Sustainability or Performance?
Ratings and Fund Managers' Incentives

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We use the introduction of Morningstar's sustainability ratings (the "globe" ratings) as an exogenous shock to mutual funds' preferences and show that mutual funds initially attempt to improve their globe ratings by increasing their demand for sustainable stocks. This trading behavior creates buying pressure, making stocks with high sustainability ratings overvalued. As a consequence, a tradeoff between sustainability and performance arises and the performance of funds improving their globe ratings deteriorates. Since performance appears to be more important in attracting flows than sustainability, a new equilibrium emerges in which the globe ratings stop affecting funds' flows and funds do not trade any longer to improve their globe ratings. Our results highlight the issues arising when funds are evaluated along two different dimensions that create conflicting incentives for fund managers who compete for flows.

Keywords. Sustainability; ESG; Mutual Funds; Fund Flows; Ratings

JEL Codes. G11, G12, G23, G24

In their efforts to increase financial flows to sustainable investments, policymakers often advocate higher transparency about the sustainability of mutual fund portfolios. To this end, in March 2016, Morningstar introduced the globe ratings to rank the sustainability of funds' portfolios. Hartzmark and Sussmann (2019) show that in the aftermath of their introduction, these easy-to-process and attention-grabbing signals significantly increased flows to the funds that received the highest sustainability ratings; the converse was true for the funds with the lowest ratings.[1]

This paper asks whether sustainability ratings can have long-lasting effects on the cost and allocation of capital in a world in which funds compete for flows based not only on their portfolios' sustainability, but also on performance. This concern arises from the fact that precisely because they affect flows, ratings are expected to alter demand for certain stocks. In particular, we expect funds to take into consideration the stocks' sustainability ratings to a larger extent after the introduction of the Morningstar globe ratings. On the one hand, this behavior could improve the funds' performance if sustainability is positively related to the stocks' future performance and most market participants do not take it into account (Pedersen, Fitzgibbons, and Pomorski, 2019).

On the other hand, in an attempt to improve their globe ratings, mutual funds may increase their demand for stocks with high sustainability ratings above and beyond what would be warranted by the stocks' expected returns. This behavior is likely to increase the valuation of stocks with high sustainability ratings and negatively affect their future performance (Heinkel, Kraus, and Zechner, 2001; Pastor, Stambaugh, and Taylor, 2019; Pedersen, Fitzgibbons, and Pomorski, 2019).

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[1] Ammann, Bauer, Fischer, and Müller (2019) and Ceccarelli, Ramelli, and Wagner (2020) also show that flows to funds with high sustainability ratings increase in the aftermath of their introduction.

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Under these conditions, a trade-off may arise between the rankings of a fund's portfolio along the sustainability and the performance dimensions. The relative weight that investors put on performance vs. sustainability would then affect fund managers' incentives to pursue different objectives.

We show that after the introduction of the globe ratings, mutual funds changed their investment policies in an attempt to improve the sustainability rankings of their portfolios and achieve higher globe ratings. This created buying (selling) pressure and stocks with high (low) sustainability ratings became overvalued (undervalued) as a result of the mutual funds' trading behavior.

Funds that were attempting to improve their star ratings, another popular Morningstar metrics that ranks mutual funds on performance, purchased (sold) stocks that became undervalued (overvalued) because of the trading of funds pursuing better sustainability ratings. This behavior was more pronounced for funds with stronger incentives to improve their star ratings, for instance because they were closer to the cutoff for a higher rating and competed with fewer peers to be upgraded. As a consequence, funds improving their globe ratings were more likely to experience a downgrade of their star rating. In contrast, funds purchasing (selling) stocks with low (high) sustainability ratings, which were sold (bought) by the funds attempting to improve their globe ratings, achieved better performance and improved their star ratings.

We show that in the aftermath of the introduction of the globe ratings, both high (low) globe and star ratings have positive (negative) effects on flows. However, the magnitude of the effect is larger for the star ratings. More importantly, we find that the effect of the globe ratings on flows is not persistent. In particular, starting nine months after the first introduction of the globe ratings, we no longer observe any effects of these ratings on flows. Consistent with a new

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equilibrium in which globe ratings appear not to affect flows any longer, funds nearly stopped trading in a way to improve their globe ratings.

This paper contributes to a strand of the mutual fund literature exploring how investor flows respond to attention-grabbing and easy-to-process signals, such as external rankings of fund performance (see, e.g., Del Guercio and Tkac, 2008; Ben-David, Li, Rossi, and Song, 2019) or of the sustainability of fund portfolios (Hartzmark and Sussman, 2019; Ammann, Bauer, Fischer and Müller, 2019). To the best of our knowledge, our paper is the first to highlight the issues arising when funds are rated along two different dimensions that may create opposing incentives for fund managers aiming to improve their funds' ratings. We show that in the long run only ratings on the dimension that is followed by a larger proportion of investors appear to have consequential effects.

In this respect, our paper also contributes to a vast literature, mostly developed in the debt markets, on the consequences of ratings. Existing literature shows that corporations and financial intermediaries have strong incentives to improve and manipulate their ratings (e.g., Rajan, Seru, and Vig, 2015). We study how mutual funds strive to improve their performance and sustainability ratings and how incentives arising from fund flows may make some ratings irrelevant in the presence of trade-offs between different types of ratings.

Our paper is also related to a strand of the literature exploring the consequences of investors' preferences for sustainable investments on asset prices. For instance, Chava (2014) and Bolton and Kacperczyk (2020) show that high carbon emissions result in stock undervaluation because of institutional investors' preferences against stocks with these characteristics. We exploit the introduction of the globe ratings as an exogenous shock to mutual funds' preferences affecting the valuation of stocks with different sustainability ratings. We also show how funds react to such a shock to increase their flows and improve their performance.

1. Institutional Background

1.1 Morningstar Performance Ratings

The Morningstar star ratings were first introduced in 1985 and represent a quantitative backward-looking measure of a fund's performance, ranging from one (low) to five (high) stars. The star rating is based on a fund's percentile rank relative to peer funds in the same Morningstar category. The fund's performance is measured using Morningstar's Risk-Adjusted Return. Morningstar computes ratings based on funds' three-, five-, and ten-year performance. The overall Morningstar rating is based on a weighted average of all available time-period ratings. Funds must have been active and report performance for at least 36 months to obtain a star rating.[2]

Star ratings are updated at the end of every month and have been widely shown to be an important determinant of fund flows, above and beyond the funds' historical performance (Ben-David, Li, Rossi, and Song, 2019; Del Guercio and Tkac, 2008).

1.2 Morningstar Sustainability Ratings

On March 1, 2016, Morningstar introduced ratings aimed at ranking the sustainability of the funds' portfolios. The objective was to provide a way for investors to evaluate how different funds meet environmental, social, and governance standards. These ratings were introduced side-by-side with the star ratings and are referred to as globe ratings. They range from one (low) to five (high) globes.[3]

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[2] See Morningstar Rating for Funds Methodology.
https://www.morningstar.com/content/dam/marketing/shared/research/methodology/771945_Morningstar_Rating_for_Funds_Methodology.pdf

[3] Most of our tests focus on the period when the Morningstar Sustainability ratings are first introduced. In late 2018, Morningstar changed the methodology to compute the globe ratings. In particular, Morningstar changed the peer-fund category from the Morningstar category to the more comprehensive Morningstar Global category.

The globe ratings are based on a fund's portfolio sustainability score, which is a weighted average of the company-level ESG scores using as weights the fund's portfolio weights. The fund's sustainability score has always been available to Morningstar users and relies on company-level ESG scores from Sustainalytics. The globe rating of a fund is based on the percentile rank of its portfolio sustainability score relative to other funds in the same Morningstar category. Only funds belonging to categories with at least ten funds are ranked.

Table A.1 summarizes the star and globe ratings based on the funds' percentile ranks.

