adjusted return, $\alpha$ - CAPM, the Fama-French three-factor model (Fama and French, 1993, FF3 hereafter), and Carhart’s four-factor model (Carhart, 1997, Carhart4 hereafter). At the end of month $t$, we first estimate $\beta$ s by regressing the excess returns from month $t - 1$ to month $t - 12$ on the independent variables in equations (1), (2), and (3). We, then, estimate the alphas for month $t$.

$$R_{j,t} = \alpha_j + \beta_{1,j} MKTRF_t + \varepsilon_{j,t} \quad (1)$$

$$R_{j,t} = \alpha_j + \beta_{1,j} MKTRF_t + \beta_{2,j} SMB_t + \beta_{3,j} HML_t + \varepsilon_{j,t} \quad (2)$$

$$R_{j,t} = \alpha_j + \beta_{1,j} MKTRF_t + \beta_{2,j} SMB_t + \beta_{3,j} HML_t + \beta_{4,j} UMD_t + \varepsilon_{j,t} \quad (3)$$

We measure the flow of fund $j$ during month $t$ as follows:

$$Flow_{j,t} = \frac{TNA_{j,t} - TNA_{j,t-1}(1+R_{j,t})}{TNA_{j,t-1}} \quad (4)$$

$TNA_{j,t}$ refers to the fund $j$’s TNA at the end of month $t$ and $R_{j,t}$ is the fund $j$’s return for month $t$.

At the end of each month, we match the mutual funds’ risk-adjusted returns and flows with the sustainability rating and all other control variables in the previous month. At any given year $t$, we match the monthly returns and flows of the fund $j$ from January to June (July to December) with the expense ratio, turnover ratio, and annual front load data of year $t - 1$. We divide our sample into three: the Pre-Crash period (September 2018 - January 2020), the Crash period (February 2020 - March 2020), and the Post-Crash period (April 2020 - June 2021) and study how various globe-rated funds perform during these times. Following Bae et al. (2021), we consider the two months, February and March 2020, as the COVID-19 pandemic-induced market crash. As a robustness check, we define the Crisis period as February - April 2020 (see Pástor and Vorsatz, 2020) and find similar results.
We further divide our sample into two - institutional and retail funds. We categorize a fund as an institutional fund if the sum of the TNA of its institutional share classes is more than 2/3 of the TNA of all its share classes and a retail fund otherwise. As a robustness check, we use other thresholds to categorize a fund as an institutional/retail fund and find similar results.

Table 1 reports the summary statistics of the variables used in our study. The mean monthly return net of fees for all funds in our sample is 1.29%, and the mean and median risk-adjusted monthly returns from all three models are negative. The mean and median annual cash flows are -2.64% and -6.72% – funds in our sample experience outflows. The steady outflows reflect the ongoing trend toward passive investment management (Pástor and Vorsatz, 2020). About 8.4% and 8.6% of observations in our sample are associated with one-globe and five-globe ratings, respectively. The remaining 83% of observations are associated with two-globe to four-globe ratings. This distribution of Morningstar globe rating is similar for institutional and retail funds across different sample periods. The median TNA of the funds in our sample is $578 million. The average expense ratio is 0.91%, and the average annual turnover ratio is 55%, which does not differ much between institutional and retail funds. Funds, on average, are 17 years old, and 43% of funds have a front-load fee.

[Table 1 Here]

3. Empirical Results

In this section, we discuss our main empirical results. In all our regressions, we use the Morningstar Institutional Category, which is its finest classification system, to cluster the standard errors, and the Morningstar Global Category, which is used by Morningstar to group the funds for sustainability ranking, for style fixed effect (see Pástor et al., 2015, and Pástor and Vorsatz, 2020). Following the literature, we include the logarithm of TNA, expense ratio, the logarithm of fund age, turnover ratio, and a dummy variable indicating if the fund has a front-load as control variables. In performance-related regressions, we also control the impact of Morningstar star rating on fund performance by including monthly innovation in the star rating, i.e., an upgrade or a downgrade in the rating (Del Guercio and Tkac, 2008, Ceccarelli et al., 2021). In flow-related regressions, we
also add monthly innovation in the star rating or fund return in the past quarter as control variables. To save space, we do not report the coefficients and t-statistics of the control variables from the regressions.

3.1 Performance

In this section, we explore the impact of sustainability on mutual fund performance. We regress fund’s monthly risk-adjusted return, $\alpha$, on dummy variables indicating the sustainability level of funds and control variables as in Equation (5). Dummy variable $5\;Globes$ equals 1 for a fund with five globes rating and zero otherwise. Dummy variable $4\;Globes$ equals 1 for a fund with four globes rating, and zero otherwise, and so on. The one-globe fund group is our reference category. We use innovation in the star rating, the logarithm of fund Total Net Assets, the logarithm of fund age, expense ratio, turnover ratio, and a dummy variable indicating if a fund is a front-load fund ($Front\;Load$ dummy equals 1 if the fund is a front-load fund and 0 otherwise) as control variables. All the independent variables are lagged by a month. For all regression, we use Morningstar Global Category for style fixed effect and the Morningstar Institutional Category to cluster the standard errors.

$$\alpha_{t+1} = \text{Constant} + \beta_1 \times 5\;Globes_t + \beta_2 \times 4\;Globes_t + \beta_3 \times 3\;Globes_t + \beta_4 \times 2\;Globes_t + Controls_t + \epsilon_{t+1} \quad (5)$$

Table 2 presents the results. We do not report coefficient estimates for the control variables to save space. We find that five-globe funds outperform one-globe funds in general, and the outperformance is the highest during February and March of 2021 when the market crashes due to the onset of the COVID-19 pandemic.

[Table 2 Here]

Five-globe funds outperform one-globe funds by between 0.11% and 0.58% monthly (or between 1.32% and 6.96% annually) in our full sample. During the two-month crash in February-March 2020, the outperformance of five-globe funds over one-globe funds increases considerably to between 0.61% and 1.73% monthly (or between 7.32% and 20.76% per annum). Our results are similar to Pástor and Vorsatz (2020), who find that the performance difference between five-globe
funds and one-globe funds is between 2.67% and 14.21% per annum between February 20 to April 30, 2021. The outperformance of five-globe funds during the post-crash pandemic (April 2020 to June 2021) is between 0.34% and 0.56% a month (between 4.08% and 6.72% per annum), increasing from between -0.02% and 0.42% per month (between -0.24% and 5.04% per annum) during the pre-crash period (September 2018 to January 2020). The other higher globe funds (two-globe to four-globe funds) tend to outperform the one-globe funds, and the outperformance is particularly significant for the four-globe funds during the post-crash pandemic - they outperform the one-globe funds by between 0.17% and 0.41% a month (between 2.04% and 4.92% per annum). These results suggest that sustainability ratings positively impact fund performance.

Next, we study if the return differences between five-globe and lower-globe funds are significantly different across the pre-crash, the crash, and the post-crash periods. In Panel A of Table 3, we use data from the pre-crash and crash periods and explore if the return differences between five-globe and lower-globe funds are amplified during the crash compared to before. We regress funds’ monthly $\alpha$ on two dummy variables, $5\ Globes$, $Crash$, and their product, as in Equation (6). The coefficients on the product (the double interaction variable) are all statistically significant. Consistent with our findings in Table 2, the outperformance of five-globe funds over lower-globe funds increases by between 0.45% and 1.04% per month (between 5.4% and 12.48% per annum) during the crash compared with the pre-crash period. In Panel B of Table 3, we use data from the pre-crash and the post-crash periods and compare the outperformance of five-globe funds over lower-globe funds during the pre-crash and the post-crash periods. We regress funds’ monthly $\alpha$ on two dummy variables, $5\ Globes$, $Post-Crash$, and their product, as in Equation (7). The coefficients on the product (the double interaction variable) are all statistically significant, indicating higher outperformance by between 0.32% and 0.39% per month (between 3.84% and 4.68% per year) during the post-crash period than the pre-crash period.

\[
\alpha_{t+1} = \text{Constant} + \beta_1 \times 5\ Globes_t + \beta_2 \times Crash_t + \beta_3 \times 5\ Globes_t \times Crash_t + Controls_t + \epsilon_{t+1} \quad (6)
\]

\[
\alpha_{t+1} = \text{Constant} + \beta_1 \times 5\ Globes_t + \beta_2 \times Post-Crash_t + \beta_3 \times 5\ Globes_t \times Post-Crash_t + Controls_t + \epsilon_{t+1} \quad (7)
\]
Next, we study if the impact of sustainability on fund performance is different across retail and institutional funds. Institutional share classes have higher minimum investment requirements and lower fees. They attract more sophisticated investors who monitor the fund managers better.

We divide our sample into two groups - institutional and retail funds and repeat the earlier regressions of monthly $\alpha$ on globe dummy and control variables. Table 4 reports the results. We find that sustainability positively affects the fund performance for both the institutional and the retail funds (except for one instance). However, the effect is stronger for the institutional funds during the market crash and post-crash period.

