Mutual Fund ESG Window Dressing*

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Abstract

Our analysis indicates that mutual funds, in anticipation of the mandatory portfolio disclosure at the quarter's end, strategically adjust their portfolios towards holdings with better ESG performance. The 2012 MSCI expansion of ESG score coverage for firms, and the 2016 introduction of mutual fund ESG ratings by MSCI and Morningstar, increase window dressing activities, particularly among funds holding low-ESG firms. Better-performing funds are more inclined to engage in window dressing, which aligns with our finding that window dressing attracts additional fund flows primarily for high-performing funds. We also observe abnormal returns of stocks with high ESG scores as the quarter-end approaches, followed by return reversals after the quarter-end, particularly in stocks owned by mutual funds with a higher degree of window dressing.

Keywords: Window dressing, ESG, portfolio disclosure, mutual funds

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1 Introduction

Environmental, Social, and Governance (ESG) investing has surged in popularity in recent years as a growing number of investors prioritize the societal and environmental impacts of their investments.[1] The ESG fund assets reached about $8.4 trillion in 2022, which represents 12.6 percent, or one in eight dollars, of the $66.6 trillion in total U.S. assets under management.[2] Given the substantial assets under management by ESG funds, their investment choices, ownership stakes, and voting decisions can significantly influence the trajectory of ESG development.

In response to growing investor interests, funds may market themselves as "green," "sustainable," or "low-carbon" to project an environmentally friendly or socially responsible image. However, the actual investment decisions and voting behaviors of these funds may or may not align with the ESG investment criteria they claim to uphold. Recent studies have uncovered evidence suggesting that fund managers may engage in greenwashing, and there have also been regulatory initiatives and actions aimed at addressing greenwashing.[3] However, determining whether a fund engages in greenwashing largely depends on the analysis of portfolio holdings disclosed in regulatory filings, which, in reality, only provide a snapshot at quarter ends, allowing limited insight into a fund's ongoing investment and ownership choices.

In this study, we explore a unique variant of greenwashing by mutual fund managers, known as *window dressing*. Since mutual funds are mandated to disclose their holdings only quarterly, their non-quarter-end portfolios remain undisclosed to the public. We examine whether mutual funds strategically tilt their portfolios towards assets with elevated ESG scores at the quarter's end, precisely when disclosure is required.

We employ a novel approach to detect potential window dressing behaviors of mutual funds. We

[1] See Riedl and Smeets (2017), Hartzmark and Sussman (2019), Krueger et al. (2020), and Bolton and Kacperczyk (2021)

[2] For details, refer to 2022 Report on U.S. Sustainable Investing Trend issued by U.S. Sustainable Investing Forum (SIF).

[3] For example, see "Fired Executive Says Deutsche Bank's DWS Overstated Sustainable-Investing Efforts", *Wall Street Journal*, Patricia Kowsmann and Ken Brown, August 1, 2021, and "ESG Funds Draw SEC Scrutiny", *Wall Street Journal*, Juliet Chung and Dave Michaels, December 16, 2019.

examine the varying loadings of regressing a mutual fund's daily returns against the returns of a constructed ESG portfolio across a quarter, with higher loadings indicating more intensive investments in firms with better ESG performance. Specifically, our ESG portfolio is formulated following the methodology outlined in Pástor et al. (2022), which involves taking long positions in stocks with high ESG scores and shorting those with low scores.[4] We partition the days in a quarter into thirteen different bins, each spanning seven calendar days, and then perform factor-model regressions of mutual fund returns on the Fama-French four factors plus ESG portfolio returns for each bin. Loadings on ESG portfolio returns (hereafter, ESG loadings) are estimated by pooling data from four consecutive quarters and for each unique combination of mutual fund, quarter, and bin in a sample period ranging from 2013 to 2021.

We proceed to investigate the intra-quarter trends of ESG loadings, employing a difference-in-differences (DiD) design to compare active mutual funds to passive funds that are primarily designed to track market indices.[5] Using the index-tracking passive funds as the control group, we document that ESG loadings of active funds are significantly larger in the last bin of each quarter compared to other periods, with the magnitude of differences (0.057) more than 7 times larger than the sample average of non-quarter-end periods (0.008). This suggests that active mutual funds strategically adjust their portfolios towards holdings with high ESG scores as they approach the holding reporting window. Conversely, as expected, we observe no significant increase in ESG holdings at quarter-ends for passive funds, indicating that our results can't be explained by market-level behavioral anomalies or irregular trading activities at quarter-ends (e.g., Lakonishok and Maberly, 1990; Abraham and Ikenberry, 1994; Kamstra et al., 2000).

Building on the robust evidence of increased ESG loadings at quarter-ends, we formulate our fund-quarter level metric for ESG window dressing as the difference between the ESG loadings in the last bin of a fund-quarter (comprising the final bin leading up to quarter-end) and the average ESG loadings

[4] Following Pástor et al. (2022), we rely on MSCI ESG scores as our major measure of ESG performance.
[5] In this analysis, we consider passive mutual funds that track the major market indices, including S&P 500, S&P 1500, Russell 1000, Russell 2000, and Russell 3000.

across the other twelve bins of that same fund-quarter. We then apply this measure in various analyses, primarily focusing on the determinants and consequences of ESG window dressing. Importantly, for identification purposes, our measure for ESG window dressing — derived from the difference between quarter-end and non-quarter-end ESG loadings within the same fund-quarter — enables us to isolate the variation among different bins and is not influenced by any unobservable time-variant fund-specific factors that may confound our findings.[6]

We next examine the effects of MSCI expanding its ESG score coverage in 2012 on mutual funds' window dressing behaviors. The median proportion of mutual fund holdings covered by the MSCI ESG score increased significantly from 57.73% in the first quarter of 2012 to 89.96% by the end of the fourth quarter. Our hypothesis posits that this increased availability of ESG scores, reducing the costs for investors to evaluate and monitor the ESG investments of mutual funds, would adversely encourage more window dressing activities, especially for those funds holding shares in low ESG-scoring firms that are unobservable to investors before the expansion. Our results confirm this hypothesis, showing a more pronounced increase in window dressing activities after the expansion among mutual funds invested in firms with lower "unobservable" ESG scores, compared to funds invested in firms with higher "unobservable" ESG scores. Our results suggest that increased public scrutiny of mutual fund ESG investing, achieved by enhancing the transparency of portfolio firms' ESG performance, may inadvertently lead to an increase in window dressing activities.

In March 2016, MSCI introduced its mutual fund ESG rating, coinciding with Morningstar's launch of a similar rating system, both of which provided investors with readily accessible fund-level ESG evaluations that were previously unavailable.[7] We contend that the disclosure of mutual fund ESG ratings, by significantly lowering the barriers for investors to assess mutual fund performance, could motivate funds with inferior ESG performance to engage in window dressing. Consistent with our conjecture, we observe a significant increase in window dressing activities among active funds that have

[6] In the following analysis, we still include fund and quarter fixed effects when appropriate for robustness. As expected, the inclusion of fund and quarter fixed effects in most regressions does not alter our findings.

[7] Before these ratings were introduced, investors had to manually calculate fund-level ESG scores using the ESG scores of the individual stocks held within the fund to evaluate the ESG performance of mutual funds.

low portfolio ESG scores in their respective fund category prior to the event, compared to passive index-tracking funds.

We systematically investigate the factors that are associated with a greater extent of window dressing. First, our results indicate that funds that earned higher alphas in the past three or twelve months are more inclined to engage in window dressing, a finding that aligns with our subsequent discovery that window dressing effectively attracts additional fund flows primarily for high-performing funds. Second, the positive returns of the aggregate green versus brown portfolio over the previous three months also correlate with increased window dressing, potentially growing pressure due to prevailing attitudes or sentiments favoring ESG investments, or a reduced cost of shifting portfolios from maximizing alphas to including high ESG stocks. Furthermore, we find that younger funds tend to engage in window dressing more frequently, consistent with the idea that younger funds are under greater pressure to attract capital.

Following the analysis of the factors driving ESG window dressing, we shift our focus to examining its consequences. We find that mutual fund flows react positively to ESG window dressing, pointing to tangible advantages for funds that engage in such tactics. This response also implies that investors struggle to differentiate between ESG window dressing and authentic ESG investments. Interestingly, the inclination to invest is observed only in funds with strong past performances, while it does not manifest in funds whose past performance falls within the lower tercile of their CRSP category. This indicates that investors are more likely to reward ESG efforts when they're confident in the fund's track record. Furthermore, upon dissecting fund flows into institutional and retail components, we discern that it's predominantly institutional investors driving this trend, not their retail counterparts. This pattern suggests that institutional investors, rather than retail investors, are the ones paying close attention to the ESG investing of mutual funds.

Furthermore, our findings demonstrate a positive association between window dressing activities and an increase in a fund's portfolio ESG score. This correlation not only validates our measure for identifying window dressing but also supports the observed investor behavior of rewarding higher

window dressing with increased capital inflows. Essentially, investors are drawn to the enhanced ESG scores that window dressing creates, making the portfolio appear more attractive, even if the underlying investments during the non-quarter end days may not genuinely reflect ESG principles.[8]

Finally, we document the tangible impacts of ESG window dressing on the capital market. Specifically, we observe a pronounced increase in the returns of stocks with high ESG scores compared to those with low ESG scores as the end of the quarter approaches. The effect is concentrated among stocks with higher mutual fund ownership and those owned by mutual funds with a greater extent of window dressing. There are return reversals for these stocks after the quarter-end. These findings are consistent with the buying behavior of mutual funds towards the quarter end that exerts price pressure and pushes up the price of the high-ESG-score stocks, which subsequently reverses.

We make several valuable contributions to the literature. First, our study enhances the understanding of the economics of information disclosure and transparency (e.g., Verrecchia (2001)). We exploit two key ESG rating introduction events: the 2012 expansion of firm ESG score coverage by MSCI and the 2016 introduction of mutual fund ESG ratings by MSCI and Morningstar, in addition to the mandatory quarter-end portfolio holding disclosures by mutual funds. Our findings suggest that greater information transparency and accessibility, enabled by disclosure and rating introduction, can have unintended consequences—specifically, increased agency issues such as window dressing.

In addition, previous studies on mutual fund window dressing have primarily focused on the performance-driven aspects of stock holdings, such as mutual funds adding past high-performing stocks and removing underperformers toward the end of the quarter.[9] In contrast, we introduce a distinct angle to window dressing. In particular, we shed light on window dressing concerning ESG preferences, aligning with the evolving investor inclination towards ESG stocks.

Furthermore, we contribute to the literature on greenwashing by institutional investors. Previous

[8] Additionally, we observe a marginally significant impact of ESG Window Dressing on achieving a higher MorningStar Sustainability Rating after accounting for fund-specific fixed effects. The limited significance of this effect could be attributed to the discrete five-star framework utilized in MorningStar's rating system.

[9] See, e.g., Agarwal et al. (2014), Lakonishok et al. (1991), Sias and Starks (1997), He et al. (2004), Ng and Wang (2004), and Meier et al. (2004).

research shows that the U.S. domiciled signatories of the United Nations Principles for Responsible Investment (PRI) attract larger fund inflows but do not have better portfolio ESG scores compared to the U.S. nonsignatories (e.g., Gibson Brandon et al. (2022), Kim and Yoon (2023), Liang et al. (2022)). While many studies rely on disclosed portfolio holdings to assess funds' adherence to ESG principles, our study uncovers that the ESG scores of holdings reported at the quarter's end do not necessarily represent the actual ESG scores throughout the quarter due to window dressing activities of mutual funds.

Lastly, our research adds to the body of literature on demand-driven price pressure. Prior work has shown that institutional demand creates price pressure and affects cross-sectional stock returns, for example, demands from index funds in the case of index inclusion (Shleifer, 1986), ESG preferences (Van der Beck, 2021), mutual fund outflows and fire sales (Coval and Stafford, 2007), performance-chasing mutual funds flows (Lou, 2012), mutual fund flows from Morningstar rating reforms (Ben-David et al., 2022), and bench-marking intensity (Pavlova and Sikorskaya, 2023). Our research contributes to this dialogue by demonstrating that trading resulting from mutual fund window dressing can drive up the returns of high ESG stocks in the days leading up to the quarter's end.

2 Background and Key Metrics

2.1 Background and Institutional Details

Mutual funds are mandated by the Securities and Exchange Commission (SEC) to report their portfolio composition and number of shares held on a quarterly basis, no later than 60 days following the end of each fiscal quarter.[10] Aiming to enhance the transparency of mutual fund investments in ESG, the disclosed holdings are extensively used as a critical basis for assessing the ESG performance of mutual funds. For example, third-party rating agencies, such as MSCI and MorningStar, evaluate the ESG performance of mutual funds by analyzing their disclosed holdings, rating each portfolio firm's

[10] Historically, mutual funds filed Form N-Q for their first and third fiscal quarters and Form N-CSR after the end of their fiscal half-year (SEC, 2004). Since June 1, 2018, funds have been required to file Form N-PORT, which replaces both Form N-Q and N-CSR and aims to improve the quality and format of information that funds provide to investors (SEC, 2016).