2. Data and Descriptive Statistics

Our sample includes all U.S. equity funds domiciled in the U.S. As is common in the literature (Chevalier and Ellison, 1997), we include all funds with at least $10 million in assets under management that are at least two years old. We also require funds to have information on their return, age, expense ratio, TNA, Morningstar category, and star and globe ratings. The final sample for our main analysis from March 2016 to December 2017 includes 6,680 unique share classes from 1,953 unique funds.

3. Results

3.1 The Introduction of Sustainability Ratings and Funds' Incentives

We explore how the introduction of sustainability ratings affected funds' incentives. Since funds with the highest globe ratings have been shown to attract flows, some funds may have had incentives to improve their globe ratings, thus creating buying pressure in stocks with high ESG scores. We identify the buying pressure driven by the funds' objective to improve their sustainability ratings ex post by considering the abnormal trading of funds that end up improving

their globe ratings. This is preferable to merely considering the stocks' sustainability ratings because funds pursue different strategies and select for stocks that can contribute to improving their globe ratings within their mandate.

Specifically, we define the aggregate abnormal ESG trading experienced by stock i in quarter t as:

$$Agg\ Abnormal\ ESG\ Trading(i,t) = \sum_{f=1}^{F} Abnormal\ Trading(f,i,t),\ if\ f \in G,$$

where G is the set of funds that improve their globe ratings between quarters t-1 and t. The abnormal trading of fund f in stock i between quarters t-1 and t is equal to the fund's change in the number of shares held in stock i as a fraction of the stock's shares outstanding – $Trading(f,i,t) = \frac{NumShares(f,i,t) - NumShares(f,i,t-1)}{Shares\ Ourstanding(i,t-1)}$ – minus the average change between t-1 and t in the holdings in stock i of all other funds .

According to our definition, *Agg Abnormal ESG Trading (i,t) > 0* indicates that there is buying pressure in stock i during quarter t due to funds' incentives to improve their portfolio sustainability ratings. In contrast, *Agg Abnormal ESG Trading (i,t) < 0* implies selling pressure by funds that attempt to improve their globe ratings.

While the findings we present below are based on this ex post definition, our results are similar if we use an ex ante definition and consider the aggregate buying and selling pressure created by funds that are in the neighborhood of the ESG rating cutoffs and whose trading should be more strongly motivated by the desire to improve their sustainability rating or the fear that they may be downgraded.

Table 2 shows that according to both our ex ante and ex post definitions, the trading of the funds that end up improving their sustainability ratings is statistically different from the trading of the average mutual fund in our sample, suggesting that mutual funds may be actively changing

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their portfolios. For example, based on the 18-month sample period (column 1), the average abnormal ESG trading in stock *i* equals about 7% of all trading.[4] Importantly though, this pattern is driven by the first nine months after the introduction of the sustainability ratings. In the second nine-month period, the trading of the funds that are close to the ratings' cutoffs, as well as the trading of the funds that end up improving their ratings, is not statistically different from the average for all mutual funds in the sample. This may suggest that after the initial period, mutual funds stopped targeting improvements in their sustainability ratings.

To provide more direct evidence that the abnormal trading of funds that end up improving their globe ratings is indeed driven by their efforts to improve the sustainability of their portfolios, we explore whether the ESG scores of the stocks held by these funds help explain the funds' abnormal trading. Figure 1 provides graphical evidence that this is indeed the case. A higher stock ESG rating is associated with higher abnormal trading by funds that end up improving their globe ratings.

Table 4 shows that this pattern is robust when we control for a number of stock characteristics. We find that the effect of a stock's *Effective ESG Score* on abnormal trading is economically significant; for instance, in column 1, a one-standard-deviation increase in a stock's ESG score (=8.67) explains about 18% of the total trading in the stock, calculated as (0.268*8.67)/(0.0013175*10000). Importantly, consistent with our earlier findings in Table 2, the pattern emerges only in the first nine months after the introduction of the globe ratings. We fail to detect a significant relation between stocks' ESG scores and funds' abnormal ESG trading afterwards.

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[4] This economic magnitude is calculated as the coefficient in column 1 (=0.000089), divided by the total trading as a percent of shares outstanding (=0 .0013175).

3.2 The Introduction of Globe Ratings, Fund Trading, and Stock Mispricing

We next explore whether the trading of the funds that strive to improve their sustainability ratings generates trading pressure and affects stock returns, thus creating profitable trading opportunities for other funds. If the sustainability-driven funds indeed create trading pressure, we should observe that the stocks that they purchase to a larger extent than other funds become overvalued, while the contrary should be the case for the stocks that they sell to a larger extent compared to other funds.

To evaluate whether this is the case, we consider the returns of a zero-cost long-short strategy that goes long in stocks with ESG selling pressure and short in stocks with ESG buying pressure. The portfolio is rebalanced at the end of each quarter. We estimate the Jensen's alpha of this long-short portfolio, controlling for the three Fama-French factors and the momentum factor.

Panel A of Table 5 shows that such a strategy has a positive and statistically significant alpha, regardless of whether we use equally-weighted or value-weighted returns. As in our earlier tests, the effect is present only in the first nine months after the introduction of the globes. The annualized return of the strategy is 7.6%, when considering equally-weighted portfolios (column 1). As one would expect, since large stocks are less affected by trading pressure, the annualized return is smaller (0.07%) when considering value-weighted portfolios (column 4).

Panel B provides analogous evidence based on stock-level monthly abnormal returns. Using the Fama-French four-factor model, stocks with negative ESG buying pressure outperform stocks with positive ESG buying pressure by 6.4% annually.

Overall, the evidence in Table 5 suggests that the trading of funds that end up improving their globe ratings may provide trading opportunities for other funds that are not concerned about the sustainability of their portfolios, but aim instead to improve their performance.

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3.3 Other Funds' Trading Strategies

To evaluate whether fund managers that do not aim to improve their sustainability ratings exploit the trading of ESG-driven funds, we define a fund's position change as:

$$Position\ Change(f, i, t) = \frac{Price(i,t-1)*(NumShares(f,i,t) - NumShares(f,i,t-1))}{TNA(f,t-1)}.$$

We consider only funds that do not improve their globe ratings. We test whether these funds end up taking (contemporaneously) the opposite trading position, thus benefitting from the price pressure generated by the sustainability-driven funds. We assume that fund managers may learn about the trading pressure generated by sustainability-driven funds from their brokers who extrapolate an order's informational content, allowing them to anticipate future price behavior. Brokers have been shown to disseminate their information to other clients who profit from trading, and at the same time, generate additional broker fees (Di Maggio, Franzoni, Kermani and Sommarvilla, 2019; Barbon, Di Maggio, Franzoni and Landier, 2019).

Panel A of Table 6 shows that in the first nine months following the introduction of the globe ratings, that is, when this trading strategy appears to be profitable, other fund managers take the position opposite to that of sustainability-driven funds. The economic magnitude of the change in fund position is meaningful and equals -0.23% of the funds' TNA, calculated as the coefficient in column 2, multiplied by the standard deviation of abnormal ESG trading (0.0032). Note that this result is obtained controlling for the stock's selling pressure which may be created by mutual funds' purchasing and selling decisions unrelated to ESG considerations. This effect, captured by the aggregate change in the shares held by mutual funds as a proportion of shares outstanding, also

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controls for flow-driven fund trading (Coval and Stafford, 2007), and indicates that our results are likely due to buying and selling pressure generated by ESG trading.

Importantly, the fact that the results do not hold in the second part of the sample suggests that the findings are not hard-wired in the definition of ESG abnormal trading, which captures the abnormal trading of globe-improving mutual funds relative to the remaining funds whose trading we explore in Table 6.