[Table 4 Here]

Specifically, five-globe institutional funds outperform one-globe institutional funds by between 0.76% and 2.26% per month (between 9.12% and 27.12% per annum) during the market crash, whereas five-globe retail funds outperform one-globe retail funds by between 0.41% and 1.24% per month (between 4.92% and 14.88% per annum). Similarly, we find that five-globe institutional funds outperform one-globe institutional funds by between 0.56% and 1.2% per month (between 6.72% and 14.40% per annum) during the post-crash period, whereas five-globe retail funds outperform the one-globe retail funds by between 0.12% and 0.31% per month (between 1.4% and 3.72% per annum) and the results are of mixed significance. Overall, we find that the impact of sustainability rating on fund performance is much stronger for the institutional funds through the pandemic, suggesting that more investor oversight provided by the institutional investors (Evans and Fahlenbrach, 2013) is especially helpful for the high-sustainable funds during a market crash/pandemic.

3.2 Fund Flows

We discuss the impact of sustainability ratings on fund flows in this section.

3.2.1 Fund Flows
In Figure 1, we plot the monthly mean flows of each globe rating fund group and the flow differences between five-globe and one-globe funds from September 2018 to June 2021. Remarkably, five-globe funds experience cash inflows for 22 out of 34 months in our sample amid the well-known ongoing trend toward passive investment management. One-globe funds experience outflows for 24 out of 34 months, and the pace of outflows is fairly rapid during the market crash in December 2018 and the COVID-19 pandemic-induced crash in early 2020. Out of the 34 months, the differences in fund flow between five-globe and one-globe funds are negative only for five months – 2018/09, 2019/02, 2019/07, 2021/03, and 2021/05. The mean difference in flow between five-globe and one-globe funds is 0.71% per month or 8.52% per annum with a t-statistics of 5.80. One-globe funds experience significant outflow during the market crash in February and March of 2020. The outflows of one-globe funds continue, but at a much slower pace, during the post-crash pandemic. Five-globe funds experience outflow during the market crash too, but at a much lower magnitude compared with the one-globe funds. Inflows to five-globe funds pick up significantly during the post-crash pandemic.

[Figure 1 Here]

Figure 2 plots the mean fund flows of various globe-rated fund groups in full and the sub-sample periods. Even though it is not monotonic, the flows display an increasing trend from one-globe funds to five-globe funds, with one-globe, two-globe, and three-globe funds experiencing outflow on average in all sample periods and five-globe funds experiencing inflows except during the market crash when funds with any globe rating experience outflow. For example, five-globe funds suffer from 3.48% outflow per annum during the market crash, while one-globe funds suffer from 15.48% outflow per annum. During the post-crash pandemic through June 2021, five-globe funds receive 6.72% inflow per annum, while one-globe funds suffer from 0.84% outflow per annum.

[Figure 2 Here]

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11 The mean differences in CAPM \( \alpha \) (Carhart4 \( \alpha \)) between five-globe and one-globe funds is 0.41% per month or 4.92% per annum (0.15% per month or 1.8% per annum) with a t-statistics of 6.41 (7.48).
Table 5 presents the regressions results of fund flows on globe sustainability rating, which is proxied by the minimum sustainability ratings among all share classes of the fund. We regress monthly fund flows on dummy variables indicating the sustainability level of funds and control variables as in Equation (8). Dummy variable 5 Globes equals 1 for a fund with five globes rating and zero otherwise. Dummy variable 4 Globes variable equals 1 for a fund with four globes rating, and zero otherwise, and so on. The one-globe fund group is our reference category. All regressions include the following control variables - the logarithm of fund’s TNA, the logarithm of fund age, expense ratio, turnover ratio, and a dummy variable indicating if a fund has a front-load (Front Load dummy equals 1 if the fund has a front load and 0 otherwise). In addition to the control variables mentioned above, columns (1) – (4) include returns from the past quarter\textsuperscript{12} as another control variable, and columns (5) – (8) include innovation in the star rating as another control variable. All the dependent variables are lagged by one month. For all the regressions, we include style fixed effects which are based on the Morningstar Global Category, and we cluster standard errors based on Morningstar Institutional Category.

\[ \text{Flow}_{t+1} = \text{Constant} + \beta_1 \times 5 \text{ Globes}_t + \beta_2 \times 4 \text{ Globes}_t + \beta_3 \times 3 \text{ Globes}_t + \beta_4 \times 2 \text{ Globes}_t + \text{Controls}_t + \varepsilon_{t+1} \]  

(8)

To save space, we do not report the coefficient estimates of the control variables. During our full sample period, five-globe funds experience between 0.44% and 0.48% more inflows per month (5.28% - 5.76% per annum) than one-globe funds. Before the COVID-19 pandemic, five-globe funds experienced between 0.30% and 0.35% per month (or between 3.60% and 4.20% per annum) more inflow than one-globe funds. The magnitude of flow differences increases to 0.83% per month or 9.96% per annum during the two months when the market crashes and to between 0.67% and 0.72% per month (or between 8.04% and 8.64% per annum) during the post-crash pandemic.

Next, we study if the impact of sustainability rating on fund flow is different across retail and institutional funds. Increasingly Institutional investors have ‘ESG Mandates.’ They engage in ESG issues (Barko et al., 2021, Dyck et al., 2019; Hoepner et al., 2020; Ilhan et al., 2020; Krueger et

\textsuperscript{12} As a robustness check, we use fund returns from the past six months as a proxy for past performance, and our flow results are similar.
al., 2020) and tend to commit to ESG publicly (Gibson et al., 2020). These investors are less financially constrained, and hence, they are less likely to act on negative market news rashly than retail investors. In addition, a large chunk of 401(k) investment goes to institutional share classes, and these investors are less sensitive to market changes (see Blanchett et al., 2020). We divide our sample into two groups - institutional and retail funds and repeat the earlier regressions of monthly flows on globe dummy variables and other control variables. Panel A and B of Table 6 report the results of the separate regressions for institutional and retail funds, respectively. We find that globe rating affects the fund flow positively. The effect is much stronger for the institutional funds compared to the retail funds.

[Table 6 Here]

From September 2018 to June 2021, five-globe institutional funds experience between 0.74% and 0.82% greater inflows per month (between 8.88% and 9.84% per annum) than one-globe institutional funds. We do not find any statistically significant difference between the flows of five-globe and one-globe retail funds, even though the difference is economically significant. The differences in flows between the five-globe funds and the one-globe funds in Table 5 are primarily driven by institutional funds.

3.2.2 Fund Flows during the Market Crash: ‘Flight to Quality’

Earlier in Table 5, we find that the flow difference between the five-globe funds and the one-globe funds is amplified during the COVID-19 pandemic-induced crash. While all the funds experience outflow on average during the crash, higher-globe funds experienced less outflow than the one-globe funds. This is consistent with the ‘flight to quality’ phenomena reported in the literature (Coudert and Gex, 2008, Parida and Wang, 2018, and Pástor and Vorsatz, 2020). Investors become more quality conscious during a crisis and consider high-globe funds as high-quality funds, one-globe funds as low-quality funds, and therefore, withdraw more from the one-globe funds than from higher-globe funds.

We further investigate this effect by running regressions given by Equation (9). We define a new dummy variable - 2-5 Globes which equals 1 when the globe rating is between 2 and 5 inclusive
and 0 otherwise. Dummy variable \( Crash \) equals 1 when the observation is during the COVID-19 pandemic-induced crash, and 0 otherwise. Dummy variable \( Institutional \) equals 1 if the fund is an institutional fund, and 0 if the fund is a retail fund. Control variables include the logarithm of TNA, the logarithm of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund has a front load. In addition to the control variables mentioned above, columns (1) and (3) of Table 7 include returns from the past quarter as another control variable, and columns (2) and (4) of Table 7 include innovation in star rating as another control variable. The style fixed effects are based on the Morningstar Global Category variable. Standard errors are clustered using the Morningstar Institutional Category. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis.

\[
Flow_{t+1} = \text{Constant} + \beta_1 \times 2-5 \text{ Globes}_t + \beta_2 \times Crash_t + \beta_3 \times 2-5 \text{ Globes}_t \times Crash_t + \text{Controls}_t + \epsilon_{t+1} \tag{9}
\)

In Panel A of Table 7, we regress fund flows on two dummy variables, 2-5 \( \text{Globes} \), \( Crash \), their product, and control variables. The coefficient on the product (the double interaction variable), which is our key variable, is statistically significant at the 5% level when we use past-quarter return as a proxy for past performance, as in Column (1). Consistent with our observations in Table 5, the results indicate that investors withdraw more from the one-globe funds during the crisis than higher-globe funds. Our results are similar when we include both the past quarterly return and innovation in star ratings along with other control variables. This effect is only significant when we group funds with 2 to 5 globes ratings together, indicating that this effect is driven by investors’ withdrawal from the one-globe funds than investment in any higher-globe funds.