ESG performance and risks, and aggregating these to assess the overall fund performance.[11] Also, as an increasing number of institutional investors embrace sustainable investing, they evaluate the ESG profiles of portfolio firms before deciding to invest in a mutual fund.

Despite the importance of the ESG profiles of portfolio firms, evaluations are typically based on end-of-quarter portfolio snapshots, potentially opening loopholes for mutual fund managers to exploit. Confronted with multifaceted incentives, these managers strive to maximize returns within defined risk tolerances and investment styles, simultaneously balancing the demands of ESG investing imposed by rating agencies and investors. Consequently, mutual fund managers can exercise discretion in enhancing the ESG profile of their portfolios by selectively holding more stocks with higher ESG scores during the disclosure window, while primarily concentrating on maximizing returns in non-quarter-end periods. This approach collectively forms a logical basis for the practice of ESG window dressing. A graphical timeline illustrating portfolio reporting regulation and the concept of ESG window dressing is depicted in Figure 2.

2.2 Key Metrics

Our metric for assessing ESG window dressing, referred to as *ESG WinDress* , is conceptually defined as the difference in the level of investments in firms with high ESG scores between quarter-end periods and non-quarter-end periods. Specifically, we split the days of a quarter into thirteen different bins, each covering a period of seven calendar days, and define the last bin of a quarter as the quarter-end period. We collect daily mutual fund return data from the CRSP Mutual Fund Database. In addition, we obtain mutual fund portfolio holding reports from the Thomson Reuters S12 database, using the MFLINKS tables to merge the S12 and CRSP mutual fund databases. To categorize stocks into different buckets for the construction of ESG portfolios, we acquire the ESG scores from MSCI and gather stock characteristics from the CRSP/Compustat merged database. Next, we proceed to estimate ESG window dressing through three key steps: constructing ESG portfolios, estimating ESG return

[11] See MSCI ESG Fund Rating Methodology (MSCI, 2023) and Morningstar Sustainability Rating Methodology (MorningStar, 2021)

loadings of mutual funds, and measuring the extent of ESG window dressing.

2.2.1 Construct ESG Portfolios

To start with, we construct an ESG portfolio by double-sorting the MSCI Weighted Average Score and firm size.[12] Specifically, we sort stocks independently into two groups based on their market capitalization and three groups based on their Weighted Average Score, which is updated annually at the end of June. This results in six portfolios (2×3): (1) Small Size - High ESG Score; (2) Big Size - High ESG Score; (3) Small Size - Middle ESG Score; (4) Big Size - Middle ESG Score; (5) Small Size - Low ESG Score; (6) Big Size - Low ESG Score. We then calculate the value-weighted returns of the six (2×3) resulting portfolios for each day and the daily long-short returns ($ESG\ Return_d$, with d representing the day) as the average of the two High ESG Score portfolios minus the average of the two Low ESG Score portfolios:

$$ESG\ Return_d = 0.5 \times (RET^{High\ ESG}_{Small,\ d} + RET^{High\ ESG}_{Large,\ d}) - 0.5 \times (RET^{Low\ ESG}_{Small,\ d} + RET^{Low\ ESG}_{Large,\ d}) \quad (1)$$

2.2.2 Estimate *ESG Return* Loadings

Next, we run factor-model regressions of mutual fund daily returns on the Fama-French four factors plus *ESG Return*. Specifically, we estimate the following model for each fund-quarter-bin:

$$Ret_{id} - RF_d = \alpha_{id} + \beta_1 SMB_d + \beta_2 HML_d + \beta_3 MKT_d + \beta_4 UMD_d + \beta_5 ESG\ Return_d + \epsilon_{id} \quad (2)$$

where i denotes the mutual fund, d represents the day, and Ret_{id} corresponds to the daily return of mutual fund i on the day d and RF_d is the risk-free return rate. The daily data for the Fama and French three factors (Fama and French, 1993) and the momentum factor (Carhart, 1997) are from the WRDS. The *ESG Return* factor is constructed as described in the previous section.

[12] The MSCI ESG Rating determines a company's ESG score by evaluating its performance in three key areas: environmental, social, and governance. This system generates a Weighted Average Score by aggregating its Environmental Pillar Score, Social Pillar Score, and Governance Pillar Score. We utilize this Weighted Average Score to develop our measure of mutual fund ESG window dressing.

To increase the effective number of observations for each regression, we aggregate data from the same bin across four consecutive quarters. For example, in estimating the loading of *ESG Return* for a fund during the quarter-end period (the last bin) in 2013 Q4, we utilize the observations available for this fund within the final bin of 2013 Q4, along with the data from the last bin of the preceding three quarters (2013 Q1 to Q3).[13] For each regression, we collect β_5, which is the loading on *ESG Return* (i.e. *ESG Loading*) for a given fund in a given quarter and bin.[14]

2.2.3 Measure ESG Window Dressing

Finally, to derive the fund-quarter level measure of ESG window dressing, denoted as *ESG WinDress* , we take the difference between the *ESG loading* in the last bin of a fund-quarter and the average *ESG loading* of the remaining twelve bins in that same fund-quarter. The design of this measure enables us to isolate variations in ESG investments across different bins, independent of any factors at the fund-quarter level, making it ideally suited for identification purposes in our analyses.

We obtain *ESG WinDress* for a sample of 50,521 fund-quarters. As shown in Table 2, the mean (median) value of *ESG Loading* is 0.008 (0.021) during the non-quarter-end periods, while the mean (median) sharply rises by 0.049 (0.036) to 0.057 (0.057) at the quarter-ends. Moreover, our primary ESG window dressing metric (*ESG WinDress*) has a mean value of 0.050, which is significantly different from 0 with a t-statistics of 30.9. This confirms the existence of ESG window dressing behaviors, and the magnitude is not negligible.

3 Data and Research Design

3.1 Data and Sample

To construct our main sample, we obtain mutual fund returns from the CRSP Mutual Fund Database, mutual fund holdings from the Thomson Reuters Mutual Fund Ownership database, and

[13] Assuming there is no missing data, each regression should consist of 20 effective observations. We exclude any regressions with an effective number of observations below 10.

[14] In other words, for each fund-quarter, we estimate a total number of 13 unique ESG loadings, each for one unique bin in the quarter.

ESG scores of portfolio firms from the MSCI ESG database.

Our mutual fund sample consists of U.S. equity funds with available daily returns, fees, total net assets (TNA), inception dates, and fund styles. To combine these fund characteristics acquired from the CRSP Mutual Fund Database with the data of their detailed holdings from the Thomson Reuters Mutual Fund Ownership database, we rely on the MFLINKS tables following Wermers (2000). We exclude fund observations whose fiscal quarter ends do not coincide with calendar quarter ends, accounting for approximately 12% of our sample.[15] Additionally, we remove observations with stale holdings (older than a quarter), which further reduces our sample by 4.5%. Our main sample spans from the first quarter of 2013 through the fourth quarter of 2021. We initiated the sample in 2013 due to the significant expansion of the MSCI ESG Score used to construct the ESG portfolio, which occurred in the last quarter of 2012, as depicted in Figure 3A and discussed in Section 3.2.2 (Pástor et al., 2022). We conclude our sample in 2021 due to the availability of MFLINKS tables, which ends in June 2022.

We rely on the MSCI scoring system to measure the ESG scores of mutual fund holdings. Companies are scored on a scale of 0-10 based on their exposure to industry-specific ESG risks and how well they manage those risks relative to peers. MSCI scoring system selects 37 key issues for each of the 156 Global Industry Classification Standard (GICS) sub-industries annually and weights them according to a materiality-mapping framework, based on data from a range of sources, including corporate annual reports, investor presentations, and financial and regulatory disclosures. MSCI generates an overall score by weighting the scores to the 37 key issues according to assessed materiality in each industry. The final ESG score is an aggregate measure that reflects a company's standing relative to peers within its industry.[16] To determine the portfolio ESG scores for each fund-quarter, we compute the market-value weighted average of the ESG scores, using the market value of each holding as the weighting factor.[17]

[15] While mutual funds must disclose their holdings at the end of fiscal quarters, their investment managers controlling over $100 million are also mandated to file Form 13-F, reporting their holdings at the end of each calendar quarter. To minimize discrepancies arising from this misalignment, we exclude mutual funds whose fiscal quarter ends do not align with calendar quarter ends.

[16] MSCI also involves companies in the data review process, offering them the opportunity to review and provide feedback on the data used in the assessment, to improve the precision and reliability of the information pertaining to the company.

[17] Stocks that lack MSCI ESG scores are excluded from this calculation. As illustrated in Figure 3A, the data

Finally, our final sample comprises 2,423 mutual funds, encompassing a total of 50,521 fund-quarter observations where all key variables are available.

3.2 Research Design

3.2.1 Baseline Diff-in-Diff

To empirically capture and quantify ESG Window Dressing behaviors, we estimate the following difference-in-differences model, with active funds as the treatment group and passive index-tracking funds as the control group:

$$ESG\ Loading_{i,b,t} = \beta_1 QENDBin_{b,t} \times Active\ Fund_i + \beta_2 QENDBin_{b,t} + \Theta Controls + \alpha_i + \gamma_t + \epsilon_{i,b,t} \quad (3)$$

for mutual fund i, quarter t, and bin b. The variable $QENDBin_{b,t}$ is an indicator variable that takes the value of one if the bin b is the last one in quarter t. $Active\ Fund_i$ takes the value of one if the fund is an active mutual fund and zero if it is a passive index fund. We control for fund fixed effects (α_i) and quarter fixed effects (γ_t) to eliminate biases from unobservable fund characteristics and time-varying factors that could confound the analysis.

To distinguish passive index funds from active funds, we rely on the classification from both MorningStar and CRSP for robustness. A mutual fund is identified as an index-tracking passive fund if it is labeled as a pure index fund in CRSP and is noted in MorningStar as benchmarking against primary S&P and Russell indices, including the S&P 500, S&P 1500, Russell 1000, Russell 2000, or Russell 3000. This results in 42 index-tracking passive funds in our sample.[18]

Passive funds serve as a perfect control group for our study. Similar to active equity funds, passively managed index funds are also subject to quarterly reporting regulations. However, they rigorously adhere to the composition and weightings of the benchmarked indices, making it unlikely for them to

missing issue should not be a big concern as the median coverage of ESG scores surpasses 80% following MSCI's expansion of their ESG score coverage in 2012.

[18] To merge the Morningstar data with CRSP, we begin by joining the two tables based on the "Ticker" identifier. Subsequently, we exclude funds with multiple "WFICN" (linked by the WRDS MFLINKS) entries, accounting for the removal of approximately 4.2% of the linked mutual funds from Morningstar.

engage in window dressing activities as the quarter-end approaches. The use of passive index funds serves to mitigate the impact of abnormal market conditions at quarter ends, similar to the widely documented behavioral anomalies or irregular trading activities, such as weekend-effect (e.g., Lakonishok and Maberly, 1990; Abraham and Ikenberry, 1994) and daylight saving effect (Kamstra et al., 2000), which are expected to impact both active and passive funds similarly. By incorporating passive index funds as controls, we can effectively isolate and assess the extent of window dressing activities exclusive to active mutual funds, enabling us to discern whether changes in ESG loadings are attributable to ESG window dressing or are merely reactions to transient quarter-end market anomalies.

3.2.2 MSCI ESG Score Expansion

In October 2012, MSCI expanded its coverage to include more U.S. firms in its ESG scoring system(Pástor et al., 2022), which enhanced the transparency of portfolio firms' ESG profiles and lowered the costs for investors to assess and monitor the investments of mutual funds. We use this ESG score expansion as a pseudo-exogenous event that may alter mutual funds' incentives to engage in window dressing. Specifically, we hypothesize that mutual funds holding shares in low ESG-scoring firms, which were unobservable to investors prior to the expansion but became visible afterward, would have a stronger incentive to engage in window dressing, compared to funds invested in firms with higher "unobservable" ESG scores before the expansion.

To examine this hypothesis, we perform the following difference-in-differences regression:

$$ESG\ WinDress_{it} = \beta_1 Treat_i \times Post_t + \Theta Controls + \alpha_i + \gamma_t + \epsilon_{it} \tag{4}$$

where i represents the mutual fund and t represents the quarter. α_i is mutual fund fixed effect, and γ_t is quarter fixed effect.