To further address this concern, the rest of Table 6 investigates whether this behavior is driven by funds that have stronger incentives to improve their performance and increase their star ratings, which have been shown to be positively associated with flows (Del Guercio and Tcak, 2008). Panel B shows that funds that are closer to the cutoff for improving their star ratings take larger positions in stocks with negative aggregate ESG pressure. The effect increases monotonically from column 1 to column 3, as we consider funds that are not close to their rating cutoff, funds that are within ±5% from the percentile ranking cutoff, and funds that are within ±2.5% from this cutoff. Once again, columns 5 to 6 suggests that the effect is largely driven by the first nine months after the introduction of the globe ratings. Afterwards, only funds within ±2.5% from the cutoff, that is, the funds with the strongest incentives to improve their star ratings, appear to take positions against the aggregate ESG pressure. Even in this case, the effect appears to be smaller than in the earlier period and less precisely estimated.

Panel C further explores to what extent the incentives to trade against funds pursuing ESG strategies are driven by the desire to improve the funds' star ratings. Because funds are ranked relative to their Morningstar category peers and different categories include different numbers of funds, the number of peers within a particular category significantly affects funds' ability to improve their star ratings. Since improving the ratings should be easier for funds with fewer peers,

we should observe that ceteris paribus, funds with fewer peers take larger positions against the aggregate ESG pressure. This is indeed what we find. The effects are stronger in the first months after the introduction of the ratings, but they are still present throughout the sample for funds with a lower number of peers. Funds with a larger number of peers, for which it is harder to improve their ranking in order to obtain a better star rating, do not appear to trade against the aggregate ESG pressure.

Finally, Table 7 shows that our results are robust if we consider a more restricted sample focused on the trading of sustainability-driven funds that are closer to the cutoff from globes 4 to 5 or from 1 to 2, that is, funds with stronger incentives to improve their sustainability ratings.

3.4 Trade-off between Globe and Star Ratings

In this subsection, we consider the consequences of the funds' trading strategies on their performance and star ratings, respectively. To do so, we need to classify funds based on whether they have been pursuing a globe or a star rating. Thus, for each fund, we add up the value of the position changes in stocks that we have identified as more likely to have experienced trading pressure due to the trading of funds that try to improve their globe ratings. Thus, we define:

$$ESG\ Pressure\ Trade\ (f,t) = \ \sum_{i=1}^{N} Pressure\ Trade\ (f,i,t),$$

where $Pressure\ Trade\ (f,i,t)$ equals $Position\ Change(f,i,t)$ if (1) stock i has positive abnormal ESG trading pressure ($Agg\ Abnormal\ ESG\ Trading\ (i,t) > 0$) and the fund significantly increased its portfolio share in the stock ($Position\ Change(f,i,t) \in Top\ Quintile$), or (2) stock i has negative abnormal ESG trading pressure ($Agg\ Abnormal\ ESG\ Trading\ (i,t) < 0$) and the fund significantly decreased its portfolio share in the stock ($Position\ Change(f,i,t) \in Bottom\ Quintile$).

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By construction, funds that purchased more highly-rated ESG stocks improve their globe ratings. More interestingly, we can explore the effects of pursuing a strategy that aims to improve sustainability (globe) ratings on the fund's performance (star) rating. We also ask the inverse question, that is, whether funds trading against other funds that pursue higher sustainability ratings, indeed improve their performance ratings while worsening their sustainability ratings.

Panel A of Table 8 provides evidence that funds that tilt their portfolios towards stocks that are experiencing higher aggregate ESG pressure are less (more) likely to experience a downgrade (an upgrade) of their globe ratings. More interestingly, these funds are more (less) likely to experience a downgrade (upgrade) of their star ratings, indicating that there is a trade-off between sustainability and performance ratings. This trade-off is very pronounced in the first nine months after the introduction of the globe ratings but is not present afterwards.

Panel B of Table 8 shows that this pattern is also revealed in the funds' performance. In particular, we regress a fund's alpha, estimated as the fund's abnormal return in excess of its exposure to the three Fama-French factors and the Carhart's momentum factor, on $ESG\ Pressure\ Trade\ (f, t)$ and a number of controls. It is evident that in the first nine months after the introduction of the globe ratings, funds that trade against the pressure created by ESG-motivated trades enjoy better performance. We find no significant effects in the subsequent period when funds' propensity to pursue ESG-driven trades subsides.

4. Consequences for Funds' Flows

In this section, we explore the reasons for funds' changes in trading incentives. Fund managers' compensation depends on the fees they earn, which in turn are driven by the funds' net assets under management (Chevalier and Ellison, 1997). Based on these considerations, funds'

trading strategies should aim to maximize net flows, which are known to be affected by performance as well as by the funds' sustainability and performance ratings.

If both strategies bring flows, there might be an equilibrium in which some funds pursue better sustainability ratings and other funds strive for better performance ratings. Table 9 explores to what extent this is the case. It appears that during our sample period only the star ratings consistently bring more flows. Such a finding emerges in Panel A, where we estimate specifications similar to those in Hartzmark and Sussman (2019), and in columns 1 to 3 of Panel B, where we consider dichotomous variables for each of the star ratings, using the middle three globe/star ratings as the omitted variable. The conclusions are also invariant in columns 4 to 6 of Panel B, in which we consider the reaction of flows to upgrades and downgrades, controlling for the initial rating.

In the first nine months of the sample period, better globe ratings are associated with higher flows, as is evident from columns 2 and 5 of Panel A and column 1 of Panel B. However, a comparison of the coefficients on the globe and star ratings in column 2 of Panel B shows that the star ratings have larger effects on new flows than the corresponding globe ratings, suggesting that pursuing a better globe rating may be counterproductive if associated with a downgrade of the performance ratings. For example, having a globe rating of 5 increases fund flows by 0.3%, whereas having a star rating of 1 reduces flows by 0.8%. In contrast, having a globe rating of 1 decreases flows by 0.2% but a star rating of 5 increases flows by 2.4%. This helps explain why we uncover weaker incentives to pursue sustainability ratings in the second half of the sample.

Interestingly, the globe ratings appear to leave flows unaffected in the second half of the sample and when we consider the whole sample period. This suggests that on average, investors

learn about the substitutability between performance and sustainability of fund portfolios and focus on performance.

5. Robustness

In October 2018, Morningstar announced some changes in the criteria used to assign globe ratings, which become effective in November 2018. First, ratings are now assigned based on the historical sustainability score, which considers also the sustainability of the fund's portfolio in the past, even though more recent scores are assigned higher weights. Second, Morningstar does not rank funds any longer within the Morningstar category, but considers the Morningstar Global category, a less fine classification so that funds have a larger number of peers.

We ask to what extent an arguably improved methodology may have increased the efficacy of the sustainability ratings. Table 10 shows that the ratings remain ineffective.

6. Conclusion

Rating financial intermediaries on the basis of the sustainability of their portfolios may appear to be an effective mechanism that allows investors to allocate their funds in accordance with their environmental and social preferences. We show that if most investors care to an even larger extent about performance, a tradeoff between portfolio sustainability and performance may arise and reduce the subsequent effectiveness of sustainability ratings.

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References

Ammann, M., Bauer, C., Fischer, S., & Müller, P. (2018). The impact of the Morningstar Sustainability Rating on mutual fund flows. *European Financial Management*, 25(3), 520–553.

Barbon, A., Di Maggio, M., Franzoni, F., & Landier, A. (2019). Brokers and Order Flow Leakage: Evidence from Fire Sales. *Journal of Finance*, 74(6), 2707–2749.

Ben-David, I., Li, J., Rossi, A., & Song, Y. (2019). What Do Mutual Fund Investors Really Care About?, Working Paper, Ohio State University.

Bolton, P. and Kacperczyk, M. T. (2020). Do Investors Care about Carbon Risk? Columbia Business School Research Paper.

Chava, S. (2014). Environmental externalities and cost of capital, *Management Science* 60, 2223-2247.

Chevalier, J. and Ellison, G. (1997). "Risk Taking by Mutual Funds as a Response to Incentives." Journal of Political Economy 105(6):1167–1200.

Ceccarelli, M., Ramelli, S., & Wagner, A. F. (2020). Low-carbon Mutual Funds. Working Paper, Universty of Zurich.