We further explore if this ‘flight to quality’ effect is driven by institutional or retail funds by introducing a triple interactions term \(-2-5 \text{ Globes} \times Crash \times Institutional\) and running regressions as in Equation (10). We report the results in Panel B of Table 7. The coefficient on the triple interaction term is positive but not statistically significant. Hence, we do not find any differential flight to quality effect across institutional and retail funds.
Flow_{t+1} = \text{Constant} + \beta_1 \times 2-5 \text{ Globes}_t + \beta_2 \times \text{Crash}_t + \beta_3 \times \text{Institutional} + \beta_4 \times (2-5 \text{ Globes}_t \times \text{Crash}_t) + \\
\beta_5 \times (2-5 \text{ Globes}_t \times \text{Institutional}_t) + \beta_6 \times (\text{Crash}_t \times \text{Institutional}_t) + \\
\beta_7 \times (2-5 \text{ Globes}_t \times \text{Crash}_t \times \text{Institutional}_t) + \text{Controls}_t + \epsilon_{t+1} \quad (10)

3.2.3 Sustainable Investment: Luxury Vs. Necessity; Is There a Change in the Investor’s Taste/Attitude?

In this section, we investigate whether investors treat sustainable investing as a necessity and invest in higher-globe funds in both good and bad times or as a luxury good to indulge in only during good times. We also explore if ‘… the pandemic — and the death and destruction left in its wake — will further prioritize investing with a conscience. …’ resulting in a jump in the investments in higher-globe funds during the pandemic.

In Table 5, we find that higher-globe (five-globe and four-globe) funds attract more flows during the post-crash pandemic. We investigate this by comparing the observations from the pre-crash and the post-crash periods by running the regressions according to equations (11) and (12). The results are reported in Table 8. The key variables in these regressions are the double interaction term in Equation (11) and the triple interaction term in Equation (12).

\[ \text{Flow}_{t+1} = \text{Constant} + \beta_1 \times 4-5 \text{ Globes}_t + \beta_2 \times \text{Post-Crash}_t + \beta_3 \times 4-5 \text{ Globes}_t \times \text{Post-Crash}_t + \\
\text{Controls}_t + \epsilon_{t+1} \quad (11) \]

\[ \text{Flow}_{t+1} = \text{Constant} + \beta_1 \times 4-5 \text{ Globes}_t + \beta_2 \times \text{Post-Crash}_t + \beta_3 \times \text{Institutional} + \\
\beta_4 \times (4-5 \text{ Globes}_t \times \text{Post-Crash}_t) + \beta_5 \times (4-5 \text{ Globes}_t \times \text{Institutional}_t) + \beta_6 \times (\text{Post-Crash}_t \times \text{Institutional}_t) + \\
\beta_7 \times (4-5 \text{ Globes}_t \times \text{Post-Crash}_t \times \text{Institutional}_t) + \text{Controls}_t + \epsilon_{t+1} \quad (12) \]

We introduce two new dummy variables - 4-5 Globes which equals 1 when the globe rating of the funds is between 4 and 5, and 0 otherwise; and After, which equals 1 when the observation is after the market crash and 0 otherwise. Control variables include the logarithm of TNA, the logarithm of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is front load. In addition to the control variables mentioned above, columns (1) and (3) of Table 8 include returns

\[ \text{See } \text{https://www.cnbc.com/2020/06/07/sustainable-investing-is-set-to-surge-in-the-wake-of-the-coronavirus-pandemic.html} \]
from the past quarter as another control variable, and columns (2) and (4) of Table 8 include innovation in star as another control variable. Fund style fixed effects are based on the Morningstar Global Category variable. Standard errors are clustered based on the Morningstar Institutional Category. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis.

[Table 8 Here]

In Panel A of Table 8, the coefficients on the double interaction term are positive and significant at 1% level. Consistent with our observations in Table 5, we find that investors invest 0.31% – 0.46% per month (or 3.72% - 5.52% per annum) more in the higher globe funds (with globe ratings 5 and 4) than the lower-globe funds (with globe rating 1-3 inclusive) during the post-crash period compared to the pre-crash period. This indicates that investors are not shying away from investing the higher globe funds during the pandemic compared to before the pandemic. This evidence supports the assertion that investors treat sustainable investing as a necessity rather than a luxury good. Moreover, not only have the investors not moved away from the higher-globe funds during the pandemic compared to before, but they also invest more. This supports the claim that investors’ taste/attitude towards sustainable investing may have changed - now, they prioritize ‘investing with a conscience.’

In panel B of Table 8, we further explore if the significant change in the attitude is driven by the institutional or the retail investors. The coefficient on the triple interaction term is positive but not statistically significant. Hence, we do not find any differential effect across retail and institutional funds. Our results are similar when we include both cumulative returns from the past quarter and innovation in the star rating, together with all other control variables in our regressions.

3.3 Robustness check

3.3.1 Definition of Globe Rating at the Fund Level

In our earlier analysis, we used the minimum globe rating among all share classes of a fund as the fund-level globe rating. For robustness check, we employ two other sustainability measures - the globe rating of the share class with the highest TNA and the TNA-weighted average globe rating
among all the share classes. We run our original regressions with both alternate fund-level globe ratings and find similar results. Table 9 presents the performance regression results using the globe rating of the share class with the highest TNA as a proxy for the fund’s globe rating.

We find similar results as before - the five-globe funds outperform one-globe funds by between 1.32% and 7.20% per annum for our entire sample period. The outperformance significantly increases during the COVID-19 pandemic-induced crash to between 6.36% and 21.36% per annum (from between -0.24% and 5.16% before the crash) and continues at between 3.96% and 7.20% per annum during the post-crash pandemic. We find similar results when we use the TNA-weighted average globe rating among all share classes as the globe rating of the fund.

Table 10 is a reproduction of Table 5 and reports the impact of globe rating on fund flows, with the globe rating of the share class with the highest TNA as the fund globe rating. During the full sample period, five-globe funds experience 5.76% - 6.48% more inflows per annum than one-globe funds, and the differences increase significantly during the market crash and the post-crash pandemic. The results corresponding to the ‘flight to quality,’ ‘necessity vs. luxury,’ and ‘change of investors’ attitude’ are similar as well. Also, the results are similar when we use the TNA-weighted average globe rating among all share classes as the globe rating of the fund.

3.3.2 Definition of COVID-19 Pandemic-Induced Crash

Pástor and Vorsatz (2020) use daily data and define the pandemic crisis period as the ten weeks between February 20 and April 30, 2020. Their rationale is as follows: the market peaked on February 19 before the rapid decline, and April 30 is the month-end by which the market had rebounded, and it puts the market bottom on March 23, roughly in the middle of the crisis period. We instead use monthly data and define the crash period as February - March 2020 (see Bae et al., 2021) as the market started recovering in April 2020. We perform a robustness test by defining the market crash period as February - April 2020. We run the performance and flow regressions and
report the results in Tables 11 and 12. The results are similar to our main results in Tables 2 and 5. However, with the inclusion of April 2020 in the market crash period, the magnitude of outperformance of five-globe funds over one-globe funds decreases during the crash period to 3.0% - 16.44% per annum, compared to 7.32% and 20.76% when only February and March 2020 are included. The flow differences between five-globe funds and one-globe funds decrease to 5.64% - 9.20% per annum during the crash period with the inclusion of April 2020, compared to 9.96% when April is not included. This suggests that the flight-to-quality effect is primarily significant during February and March 2020, but not in April 2020, when the market starts to recover.

[Table 11 Here]

[Table 12 Here]

3.3.3 Other Robustness Tests

We perform some other robustness tests. For example, we winsorize all continuous variables at 1% and 99% levels and rerun all the regressions. The empirical results are similar to our main results in Session 2. To save space, we do not report the results.

Earlier, we categorized a fund as institutional if the sum of TNA of its institutional share classes is more than 2/3 of the sum of TNA of all its share classes. Otherwise, we categorize it as a retail fund. As another robustness check, we use other thresholds such as 75% in determining whether a fund is an institutional or retail fund and run the same regressions. Our results are similar - the institutional funds are primarily driving our results. To save space, we do not report the results.

4. Conclusion

We study the performance and flow of sustainable funds and the impact of the pandemic on them using data from seventeen months before the COVID-19 pandemic-induced market crash, through the crash, and the post-crash pandemic. To the best of our knowledge, this is the first paper that studies data from the later months of the pandemic (until June 2021). We present evidence that active high-sustainable domestic equity funds significantly outperform low-sustainable funds,
particularly during the market crash and the post-crash pandemic. In addition, high-sustainable domestic equity funds attract more (or lose less) investments than low-sustainable funds, and this effect is amplified during the crash and the post-crash pandemic.

We shed light on some of the outstanding questions in the literature. First, investors do not sacrifice performance by choosing five-globe (high-sustainable) funds. On the contrary, the five-globe funds outperform the one-globe funds. Second, the one-globe funds lose significantly more money during the market crash than the higher-globe funds, consistent with the flight to quality effect - investors associate one-globe funds with low-quality funds and withdraw more money from them than five-globe funds during a crisis. Third, the five-globe funds attract more funds than the one-globe funds during the post-crash pandemic. This supports the assertion that investors treat sustainable investing as a necessity rather than a luxury good - they do not flee from it during difficult times. The finding that they invest even more in five-globe funds during a pandemic gives credence to the claim that investors’ taste/attitude towards sustainable investing might have changed – now, they prioritize sustainable investments.