We extend our main sample to cover four quarters before and after the event quarter, ranging from 2011Q2 to 2013Q2. Quarters from 2011Q2 to 2012Q2 are designated as $Post_t = 0$, while quarters from 2012Q3 to 2013Q2 are marked as $Post_t = 1$. Although the event month is October 2012, it is important

to note that mutual funds are allowed to file portfolio holdings within 60 days after the quarter ends and most funds would delay their filings due to proprietary concerns (e.g., Frank et al., 2004; Choi, 2022). Therefore, we treat quarters since 2012Q3 as $Post_t = 1$.[19]

We then calculate the weighted-average ESG scores prior to the MSCI expansion for each fund, which serves as the basis for categorizing mutual funds into treatment and control groups. The weighting is determined by the market value of each stock held by the mutual fund, based on the holdings snapshot before the expansion and we refer to the first ESG scores after the expansion. We then sort mutual funds into tercile groups based on their weighted average ESG scores. Mutual funds placed in the bottom tercile are considered to have the highest incentive to engage in ESG window dressing and are designated as the treatment group, while those in the top tercile serve as the control group.[20]

3.2.3 Fund ESG Ratings Launch

In March 2016, MSCI introduced its mutual fund ESG rating system, which assigns ratings ranging from CCC to AAA, intending to provide greater transparency at the fund level in addition to the firm-level ESG scores that were available at the time. In the same month, Morningstar also released its first Sustainability Rating, as documented by Hartzmark and Sussman (2019), with the top 10% of funds having the best ESG performance assigned five globes and the bottom 10% assigned one globe.

We hypothesize that the release of mutual fund ESG ratings significantly lowered the barriers for investors to assess the ESG performance of mutual funds, incentivizing fund managers to engage in ESG window dressing, especially for actively managed funds with the worst portfolio ESG performance. To empirically test the hypothesis, we employ a difference-in-differences specification as in equation (4) including treatment and control funds. The treatment funds are mutual funds in the bottom tercile of the 2015 quarterly average ESG scores. [21] The control funds are passive index-tracking mutual funds as

[19] Our results are robust when treating 2012 Q3 as a pre-event period or excluding 2012 Q3 from the sample.

[20] To enhance the comparability of mutual funds, we compare the "unobservable" ESG scores of funds within the same CRSP Style Category and among those belonging to identical average quarterly portfolio ESG score decile groups.

[21] Similarly, mutual funds' portfolio ESG scores are compared among funds within the same CRSP Style Category to enhance comparability. To exclude potential impacts from increased ESG score coverage, we require at least 80% of holdings of a portfolio to be covered by MSCI.

described in section 3.2.1. The post-period is defined as 2016Q1 and the following four quarters, while the pre-period comprises the four quarters prior to 2016Q1.

3.2.4 Return Impact around Quarter Turns

We conclude our paper by investigating the capital market implications of mutual fund ESG window dressing behaviors. We posit that stocks with high ESG scores exhibit higher abnormal returns compared to stocks with lower ESG scores at quarter-ends, driven by the concentrated purchasing activities from mutual funds that engage in window dressing. Then in the next quarter's beginning, these stocks with high ESG scores would experience abnormally lower returns compared to lower ESG stocks. We empirically test these two hypotheses using the following two equations:

$$DGTW\ Return_{jd} = \beta_1 HighESG_j \times QEND_d + \beta_2 HighESG_t + \Theta Controls + \alpha_j + \gamma_d + \epsilon_{jd} \quad (5)$$

$$DGTW\ Return_{jd} = \beta_1 HighESG_j \times QBEG_d + \beta_2 HighESG_t + \Theta Controls + \alpha_j + \gamma_d + \epsilon_{jd} \quad (6)$$

where j represents individual stocks and d denotes trading days. The dependent variable, $DGTW\ Return$, measures risk-adjusted excess returns, as defined in Daniel et al. (1997).[22] The primary independent variable of interest is the interaction between $HighESG_j$ and $QEND_d$ and the interaction between $HighESG_j$ and $QBEG_d$. $HighESG_j$ is an indicator variable equal to one for stocks in the top ESG score tercile at the beginning of a year, and zero otherwise. $QEND_d$ takes the value of one for the days in the last few days of each calendar quarter and zero otherwise. For example, $QEND[0,3]$ equals one for the final day of a quarter and the three days preceding the quarter end. Similarly, $QBEG_d$ takes the value of one for the days in the first few days of each calendar quarter and zero otherwise. For example, $QBEG[0,3]$ equals one for the first day of a quarter and the three days after the quarter begins. We account for stock fixed effects with α_j and day fixed effects with γ_d.

[22] We adopt their procedure to create 125 portfolios each June. We then compute the abnormal return for each stock in the following year until the subsequent June, measuring it as the excess return of the stock's daily return over the corresponding portfolio return.

To create the sample for this stock-level analysis, we utilize the CRSP daily stock databases, along with the CRSP/Compustat merged database. We retain stocks with share codes 10 or 11 and include all stocks with available MSCI ESG scores as of the prior year-end, covering the period from January 2013 through December 2021. Company-level control variables, such as market equity, book-to-market ratios, return on assets, and debt-to-assets ratios, are constructed based on the CRSP/Compustat merged table. Our final sample comprises 3,439 stocks with all key variables available.

3.3 Other Key Variables

Flow. Quarterly fund flows are computed following the method outlined in Agarwal et al. (2014), which takes the quarterly sum of monthly dollar flows and divides it by the beginning-of-quarter TNA:

$$\text{3-Month Flow}_t = \frac{\sum_{i=m-2}^{m} [TNA_i - TNA_{i-1} \cdot (1 + r_i)]}{TNA_{t-1}}. \tag{7}$$

where m, $m-1$, and $m-2$ represent the months within quarter t and r_i denotes the net-of-fee monthly return of the mutual fund for month i.

Alpha. We compute mutual fund monthly alpha by conducting a rolling regression of the mutual fund's monthly excess return over the Fama and French three factors and the momentum factor for the preceding 36 months, with a minimum requirement of 30 months' data. The calculation of *Alpha* involves subtracting the expected value predicted by the estimated model from the actual monthly excess return. Subsequently, we derive *3-Month Alpha* and *12-Month Alpha* by summing the alpha values for the three most recent months and the twelve most recent months, respectively.

GMB. We create this green-minus-brown portfolio as a proxy for the market return of a long/short ESG portfolio. Following a methodology similar to that of Pástor et al. (2022), we categorize stocks into terciles based on the previous month's MSCI "Environmental Pillar Score". Subsequently, we compute this month's *GMB* return by calculating the difference between the portfolio return of the group with the highest score and the group with the lowest score. We then derive *3-Month GMB* and *12-Month GMB* by calculating the buy-and-hold return of the long/short portfolio over the most recent three

months and twelve months, respectively.

For other main control variables, we aggregate the TNA across all share classes to derive the fund-level variable. The fund's *Age* is determined by calculating the number of years between the current year and the inception year of the oldest share class. The *Exp. Ratio* is extracted from the *exp_ratio* field in CRSP, with TNA weighting applied across all share classes.

3.4 Summary Statistics

Table 2 provides an aggregation of descriptive statistics for our sample comprised of 2,381 U.S. active equity mutual funds and 42 passive index funds tracking the major S&P and Russell indices, spanning 50,521 fund-quarter observations. On average, quarterly flows exhibit a slight negative value, with a mean of -1% and a median of -2%. In terms of performance, the funds record an average quarterly alpha of -0.2% and a median of -0.1%. The typical fund has been in existence for approximately 21 years, operates with an expense ratio of 1%, and manages total net assets averaging $2,046 million. Furthermore, the mean (median) quarterly buy-and-hold return for the long/short GMB portfolio is noted at 1.6% (2.2%). In relation to ESG considerations, the average portfolio ESG score is 4.64 out of a 10-point scale, with the Morningstar Sustainability Rating averaging at 2.99 on a 5-point scale.

4 Results and Discussions

We conduct a comprehensive analysis of the window dressing behavior of mutual funds concerning ESG investments. This includes an investigation of the presence and extent of ESG window dressing behavior, an analysis of characteristics and factors that contribute to its prevalence, and an assessment of its impact on fund flows and ESG scores. Furthermore, we investigate how the expansion of firm-level ESG scores coverage by MSCI in 2012 and the introduction of fund-level ESG ratings have affected the window dressing activity among mutual funds. Finally, we examine the impacts of ESG window dressing on the capital market.

4.1 Baseline Results

Detecting window dressing activity within mutual funds is inherently challenging due to the lack of visibility into their daily holdings. Regulatory requirements stipulate that mutual funds need only disclose their portfolio holdings quarterly, offering only a snapshot of their assets at each quarter's end. This lack of continual disclosure means we cannot directly compare quarter-end holdings with those maintained throughout the quarter. As such, any analysis of these practices must often rely on indirect methods and inferences rather than direct comparison of portfolio compositions over time. To navigate this obstacle, we develop a unique methodology that allows us to identify window dressing activities catering to investors' preferences for ESG stocks.

Specifically, we construct an ESG portfolio that takes long positions in stocks with high ESG scores and short those with low scores (as detailed in Section 2.2.1). We then segment each quarter into small intervals or bins, with widths of 7 calendar days. The final bin of every quarter is defined as the quarter-end bin (*QENDBin=1*). We next regress the daily returns of a mutual fund on the daily returns of the ESG portfolio in each bin location to estimate the loading of a mutual fund on the ESG portfolio. To guarantee a sufficient number of observations for each regression, we aggregate the data from each bin location over the four quarters of a year. The regression coefficients, which are the loadings on the ESG portfolio, gauge the degree to which a mutual fund invests in green stocks as opposed to brown stocks. We investigate whether these loadings increase as the end of a quarter approaches. If a mutual fund shifts its portfolio towards stocks with higher ESG scores closer to the quarter's end, we anticipate the loadings on the ESG portfolio to be more pronounced in the quarter-end bin compared to other bins.

Table 3 presents the regression results of equation (3), where the dependent variable, *ESG Loading (i,b,t)*, represents the loading on the ESG portfolio returns. This is obtained by regressing the daily returns of an active mutual fund i against the ESG portfolio returns for days in bin b of quarter t. The variable *QENDBin* assumes a value of 1 if the bin is the last one before a quarter's end and 0 otherwise. In the regressions, we include fund and quarter fixed effects in column (1), fund times quarter fixed effects in column (2), and additional control variables including lagged flows, fund alpha, expense ratio,

fund size, and fund age in column (3). Standard errors are clustered at fund level.

The coefficients on the interaction term between *QENDBin* and active fund dummy are positive and statistically significant in all three columns. The results suggest that the loadings on the ESG portfolio are significantly larger in the bin leading up to a quarter end, and this increase is significantly greater for active mutual funds than that of the index-tracking passive mutual funds. For example, in column (3), the coefficient is 0.048 (t-stat=5.93). This means that, relative to the control funds, the loadings in the quarter-end bin are 0.048 greater than that in the rest of the bins for the active funds. Since we include fund times quarter fixed effects, the results essentially capture the within fund-quarter variations in the loadings on the ESG portfolio. This finding aligns with the notion that active mutual funds strategically shift their portfolios toward stocks with higher ESG scores at the quarter's end, coinciding with the mandated public disclosure of portfolio holdings.

4.2 MSCI Firm-level ESG Score Coverage Expansion

We next explore the impact of MSCI expanding its ESG score coverage in 2012 on the window dressing behavior of mutual funds. As shown in Figure 3A, the median percentage of mutual fund holdings covered by MSCI ESG Scores experiences a substantial increase, rising from 57.73% in the first quarter of 2012 to 89.96% by the end of the fourth quarter. We hypothesize that the expanded availability of ESG scores would result in increased window dressing activities among mutual funds, especially for those funds holding shares in firms whose low ESG scores were previously "unobservable".

We employ a difference-in-differences regression analysis exploiting this pseudo-exogenous expansion in MSCI ESG Score coverage. The treatment group consists of mutual funds that held shares in firms with low ESG scores, which were previously "unobservable" before the expansion of ESG score coverage in 2012. The control group is matched based on two criteria: fund category and the average quarterly portfolio ESG score in 2011.[23] The inclusion of the latter criterion aims to account for potential pre-event variations in window dressing incentives among mutual funds (as detailed in Section 3.2.2). This

[23] The mutual fund categories used in this study are derived from the *crsp_obj_cd* field in the CRSP "Fund_Style" table. For instance, "EDYG" in this field denotes "Equity, Domestic, Style, Growth."

yields 400 funds in the control group and 466 funds in the treatment group. The post-event period is defined as the four quarters after the ESG coverage expansion in 2012Q2. The pre-event period includes 2012Q2 and the prior four quarters.