Coval J., and E. Stafford. (2007). Asset fire sales (and purchases) in equity markets. *Journal of Financial Economics* 86(2), 479–512.

Del Guercio, D. and P. A. Tkac. (2009). Star Power: The Effect of Morningstar Ratings on Mutual Fund Flow. *Journal of Financial and Quantitative Analysis*, 43(04), 1–30.

Di Maggio, M., Franzoni, F., Kermani, A., & Sommavilla, C. (2019). The relevance of broker networks for information diffusion in the stock market. *Journal of Financial Economic*s, 134(2), 419–446.

Hartzmark, S. M., and A. B. Sussman. (2019). Do investors value sustainability? A natural experiment examining ranking and fund flows, *Journal of Finance* 74, 2789-2837.

Heinkel, R., A. Kraus, and J. Zechner. (2001). The Effect of Green Investment on Corporate Behavior. *Journal of Financial and Quantitative Analysis* 36, 431–449.

Rajan, U., A. Seru, and V. Vig. (2015). The failure of models that predict failure: Distance, incentives, and defaults. *Journal of Financial Economics* 115, 237–60.

Pastor, L., R. F. Stambaugh, and L. Taylor. (2019). Sustainable Investing in Equilibrium. Working Paper, University of Chicago.

Pedersen, L. H., S. Fitzgibbons, and Pomorski, L., (2019) Responsible Investing: The ESG-Efficient Frontier. *Working Paper*, New York University.

Appendix: Variable Definition

Variable Name	Definition
Panel A: Fund Trading	
Trading	For fund *f* in quarter *t*, the trading in stock *i* is defined as: $$Trading(f, i, t) = \frac{NumShares(f, i, t) - NumShares(f, i, t-1)}{Shares\ Ourstanding(i, t-1)}$$
Abnormal Trading	For fund *f* in quarter *t*, the abnormal stock trading in stock *i* is defined as the fund's stock trading minus the average trading in stock *i* between quarters *t* and *t-1* across all funds.
Abnormal ESG Trading	For each quarter *t*, the aggregate abnormal ESG trading is the abnormal trading across all funds in set G that improve their Globe ratings between quarters *t-1* and *t*, defined as: $$Agg\ Abnormal\ ESG\ Trading(i, t) = \sum_{f=1}^{F} Abnormal\ Trading(f, i, t),\ if\ f \in G$$
Effective ESG Score	The Effective ESG Score is a normalized company-level ESG score minus a Sustainalytics controversy deduction. The company-level ESG score is normalized using a z-score transformation within each company's peer group. The Sustainalytics controversy deduction is based on the following calculation: Score 0: Deduction 0; Score 1: Deduction 0.2; Score 20: Deduction 4; Score 50: Deduction 10; Score 80: Deduction 16; Score 100: Deduction 20. This is equivalent to Morningstar's Portfolio Sustainability Score calculation.
ESG Pressure Trading	Defined as the most positive fund trading (top quintile) of a stock with sustainability-driven trading pressure (Abnormal ESG Trading > 0), or the most negative fund trading (bottom quintile) of a stock with Abnormal ESG Trading < 0. Then, we aggregate all the pressure trading for each fund *f* in each quarter *t*.
Position Change	For fund *f* in quarter *t*, the position change in stock *i* is defined as: $$Position\ Change(f, i, t) = \frac{Price(i, t-1) * (NumShares(f, i, t) - NumShares(f, i, t-1))}{TNA(f, t-1)}$$
Total Trading (% Shares Outstanding)	For stock *i* in quarter *t*, total trading is the aggregate stock trading across all funds between quarters *t-1* and *t*.
Total Trading (% TNA)	For fund *f* in quarter *t*, total trading is the aggregate position change between quarters *t-1* and *t* across all stock holdings.
Panel B: Fund Characteristics	
Flow (% TNA)	Dollar fund flow (inflow or outflow) scaled by monthly total net assets (TNA).

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Expense Ratio	Ratio of total fees (as a percentage) that shareholders pay for a fund's operating expenses, including 12b-1 fees.
Ln TNA	Natural logarithm of month-end total net assets of a fund (share class).
Fund Age	Natural logarithm of fund age, calculated as the number of years since a particular share class was made available to investors. Fund age is calculated based on the inception date of the oldest share class of the fund.
Ret	Monthly net return of a fund (share class).
Star Rating	Rating based on risk-adjusted return, using Morningstar's Risk-Adjusted Return % Rank for all funds in a category. Morningstar calculates ratings for three-, five-, and ten-year periods. Investments must have at least 36 continuous months of total returns in order to receive a rating. For each time period (three, five, and ten years), Morningstar ranks all funds in a category using Morningstar's Risk-Adjusted Return, with the funds with the highest scores receiving the most stars. A fund's peer group for the three-, five-, and ten-year ratings is based on the fund's current category without adjusting for historical category changes in the three-, five-, and 10-year ratings. The overall Star rating for each fund is based on a weighted average (rounded to the nearest integer) of the number of stars assigned to it in the three-, five-, and 10-year rating periods. See Rating Details in Table A.1.
Globe Rating	Based on their portfolio sustainability scores, funds are assigned absolute category ranks and percent ranks within their Morningstar categories. A fund's Morningstar Sustainability Rating is its normally distributed ordinal score and descriptive rank relative to the fund's category. To receive a Globe rating, the fund's Morningstar category must have at least 10 funds with portfolio sustainability scores. See Rating Details in Table A.1.
Panel C: Stock Characteristics	
Monthly abnormal return	A firm's monthly abnormal returns, calculated using the Fama-French four factor model, with betas estimated over the previous 36-months.
Ln Market Cap	Natural logarithm of market capitalization.
Book to Market	Book to market ratio, calculated as book value of equity scaled by market value of equity using the quarter-end stock price.
Leverage	Book leverage calculated as total liabilities scaled by total assets.
ROA	Return on assets, calculated as operating income scaled by lagged total assets.
Sales Growth Rate	Current period net sales minus prior period net sales divided by prior period net sales.
Ret	Quarterly stock return.

Figure 1. Trading pressure and stock ESG ratings

This figure presents binscatter plots of *Abnormal ESG Trading* pressure and a stock's *Effective ESG Score*. *Abnormal ESG Trading* pressure is the abnormal trading across all funds that improve their globe ratings between quarters *t-1* and *t*. *Effective ESG Score* is a firm-level ESG score normalized using a *z*-score transformation within each firm's peer group minus a controversy deduction, as reported by Sustainalytics. Detailed variable definitions are provided in the Appendix. The top plot uses the sample period from March 2016 to September 2017. The middle plot reports results for the first half of the sample period (from March to December 2016), whereas the bottom plot reports results for the second half of the sample period (from January to September 2017).
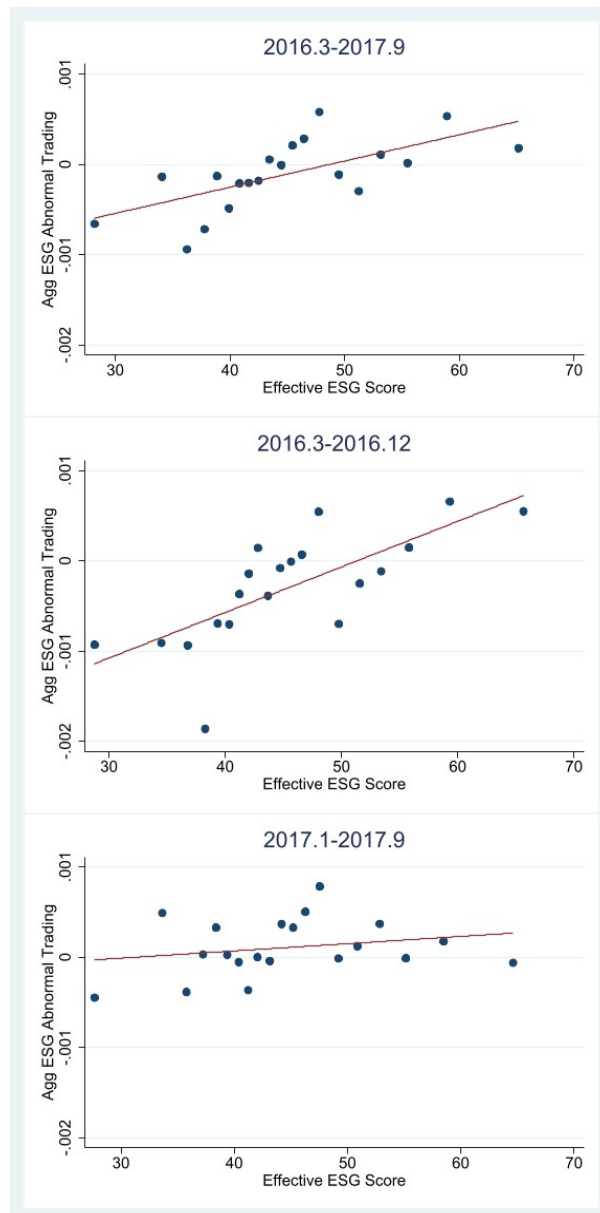
Table 1. Summary statistics