The better performance of the high-sustainable funds appears to be limited to active funds only. Other papers find that sustainable ETFs and index funds do not perform well during the early part of the pandemic (Omura et al., 2021, and Pavlova and de Boyrie, 2022). Our results are consistent with the hypothesis formulated by Moskowitz (2000) and Glode (2011) that active sustainable fund managers deliver higher returns during periods when investors’ marginal utility of consumption is higher. We find that institutional funds are driving our results. Institutional investors are following their ‘ESG mandates’ and are more engaging on ESG issues. That is reflected in the flows into the high sustainable funds during the market crash and the post-crash pandemic.
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Figure 1 Time Series Plot of Mean Flow of Various Sustainable Fund Groups. Figure 1 plots the monthly mean flows of various globe-rated fund groups and the flow differences between five-globe and one-globe fund groups from September 2018 to June 2021.

Figure 2 Mean Fund Flows of Sustainable Fund Groups in Sub-Samples. Figure 2 plots the mean flows of various globe-rated fund groups in the full sample and the sub-sample periods.
This table reports the summary statistics of the key variables in our sample from September 2018 to June 2021. CAPM $\alpha$, FF3 $\alpha$, and Carhart $\alpha$ are the monthly risk-adjusted returns calculated using CAPM, Fama-French 3-factor, and Carhart 4-factor models, respectively. Flow is monthly incremental fund flows as a percentage of the previous month’s total net assets. Monthly Return is the monthly fund return net of fees. Quarterly Return the quarterly, semiannual and annual fund returns. Globe is the minimum sustainability rating among all share classes of a fund. Star is the minimum star rating among all share classes of a fund. Star Innovation is the monthly incremental Star rating of a fund. TNA is the total net assets of a fund. Expense Ratio is the annual expense ratio of a fund. Turnover Ratio is the annual turnover ratio of a fund. Age is the number of months for which the earliest share class of the fund is in existence. Front Load Dummy equals 1 if the front load is greater than zero, and 0 otherwise.

| Variable                  | Number of Observations | Mean       | 25%       | Median   | 75%       | Standard Deviation |
|---------------------------|------------------------|------------|-----------|----------|-----------|--------------------|
| CAPM $\alpha$ (%)        | 85,914                 | -0.34      | -1.64     | -0.18    | 1.12      | 2.93               |
| FF3 $\alpha$ (%)         | 85,914                 | -0.19      | -1.36     | -0.08    | 1.07      | 2.88               |
| Carhart4 $\alpha$ (%)    | 85,914                 | -0.30      | -1.47     | -0.10    | 1.05      | 3.12               |
| Flow (%)                  | 85,503                 | -0.22      | -1.49     | -0.56    | 0.44      | 6.23               |
| Monthly Return (%)        | 85,914                 | 1.29       | -1.56     | 1.93     | 4.61      | 6.26               |
| Quarterly Return (%)      | 84,242                 | 3.83       | -1.06     | 4.19     | 9.96      | 10.80              |
| Globe                     | 86,057                 | 2.98       | 2.00      | 3.00     | 4.00      | 1.07               |
| Star Innovation           | 81,940                 | 0.00       | 0.00      | 0.00     | 0.00      | 0.38               |
| TNA ($ million)           | 86,057                 | 4099       | 164       | 578      | 1989      | 25400              |
| Expense Ratio (%)         | 63,553                 | 0.91       | 0.72      | 0.96     | 1.14      | 0.40               |
| Turnover Ratio (%)        | 63,766                 | 55.46      | 22.00     | 40.00    | 69.00     | 86.80              |
| Age (months)              | 86,057                 | 202        | 95        | 175      | 276       | 149                |
| Front Load Dummy          | 86,057                 | 0.43       | 0.00      | 0.00     | 1.00      | 0.50               |
This table shows the regression results with funds’ monthly risk-adjusted returns $\alpha_s$ as the dependent variables in different sample periods. $\text{CAPM} \alpha$, $\text{FF3} \alpha$, and $\text{Carhart4} \alpha$ are the monthly risk-adjusted returns calculated using CAPM, Fama-French 3-factor, and Carhart 4-factor models, respectively. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable $5 \text{Globes}$ equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable $4 \text{Globes}$ variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. Control variables include innovation in the star rating, logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                | Full sample (2018/09 – 2021/06) | Pre-Crash (2018/09 – 2020/01) | Crash (2020/02 – 2020/03) | Post-Crash (2020/04 – 2021/06) |
|----------------|--------------------------------|--------------------------------|---------------------------|--------------------------------|
|                | CAPM $\alpha$       | FF3 $\alpha$     | Carhart4 $\alpha$ | CAPM $\alpha$       | FF3 $\alpha$     | Carhart4 $\alpha$ | CAPM $\alpha$       | FF3 $\alpha$     | Carhart4 $\alpha$ | CAPM $\alpha$       | FF3 $\alpha$     | Carhart4 $\alpha$ |
| $5 \text{Globes}$ | 0.58*** (9.16) | 0.23*** (4.47) | 0.11** (2.01) | 0.42*** (8.23) | 0.06 (1.14) | -0.02 (-0.41) | 1.73*** (6.68) | 0.75** (2.38) | 0.61** (1.97) | 0.56*** (3.98) | 0.44*** (4.73) | 0.34*** (3.18) |
| $4 \text{Globes}$ | 0.47*** (8.32) | 0.14*** (3.30) | 0.05 (1.12) | 0.35*** (8.14) | 0.02 (0.42) | -0.03 (-0.65) | 1.36*** (6.26) | 0.47* (1.74) | 0.46 (1.61) | 0.41*** (3.23) | 0.30*** (3.54) | 0.17* (1.75) |
| $3 \text{Globes}$ | 0.31*** (5.53) | 0.11** (2.57) | 0.04 (0.86) | 0.32*** (7.74) | 0.06 (1.48) | 0.04 (0.85) | 0.92*** (4.31) | 0.34 (1.31) | 0.24 (0.91) | 0.10 (0.79) | 0.17** (2.07) | 0.07 (0.72) |
| $2 \text{Globes}$ | 0.16*** (2.64) | 0.07 (1.43) | 0.01 (0.18) | 0.19*** (4.26) | 0.04 (0.91) | 0.01 (0.30) | 0.58*** (2.68) | 0.26 (0.97) | 0.20 (0.72) | 0.01 (0.04) | 0.11 (1.27) | 0.02 (0.24) |
| $\text{Constant}$ | -0.01*** (-8.15) | -0.00 (-1.00) | -0.00 (-1.14) | -0.01*** (-8.34) | -0.00 (-1.28) | -0.00 (-2.39) | -0.01** (-2.16) | -0.00 (-0.44) | -0.00 (-0.33) | -0.03*** (-9.88) | -0.01*** (-5.93) | -0.01** (-2.50) |
| $N$             | 59812           | 59812           | 59812          | 37481           | 37481          | 37481          | 4604           | 4604           | 4604          | 17727          | 17727          | 17727          |
| $R^2$           | 0.203           | 0.142           | 0.130          | 0.176           | 0.153          | 0.139          | 0.492          | 0.375          | 0.332         | 0.164           | 0.120           | 0.138           |
Table 3 Fund Performance and Sustainability Ratings: the Crash and the Post-Crash Periods Vs. the Pre-Crash Period

This table shows the regression results with funds’ monthly risk-adjusted returns as the dependent variable. \( \text{CAPM} \alpha, \text{FF3} \alpha, \text{and Carhart4} \alpha \) are the monthly risk-adjusted returns calculated using CAPM, Fama-French 3-factor, and Carhart 4-factor models, respectively. Our sample periods include the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - March 2020), and the Post-Crash (April 2020 - June 2021). The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 5 Globes equals 1 when the globe rating of the funds is 5, and 0 otherwise. Dummy variable Crash equals 1 if the observation is during the crash period, i.e., February 2021 to March 2021. Dummy variable Post-Crash equals 1 if the observation is from the post-crash period, i.e., April 2020 to June 2021. Control variables include innovation in the star rating, logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. Panel A contains data from the pre-crash and the crash periods, and Panel B contains data from the pre-crash and the post-crash periods. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                  | Panel A: Crash Vs. Pre-Crash |                  | Panel B: Post-Crash Vs. Pre-Crash |
|------------------|-------------------------------|------------------|-------------------------------|
|                  | CAPM \( \alpha \) | FF3 \( \alpha \) | Carhart4 \( \alpha \) | CAPM \( \alpha \) | FF3 \( \alpha \) | Carhart4 \( \alpha \) |
| 5 Globes         | 0.13***                      | -0.01            | -0.05                         | 0.15***                      | 0.01             | -0.05                        |
|                  | (3.40)                       | (-0.25)          | (-1.33)                       | (4.06)                       | (0.19)           | (-1.33)                       |
| Crash            | -0.04***                     | -0.03***         | -0.02***                      | -0.01***                     | -0.01***         | -0.01***                      |
|                  | (-36.31)                     | (-25.22)         | (-17.42)                      | (-6.54)                      | (-9.48)          | (-9.83)                       |
| 5 Globes \times Crash | 1.04***                     | 0.76***          | 0.45*                         | 0.32***                      | 0.33***          | 0.39***                       |
|                  | (4.99)                       | (3.10)           | (1.88)                        | (3.57)                       | (4.50)           | (5.06)                        |
| Constant         | -0.01***                     | 0.00             | -0.00                         | -0.01***                     | -0.00            | -0.00                         |
|                  | (-5.19)                      | (0.49)           | (-1.21)                       | (-7.36)                      | (-0.82)          | (-1.55)                       |
| N                | 42085                        | 42085            | 42085                         | 55208                        | 55208            | 55208                         |
| \( R^2 \)        | 0.241                        | 0.163            | 0.141                         | 0.152                        | 0.128            | 0.133                         |
Table 4 Fund Performance and Sustainability Ratings: Institutional Vs. Retail Funds