The regression results of equation (4) are presented in Table 4. As shown in the three columns, the coefficient on the interaction term between treatment and post is positive and statistically significant. Controlling for fund and quarter fixed effects, the expansion of MSCI ESG scores is associated with approximately a one-third interquartile change in ESG window dressing among treatment funds in comparison to control funds, as evidenced by column (3) (coeffi.= 0.103, t-stat=4.35). This suggests that, compared to the control group, the treatment group experienced a substantial increase in window dressing activities following the expansion in 2012. The result is robust to different fixed effect specifications, as demonstrated across columns (1) to (3).

In Figure 3C, we evaluate the parallel trends assumption in our difference-in-differences analysis. The figure illustrates that, in the four quarters leading up to the expansion of MSCI ESG Score coverage, the discrepancy in window dressing activities between the treatment and control groups remained stable and was not statistically different from zero. This implies that, prior to the event, the trend in window dressing activities did not differ significantly between the two groups, thereby fulfilling the parallel trends assumption. Following the expansion, the disparity between the treatment and control groups became positive and statistically significant, suggesting that the treatment group engaged more intensively in window dressing compared to the control group.

Overall, following the expansion of MSCI ESG score coverage, we observe a more pronounced increase in window dressing activities among mutual funds investing in firms with lower "unobservable" ESG scores, compared to those investing in firms with higher "unobservable" ESG scores. These results align with our hypothesis, indicating that mutual funds tend to intensify their window dressing activities as ESG scores of more firms become available.

4.3 The Launch of Mutual Fund ESG Ratings

MSCI launched its mutual fund ESG rating in March 2016, providing a direct and visible measure of a mutual fund portfolio's ESG performance. Prior to this, there was no widely available fund-level ESG rating; to evaluate the ESG performance of a mutual fund, investors would need to manually calculate portfolio ESG scores using the ESG scores of the individual firms.[24] Concurrently, as documented by Hartzmark and Sussman (2019), Morningstar first published its mutual fund sustainability rating, rating top-performing ESG funds with five globes and bottom funds with one globe. We conjecture that the revelation of mutual fund ESG ratings would induce funds to engage in window dressing, particularly those with poorer ESG performance prior to the rating launch, which therefore have a higher incentive to do so. Since index-tracking mutual funds are subject to less such incentive, we use passive funds as the control group.

Specifically, we follow the specification in equation (4) and use index-tracking passive mutual funds as the control group. The treatment group consists of active funds whose average quarterly ESG scores in 2015 were in the bottom tercile of their respective fund categories. To minimize potential impacts from increased ESG score coverage, we require that at least 80% of the holdings were covered by MSCI in 2015. This procedure results in 25 control funds and 319 treatment funds. The post-event period covers 2016Q1 and the four subsequent quarters, while the pre-event period comprises four quarters before 2016Q1.

The regression results are presented in Table 5. The coefficient on the interaction between treatment and post is positive and statistically significant. With fund and quarter fixed effects controlled for, the introduction of fund ESG ratings is linked to an approximate two-thirds interquartile shift in ESG window dressing by the active funds in the treatment group relative to the passive funds in the control group, as demonstrated in column (3) (coeffi.= 0.222, t-stat=9.21). In our parallel trends analysis, depicted in Figure 4, we examine the consistency of trends between the treatment and control groups before the intervention. The analysis shows a statistically insignificant difference between the two

[24] See the section "ESG Fund Ratings Update History" in MSCI ESG Fund Rating Methodology (MSCI, 2023)

groups in the four quarters leading up to the end of 2015 (2015Q4), suggesting that the conditions for the parallel trends assumption are met.

In summary, we observe a statistically significant increase in window dressing activities among active funds with poorer ESG performance, following the releases of ESG ratings for mutual funds from both MSCI and Morningstar, compared to passive index-tracking funds.

4.4 The Determinants of Mutual Fund ESG Window Dressing

In Section 4.1, we show that mutual funds engage in window dressing behavior, evident from increased loadings on the ESG portfolio as the quarter end nears. This section delves into the factors that affect such window dressing activities.

We begin by developing a window dressing measure at the fund-quarter level, which represents the difference in ESG loadings between the final bin of the quarter and the other bins within the same quarter. Given that ESG window dressing is an activity presumably aimed at aligning with investor preferences for ESG, likely to draw more capital from mutual fund investors, we explore factors that might be related to fund flows. Specifically, we investigate potential influences on window dressing activities, including past fund performance, past fund flows, expense ratio, total net assets of the fund, fund age, and recent performance of the green-minus-brown (GMB) portfolio (Pástor et al., 2022).

In columns (1) to (4) of Table 6, the coefficients for both the past 3-month fund alpha and past 12-month fund alpha are positive and statistically significant. This indicates that mutual funds with better performance are more likely to engage in window dressing. One plausible explanation is that investors primarily reward the ESG attributes of a portfolio when the fund's performance is strong. Consequently, funds with poorer performance may not attract additional flows even if they appear to invest in high ESG score stocks. Another possibility is that funds with good performance have effective trading strategies, and shifting towards ESG investment might lead to greater losses for these funds. Hence, funds with better performance might be more inclined to engage in window dressing.

The past 12-month flow is also a significant predictor of window dressing activities. This indicates

that window dressing is not merely a tactic used by funds in a desperate attempt to attract flows. Rather, it appears to function as an added benefit for funds that are already in a favorable position. The negative and statistically significant coefficient on fund age suggests that younger funds are more prone to engage in window dressing. This tendency may be linked to several factors: younger funds often have a greater need to attract fund flows, a stronger imperative to establish a reputation as responsible investment entities or face less risk of damaging an established reputation if their window dressing activities are discovered.

In columns (3) and (4), we incorporate the recent performance of the GMB portfolio into our regression analysis. We hypothesize that the superior recent performance of the GMB portfolio is associated with more extensive window dressing activities. The reasoning behind this is that better recent performance of the GMB portfolio may reflect prevailing attitudes or sentiments that favor ESG investments. Consequently, this could motivate funds to engage in window dressing activities as a means to cater to these prevailing attitudes or sentiments.

4.5 Mutual Fund ESG Window Dressing and Fund Flows

Window dressing is used by mutual funds to cater to investors' preference for ESG investing. But does it achieve its intended benefit? In this section, we investigate the response of mutual fund flows to window dressing.

Specifically, we conduct a regression analysis of mutual fund flows on our window dressing measure, while controlling for various fund characteristics that might influence these flows. The results are presented in Table 8. The dependent variable in this analysis is mutual fund flows in quarter t. Our main independent variable is *ESG WinDress* , which is the measure of window dressing calculated using return data from the previous four quarters. Control variables include past 3-month fund alpha, past 12-month fund alpha, expense ratio, total net assets of the fund, and fund age. Quarterly fixed effects are included in all specifications. Columns (1), (3), and (5) include fund category fixed effects, while columns (2), (4), and (6) include fund fixed effects.

In columns (1) and (2), the coefficient for *ESG WinDress* is positive and statistically significant, indicating that mutual fund flows are positively influenced by the window dressing behavior of mutual funds. For instance, in column (1), where fund category fixed effects are included, the findings imply that within a given fund category, funds engaging more extensively in window dressing attract larger fund flows. Column (2) incorporates fund fixed effects, accounting for unobserved characteristics at the fund level that might concurrently impact window dressing and fund flows. A similar association is observed: a greater degree of window dressing within a fund is linked to increased fund inflows. The coefficient on past fund performance measured using either the past 3-month fund alpha or past 12-month fund alpha, is positive and statistically significant. This aligns with the conclusions of prior research, indicating that mutual fund investors tend to chase past fund performance.

The findings in Section 4.4 reveal that mutual funds with better performance are more inclined to engage in window dressing. To explore the underlying reasons, we divide our sample based on fund performance. Columns (3) and (4) display the results for funds ranked in the top performance tercile within their CRSP category in quarter *t-1*, while columns (5) and (6) focus on funds in the bottom performance tercile. The findings are noteworthy: the coefficients on *ESG WinDress* are statistically significant only in columns (3) and (4), which include the top-performing funds. In contrast, in columns (5) and (6), which encompass the bottom performers, the coefficients on *ESG WinDress* are not statistically significant. This suggests that fund flows respond to window dressing primarily when the fund has recently demonstrated strong performance. The results provide an explanation for the findings in Section 4.4 where we find only good performing mutual funds engage in window dressing.

We next ask the question which type of investors, institutional or retail investors, reward window dressing behavior of mutual funds? We conduct regression analysis that examines the response of institutional and retail investor flows to mutual funds window dressing. The sample consists of 158,186 fund share class-quarter observations, of which 51% are institutional share classes. The dependent variable is share-class quarterly flow in quarter *t*. The key independent variable interacts the institutional share class indicator with *ESG WinDress* , our window dressing measure.

As demonstrated in Panel B, the interaction term between *Institutional* and *ESG WinDress* is positive and statistically significant in both columns (1) and (2), which account for fund category fixed effects and fund fixed effects, respectively. Conversely, the coefficient for *ESG WinDress* alone is not statistically significant. These findings imply that it is primarily institutional investors who respond positively to mutual funds' window dressing activities, as opposed to retail investors. This aligns with the notion that institutional investors may place greater emphasis on portfolio ESG scores or fund ESG ratings in their investment decision-making process.

4.6 Mutual Fund ESG Window Dressing and Fund ESG Scores

In this section, we examine the impact of ESG window dressing behavior on a fund's portfolio ESG scores and its overall ESG rating. As mutual funds involved in window dressing tend to orient their portfolios towards stocks with higher ESG scores at quarter-end, it is anticipated that funds with more extensive window dressing activities will display elevated portfolio ESG scores. Consequently, to the extent that a higher portfolio ESG score translates into a higher ESG rating for the fund, window dressing mutual funds should exhibit higher ESG fund ratings.

Table 9 presents the results of regressing portfolio ESG scores and funds' ESG ratings against our window dressing measure, *ESG WinDress* In columns (1) and (2), the dependent variables are the monthly average portfolio ESG scores, computed using MSCI company ESG scores. In columns (3) and (4), the dependent variables are the end-of-quarter Morningstar mutual fund ESG ratings. Control variables include past 3-month fund alpha, past 12-month fund alpha, expense ratio, total net assets (TNA), and fund age. Quarter fixed effects are included in all models. Columns (1) to (4) also differ in whether fund fixed effects or category fixed effects are included.

As shown in columns (1) and (2), where the dependent variable is portfolio ESG scores, the coefficients on *ESG WinDress* are positive and statistically significant. This suggests that more extensive window dressing activities are linked to higher portfolio ESG scores. In column (1), with the inclusion of category fixed effects, the analysis captures variations within categories, indicating that

funds engaging more in window dressing exhibit higher portfolio ESG scores. Column (2) includes fund fixed effects to account for unobserved fund-level time-invariant characteristics that might influence both window dressing and portfolio ESG scores. Here, the results highlight within-fund variations, showing that a greater degree of window dressing, as measured over the previous four quarters, is associated with increased portfolio ESG scores.

In columns (3) and (4), the dependent variable is the overall ESG rating of the fund as provided by Morningstar. The Morningstar Sustainability Rating, ranging from 1 to 5 stars, is calculated based on a fund's portfolio ESG scores. Due to the discrete nature of the Morningstar fund rating, an increase in portfolio ESG scores may not always translate into a higher fund ESG rating.[25] In column (4), where fund fixed effects are included, we find a positive and statistically significant coefficient (coeffi. = 0.043, t-stat = 1.66), albeit the statistical significance is at the 10% level.

The results presented in this section not only validate our methodology for identifying window dressing but also corroborate the observed investor behavior of rewarding higher levels of window dressing with greater capital inflows. Essentially, investors are attracted to the improved ESG scores resulting from window dressing, which enhances the perceived appeal of the portfolio.

4.7 Price Impact of Mutual Fund ESG Window Dressing

We provide further evidence aligning with the window dressing behavior of mutual funds. We delve into the price implications of this behavior at quarter's end and quarter's beginning. Should mutual funds collectively gravitate towards high ESG-rated stocks, these stocks' prices would likely rise near the quarter end and drop in the next quarter beginning, compared to those with lower ESG ratings. Specifically, we estimate the equation (5) and equation (6).

Control variables include logarithm firm size, book-to-market ratio, return on assets, and debt to assets. We also include stock fixed effects and day fixed effects. The test framework follows a difference-in-differences approach, with stocks having a low ESG score serving as the control group and those

[25] As shown by Table II, Panel D of Hartzmark and Sussman (2019), there is approximately an 80% likelihood that a mutual fund's sustainability rating remains unchanged from one month to the next.

with high ESG scores as the treatment group. Since the purchase and sale decisions of window dressing mutual funds would treat these two different groups differently, they are the natural choice for the treatment and control groups. The treatment effect should show up in days leading up to the quarter end and in days right after the quarter beginning, and therefore should be captured by *HighESG* × *QEND* and *HighESG* × *QBEG*.