This table reports summary statistics of mutual fund characteristics (Panel A), stock characteristics (Panel B), Morningstar ratings and fund trading variables (Panel C), and fund-stock position changes (Panel D). The sample includes U.S. domiciled funds investing in U.S equities with at least $10 million in assets under management and age of at least two years. The sample period is from March 2016 to September 2017. All variables are defined in the Appendix.

	Num Obs	Mean	Std Dev	10th Pctl	Median	90th Pctl
Panel A: Fund (Monthly)						
Flow (% TNA)	266,740	-0.003	0.057	-0.038	-0.006	0.031
Ln TNA	269,349	17.810	2.760	14.280	18.070	21.090
Fund Age	280,331	5.301	0.688	4.290	5.403	6.006
Ret	280,250	1.109	4.040	-3.681	1.294	5.777
Expense Ratio	266,972	1.228	0.632	0.600	1.120	2.000
Star Rating	237,111	3.091	0.991	2	3	4
Globe Rating	265,724	3.011	1.069	2	3	4
Panel B: Stock (Quarterly)						
Abnormal ESG Trading (x10000)	21,456	-0.895	38.240	-21.910	0.000	20.980
Total Trading (% Shares Outstanding)	21,456	0.001	0.022	-0.012	0.000	0.013
Effective ESG Score	6,580	45.067	8.675	35.204	43.925	56.970
Ln Market Cap	21,456	13.680	2.048	11.000	13.680	16.380
Book to Market	20,551	0.513	0.521	0.078	0.429	1.070
ROA	20,010	0.008	0.060	-0.052	0.020	0.055
Ret	20,501	0.057	0.223	-0.175	0.036	0.293
Leverage	20,615	0.589	0.289	0.196	0.587	0.911
Sales Growth Rate	19,926	0.059	0.293	-0.130	0.025	0.230
Panel C: Fund (Quarterly)						
Globe Downgrade	102,982	0.099	0.299	0	0	0
Globe Upgrade	102,982	0.095	0.308	0	0	1
Star Downgrade	97,915	0.066	0.249	0	0	0
Star Upgrade	97,915	0.063	0.242	0	0	0
ESG Pressure Trading	93,540	0.067	0.059	0.012	0.052	0.136
Total Trading (% TNA)	93,732	0.167	0.147	0.039	0.135	0.31
Panel D: Fund-Stock (Quarterly)						
Position Change	1,966,535	0.0013	0.213	-0.0794	0	0.0767

Table 2. Sustainability ratings and funds' incentives

This table reports the *Abnormal ESG Trading* pressure resulting from the funds' incentives to improve their sustainability (globe) ratings. *Ex-ante Abnormal ESG Trading* pressure is the aggregate abnormal trading by funds within ±2.5% of the portfolio ESG score ranking cutoffs for globe ratings between 1 and 2 or 4 and 5. *Ex-post Abnormal ESG Trading* pressure is the aggregate abnormal trading by funds with improved globe ratings between quarters *t-1* and *t*. *Abnormal ESG Trading* pressure is multiplied by 10000 in the table below. Detailed variable definitions are provided in the Appendix. Column 1 presents results for the full sample period from March 2016 to September 2017. Column 2 reports results for the first half of the sample period (from March to December 2016), whereas Column 3 reports results for the second half of the sample period (from January to September 2017).

	(1)	(2)	(3)
Ex-ante Definition	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9
Abnormal ESG Trading	-0.273	-0.709	0.16
t-stat	-1.17	-2.907	0.404
Ex-post Definition	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9
Abnormal ESG Trading	-0.895	-2.2077	0.262
t-stat	-3.4627	-5.1123	0.804

Table 3: Trading and stock ESG ratings

This table reports the relation between a fund's position change and a stock's *Effective Score*, which is interacted with an indicator – *Border Funds* – that takes a value of one if a fund is within +/-2.5% of the cutoff between globes 1 and 2 or 4 and 5. *Effective ESG Score* is a firm-level ESG score normalized using a *z*-score transformation within each firm's peer group minus a controversy deduction, as reported by Sustainalytics. Detailed variable definitions are provided in the Appendix. Column (1) shows results for the full sample period from April 2016 to September 2017. Columns (2), (4), and (5) reports results for the first nine months (April - December 2016), whereas column (3) reports results for the second nine months (January - September 2017). All specifications include lagged firm-level controls and fund-by-year-quarter fixed-effects. Standard errors are clustered at the fund level.

	(1)	(2)	(3)	(4)	(5)
			Position Change (*f,i,t*)		
	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9	2016.3-2016.12	
				Low Peers	High Peers
Effective Score	-0.001	-0.010**	0.008**	-0.019**	0.016***
	(-0.415)	(-2.281)	(1.972)	(-2.462)	(3.294)
Border Funds # Effective Score	0.031**	0.033*	0.026	0.064**	0.013
	(2.321)	(1.768)	(1.427)	(2.438)	(0.616)
Ln Market Cap	0.180**	0.363***	-0.016	0.504***	0.011
	(1.984)	(3.448)	(-0.161)	(2.996)	(0.090)
Book to Market	-0.042	0.092	-0.506***	0.254	-0.511***
	(-0.331)	(0.555)	(-3.151)	(0.813)	(-2.624)
Leverage	-0.049	-0.391*	0.125	0.162	0.688***
	(-0.344)	(-1.945)	(0.636)	(0.484)	(2.584)
ROA	-12.796***	-15.896***	-8.483***	-22.849***	-5.154**
	(-9.265)	(-8.208)	(-4.828)	(-7.118)	(-2.448)
Sales Growth Rate	1.323***	1.202***	1.440***	2.094***	1.779***
	(7.788)	(5.376)	(6.035)	(5.325)	(5.602)
Ret(t-1)	-5.859***	-3.528***	-9.375***	-6.443***	-6.202***
	(-13.410)	(-7.436)	(-17.210)	(-8.637)	(-10.049)
Constant	-2.232	-5.306***	1.328	-7.296***	-0.555
	(-1.481)	(-3.024)	(0.813)	(-2.586)	(-0.284)
Observations	884514	459257	425257	204258	247593
Adjusted R-squared	0.214	0.211	0.218	0.236	0.142
Fixed Effects	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ

Table 4. Trading pressure and stock ESG ratings

This table reports the relation between *Abnormal ESG Trading* pressure and a stock's *Effective ESG Score*. *Abnormal ESG Trading* pressure is the abnormal trading across all funds that improve their globe ratings between quarters *t-1* and *t*. *Effective ESG Score* is a firm-level ESG score normalized using a *z*-score transformation within each firm's peer group minus a controversy deduction, as reported by Sustainalytics. Detailed variable definitions are provided in the Appendix. Columns 1 and 4 present results for the full sample period from March 2016 to September 2017. Column 2 reports results for the first half of the sample period (from March to December 2016), whereas column 3 reports results for the second half of the sample period (from January to September 2017). All specifications include lagged firm-level control variables and industry-by-year-quarter fixed-effects. Standard errors are clustered at the firm level. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
	Abnormal ESG Trading			
	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9	2016.3-2017.9
Effective ESG Score	0.268***	0.464***	0.064	0.057
	(3.805)	(3.684)	(0.967)	(0.847)
Effective ESG Score # First 9 mo				0.416***
				(2.921)
Ln Market Cap	-0.119	0.013	-0.235	-0.149
	(-0.303)	(0.021)	(-0.506)	(-0.379)
Book to Market	-1.822	-4.877	2.740	-1.730
	(-0.873)	(-1.555)	(1.368)	(-0.833)
Leverage	-3.036	-4.275	-1.991	-3.054
	(-0.823)	(-0.685)	(-0.553)	(-0.828)
ROA	16.166	6.090	31.845	16.449
	(0.567)	(0.127)	(1.036)	(0.576)
Sales Growth Rate	0.007	1.457	-2.214	0.140
	(0.003)	(0.474)	(-0.566)	(0.058)
Ret (t-1)	2.204	6.474	-4.156	2.375
	(0.433)	(0.884)	(-0.743)	(0.467)
Constant	-9.166	-20.133*	1.411	-9.124
	(-1.263)	(-1.796)	(0.165)	(-1.259)
Observations	5846	3058	2788	5846
Adjusted R-squared	0.003	-0.004	0.028	0.004
Fixed Effects	Ind*YQ	Ind*YQ	Ind*YQ	Ind*YQ

Table 5. Sustainability-driven trading pressure and stock returns

This table reports the relation between sustainability-driven trading pressure and stock returns. Panel A presents daily equal- and value-weighted returns of a zero-cost long-short portfolio, created by going long stocks with negative sustainability-driven trading pressure and shorting stocks with positive sustainability-driven trading pressure. The portfolio is rebalanced at the end of each quarter. Columns 1 and 4 show results for the period from April 2016 to September 2017. Columns 2 and 5 report results for the period from July to December 2016, whereas columns 3 and 6 report results for the period from January to September 2017. We estimate Newey-West standard errors with 22 lags. Panel B reports stocks' monthly abnormal returns calculated using the Fama-French four factor model, with betas estimated over the previous 36 months. Column 1 shows results for the period from April 2016 to September 2017. Column 2 reports results from July to December 2016, whereas column 3 reports results from January to September 2017. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel A. Long-short portfolio

	(1)	(2)	(3)	(4)	(5)	(6)
	2016.7-2017.9	2016.7-2016.12	2017.1-2017.9	2016.7-2017.9	2016.7-2016.12	2017.1-2017.9
	Equal-weighted			Value-weighted		
Mkt-RF	-0.097***	-0.082***	-0.047**	-0.0003	-0.0000	-0.0004
	(-7.414)	(-6.127)	(-2.133)	(-1.603)	(-0.219)	(-1.410)
SMB	-0.097***	-0.052***	-0.037	-0.0011**	-0.0008***	0.0005
	(-2.840)	(-3.129)	(-0.920)	(-2.457)	(-2.746)	(0.909)
HML	-0.115***	-0.085***	-0.032**	-0.0001	-0.0006**	0.0003
	(-5.677)	(-5.526)	(-1.992)	(-0.334)	(-2.415)	(1.632)
Mom	-0.072***	-0.047***	0.047**	-0.0016***	-0.0005	0.0002
	(-5.398)	(-4.092)	(2.150)	(-7.391)	(-0.679)	(0.306)
Alpha	0.030***	0.019*	-0.006	0.0003***	0.0002	-0.0002*
	(2.948)	(1.959)	(-0.574)	(2.668)	(1.254)	(-1.749)
Observations	64	127	188	64	127	188
R-squared	0.413	0.298	0.101	0.327	0.107	0.033

Panel B: Stock-level abnormal returns

	(1)	(2)	(3)
	2016.7-2016.9	2016.7-2016.12	2017.1-2017.9
Agg ESG < 0	0.5603	0.2087	0.2021
N	5,412	11,910	16,713
Agg ESG > 0	0.0283	0.0491	0.4675
N	4,978	8,827	14,659
Diff	0.5320	0.1596	-0.2655
t-stat	1.7735	0.7446	-1.6382

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Table 6. Sustainability-driven trading pressure and trading of funds pursuing star ratings

This table reports the effect of sustainability-driven trading pressure on stock trading by funds attempting to improve their star ratings. Panel A presents the trading of all U.S. equity funds, excluding those with improved globe ratings in the quarter. Columns 1 and 4 present results for the full sample period from March 2016 to September 2017. Column 2 reports results for the first half of the sample period (from March to December 2016), whereas column 3 reports results for the second half of the sample period (from January to September 2017). Panel B presents the trading of U.S. equity funds within close range of the star rating cutoffs. Panel C presents the trading of U.S. equity funds that are above and below the median in terms of the number of peers with the same investment style. All specifications include fund-by-year-quarter fixed effects. Standard errors are clustered at the fund level. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel A. Trading by all U.S. equity funds (excluding globe-improving funds)

	(1)	(2)	(3)	(4)
	Position Change (f,i,t)			
	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9	2016.3-2017.9
Abnormal ESG Trading	-0.444***	-0.759***	0.057	0.055
	(-6.800)	(-8.793)	(0.725)	(0.690)
First 9m dummy # Abnormal ESG Trading				-0.814***
				(-7.536)
Total Trading (% Shares Outstanding)	0.781***	0.778***	0.789***	0.782***
	(26.861)	(29.024)	(18.855)	(26.911)
Constant	0.001***	-0.002***	0.004***	0.001***
	(27.924)	(-56.215)	(27.979)	(25.764)
Observations	1760846	926260	834586	1760846
Adjusted R-squared	0.230	0.228	0.231	0.230
Fixed Effects	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ

Panel B. Trading by U.S. equity funds within close range of the star rating cutoffs

	(1)	(2)	(3)	(4)	(5)	(6)
	Position Change *(f,i,t)*					
	Rating Cutoff Split			Time Split		
	Other	Within ±5%	Within ±2.5%	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9
Abnormal ESG Trading	0.176*	-0.039	-0.074	-0.205***	-0.467***	0.226**
	(1.719)	(-0.213)	(-0.480)	(-2.585)	(-4.407)	(2.198)
First 9m dummy # Abnormal ESG Trading	-0.626***	-0.825***	-1.084***			
	(-4.361)	(-3.054)	(-5.050)			
Within ±5% Rating Cutoff # Abnormal ESG Trading				-0.341**	-0.389*	-0.277
				(-2.092)	(-1.736)	(-1.301)
Within ±2.5% of Rating Cutoff # Abnormal ESG Trading				-0.525***	-0.669***	-0.341*
				(-3.579)	(-3.382)	(-1.817)
Total Trading (% Shares Outstanding)	0.636***	0.831***	0.933***	0.781***	0.778***	0.789***
	(17.597)	(16.909)	(23.338)	(26.859)	(29.017)	(18.855)
Constant	0.008***	-0.003***	-0.008***	0.001***	-0.002***	0.004***
	(226.438)	(-45.060)	(-175.312)	(28.190)	(-55.460)	(27.993)
Observations	848306	324644	587896	1760846	926260	834586
Adjusted R-squared	0.277	0.217	0.181	0.230	0.228	0.231
Fixed Effects	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ

Panel C. Trading by U.S. equity funds with below/above median peers within their star rating category