This table shows the regression results with funds’ monthly risk-adjusted returns as the dependent variables in different sample periods - Full sample (September 2018 - June 2021), the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - March 2020), and the Post-Crash (April 2020 - June 2021). CAPM $\alpha$, FF3 $\alpha$, and Carhart4 $\alpha$ are the monthly risk-adjusted returns calculated using CAPM, Fama-French 3-factor, and Carhart 4-factor models, respectively. A fund is categorized as an institutional fund if the total asset of the institutional share classes is more than 2/3 of the asset of all share classes within the fund and retail funds otherwise. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 5 Globes equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable 4 Globes variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. Control variables include innovation in the star rating, logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. Panel A and B show the results of institutional and retail investors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

### Panel A: Institutional Fund Performance and Sustainability Ratings

|                  | Full sample (2018/09 – 2021/06) | Pre-Crash (2018/09 – 2020/01) | Crash (2020/02 – 2020/03) | Post-Crash (2020/04 – 2021/06) |
|------------------|----------------------------------|--------------------------------|---------------------------|--------------------------------|
|                  | CAPM $\alpha$                   | FF3 $\alpha$                   | Carhart4 $\alpha$        | CAPM $\alpha$                   | FF3 $\alpha$                   | Carhart4 $\alpha$        | CAPM $\alpha$                   | FF3 $\alpha$                   | Carhart4 $\alpha$        |
| 5 Globes         | 0.69***                          | 0.15*                          | 0.09                       | 0.32***                          | -0.08                          | -0.13*                         | 2.26***                          | 0.82*                         | 0.76*                         | 1.20***                          | 0.64***                          | 0.56***                         |
|                  | (6.73)                           | (1.88)                         | (1.05)                     | (4.15)                           | (-1.07)                         | (-1.68)                        | (5.85)                           | (1.84)                         | (1.70)                        | (6.03)                           | (4.95)                           | (4.05)                          |
| 4 Globes         | 0.52***                          | 0.09                           | 0.06                       | 0.26***                          | -0.06                          | -0.09                         | 1.70***                          | 0.67*                         | 0.65                         | 0.83***                          | 0.39***                          | 0.33***                          |
|                  | (5.77)                           | (1.35)                         | (0.83)                     | (4.34)                           | (-0.95)                         | (-1.32)                        | (5.34)                           | (1.78)                         | (1.61)                        | (4.57)                           | (3.46)                           | (2.76)                          |
| 3 Globes         | 0.35***                          | 0.06                           | 0.05                       | 0.22***                          | -0.04                          | -0.05                         | 1.28***                          | 0.58                          | 0.50                         | 0.47***                          | 0.26**                           | 0.24**                           |
|                  | (3.91)                           | (0.83)                         | (0.72)                     | (3.75)                           | (-0.71)                         | (-0.74)                        | (4.16)                           | (1.56)                         | (1.43)                        | (2.73)                           | (2.44)                           | (2.21)                          |
| 2 Globes         | 0.18*                            | 0.07                           | 0.06                       | 0.09                             | 0.01                           | -0.01                         | 0.92***                          | 0.64*                         | 0.65*                         | 0.36**                           | 0.27**                           | 0.26**                           |
|                  | (1.80)                           | (0.84)                         | (0.74)                     | (1.35)                           | (0.09)                          | (-0.12)                        | (2.92)                           | (1.69)                         | (1.81)                        | (2.02)                           | (2.53)                           | (2.30)                          |
| Constant         | -0.01***                         | 0.00                           | -0.00                      | -0.01***                         | -0.00                          | -0.00                         | -0.01**                          | -0.01                          | -0.00                         | -0.04***                         | -0.01***                         | -0.01***                         |
|                  | (-4.71)                          | (0.37)                         | (-0.12)                    | (-4.91)                          | (-0.12)                         | (-0.97)                        | (-2.30)                          | (-1.07)                         | (-0.50)                       | (-8.91)                          | (-5.45)                          | (-3.31)                          |
| N                | 26744                           | 26744                          | 26744                      | 16546                           | 16546                          | 16546                         | 2187                            | 2187                          | 2187                         | 8011                            | 8011                             | 8011                             |
| $R^2$            | 0.268                           | 0.193                          | 0.175                      | 0.218                           | 0.199                          | 0.182                         | 0.539                           | 0.408                          | 0.312                         | 0.229                           | 0.167                            | 0.195                            |
## Panel B: Retail Fund Performance and Sustainability Ratings

|                | Full sample (2018/09 – 2021/06) | Pre-Crash (2018/09 – 2020/01) | Crash (2020/02 – 2020/03) | Post-Crash (2020/04 – 2021/06) |
|----------------|----------------------------------|--------------------------------|---------------------------|---------------------------------|
|                | CAPM α | FF3 α | Carhart4 α | CAPM α | FF3 α | Carhart4 α | CAPM α | FF3 α | Carhart4 α | CAPM α | FF3 α | Carhart4 α |
| 5 Globes       | 0.49*** | 0.28** | 0.12*      | 0.48*** | 0.16** | 0.06      | 1.24*** | 0.58 | 0.41      | 0.12  | 0.31** | 0.21      |
|                | (6.08)  | (4.17) | (1.70)     | (7.09)  | (2.21) | (0.83)    | (3.56)  | (1.36) | (1.00)    | (0.66) | (2.47) | (1.43)    |
| 4 Globes       | 0.42*** | 0.17** | 0.04       | 0.39*** | 0.07  | 0.01      | 1.05*** | 0.26 | 0.33      | 0.12  | 0.24** | 0.07      |
|                | (5.76)  | (2.99) | (0.68)     | (6.58)  | (1.06) | (0.17)    | (3.56)  | (0.72) | (0.91)    | (0.73) | (2.12) | (0.53)    |
| 3 Globes       | 0.28*** | 0.14** | 0.03       | 0.38*** | 0.14** | 0.10*     | 0.58**  | 0.12 | -0.04     | -0.13 | 0.13   | -0.03     |
|                | (3.83)  | (2.56) | (0.43)     | (6.58)  | (2.32) | (1.71)    | (2.03)  | (0.33) | (-0.11)   | (-0.75) | (1.12) | (-0.24)   |
| 2 Globes       | 0.15*   | 0.06   | -0.03      | 0.26*** | 0.07  | 0.03      | 0.23    | -0.13 | -0.26     | -0.22 | -0.00  | -0.13     |
|                | (1.96)  | (1.05) | (-0.53)    | (4.31)  | (1.10) | (0.54)    | (0.80)  | (-0.37) | (-0.70)   | (-1.23) | (-0.00) | (-0.99)   |
| Constant       | -0.01***| -0.00  | -0.00      | -0.01***| -0.00 | -0.00**   | -0.00   | 0.01  | 0.01      | -0.02***| -0.01***| -0.00     |
|                | (-6.06) | (-1.38) | (-1.07)    | (-6.26) | (-1.54) | (-2.22)   | (-0.17) | (0.91) | (1.21)    | (-5.13) | (-3.11) | (-0.61)   |
| N              | 33068   | 33068  | 33068      | 20935   | 20935 | 20935     | 2417    | 2417  | 2417      | 9716   | 9716   | 9716      |
| R²             | 0.164   | 0.113  | 0.107      | 0.156   | 0.130 | 0.120     | 0.471   | 0.376 | 0.365     | 0.134  | 0.099  | 0.112     |
Table 5 Fund Flows and Sustainability Ratings