4.7.1 Price Impact at Quarter's End

Column (1) of Table 10 Panel A shows the regression results of equation (5) for the full sample. In columns (2) and (3), we partition our sample into tercile groups based on the fraction of shares held by mutual funds in each quarter's reported mutual fund holdings. Stocks in the bottom tercile of the mutual fund ownership are shown in column (2), while stocks in the top tercile are in column (3). In addition, we also divide stocks based on the *ESG WinDress* Ownership. Specifically, we first divide mutual funds into tercile groups based on *ESG WinDress* in each quarter and then calculate the fraction of mutual fund ownership that is from funds in the top tercile of *ESG WinDress*.

As shown in column (1), the coefficient on the interaction between *QEND[0,3]* and *HighESG* is positive and statistically significant for the full sample (coeffi.= 0.021, t-stat=2.54), indicating a significant difference in returns between high and low ESG stocks during the four days before the quarter end, compared to other days. During four to seven days before the quarter end, we observe a smaller positively significant return premium (coeffi.= 0.015, t-stat=1.72). In other words, the return disparity between days near the quarter end and other days is more evident for high ESG stocks than their low ESG counterparts. Specifically, this difference-in-differences is 0.021% daily, which is economically significant.

Upon dividing the sample based on mutual fund ownership, we observe that the coefficient for the interaction between *QEND[0,3]* and *HighESG* is positive and statistically significant within the high mutual fund ownership subgroups, as indicated in columns (2) (coeffi.= 0.034, t-stat=2.68). Additionally, partitioned by *WinDress* ownership, the coefficient for *HighESG* × *QEND[0,3]* is also positive and statistically significant (coeffi.= 0.029, t-stat=2.24), and this effect still holds in four to

seven days before the quarter end (coeffi.= 0.034, t-stat=2.41). Both results support our hypothesis that mutual funds systematically gravitate towards high ESG stocks as the quarter ends, leading to abnormal returns in those stocks.

4.7.2 Return Reversal at Quarter's Beginning

We next examine whether the abnormal returns of stocks with high ESG scores reverse after the quarter-end. If the abnormal returns before the quarter-end are due to price pressure from mutual funds purchasing high-ESG stocks, we would expect a reversal of returns after the quarter-end. In addition, mutual funds, after systematically purchasing high ESG stocks over the quarter-end, could engage in selling those stocks at the beginning of the next quarter. Column (1) of Panel B in Table 6 shows the regression results of equation (6). The statistically negative coefficient on *HighESG* × *QBEG[0,3]* (coeff.= -0.036, t-stat=-3.66) indicates that in the first four days of a quarter, high ESG stocks experience more negative returns relative to their low ESG counterparts.

Similarly, we divide stocks into tercile groups based on their mutual fund ownership and $WinDress$ ownership. Columns (2) and (4) show the results for the high ownership tercile, while columns (3) and (5) show the results for the low ownership tercile. We observe a negatively significant coefficient on *HighESG* × *QBEG[0,3]* across both the high mutual fund ownership tercile (coeff.= -0.047, t-stat=-3.07) and the high *WinDress* ownership tercile (coeff.= -0.058, t-stat=-3.77). These results suggest that return reversals mostly occur in stocks with high mutual fund ownership and those owned by mutual funds engaged in window dressing.

5 Conclusion

The rapid growth of Environmental, Social, and Governance (ESG) investing, now representing a significant portion of U.S. assets under management, reflects a profound shift in investment priorities. However, this evolution is not without challenges, particularly the practice of greenwashing, where funds overstate their ESG commitments, a concern highlighted in recent studies and regulatory initiatives.

Our research delves into a specific form of greenwashing: window dressing. Analyzing U.S. active

equity mutual funds, we identified a pattern where funds amplify their holdings of high ESG-scoring stocks by the end of the quarter, potentially to enhance their public image. We connected window dressing with increased capital inflows, especially for funds with strong past performance and primarily from institutional investors. In essence, our findings highlight a dichotomy in ESG investing: while it aims for sustainable, ethical financial activity, practices like window dressing can undermine its authenticity.

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Appendix A. Variables Definitions

Variable	Definition
Active Fund	Indicator variable equal to 1, if a mutual fund is included in the active fund sample screened following Kacperczyk et al. (2008) and 0 if the fund belongs to one of the 47 passive index funds benchmarking the S&P 500, S&P 1500, Russell 1000, Russell 2000, or Russell 3000, and is classified as a pure index fund by CRSP.
12-Month Alpha	Summed mutual fund monthly excess return unexplained by the Fama-French three-factor model and momentum factor over the past 12 months.
3-Month Alpha	Summed mutual fund monthly excess return unexplained by the Fama-French three-factor model and momentum factor over the past 3 months.
Age	Number of years between the inception date of the oldest share class of a mutual fund and the current date.
ESG WinDress	Difference between *ESG Loading* (see below) of a fund-quarter's last bin and average *ESG Loading* of the fund-quarter's other bins.
Book-to-Market	Ratio of the book value of equity to the market value of equity for a stock.
12-Month Flow	Sum of monthly net flows divided by beginning period total net assets over the past 12 months.
3-Month Flow	Sum of monthly net flows divided by beginning period total net assets over the past 3 months.
Debt to Assets	Ratio of total liabilities to total assets for a stock.
DGTW Return	Daily risk adjusted return from size, book-to-market, and momentum factors.
ESG Loading	The coefficient for the ESG factor return is determined by regressing a fund's daily returns on the Fama-French and momentum factors, along with the ESG portfolio return over the preceding 4 quarters within the same calendar bin.
Exp. Ratio	Annual expense ratio (*exp_ratio* in CRSP), asset-weighted across all share classes of a mutual fund.
12-Month GMB	Average monthly return of a green minus brown portfolio over the past 12 months.
3-Month GMB	Average monthly return of a green minus brown portfolio over the past 3 months.
HighESG	Indicator variable equal to 1 if a stock has an MSCI score in the top tercile, 0 otherwise.
Institutional	Indicator variable equal to 1 if a mutual fund share class is limited to institutional investors.
Ln(Market Equity)	Natural logarithm of market capitalization for a stock.

MF Ownership	Fraction of shares held by mutual funds from Thomson Reuters S12.
MorningStar ESG Rating	Mutual fund Morningstar Sustainability Rating (available from October 2018 only).
Portfolio ESG (MSCI)	Value-weighted average portfolio ESG score excluding stocks without a score assigned by MSCI.
QENDBin	Dummy variable equal to 1 for days in the last bin of a quarter.
Return on Assets	Ratio of operating income before depreciation to average total assets over the most recent 2 periods.
TNA	Total net assets aggregated across all mutual fund share classes.
WinDress Ownership	Fraction of shares held by mutual funds with *ESG WinDress* at the top tercile in a given quarter.

Figure 1. Proxying Quarter-end Holdings with Mutual Fund *ESG Loading*

This figure presents the relationship between stocks' observed ESG score and their ESG beta (Panel A) and the distribution of the cosine similarity (CS) between mutual funds' quarter-end (QEND) and non-quarter-end (non-QEND) exposure over Fama-French 12 industry portfolios (Panel B). In Panel A, we regress each stock's daily returns on the Fama-French Three Factors, the Momentum Factor, and the ESG portfolio for each month, using the past three months' data to obtain each stock's monthly ESG beta (or ESG loading), requiring at least 30 observations for one regression. We then obtain the parallel average ESG score over the past three months. Each month, we rank each stock's ESG beta and its average ESG score within each industry. For visual representation, we illustrate the relationship between the two using a binned scatter plot with a fit line for 100 groups sorted based on ESG betas. The Y-axis of each point in Panel A represents the average ESG score in the corresponding ESG beta group. In Panel B, for each QEND- and non-QEND-period, we regress mutual funds' daily returns on the Fama-French 12 industry portfolios to obtain each mutual fund's exposure to the 12 industries. We then calculate the cosine similarity between a fund's QEND exposure vector and non-QEND exposure vector. Panel B displays the distribution of this cosine similarity.

(A) Correlation Between Stock *ESG Loading* and Stock ESG Score

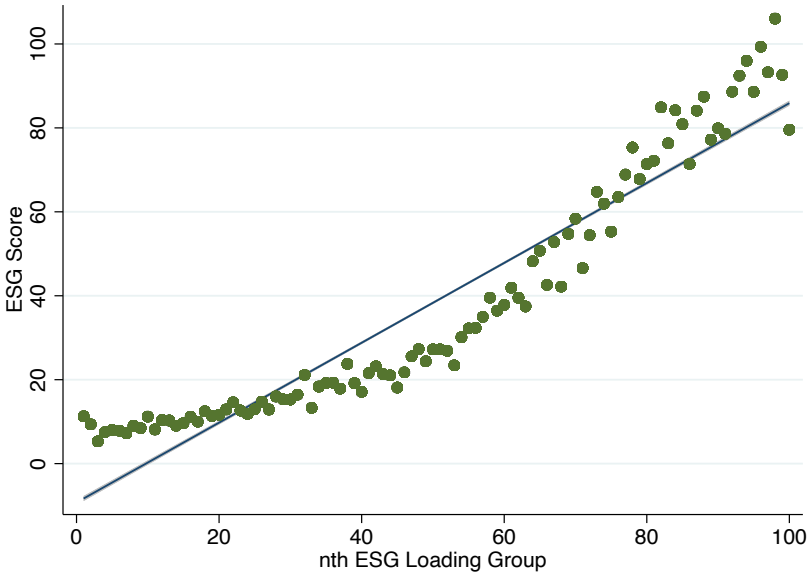


Figure 1. Proxying Quarter-end Holdings with Mutual Fund *ESG Loading* (Cont'd)

(B) The Distribution (%) of *CS* for Fund's QEND and Non-QEND Industry Loadings

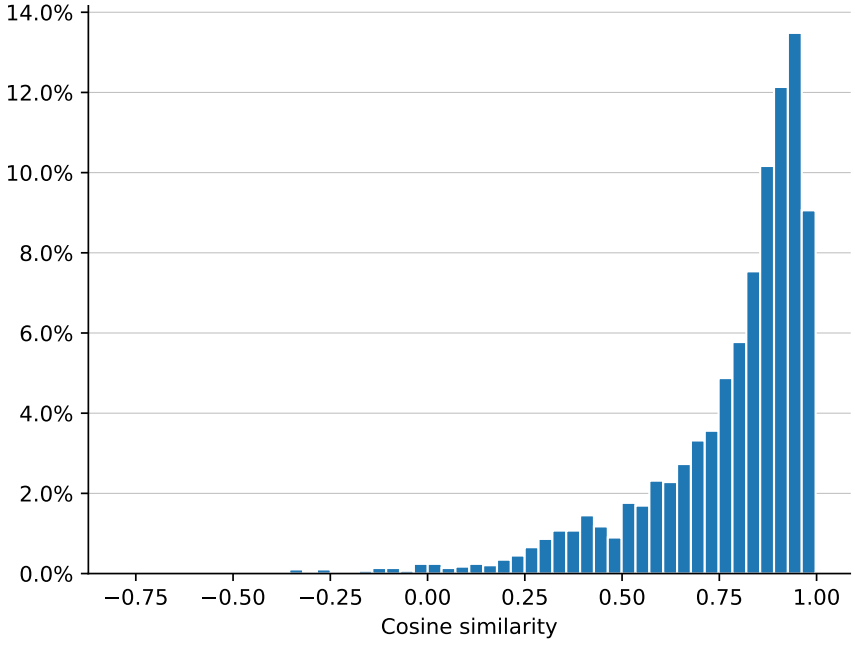


Figure 2. Illustration of the Methodology and Mutual Fund Actions

This figure illustrates the methodology used to construct the ESG window dressing measure, referred to as *ESG WinDress* in this paper. We divide each quarter range into time intervals of seven calendar days, resulting in a total of 13 bins. For all bins except the last one in each quarter, we designate them as *QENDBin = 0*, while for the last bin (the shaded area), we define it as *QENDBin = 1*. The last several days from the cutoff are included in the last bin for completeness. We hypothesize that mutual funds engage ESG window dressing during the final bin of a quarter, which becomes apparent after the quarter ends and the funds report their portfolio holdings.