	(1)	(2)	(3)	(4)	(5)	(6)
	Position Change (*f,i,t*)					
	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9
	Below-Median Peers			Above-Median Peers		
Abnormal ESG Trading	-0.506***	-0.751***	-0.101	0.274***	-0.001	0.684***
	(-4.576)	(-5.189)	(-0.686)	(2.665)	(-0.008)	(4.843)
Within ±5% of Rating Cutoff # Abnormal ESG Trading	-0.530***	-0.644***	-0.465**	-0.247	-0.467*	0.292
	(-3.310)	(-3.013)	(-2.160)	(-1.298)	(-1.859)	(1.171)
Total Trading (% Shares Outstanding)	0.845***	0.879***	0.800***	0.712***	0.694***	0.767***
	(20.151)	(21.310)	(15.294)	(18.141)	(20.234)	(11.134)
Constant	0.002***	-0.001***	0.007***	-0.002***	-0.004***	0.001***
	(45.728)	(-16.969)	(29.811)	(-82.322)	(-71.828)	(3.013)
Observations	1052409	562494	489915	708437	363766	344671
Adjusted R-squared	0.259	0.247	0.276	0.177	0.196	0.150
Fixed Effects	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ	Fund*YQ

Table 7: Sustainability-driven trading pressure and the trading of funds pursuing star ratings - ex ante analysis

This table reports the effect of sustainability-driven trading pressure on stock trading. Column 1 reports the trading of funds within 2.5% of the star rating cutoffs, column 2 includes funds within 5% of the star rating cutoffs (excluding funds in column 1), and column 3 reports the trading of all other funds. All specifications include fund-by-year-quarter fixed-effects. Standard errors are clustered at the fund level.

	(1)	(2)	(3)
	Position Change(f,i,t)		
	Within 2.5%	Within 5%	Other
Abnormal ESG Trading (ex ante)	0.322**	0.151	0.111
	(2.453)	(1.030)	(1.159)
First 9 mo dummy # Abnormal ESG Trading (ex ante)	-2.063***	-1.547***	-1.303***
	(-7.395)	(-4.141)	(-6.743)
Constant	-0.008***	-0.001***	0.008***
	(-548.280)	(-45.948)	(1073.705)
Observations	669715	364102	932714
Adjusted R-squared	0.160	0.219	0.261
Fixed Effects	Fund*YQ	Fund*YQ	Fund*YQ

Table 8. Trade-off between star and globe ratings

This table reports the trade-off between star (performance) and globe (sustainability) ratings. For each fund in each quarter, we rank the position change (as a percentage of TNA) into quintiles. We then identify position changes in the top quintile of a stock with sustainability-driven positive trading pressure (Abnormal ESG Trading > 0), or position changes in the bottom quintile of a stock with sustainability-driven negative trading pressure (Abnormal ESG Trading < 0). Then, we aggregate all the pressure trading for each fund in each quarter *t*, and estimate (at the share-class level) the relationship between the likelihood of star/globe upgrade/downgrade and *ESG Pressure Trading* in the previous quarter. In Panel A, columns 1 and 2 report results on globe rating downgrades and upgrades, whereas the remaining columns present results on star rating downgrades and upgrades. Columns 1 to 4 present results for the full sample period from March 2016 to September 2017; columns 5 and 6 report results for the first half of the sample period (from March to December 2016); columns 7 and 8 report results for the second half of the sample period (from January to September 2017). In Panel B, we report the monthly alpha from the Carhart four-factor model, estimated over a rolling window of 36 monthly observations. Column 1 presents results for the full sample period, column 2 presents the first half of the sample period, and column 3 presents the second half of the sample period. All specifications include lagged share-class level controls and investment category-by-year-month fixed effects. Standard errors are clustered at the share class level. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel A. Rating downgrades and upgrades

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2016.3-2017.9				2016.3-2016.12		2017.1-2017.9	
	Globe rating		*Star rating*					
	Downgrade	Upgrade	Downgrade	Upgrade	Downgrade	Upgrade	Downgrade	Upgrade
ESG Pressure Trading	-0.169***	0.808***	0.072**	-0.070**	0.136**	-0.166***	0.038	-0.027
	(-4.315)	(18.622)	(2.032)	(-2.027)	(2.440)	(-3.103)	(0.841)	(-0.585)
Total Trading (% TNA)	0.115***	-0.256***	-0.018	0.011	-0.041	0.054**	-0.008	-0.007
	(6.918)	(-13.967)	(-1.224)	(0.743)	(-1.592)	(2.289)	(-0.424)	(-0.402)
One Star (t-1)	0.000	0.002	-0.067***	0.091***	-0.078***	0.132***	-0.060***	0.067***
	(0.033)	(0.373)	(-31.366)	(10.812)	(-23.571)	(10.036)	(-25.574)	(7.346)
Two Stars (t-1)	0.008**	0.003	-0.031***	0.045***	-0.034***	0.062***	-0.028***	0.035***
	(2.538)	(1.020)	(-11.177)	(11.706)	(-8.280)	(10.917)	(-9.275)	(8.240)
Four Stars (t-1)	-0.005	0.003	0.058***	-0.032***	0.065***	-0.045***	0.054***	-0.025***
	(-1.552)	(1.038)	(16.833)	(-12.012)	(12.637)	(-11.737)	(13.949)	(-7.930)
Five Stars (t-1)	-0.016***	0.025***	0.122***	-0.080***	0.138***	-0.093***	0.111***	-0.072***
	(-3.327)	(5.428)	(17.678)	(-34.000)	(13.919)	(-24.834)	(14.434)	(-27.247)
One Globe (t-1)	-0.100***	0.094***	0.013***	0.011***	0.008	0.010	0.017***	0.012**
	(-41.260)	(13.808)	(3.547)	(2.983)	(1.383)	(1.509)	(3.732)	(2.549)
Two Globes (t-1)	-0.028***	0.064***	0.006**	0.008***	-0.001	0.007	0.010***	0.009***
	(-7.821)	(14.330)	(2.190)	(3.240)	(-0.254)	(1.612)	(3.126)	(2.955)
Four Globes (t-1)	0.059***	-0.042***	0.003	0.007***	-0.003	0.008*	0.006**	0.007**
	(13.791)	(-12.460)	(1.200)	(2.828)	(-0.594)	(1.842)	(1.964)	(2.499)

Five Globes (t-1)	0.073***	-0.103***	0.011**	0.004	0.018***	0.006	0.007	0.004
	(10.672)	(-40.983)	(2.512)	(1.242)	(2.586)	(0.925)	(1.357)	(0.871)
Flow (t-1)	0.024	-0.003	-0.085***	0.136***	-0.118***	0.170***	-0.073***	0.121***
	(1.062)	(-0.130)	(-4.684)	(7.574)	(-3.330)	(5.263)	(-3.535)	(5.715)
Ret(t-1)	-0.002	-0.000	-0.002***	0.005***	-0.005***	0.008***	-0.000	0.002
	(-1.617)	(-0.143)	(-2.689)	(5.339)	(-3.416)	(5.843)	(-0.087)	(1.603)
Ln TNA (t-1)	-0.001**	-0.001**	-0.007***	0.005***	-0.008***	0.006***	-0.006***	0.004***
	(-2.454)	(-2.559)	(-13.964)	(9.773)	(-10.085)	(8.504)	(-11.189)	(6.762)
Age	-0.009***	0.001	-0.009***	-0.011***	-0.009***	-0.011***	-0.009***	-0.012***
	(-4.469)	(0.462)	(-5.096)	(-6.219)	(-3.180)	(-3.791)	(-4.451)	(-5.546)
Constant	0.141***	0.114***	0.200***	0.003	0.226***	-0.021	0.183***	0.021*
	(12.581)	(10.441)	(20.440)	(0.321)	(14.851)	(-1.391)	(15.801)	(1.844)
Observations	72088	72088	72106	72106	26187	26187	45919	45919
Adjusted R-squared	0.046	0.077	0.037	0.030	0.047	0.049	0.029	0.018
Fixed Effects	Cat*YM	Cat*YM	Cat*YM	Cat*YM	Cat*YM	Cat*YM	Cat*YM	Cat*YM