This table shows the regression results with fund flows as the dependent variables in different sample periods- Full Sample (September 2018 – June 2021), the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - March 2020), and the Post-Crash (April 2020 - June 2021). Fund flow is defined as the incremental fund flows as a percentage of the previous month’s total net assets. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 5 Globes equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable 4 Globes variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. Control variables include logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. In addition to the control variables mentioned above, columns (1) – (4) include returns from the past quarter as another control variable, and columns (5) – (8) include innovation in the star rating as another control variable. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                | With Return of the Past Quarter as Control | With Innovation in the Star Rating as Control |
|----------------|-------------------------------------------|---------------------------------------------|
|                | (1)                                       | (2)                                        | (3)                                       | (4)                                       | (5)                                       | (6)                                        | (7)                                       | (8)                                       |
|                | Full Pre-Crash Crash Post-Crash           | Full Pre-Crash Crash Post-Crash            | Full Pre-Crash Crash Post-Crash           | Full Pre-Crash Crash Post-Crash           | Full Pre-Crash Crash Post-Crash           | Full Pre-Crash Crash Post-Crash           | Full Pre-Crash Crash Post-Crash           |
| 5 Globes       | 0.44**                                   | 0.30                                       | 0.83**                                   | 0.67*                                    | 0.48***                                   | 0.35*                                     | 0.83**                                   | 0.72**                                   |
|                | (2.36)                                    | (1.46)                                     | (2.42)                                   | (1.85)                                   | (2.60)                                    | (1.67)                                     | (2.49)                                    | (2.12)                                   |
| 4 Globes       | 0.19                                     | 0.12                                       | 0.63**                                   | 0.22                                     | 0.30*                                     | 0.20                                       | 0.63**                                   | 0.43                                     |
|                | (1.23)                                    | (0.68)                                     | (2.04)                                   | (0.72)                                   | (1.91)                                    | (1.10)                                     | (2.10)                                   | (1.50)                                   |
| 3 Globes       | 0.06                                     | 0.01                                       | 0.81***                                  | -0.08                                    | 0.14                                     | 0.13                                       | 0.68**                                   | 0.03                                     |
|                | (0.40)                                    | (0.07)                                     | (2.75)                                   | (-0.29)                                  | (0.98)                                    | (0.77)                                     | (2.39)                                   | (0.10)                                   |
| 2 Globes       | 0.05                                     | 0.16                                       | 0.43                                     | -0.28                                    | 0.16                                     | 0.29                                       | 0.38                                     | -0.12                                    |
|                | (0.33)                                    | (0.96)                                     | (1.49)                                   | (-0.97)                                  | (1.08)                                    | (1.62)                                     | (1.34)                                   | (-0.46)                                  |
| Constant       | 0.04***                                  | 0.04***                                    | 0.04***                                  | 0.05**                                   | 0.03***                                   | 0.04***                                    | 0.03***                                   | 0.02**                                   |
|                | (8.35)                                    | (7.22)                                     | (4.39)                                   | (6.33)                                   | (6.78)                                    | (6.29)                                     | (3.67)                                   | (2.57)                                   |
| N              | 61845                                    | 38813                                      | 4791                                     | 18241                                    | 59676                                     | 37411                                      | 4603                                     | 17662                                    |
| $R^2$          | 0.023                                    | 0.027                                      | 0.039                                     | 0.025                                    | 0.016                                     | 0.019                                      | 0.032                                     | 0.016                                    |
Table 6 Fund Flows and Sustainability Ratings: Institutional Vs. Retail Funds

This table shows the regression results with funds’ flow as the dependent variables in different sample periods – Full Sample (September 2018 - June 2021), the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - March 2020), and the Post-Crash (April 2020 - June 2021). Fund flow is defined as the incremental fund flows as a percentage of the previous month’s total net assets. A fund is categorized as an institutional fund if the total asset of the institutional share classes is more than 2/3 of the asset of all share classes within the fund and retail funds otherwise. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 5 Globes equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable 4 Globes variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. Control variables include logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. In addition to the control variables mentioned above, columns (1) – (4) include returns from the past quarter as another control variable, and columns (5) – (8) include innovation in the star rating as another control variable. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported. Panel A is for institutional funds, and Panel B is for retail funds.

### Panel A: Institutional Fund Flows and Sustainability Ratings

|                | With Return of the Past Quarter as Control | With Innovation in the Star Rating as Control |
|----------------|------------------------------------------|-----------------------------------------------|
|                | (1)                                      | (2)                                          | (3)                                          | (4)                                          | (5)                                      | (6)                                          | (7)                                          | (8)                                          |
| Full           | 0.74**                                   | 0.66**                                       | 1.70***                                      | 0.90                                         | 0.82**                                   | 0.73**                                       | 1.52**                                      | 1.09                                         |
| Pre-Crash      | (2.15)                                   | (1.97)                                       | (2.73)                                       | (1.29)                                       | (2.34)                                   | (2.02)                                       | (2.45)                                       | (1.63)                                       |
| Crash          | 0.34                                     | 0.43                                         | 1.25**                                       | 0.04                                         | 0.42                                     | 0.44                                         | 1.17**                                       | 0.36                                         |
| Post-Crash     | (1.16)                                   | (1.49)                                       | (2.44)                                       | (0.07)                                       | (1.41)                                   | (1.44)                                       | (2.27)                                       | (0.66)                                       |
| 5 Globes       | 0.00                                     | 0.15                                         | 0.95**                                       | -0.46                                        | 0.08                                     | 0.28                                         | 0.62                                         | -0.33                                        |
|                | (0.02)                                   | (0.52)                                       | (2.13)                                       | (-0.85)                                      | (0.29)                                   | (0.93)                                       | (1.42)                                       | (-0.66)                                      |
| 4 Globes       | -0.14                                    | 0.20                                         | 0.33                                         | -0.84                                        | -0.01                                    | 0.36                                         | 0.23                                         | -0.63                                        |
|                | (-0.48)                                  | (0.67)                                       | (0.72)                                       | (-1.56)                                      | (-0.03)                                  | (1.13)                                       | (0.50)                                       | (-1.27)                                      |
| 3 Globes       | 0.04***                                  | 0.04***                                      | 0.04***                                      | 0.06***                                      | 0.04***                                  | 0.04***                                      | 0.03*                                        | 0.03***                                      |
|                | (6.43)                                   | (5.23)                                       | (2.63)                                       | (4.55)                                       | (5.61)                                   | (4.92)                                       | (1.82)                                       | (3.10)                                       |
| 2 Globes       | N                                        | 28274                                       | 17517                                       | 2310                                         | 8447                                     | 26654                                       | 16499                                       | 2186                                         | 7969                                         |
| Constant       | 0.028                                    | 0.035                                       | 0.046                                        | 0.033                                        | 0.024                                    | 0.030                                        | 0.041                                        | 0.028                                        |
### Panel B: Retail Fund Flows and Sustainability Ratings

| 5 Globes | With Return of the Past Quarter as Control | With Innovation in the Star Rating as Control |
|----------|-------------------------------------------|---------------------------------------------|
|          | Full | Pre-Crash | Crash | Post-Crash | Full | Pre-Crash | Crash | Post-Crash |
|          | (1)  | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 5 Globes | 0.21 | 0.03 | 0.35 | 0.40 | 0.21 | 0.08 | 0.57* | 0.26 |
|          | (1.03) | (0.13) | (1.08) | (1.17) | (1.06) | (0.30) | (1.78) | (0.86) |
| 4 Globes | 0.11 | -0.05 | 0.36 | 0.30 | 0.25 | 0.11 | 0.58 | 0.36 |
|          | (0.63) | (-0.21) | (1.02) | (1.03) | (1.29) | (0.46) | (1.64) | (1.25) |
| 3 Globes | 0.16 | -0.02 | 0.68** | 0.26 | 0.24 | 0.12 | 0.78** | 0.31 |
|          | (0.89) | (-0.08) | (2.05) | (0.82) | (1.33) | (0.50) | (2.35) | (0.98) |
| 2 Globes | 0.21 | 0.18 | 0.64* | 0.12 | 0.30* | 0.30 | 0.66* | 0.21 |
|          | (1.30) | (0.81) | (1.89) | (0.42) | (1.76) | (1.30) | (1.87) | (0.75) |
| Constant | 0.03*** | 0.04*** | 0.01 | 0.02** | 0.03*** | 0.04*** | 0.01 | 0.00 |
|          | (4.39) | (4.07) | (1.08) | (2.29) | (3.81) | (3.76) | (1.05) | (0.17) |
| N        | 33571 | 21296 | 3696 | 8579 | 33022 | 20912 | 3597 | 8513 |
| $R^2$    | 0.026 | 0.030 | 0.034 | 0.031 | 0.016 | 0.020 | 0.025 | 0.018 |
Table 7 Funds Flows: the Crash Period Vs. the Non-Crash Period