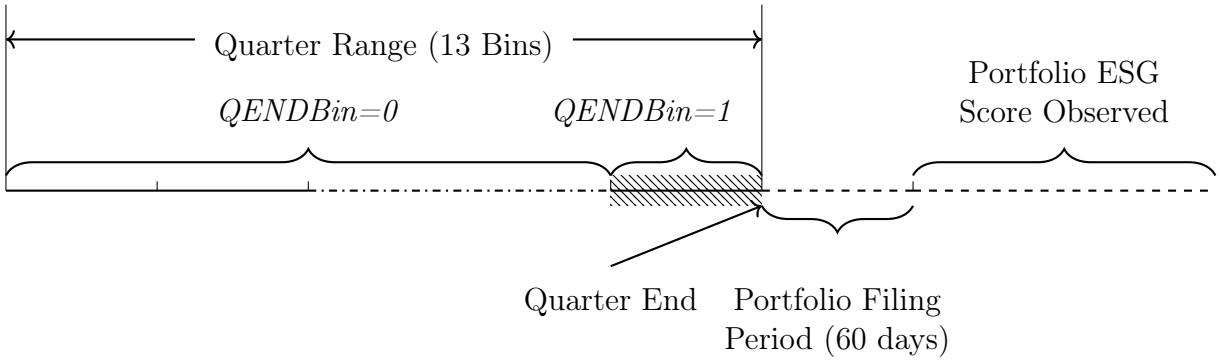


Figure 3. MSCI ESG Score Expansion in 2012

Panel A displays the median fraction of the mutual fund portfolio with MSCI ESG score coverage. This fraction is calculated as the aggregate market value of fund holdings with available MSCI ESG scores divided by the total portfolio market value. The plot shows the time series trend of this median coverage fraction from 2011Q1 to 2013Q4. The fraction begins at 0.577 in 2012Q1 and increases to 0.900 by the end of 2012Q4. Panel B illustrates the differential effects of MSCI Score Expansion over time, along with a 95% confidence interval. Although the event month is October 2012, it is important to note that mutual funds are allowed to file portfolio holdings within 60 days after the quarter ends and most funds would delay their filings due to proprietary concerns. Therefore, we treat quarters since 2012Q3 as $Post_t = 1$. Standard errors are clustered at the mutual fund level.

(A) Median Fraction of Mutual Fund Holdings Covered by MSCI ESG Score

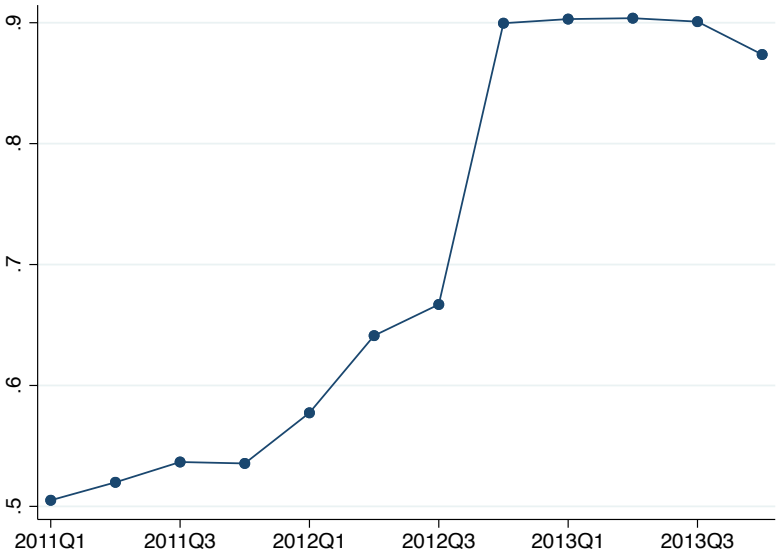
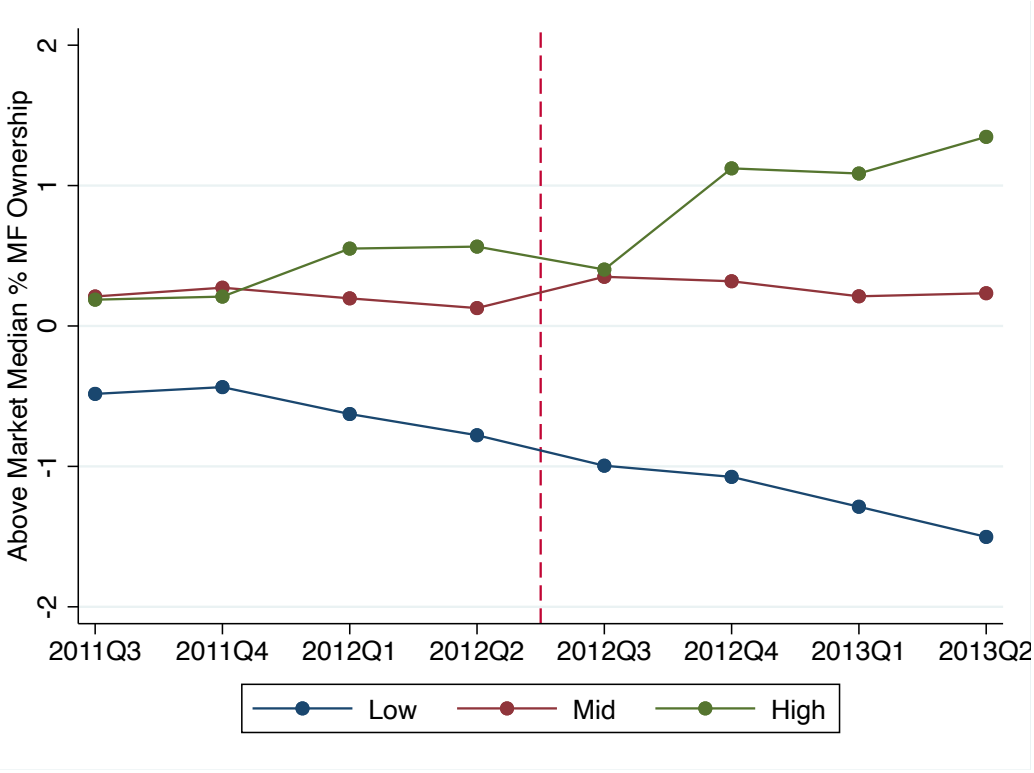


Figure 3. MSCI ESG Score Expansion in 2012 (Cont'd)

(B) Median Mutual Fund Ownership by Stock ESG Score Level



(C) Parallel Trends: Effect of ESG Score Expansion on Fund's ESG Window Dressing

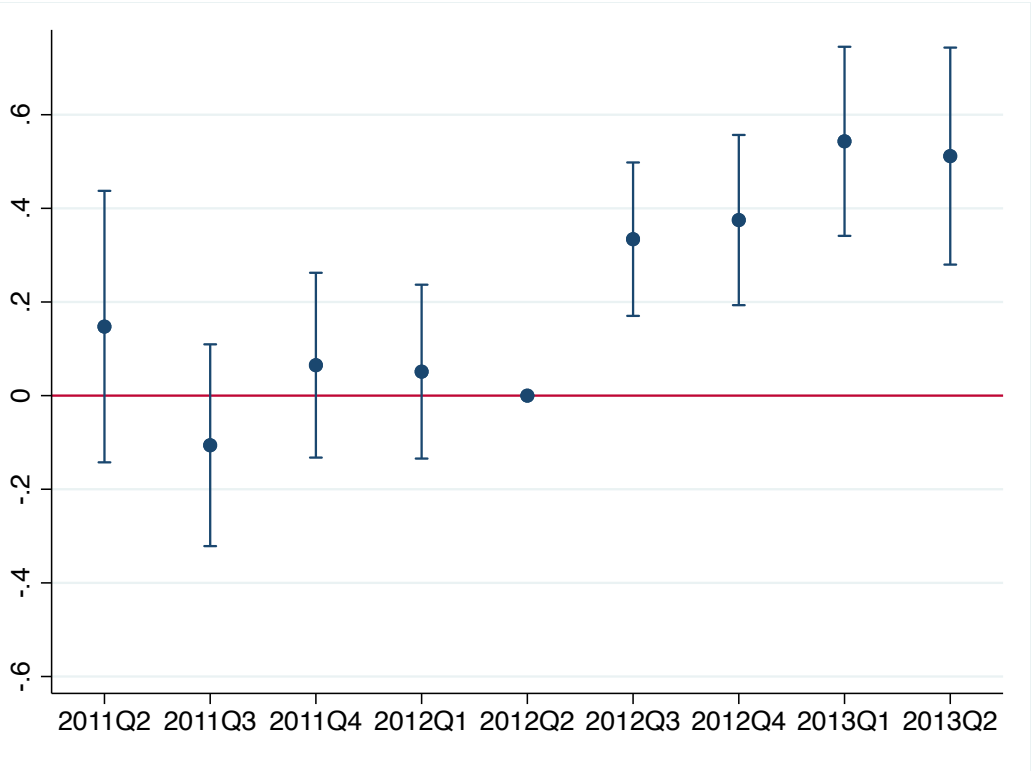


Figure 4. Parallel Trends: Effect of Mutual Fund ESG Ratings Launch

This figure illustrates the differential effects of Mutual Fund ESG Ratings Launch over time, along with a 95% confidence interval. The ratings were launched in March 2016, so we benchmark using the last quarter of 2015. We assign quarters since 2016Q1 as $Post_t = 1$. Standard errors are clustered at the mutual fund level.

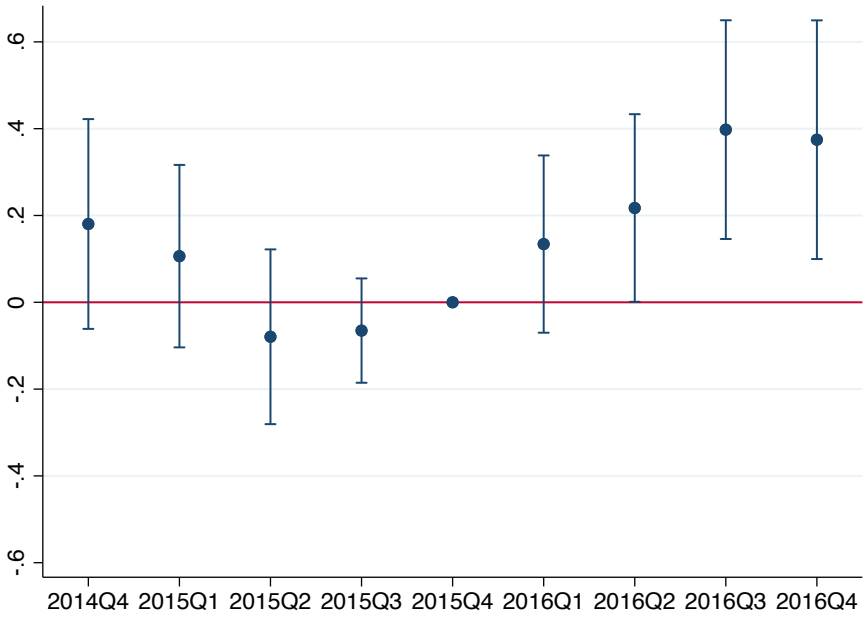


Figure 5. ESG Window Dressing Persistence

This table visualizes the persistence of mutual fund window dressing. It corresponds to column (4) of Table 7. Specifically, we divide mutual funds into three groups based on terciles of *ESG WinDress* , and then compute the average *ESG WinDress* across all three groups for the following eight quarters. The basis for sorting funds is the *ESG WinDress* averaged over the previous eight quarters, requiring at least four non-missing values. Since our main sample starts from 2013Q1, this plot starts from 2015Q1 when we first sort funds into terciles.