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Panel B. Fund performance

	Abnormal Return		
	2016.3 - 2017.9	2016.3-2016.12	2017.1 - 2017.9
ESG Pressure Trading	0.028	-0.476**	0.152
	(0.232)	(-2.451)	(1.036)
Total Trading (% TNA)	-0.045	0.235***	-0.178***
	(-0.896)	(2.732)	(-3.106)
Flow (t-1)	0.137***	0.233**	0.142**
	(2.624)	(2.276)	(2.431)
Ln TNA (t-1)	0.006***	0.004*	0.008***
	(4.939)	(1.808)	(5.359)
Age	-0.007	-0.014	-0.010
	(-1.341)	(-1.506)	(-1.591)
Exp Ratio (t-1)	-0.000*	-0.020*	-0.000**
	(-1.657)	(-1.878)	(-2.032)
Ret(t-1)	-0.023***	0.005	-0.052***
	(-5.858)	(0.882)	(-8.591)
Ret(t-12,t-1)	-0.008***	-0.027***	0.004***
	(-6.944)	(-14.402)	(2.800)
Constant	-0.080***	-0.067	-0.193***
	(-2.631)	(-1.163)	(-5.062)
Observations	85673	33322	52351
Adjusted R-squared	0.219	0.214	0.229
Fixed Effects	Cat*YM	Cat*YM	Cat*YM

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Table 9. Effects of ratings on fund flows

Panel A of this table presents the effects of globe ratings on fund flows. Columns 1 and 4 show results for the period from April 2016 to September 2017. Columns 2 and 5 report results for the period from July to December 2016, whereas columns 3 and 6 report results for the period from January to September 2017. Columns 1–3 use globe 3 as the baseline; columns 4–6 use the three middle globe ratings as the baseline. Panel B reports the effects of star and globe ratings on fund flows, and Panel C reports the effects of star and globe rating upgrades/downgrades on fund flows. Column 1 presents results for the full sample period from March 2016 to September 2017; column 2 reports results for the first half of the sample period from March to December 2016; column 3 reports results for the second half of the sample period from January to September 2017. All specifications include lagged share-class level controls and investment category-by-year-month fixed effects. Standard errors are clustered at the share-class level. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel A. Globe ratings and fund flows

	(1)	(2)	(3)	(4)	(5)	(6)
	Flow (% TNA)					
	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9
One Globe	-0.001	-0.002**	0.001	-0.001	-0.002***	0.000
	(-0.939)	(-2.366)	(0.557)	(-1.504)	(-2.701)	(0.084)
Two Globes	0.001	-0.001	0.002**			
	(1.315)	(-0.812)	(2.318)			
Four Globes	0.001	0.001	0.000			
	(1.085)	(1.345)	(0.274)			
Five Globes	0.001	0.003***	-0.000	0.001	0.003***	-0.001
	(1.583)	(3.083)	(-0.253)	(1.240)	(3.157)	(-0.758)
Observations	82977	37015	45962	82977	37015	45962
Adjusted R-squared	0.105	0.124	0.095	0.105	0.124	0.094
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Cat*YM	Cat*YM	Cat*YM	Cat*YM	Cat*YM	Cat*YM

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Panel B. Star and globe ratings and fund flows

	(1)	(2)	(3)
	Flow (% TNA)		
	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9
One Globe	-0.001	-0.002***	0.000
	(-1.364)	(-2.702)	(0.229)
Two Globes	0.001	-0.000	0.001**
	(1.116)	(-0.718)	(2.006)
Four Globes	0.000	0.001	-0.000
	(0.911)	(1.446)	(-0.042)
Five Globes	0.001	0.003**	-0.001
	(0.915)	(2.529)	(-0.737)
One Star	-0.008***	-0.008***	-0.009***
	(-8.790)	(-6.965)	(-6.720)
Two Stars	-0.006***	-0.006***	-0.006***
	(-11.337)	(-9.203)	(-8.070)
Four Stars	0.008***	0.008***	0.007***
	(14.148)	(12.055)	(10.205)
Five Stars	0.021***	0.024***	0.019***
	(17.396)	(15.720)	(13.375)
Observations	83390	37186	46204
Adjusted R-squared	0.106	0.126	0.096
Controls	Yes	Yes	Yes
Fixed Effects	Cat*YM	Cat*YM	Cat*YM

Panel C. Star and globe rating upgrades/downgrades and fund flows

	(1)	(2)	(3)
	Flow (% TNA)		
	2016.3-2017.9	2016.3-2016.12	2017.1-2017.9
Globe Downgrade	0.000	0.000	0.000
	(0.467)	(0.577)	(0.138)
Globe Upgrade	-0.001	-0.001	-0.000
	(-1.039)	(-1.566)	(-0.050)
Star Downgrade	-0.003***	-0.003***	-0.002**
	(-3.529)	(-3.277)	(-2.071)
Star Upgrade	0.004***	0.004***	0.004***
	(5.129)	(4.256)	(3.319)
One Globe (t-1)	0.000	-0.001	0.001
	(0.486)	(-0.954)	(1.333)
Two Globes (t-1)	0.000	-0.000	0.001
	(0.926)	(-0.239)	(1.396)
Four Globes (t-1)	0.001	0.002**	-0.000
	(1.316)	(2.181)	(-0.019)
Five Globes (t-1)	0.001	0.004***	-0.000
	(1.436)	(3.191)	(-0.441)
One Star (t-1)	-0.009***	-0.009***	-0.009***
	(-9.461)	(-7.568)	(-7.103)
Two Stars (t-1)	-0.007***	-0.007***	-0.007***
	(-12.379)	(-9.481)	(-9.115)
Four Stars (t-1)	0.008***	0.008***	0.008***
	(14.094)	(10.959)	(11.167)
Five Stars (t-1)	0.021***	0.024***	0.019***
	(17.211)	(15.325)	(13.256)
Observations	78120	32183	45937
Adjusted R-squared	0.105	0.125	0.095
Controls	Yes	Yes	Yes
Fixed Effects	Cat*YM	Cat*YM	Cat*YM

Table 10. Effects on flows - Modified Morningstar methodology

This table reports the effects of star and globe ratings on fund flows after Morningstar modified its globe rating methodology in November 2018. Column (1) uses globe 3 as the baseline; column (2) uses the middle three globe ratings as the baseline. All specifications include lagged share-class level controls and investment category-by-year-month fixed effects. Standard errors are clustered at the share-class level. Statistical significance at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

	(1)	(2)
	Flow (% TNA)	
	2018.11-2019.9	
One Globe	0.001	0.001
	(1.402)	(0.624)
Two Globe	0.001**	
	(2.219)	
Four Globe	0.001**	
	(1.965)	
Five Globe	0.002**	0.001*
	(2.360)	(1.668)
One Star (t-1)	-0.008***	-0.008***
	(-7.931)	(-7.867)
Two Star (t-1)	-0.005***	-0.005***
	(-8.600)	(-8.558)
Four Star (t-1)	0.009***	0.009***
	(15.307)	(15.266)
Five Star (t-1)	0.023***	0.023***
	(17.966)	(18.031)
Observations	61758	61758
Adjusted R-squared	0.088	0.088
Controls	Yes	Yes
Fixed Effects	Cat*YM	Cat*YM

Table A.1. Distribution of Morningstar's star and globe ratings

<div align="center">Morningstar Risk and Return Rating (Star Rating)</div>

Score	Percent	Label
5	Top 10%	High
4	Next 22.5%	Above Average
3	Next 35%	Average
2	Next 22.5%	Below Average
1	Bottom 10%	Low

<div align="center">Morningstar Sustainability Rating (Globe Rating)</div>

Score	Percent	Label
5	Highest 10%	High
4	Next 22.5%	Above Average
3	Next 35%	Average
2	Next 22.5%	Below Average
1	Lowest 10%	Low