This table shows the regression results with fund flows as the dependent variables. Fund flow is defined as the incremental fund flows as a percentage of the previous month’s total net assets. A fund is categorized as an institutional fund if the total asset of the institutional share classes is more than 2/3 of the asset of all share classes within the fund and retail funds otherwise. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 2-5 Globes equals 1 when the globe rating of the funds is between 2 and 5 inclusive, and 0 otherwise. Dummy variable Crash equals 1 when the observation is in the COVID-19 pandemic-induced crash, and 0 otherwise. Dummy variable Institutional equals 1 if the fund is an institutional fund, and 0 if the fund is a retail fund. Control variables include logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. In addition to the control variables mentioned above, Columns (1) and (3) include returns from the past quarter as another control variable, and Columns (2) and (4) include innovation in the star rating as another control variable. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

| Panel A | Panel B |
|---------|---------|
|         | (1)     | (2)     | (3)     | (4)     |
| 2-5 Globes | 0.09    | 0.19    | 0.16    | 0.24    |
|          | (0.60)  | (1.33)  | (0.95)  | (1.43)  |
| Crash   | -0.66** | -1.60***| -0.78** | -1.73***|
|          | (-2.28) | (-5.41) | (-2.33) | (-5.45) |
| 2-5 Globes × Crash | 0.58** | 0.42    | 0.02    | -0.04   |
|          | (2.18)  | (1.60)  | (0.05)  | (-0.10) |
| Constant | 0.04*** | 0.03*** | 2-5 Globes × Crash | 0.37    | 0.26    |
|          | (8.30)  | (6.72)  | (1.15)  | (0.89)  |
| N       | 61845   | 59676   | 2-5 Globes × Institutional | -0.18   | -0.12   |
| R²      | 0.023   | 0.015   |        |        |
| Crash × Institutional |        |        | 0.31    | 0.33    |
|          |         |         | (0.57)  | (0.61)  |
| 2-5 Globes × Crash × Institutional |        |        | 0.41    | 0.29    |
|          |         |         | (0.71)  | (0.51)  |
| Constant | 0.04*** | 0.03*** |        |        |
|          | (7.47)  | (6.15)  |        |        |
| N       | 61845   | 59676   |        |        |
| R²      | 0.023   | 0.016   |        |        |
This table shows the regression results with fund flows as the dependent variables with data from the Pre-Crash (September 2018 - January 2020) and the Post-Crash (April 2020 - June 2021) periods. Fund flow is defined as the incremental fund flows as a percentage of the previous month’s total net assets. A fund is categorized as an institutional fund if the total asset of the institutional share classes is more than 2/3 of the asset of all share classes within the fund and retail funds otherwise. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 4-5 Globes equals 1 when the globe rating of the funds is between 4 and 5 inclusive, and 0 otherwise. Dummy variable Post-Crash equals 1 when the observation is during the post-crash pandemic, i.e., April 2020 to June 2021. Dummy variable Institutional equals 1 if the fund is an institutional fund, and 0 if the fund is a retail fund. Control variables include logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. In addition to the control variables mentioned above, columns (1) and (3) include returns from the past quarter as another control variable, and columns (2) and (4) include innovation in the star rating as another control variable. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                  | Panel A   | Panel B   | Panel B   | Panel B   |
|------------------|-----------|-----------|-----------|-----------|
|                  | (1)       | (2)       | (3)       | (4)       |
| 4-5 Globes       | 0.13      | 0.09      | -0.06     | -0.07     |
|                  | (1.48)    | (0.87)    | (-0.55)   | (-0.56)   |
| Post-Crash       | -0.14     | -0.01     | -0.16     | 0.06      |
|                  | (-0.64)   | (-0.02)   | (-0.66)   | (0.22)    |
| 4-5 Globes × Post-Crash | 0.31**    | 0.46***   | -0.31**   | -0.25*    |
|                  | (1.98)    | (2.87)    | (-2.28)   | (-1.77)   |
| Constant         | 0.03***   | 0.03***   | 0.19      | 0.26      |
|                  | (8.64)    | (7.25)    | (1.10)    | (1.37)    |
| N                | 57054     | 55073     | 0.43**    | 0.35*     |
| R²               | 0.023     | 0.016     | (2.42)    | (1.82)    |
|                  |           |           | Post-Crash × Institutional | 0.04     |
|                  |           |           |          | (-0.14)   |
|                  |           |           |          | (0.22)    |
|                  |           |           | 4-5 Globes × Post-Crash × Institutional | 0.24     |
|                  |           |           |          | (0.45)    |
|                  |           |           |          | (0.77)    |
|                  |           |           | Constant | 0.04***   |
|                  |           |           |          | (8.11)    |
|                  |           |           | N        | 57054     |
|                  |           |           | R²       | 0.024     |
Table 9 Fund Performance and Alternate Sustainability Ratings

This table shows the regression results with funds’ monthly risk-adjusted returns as the dependent variables in different sample periods - Full Sample (September 2018 - June 2021), the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - March 2020), and the Post-Crash (April 2020 - June 2021). CAPM $\alpha$, FF3 $\alpha$, and Carhart4 $\alpha$ are the monthly risk-adjusted returns calculated using CAPM, Fama-French 3-factor, and Carhart 4-factor models, respectively. The fund-level globe rating is proxied by the sustainability rating of the share class with the highest total net asset. Dummy variable 5 Globes equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable 4 Globes variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. Control variables include innovation in the star rating, logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                      | Full sample (2018/09 – 2021/06) | Pre-Crash (2018/09 – 2020/01) | Crash (2020/02 – 2020/03) | Post-Crash (2020/04 – 2021/06) |
|----------------------|---------------------------------|-------------------------------|---------------------------|-------------------------------|
|                      | CAPM $\alpha$ FF3 $\alpha$ Carhart4 $\alpha$ | CAPM $\alpha$ FF3 $\alpha$ Carhart4 $\alpha$ | CAPM $\alpha$ FF3 $\alpha$ Carhart4 $\alpha$ | CAPM $\alpha$ FF3 $\alpha$ Carhart4 $\alpha$ |
| 5 Globes             | 0.60*** 0.24*** 0.11**          | 0.43*** 0.07 -0.02           | 1.78*** 0.79** 0.53*      | 0.60*** 0.43*** 0.33***      |
|                      | (9.41) (4.56) (2.01)           | (8.38) (1.23) (-0.39)        | (7.00) (2.55) (1.75)      | (4.24) (4.69) (3.06)         |
| 4 Globes             | 0.48*** 0.15*** 0.05           | 0.35*** 0.03 -0.02           | 1.41*** 0.52** 0.39       | 0.42*** 0.28*** 0.14         |
|                      | (8.35) (3.27) (1.02)           | (8.12) (0.61) (-0.51)        | (6.56) (1.96) (1.40)      | (3.24) (3.31) (1.43)         |
| 3 Globes             | 0.32*** 0.11** 0.03            | 0.33*** 0.07 0.04            | 0.93*** 0.36 0.10         | 0.12 0.17** 0.06             |
|                      | (5.60) (2.56) (0.72)           | (7.64) (1.47) (0.78)         | (4.41) (1.40) (0.39)      | (0.95) (2.07) (0.66)         |
| 2 Globes             | 0.16** 0.06 -0.00              | 0.19*** 0.04 0.01            | 0.58*** 0.26 0.06         | 0.01 0.09 -0.00              |
|                      | (2.57) (1.29) (-0.05)          | (4.09) (0.84) (0.22)         | (2.69) (0.98) (0.25)      | (0.05) (1.07) (-0.04)        |
| Constant             | -0.01*** -0.00 -0.00           | -0.01*** -0.00 -0.00**       | -0.01*** -0.00 -0.00      | -0.03*** -0.01*** -0.00**    |
|                      | (-8.11) (-0.96) (-1.05)        | (-8.22) (-1.26) (-2.35)      | (-2.17) (-0.48) (-0.09)   | (-10.00) (-5.91) (-2.44)     |
| N                    | 59812 59812 59812             | 37481 37481 37481            | 4604 4604 4604            | 17727 17727 17727            |
| $R^2$                | 0.203 0.142 0.130            | 0.176 0.153 0.139            | 0.493 0.375 0.333         | 0.164 0.120 0.138            |
Table 10 Fund Flows and Alternate Sustainability Ratings

This table shows the regression results with fund flows as the dependent variables in different sample periods - Full Sample (September 2018 - June 2021), the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - March 2020), and the Post-Crash (April 2020 - June 2021). Fund flow is defined as the incremental fund flows as a percentage of the previous month’s total net assets. The fund-level globe rating is proxied by the sustainability rating of the share class with the highest total net asset. Dummy variable 5 Globes equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable 4 Globes variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. The one-globe fund group is our reference category. Control variables include logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. In addition to the control variables mentioned above, columns (1) – (4) include returns from the past quarter as another control variable, and columns (5) – (8) include innovation in the star rating as another control variable. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                | With Return of the Past Quarter as Control | With Innovation in the Star Rating as Control |
|----------------|--------------------------------------------|---------------------------------------------|
|                | (1)            | (2)            | (3)            | (4)            | (5)            | (6)            | (7)            | (8)            |
| 5 Globes       | 0.48***        | 0.34*          | 0.83**         | 0.74**         | 0.54***        | 0.42**         | 0.83**         | 0.81**         |
|                | (2.66)         | (1.76)         | (2.41)         | (2.05)         | (3.00)         | (2.08)         | (2.49)         | (2.39)         |
| 4 Globes       | 0.24           | 0.16           | 0.63**         | 0.30           | 0.36**         | 0.27           | 0.62**         | 0.51*          |
|                | (1.55)         | (0.96)         | (1.98)         | (0.99)         | (2.33)         | (1.50)         | (2.00)         | (1.80)         |
| 3 Globes       | 0.09           | 0.05           | 0.76**         | -0.03          | 0.19           | 0.17           | 0.63**         | 0.11           |
|                | (0.63)         | (0.32)         | (2.49)         | (-0.10)        | (1.27)         | (1.03)         | (2.15)         | (0.38)         |
| 2 Globes       | 0.04           | 0.15           | 0.38           | -0.24          | 0.15           | 0.25           | 0.33           | -0.07          |
|                | (0.30)         | (0.91)         | (1.29)         | (-0.81)        | (1.02)         | (1.47)         | (1.12)         | (-0.28)        |
| Constant       | 0.04***        | 0.04***        | 0.04***        | 0.05***        | 0.03***        | 0.04***        | 0.03***        | 0.02***        |
|                | (8.32)         | (7.27)         | (4.42)         | (6.20)         | (6.77)         | (6.37)         | (3.71)         | (2.45)         |
| N              | 61845          | 38813          | 4791           | 18241          | 59676          | 37411          | 4603           | 17662          |
| R²             | 0.023          | 0.027          | 0.039          | 0.026          | 0.016          | 0.019          | 0.032          | 0.016          |
Table 11 Fund Performance and Sustainability Ratings: Alternate Crash Period