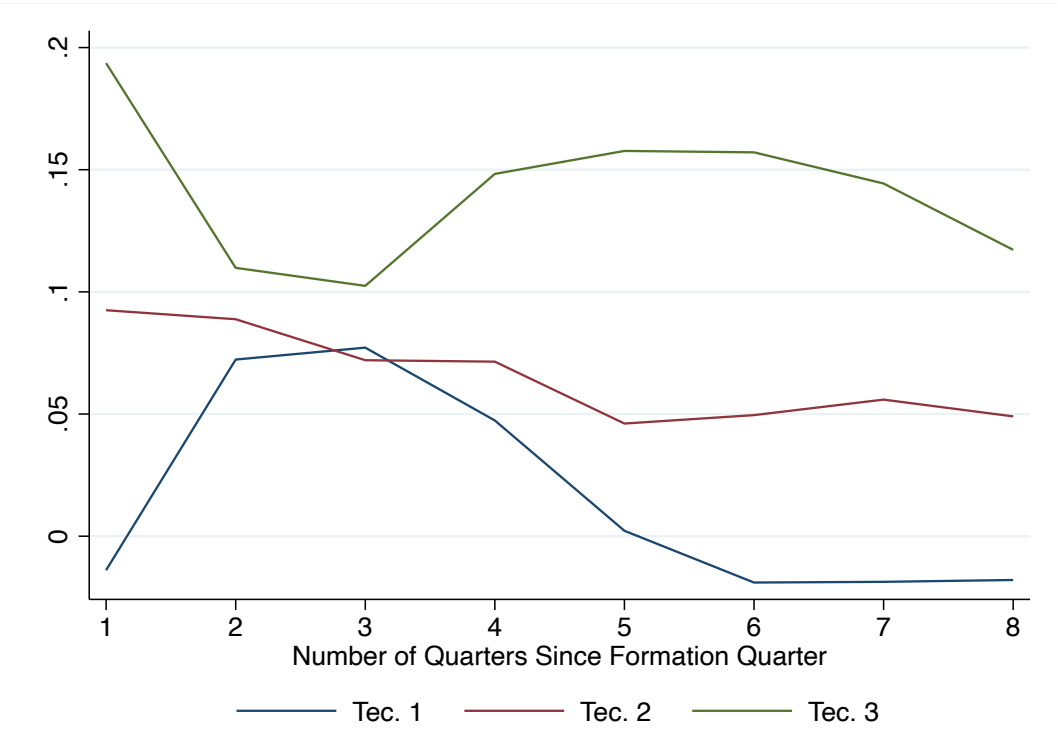


Table 1. Transition Matrix: Mutual Fund's *ESG Loading* at Quarter-Ends and Non-Quarter-Ends

This table presents the transition matrix of mutual funds' *ESG Loading* at quarter-ends and non-quarter-ends. In each quarter, mutual funds are divided into five groups at quarter-end and non-quarter-end (Bottom 10%, 10 – 32.5%, 32.5 – 67.5%, 67.5 – 90%, and Top 10%) based on their *ESG Loading* magnitude relative to other funds in the same CRSP category. For example, among all funds that are in the Top 10% at quarter-end, 26.95% of mutual funds maintained this position at non-quarter-end, while 30.80% were in the 67.5 - 90% group.

QEND Group	Non-QEND Group					
	Bottom 10%	10 – 32.5%	32.5 – 67.5%	67.5 – 90%	Top 10%	Total (%)
Bottom 10%	28.63	29.16	27.52	11.28	3.41	100
10 – 32.5%	14.52	29.12	35.77	16.27	4.32	100
32.5 – 67.5%	9.09	21.75	40.41	22.19	6.56	100
67.5 – 90%	6.59	16.29	33.96	30.37	12.79	100
Top 10%	4.31	11.79	26.15	30.80	26.95	100

Table 2. Descriptive Statistics

This table presents descriptive statistics for our sample of U.S. equity mutual funds (Panel A) and stocks (Panel B). To identify active mutual funds, we initially adopted the procedure outlined in Kacperczyk et al. (2008). We then limited the sample to mutual fund holding reports (identified from Refinitiv S12) aligned with calendar quarter ends, dropping 12% of reports that did not meet this criterion. Since mutual funds are required to report holdings quarterly, we also dropped stale quarterly reports that were over one quarter out of date, excluding 4.5% of the prior dropped sample. The second sample, utilized in Table 3, consists of 42 passive index funds that track major S&P and Russell indices. This resulted in a sample of 50,521 fund-quarter observations representing 2,423 unique mutual funds over the period from the first quarter of 2013 through the fourth quarter of 2021. Finally, we winsorized all continuous variables at the 1st and 99th percentiles to minimize the influence of outliers.

Panel A. Mutual-fund variables

	N	Mean	Std	P25	Median	P75
ESG Loadings (Non-Window)	595,860	0.008	0.432	-0.191	0.021	0.231
ESG Loadings (Window)	49,655	0.057	0.395	-0.125	0.057	0.252
ESG WinDress	50,521	0.050	0.362	-0.145	0.032	0.224
3-Month Flow	50,521	-0.011	0.109	-0.047	-0.020	0.008
12-Month Flow	50,521	-0.008	0.334	-0.135	-0.064	0.025
3-Month Alpha	50,521	-0.002	0.030	-0.016	-0.001	0.013
12-Month Alpha	50,521	-0.005	0.052	-0.030	-0.003	0.023
Age	50,521	21.322	13.165	12.500	19.250	26.500
Exp. Ratio	50,521	0.010	0.004	0.008	0.010	0.012
TNA ($millions)	50,521	2045.997	4317.789	124.383	507.083	1713.283
3-Month GMB	50,521	0.016	0.046	-0.018	0.022	0.044
12-Month GMB	50,521	0.054	0.070	0.012	0.052	0.104
Portfolio ESG (MSCI)	46,737	4.641	0.403	4.423	4.632	4.880
MorningStar ESG Rating	17,622	2.987	1.070	2.000	3.000	4.000

Panel B. Stock variables

	N	Mean	Std	P25	Median	P75
DGTW Return (%)	4,484,963	-0.002	2.002	-0.895	-0.017	0.864
Book-to-Market	4,484,963	0.543	0.464	0.234	0.434	0.729
Return on Assets	4,484,963	0.079	0.161	0.031	0.100	0.154
Debt-to-Assets	4,484,963	0.238	0.190	0.067	0.218	0.368
Ln(Market Equity)	4,484,963	14.738	1.525	13.615	14.562	15.677

Table 3. Mutual Fund's *ESG Loading* at Quarter Ends

This table presents fund-quarter-bin level regression results examining differences in quarter-end *ESG Loading* between active and passive mutual funds. Passive funds are identified as those benchmarked to the S&P 500, S&P 1500, Russell 1000, Russell 2000, or Russell 3000 based on the Morningstar "Primary Prospectus Benchmark" and designated as pure index funds (*index_fund_flag* = *D*) in CRSP. After removing observations with missing control variable values, this process yields 42 passive funds. The remaining 2,381 funds from the main sample are categorized as active funds. The indicator variable *Active Fund* equals one for active funds and zero for passive funds. *QENDBin (7 Days)* is a dummy variable equal to one for the last bin at the end of each quarter, classified by partitioning the quarter into bins for every seven calendar days from the beginning to the end of the quarter. All other variables are defined in Appendix A. Standard errors are clustered at the mutual fund level. T-statistics are reported in parentheses with significance levels denoted by *, *, and *** for the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
QENDBin (7 Days) × Active Fund	0.048***	0.048***	0.048***
	(5.93)	(5.93)	(5.93)
QENDBin (7 Days)	0.001	0.001	0.001
	(0.11)	(0.11)	(0.11)
3-Month Alpha			-0.285***
			(-8.76)
12-Month Alpha			-0.217***
			(-8.05)
3-Month Flow			-0.022***
			(-2.66)
12-Month Flow			0.008**
			(1.99)
Exp. Ratio			0.726
			(0.29)
Ln(TNA)			-0.010**
			(-2.09)
Ln(Age)			0.069***
			(2.91)
Fixed Effects	Fund, Quarter	Fund × Quarter	Fund, Quarter
Observations	645,515	645,515	645,515
Adjusted R-squared	0.135	0.190	0.136

Table 4. MSCI ESG Score Expansion and Mutual Fund ESG Window Dressing

This table presents difference-in-differences regression results exploiting a pseudo-exogenous increase in MSCI ESG Score coverage. To obtain similar treatment and control mutual fund groups, funds are first assigned into deciles based on their 2011 quarterly portfolio average ESG score, requiring at least 3 non-missing values. Within each CRSP Category × decile bucket, funds are then split into terciles by their 2012Q1 holdings-based ESG score calculated using the expanded 2012Q4 ESG score. Funds in the bottom ESG score tercile within each bucket are assigned to the treatment group, while top tercile funds define the control group. This approach yields 400 control funds and 466 treatment funds. The post-event period comprises the four quarters after the 2012Q2 ESG coverage expansion. The pre-event period includes 2012Q2 and the prior four quarters. Column (1) shows results without fixed effects. Column (2) shows results with Category and Quarter fixed effects. Column (3) shows results with Fund and Quarter fixed effects. All variables are defined in Appendix A. Standard errors are clustered at the mutual fund level. T-statistics are reported in parentheses with significance levels denoted by *, *, and *** for the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Treat × Post	0.102***	0.104***	0.103***
	(4.55)	(4.66)	(4.35)
Treat	-0.086***	-0.092***	
	(-6.40)	(-6.78)	
Post	0.108***		
	(6.88)		
3-Month Alpha	0.919***	0.585***	0.365
	(4.28)	(2.75)	(1.58)
12-Month Alpha	-0.146	-0.354***	-0.637***
	(-1.18)	(-2.70)	(-3.86)
Exp. Ratio	-1.116	-1.076	5.898
	(-0.69)	(-0.70)	(0.55)
Ln(TNA)	-0.003	0.001	0.081**
	(-0.64)	(0.19)	(2.21)
Ln(Age)	-0.006	-0.008	0.080
	(-0.58)	(-0.85)	(0.50)
Fund FE	No	No	Yes
Category FE	No	Yes	No
Quarter FE	No	Yes	Yes
Observations	5,948	5,948	5,948
Adjusted R-squared	0.092	0.181	0.349

Table 5. ESG Ratings Launch and Mutual Fund ESG Window Dressing

This table presents difference-in-differences regression results exploiting the pseudo-exogenous release of mutual fund ESG ratings in 2016Q1. The treatment group consists of active funds that were in the bottom tercile of the average quarterly ESG score from 2015Q1 to 2015Q4 among all funds in the same category, indicating a high incentive for ESG window dressing. The control group comprises passive index funds (see section 3.2.1 for the screening process). We benchmark using 2015Q4, one quarter before the ESG ratings were revealed. Additionally, we require at least 80% of holdings to be covered by MSCI to exclude potential effects due to changes in coverage. This approach yields 25 control funds and 319 treatment funds. The post-event period includes 2016Q1 and the past four quarters. The pre-event period comprises four quarters before 2016Q1. Column (1) shows results without fixed effects. Column (2) shows results with Category and Quarter fixed effects. Column (3) shows results with Fund and Quarter fixed effects. All variables are defined in Appendix A. Standard errors are clustered at the mutual fund level. T-statistics are reported in parentheses with significance levels denoted by *, *, and *** for the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Treat × Post	0.225***	0.221***	0.222***
	(9.38)	(9.39)	(9.21)
Treat	-0.036	-0.171***	
	(-1.46)	(-2.80)	
Post	-0.062***		
	(-4.09)		
3-Month Alpha	-0.668	-0.258	-0.362
	(-1.55)	(-0.64)	(-0.90)
12-Month Alpha	-0.363	0.186	0.090
	(-0.89)	(0.48)	(0.20)
Exp. Ratio	1.503	0.351	21.540
	(0.46)	(0.12)	(0.81)
Ln(TNA)	-0.001	0.002	-0.100
	(-0.12)	(0.36)	(-1.49)
Ln(Age)	-0.018	0.003	-0.018
	(-0.99)	(0.15)	(-0.06)
Fund FE	No	No	Yes
Category FE	No	Yes	No
Quarter FE	No	Yes	Yes
Observations	2,565	2,565	2,565
Adjusted R-squared	0.064	0.167	0.325

Table 6. The Determinants of Mutual Fund ESG Window Dressing

This table presents regression results with the window dressing measure, *ESG WinDress* , as the dependent variable. *ESG WinDress* is calculated for each fund-quarter as the difference between the *ESG Loading* at quarter-end and the average *ESG Loading* in other time bins. The *ESG Loading* represents the coefficient estimate for the ESG portfolio when regressing mutual fund returns on the Fama-French three factors, momentum factor, and the ESG portfolio. This regression is estimated by rolling back over quarters t, $t-1$, $t-2$, and $t-3$ (where t denotes the current quarter). Independent variables are calculated using data from quarter $t-4$. All variables are defined in Appendix A. Standard errors are clustered at the mutual fund level. T-statistics are reported in parentheses with significance levels denoted by *, *, and *** for the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
3-Month Alpha	0.523***	0.593***	0.571***	0.600***
	(6.07)	(6.66)	(6.73)	(6.75)
12-Month Alpha	0.186***	0.278***	0.140**	0.231***
	(2.68)	(3.81)	(2.05)	(3.24)
3-Month Flow	0.008	0.011	0.013	0.005
	(0.46)	(0.65)	(0.76)	(0.32)
12-Month Flow	0.017**	0.020***	0.023***	0.021***
	(2.48)	(2.62)	(3.34)	(2.66)
Exp. Ratio	-0.043	3.119	2.108**	9.396**
	(-0.05)	(0.79)	(2.39)	(2.52)
Ln(TNA)	-0.002	0.004	0.002	0.011*
	(-0.84)	(0.60)	(0.88)	(1.66)
Ln(Age)	-0.009*	-0.053*	-0.014***	-0.150***
	(-1.83)	(-1.71)	(-2.88)	(-7.68)
3-Month GMB			0.370***	0.329***
			(9.57)	(8.46)
12-Month GMB			0.655***	0.707***
			(17.23)	(18.05)
Fund FE	No	Yes	No	Yes
Category FE	Yes	No	Yes	No
Quarter FE	Yes	Yes	No	No
Observations	49,015	49,015	49,015	49,015
Adjusted R-squared	0.094	0.166	0.062	0.140

Table 7. ESG Window Dressing Persistence

This table presents evidence on the persistence of mutual fund window dressing. In each quarter, we divide mutual funds into terciles, quintiles, and deciles based on percentiles of *ESG WinDress* , and then compute the average *ESG WinDress* for each group for the following quarter right after the sorting. The basis for sorting funds is the *ESG WinDress* averaged over the previous four quarters (columns (1) to (3)) or eight quarters (columns (4) to (6)), requiring at least two or four non-missing values, respectively. Since our main sample starts from 2013Q1, the first sort based on the previous four quarters is at 2014Q1, and the first sort based on the previous eight quarters is at 2015Q1. We also present the mean difference between the highest group's *ESG WinDress* and the lowest group's *ESG WinDress* at the bottom line ($GroupK - Group1$), where $K = 3, 5, 10$. T-statistics are reported in parentheses, with significance levels denoted by *, **, and *** for the 10%, 5%, and 1% levels, respectively.

	Four Quarters			Eight Quarters		
	(1)	(2)	(3)	(4)	(5)	(6)
Group 1	-0.094***	-0.142***	-0.184***	-0.037***	-0.059***	-0.092***
	(-12.07)	(-14.11)	(-12.96)	(-4.42)	(-5.51)	(-5.97)
Group 2	0.094***	-0.006	-0.100***	0.108***	0.012	-0.028*
	(12.16)	(-0.60)	(-7.02)	(12.95)	(1.15)	(-1.86)
Group 3	0.251***	0.101***	-0.040***	0.209***	0.106***	-0.013
	(32.18)	(10.15)	(-2.80)	(24.86)	(9.86)	(-0.84)
Group 4		0.170***	0.027*		0.167***	0.038**
		(17.03)	(1.94)		(15.51)	(2.48)
Group 5		0.295***	0.083***		0.241***	0.068***
		(29.27)	(5.88)		(22.14)	(4.49)
Group 6			0.119***			0.144***
			(8.48)			(9.46)
Group 7			0.164***			0.179***
			(11.64)			(11.82)
Group 8			0.177***			0.154***
			(12.46)			(10.12)
Group 9			0.243***			0.235***
			(17.14)			(15.37)
Group 10			0.347***			0.248***
			(24.31)			(15.96)
$GroupK - Group1$	0.345***	0.437***	0.531***	0.246***	0.301***	0.339***
	(31.54)	(31.27)	(27.03)	(20.85)	(19.95)	(15.86)

Table 8. Mutual Fund ESG Window Dressing and Fund Flows

Panel A presents regression results examining mutual fund investor flows in response to mutual fund ESG window dressing. The dependent variable is mutual fund flows measured in quarter *t*. The key independent variable is *ESG WinDress* , the window dressing measure calculated using return data from the prior four quarters. Control variables related to fund flows are also included. The main results are shown in columns (1) and (2). Columns (3) and (4) present results for funds in the top performance tercile within their CRSP category in quarter *t-1*. Columns (5) and (6) show results for funds in the bottom performance tercile. Panel B presents regression results examining institutional and retail investor flows toward mutual fund ESG window dressing. The sample consists of 158,186 fund share class-quarter observations, of which 51% are institutional share classes. The dependent variable is share-class quarterly flow in quarter *t*. The key independent variable interacts with the institutional share class indicator with *ESG WinDress* , our ESG window dressing measure. The institutional share class indicator is based on the CRSP *retail_fund* variable, where institutional shares are defined as those with *retail_fund=N*. All variables are defined in Appendix A. Standard errors are clustered at the mutual fund level. T-statistics are reported in parentheses with significance levels denoted by *, *, and *** for the 10%, 5%, and 1% levels, respectively.

Panel A. Fund-level Flows

	Full Sample		**High Performance Tercile**		**Low Performance Tercile**	
	(1)	(2)	(3)	(4)	(5)	(6)
ESG WinDress	0.004**	0.003*	0.008**	0.007**	0.002	0.001
	(2.37)	(1.86)	(2.46)	(2.05)	(0.57)	(0.31)
3-Month Alpha	0.457***	0.361***	0.589***	0.472***	0.360***	0.302***
	(20.60)	(16.14)	(10.97)	(8.31)	(9.87)	(8.03)
12-Month Alpha	0.297***	0.214***	0.340***	0.260***	0.242***	0.172***
	(19.35)	(14.33)	(13.56)	(10.07)	(11.35)	(8.24)
Exp. Ratio	-2.511***	-5.376***	-2.994***	-5.990***	-2.314***	-6.114***
	(-9.75)	(-4.48)	(-7.47)	(-3.47)	(-6.69)	(-3.83)
Ln(TNA)	-0.005***	-0.043***	-0.006***	-0.040***	-0.006***	-0.043***
	(-10.36)	(-15.78)	(-7.42)	(-10.80)	(-7.95)	(-12.38)
Ln(Age)	-0.010***	-0.013	-0.016***	-0.029*	-0.004**	0.001
	(-6.93)	(-1.20)	(-6.75)	(-1.66)	(-2.33)	(0.09)
Fund FE	No	Yes	No	Yes	No	Yes
Category FE	Yes	No	Yes	No	Yes	No
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	50,356	50,356	16,435	16,435	17,008	17,008
Adjusted R-squared	0.065	0.170	0.081	0.211	0.057	0.156

Table 8. Mutual Fund ESG Window Dressing and Fund Flows (Cont'd)

Panel B. Share-class Level Flows

	(1)	(2)
Institutional × ESG WinDress	0.010***	0.011***
	(2.75)	(3.05)
Institutional	-0.014***	-0.025***
	(-7.07)	(-10.39)
ESG WinDress	0.001	-0.003
	(0.26)	(-1.20)
3-Month Alpha	0.557***	0.483***
	(18.25)	(16.43)
12-Month Alpha	0.376***	0.308***
	(18.11)	(15.28)
Exp. Ratio	-6.205***	-9.172***
	(-26.17)	(-29.92)
Ln(TNA)	-0.010***	-0.014***
	(-18.90)	(-21.18)
Ln(Age)	-0.039***	-0.037***
	(-22.59)	(-19.27)
Fund FE	No	Yes
Category FE	Yes	No
Quarter FE	Yes	Yes
Observations	158,186	158,186
Adjusted R-squared	0.063	0.097

Table 9. Mutual Fund ESG Window Dressing and Fund ESG scores

This table presents regression results examining the ESG implications of mutual fund ESG window dressing, as measured by *ESG WinDress* . The dependent variables are monthly average portfolio ESG scores using MSCI company ESG scores (columns 1 and 2) and end-of-quarter Morningstar mutual fund ESG ratings (columns 3 and 4). The key independent variable, *ESG WinDress* , is calculated based on data from the prior four quarters. All variables are defined in Appendix A. Standard errors are clustered at the mutual fund level. T-statistics are reported in parentheses with significance levels denoted by *, *, and *** for the 10%, 5%, and 1% levels, respectively.

	MSCI		**MorningStar**	
	(1)	(2)	(3)	(4)
ESG WinDress	0.021**	0.037***	-0.018	0.043*
	(2.36)	(5.31)	(-0.38)	(1.66)
3-Month Alpha	0.151**	-0.012	0.202	0.033
	(2.13)	(-0.22)	(0.75)	(0.17)
12-Month Alpha	0.074	-0.055	0.331	0.051
	(1.26)	(-1.37)	(1.41)	(0.30)
Exp. Ratio	-4.971***	-12.685***	5.140	7.763
	(-3.21)	(-3.28)	(0.58)	(0.27)
Ln(TNA)	0.001	-0.008	-0.007	0.098**
	(0.44)	(-1.28)	(-0.41)	(2.02)
Ln(Age)	0.018**	-0.038	-0.005	-0.027
	(2.46)	(-1.24)	(-0.12)	(-0.10)
Fund FE	No	Yes	No	Yes
Category FE	Yes	No	Yes	No
Quarter FE	Yes	Yes	Yes	Yes
Observations	46,074	46,075	17,053	17,053
Adjusted R-squared	0.432	0.742	0.037	0.662

Table 10. Return Patterns around Quarter Turns for High ESG Stocks

This table presents regression results examining quarter-end returns (Panel A) and return reversals at the beginning of the quarter (Panel B) for stocks with high ESG scores. The dependent variable is the DGTW daily excess return over the corresponding one of 125 risk-matched portfolios. Portfolios are formed in June of each year based on size, book-to-market, and momentum. The key independent variable is an interaction between *HighESG* and *QEND* (*QBEG*). *HighESG* is an indicator set to one for stocks in the top ESG score tercile, using the first available MSCI ESG score annually, and set to zero otherwise. *QEND* (*QBEG*) equals one for the last (first) days of each calendar quarter, and zero otherwise. For example, *QEND[0,3]* equals one for the final day of a quarter and the three days preceding the quarter end. The main results are presented in column (1) using the full sample. In columns (2) and (3), the sample is partitioned into terciles based on the aggregate mutual fund ownership. Columns (4) and (5) partition the sample into terciles based on *WinDress* ownership, defined as the total fraction of shares held by mutual funds whose *ESG WinDress* are in the top tercile for a given quarter. Specifically, column (2) presents results for the high ownership tercile, (3) for the low ownership tercile, (4) for the high *WinDress* ownership tercile, and (5) for the low *WinDress* ownership tercile. All variables are defined in Appendix A. Standard errors are clustered at the stock level. T-statistics are reported in parentheses with significance levels denoted by *, *, and *** for the 10%, 5%, and 1% levels, respectively.

Panel A. Quarter-end Returns

	Full Sample	**MF Ownership**		*WinDress* **Ownership**	
	(1)	(2)	(3)	(4)	(5)
HighESG × QEND[0,3]	0.021**	0.034***	0.024	0.029**	0.024
	(2.54)	(2.68)	(1.45)	(2.24)	(1.55)
HighESG × QEND[4,7]	0.015*	0.014	0.025	0.034**	0.016
	(1.72)	(0.97)	(1.44)	(2.41)	(0.90)
HighESG	0.004	0.008	-0.012	0.005	0.002
	(1.28)	(1.63)	(-1.52)	(1.07)	(0.31)
Ln(Market Equity)	-0.089***	-0.119***	-0.106***	-0.114***	-0.102***
	(-21.06)	(-17.19)	(-12.06)	(-18.13)	(-12.46)
Book-to-Market	-0.009***	0.024**	-0.011***	0.006	-0.013**
	(-2.58)	(2.24)	(-2.67)	(0.57)	(-2.39)
Return on Assets	0.055**	0.113***	0.034	0.091***	0.050
	(2.34)	(3.47)	(0.77)	(3.07)	(1.20)
Debt to Assets	-0.048***	-0.041	-0.044	-0.039	-0.043
	(-2.68)	(-1.43)	(-0.94)	(-1.49)	(-1.05)
Stock FE	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes
Observations	4,397,802	1,510,148	1,396,610	1,494,416	1,424,679
Adjusted R-squared	0.002	0.004	0.003	0.005	0.004

Table 10. Return Patterns around Quarter Turns for High ESG Stocks (Cont'd)

Panel B. Quarter-beginning Return Reversal

	Full Sample	**MF Ownership**		*WinDress* **Ownership**	
	(1)	(2)	(3)	(4)	(5)
HighESG × QBEG[0,3]	-0.036***	-0.047***	-0.019	-0.058***	-0.017
	(-3.66)	(-3.07)	(-0.93)	(-3.77)	(-0.92)
HighESG × QBEG[4,7]	0.014	0.019	0.020	0.016	-0.019
	(1.56)	(1.33)	(1.14)	(1.07)	(-1.14)
HighESG	0.007**	0.011**	-0.007	0.009*	0.002
	(2.11)	(2.12)	(-0.93)	(1.93)	(0.24)
Ln(Market Equity)	-0.089***	-0.111***	-0.098***	-0.104***	-0.104***
	(-20.28)	(-16.06)	(-11.13)	(-16.90)	(-12.54)
Book-to-Market	-0.012***	0.006	-0.010*	-0.022***	-0.012***
	(-3.03)	(0.50)	(-1.90)	(-2.84)	(-2.79)
Return on Assets	0.053**	0.095***	0.034	0.066	0.062
	(2.19)	(2.68)	(0.74)	(1.64)	(1.41)
Debt to Assets	-0.049***	-0.061**	-0.061	-0.062**	-0.039
	(-2.80)	(-2.18)	(-1.35)	(-2.18)	(-1.02)
Stock FE	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes
Observations	4,365,759	1,508,517	1,375,315	1,493,824	1,400,231
Adjusted R-squared	0.002	0.003	0.002	0.005	0.005