This table shows the regression results with funds’ monthly risk-adjusted returns as the dependent variables in different sample periods - Full Sample (September 2018 - June 2021), the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - April 2020), and the Post-Crash (May 2020 - June 2021). \( \text{CAPM} \alpha \), \( \text{FF3} \alpha \), and \( \text{Carhart4} \alpha \) are the monthly risk-adjusted returns calculated using CAPM, Fama-French 3-factor, and Carhart 4-factor models, respectively. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 5 \( \text{Globes} \) equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable 4 \( \text{Globes} \) variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. The one-globe fund group is our reference category. Control variables include innovation in the star rating, logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                  | Full Sample (2018/09 – 2021/06) | Pre-Crash (2018/09 – 2020/01) | Crash (2020/02 – 2020/04) | Post-Crash (2020/05 – 2021/06) |
|------------------|---------------------------------|-------------------------------|-----------------------------|---------------------------------|
| \( \text{CAPM} \alpha \) | 0.58*** (9.16)                  | 0.42*** (8.23)                | 1.37*** (5.51)              | 0.62*** (4.77)                  |
| \( \text{FF3} \alpha \) | 0.23*** (4.47)                  | 0.06 (-0.41)                 | 0.40 (1.64)                 | 0.65*** (5.99)                  |
| \( \text{Carhart4} \alpha \) | 0.11** (2.01)                  | -0.02 (-0.41)                | 0.25 (1.05)                 | 0.56*** (4.78)                  |
| 5 Globes         |                                 |                               |                             |                                 |
| \( \text{CAPM} \alpha \) | 0.47*** (8.32)                  | 0.35*** (8.14)               | 1.14*** (5.04)              | 0.46*** (3.96)                  |
| \( \text{FF3} \alpha \) | 0.14*** (3.30)                  | 0.02 (-0.65)                 | 0.25 (1.16)                 | 0.47*** (4.95)                  |
| \( \text{Carhart4} \alpha \) | 0.05 (1.12)                     | -0.03 (-0.65)                | 0.21 (0.92)                 | 0.34*** (3.26)                  |
| 4 Globes         |                                 |                               |                             |                                 |
| \( \text{CAPM} \alpha \) | 0.31*** (5.53)                  | 0.32*** (7.74)               | 0.73*** (3.28)              | 0.20* (1.76)                    |
| \( \text{FF3} \alpha \) | 0.11** (2.57)                   | 0.06 (0.85)                  | 0.20 (0.94)                 | 0.33*** (3.66)                  |
| \( \text{Carhart4} \alpha \) | 0.04 (0.86)                     | 0.04 (0.85)                  | 0.07 (0.31)                 | 0.24** (2.43)                   |
| 3 Globes         |                                 |                               |                             |                                 |
| \( \text{CAPM} \alpha \) | 0.16*** (2.64)                  | 0.19*** (4.26)               | 0.32 (1.39)                 | 0.09 (0.73)                     |
| \( \text{FF3} \alpha \) | 0.07 (1.43)                     | 0.04 (0.91)                  | 0.06 (0.28)                 | 0.21** (2.21)                   |
| \( \text{Carhart4} \alpha \) | 0.01 (0.18)                     | 0.01 (0.30)                  | -0.05 (-0.20)               | 0.12 (1.20)                     |
| 2 Globes         |                                 |                               |                             |                                 |
| \( \text{CAPM} \alpha \) | -0.01*** (-8.15)                | -0.01*** (-8.34)             | -0.01** (-2.33)             | -0.01*** (-3.18)                |
| \( \text{FF3} \alpha \) | -0.00 (-1.00)                   | -0.00 (-1.28)                | -0.00 (-0.23)               | 0.00* (2.38)                    |
| \( \text{Carhart4} \alpha \) | -0.00 (-1.14)                   | -0.00 (-2.39)                | -0.00 (0.13)                | 0.00 (1.82)                     |
| Constant         | -0.01*** (-3.18)                | -0.01** (-2.33)              | -0.01** (-0.23)             | -0.01*** (-3.18)                |
| \( \text{N} \) | 59812 59812 59812 37481 37481 37481 6888 6888 6888 15443 15443 15443 |
| \( R^2 \)       | 0.203 0.142 0.130 0.176 0.153 0.139 0.364 0.185 0.213 0.168 0.182 0.209 |
Table 12 Fund Flows and Sustainability Ratings: Alternate Crash Period

This table shows the regression results with funds’ monthly risk-adjusted returns as the dependent variables in different sample periods - Full Sample (September 2018 - June 2021), the Pre-Crash (September 2018 - January 2020), the Crash (February 2020 - April 2020), and the Post-Crash (May 2020 - June 2021). CAPM α, FF3 α, and Carhart4 α are the monthly risk-adjusted returns calculated using CAPM, Fama-French 3-factor, and Carhart 4-factor models, respectively. The fund-level globe rating is proxied by the minimum globe rating among all share classes of a fund. Dummy variable 5 Globes equals 1 for a fund with five globes rating, and 0 otherwise. Dummy variable 4 Globes variable equals 1 for a fund with four globes rating, and 0 otherwise, and so on. The one-globe fund group is our reference category. Control variables include logarithms of TNA, logarithms of fund age, expense ratio, turnover ratio, and a dummy variable indicating if the fund is a front-load fund. In addition to the control variables mentioned above, columns (1) – (4) include returns from the past quarter as another control variable, and columns (5) – (8) include innovation in the star rating as another control variable. Morningstar Global Category and Morningstar Institutional Category are used for style fixed effect and clustering the standard errors, respectively. The coefficients of the globe-related dummy variables are in percentage, and t-statistics are in parenthesis. *** indicates statistical significance at 1%, ** indicates statistical significance at 5%, and * indicates statistical significance at 10%. To save space, control variables are not reported.

|                  | With Return of the Past Quarter as Control | With Innovation in the Star Rating as Control |
|------------------|--------------------------------------------|---------------------------------------------|
|                  | (1)           | (2)           | (3)           | (4)           | (5)           | (6)           | (7)           | (8)           |
|                  | Full          | Pre-Crash     | Crash         | Post-Crash    | Full          | Pre-Crash     | Crash         | Post-Crash    |
| 5 Globes         |               |               |               |               |               |               |               |               |
|                   | 0.44** (2.36) | 0.30 (1.46)   | 0.47 (1.32)   | 0.74** (1.97) | 0.48*** (2.60)| 0.35* (1.67)  | 0.80** (2.24) | 0.70** (2.04) |
| 4 Globes         | 0.19 (1.23)   | 0.12 (0.68)   | 0.43 (1.32)   | 0.19 (0.64)   | 0.30* (1.91)  | 0.20 (1.10)   | 0.71** (2.28) | 0.36 (1.28)   |
| 3 Globes         | 0.06 (0.40)   | 0.01 (0.07)   | 0.46 (1.57)   | -0.09 (-0.31) | 0.14 (0.98)   | 0.13 (0.77)   | 0.51* (1.84)  | 0.00 (0.01)   |
| 2 Globes         | 0.05 (0.33)   | 0.16 (0.96)   | 0.24 (0.79)   | -0.32 (-1.07) | 0.16 (1.08)   | 0.29 (1.62)   | 0.34 (1.12)   | -0.17 (-0.65) |
| Constant         | 0.04*** (8.35)| 0.04*** (7.22)| 0.04*** (4.59)| 0.03*** (4.15)| 0.03*** (6.78)| 0.04*** (6.29)| 0.03*** (3.29)| 0.01 (1.57)   |
| N                | 61845         | 38813         | 4791          | 18241         | 59676         | 37411         | 4603          | 17662         |
| $R^2$            | 0.023         | 0.027         | 0.039         | 0.025         | 0.016         | 0.019         | 0.032         | 0.016         |