

Greenwashing Temptations: Impact of ESG Rating Changes on Fund Holdings and Corporate Responses

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Abstract

This study investigates the impact of ESG rating changes on mutual fund asset holdings in the context of sustainable investing. By exploring the link between ESG ratings and mutual fund asset holdings, we aim to understand the role of ESG metrics in fund asset allocations and its implications for corporate firms. Drawing from existing literature, we establish expectations regarding the relationship between ESG rating changes and mutual fund asset holdings and corporate responses. The findings contribute to the understanding of how asset managers integrate ESG factors into their investment processes and provide insights into the corporate behavior associated with sustainable investing. This research has implications for investors, asset managers, and policymakers in shaping sustainable investment strategies.

Keywords: Greenwashing, ESG ratings, ESG Ownership

JEL: G21, G23

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Abstract

This study investigates the impact of ESG rating changes on mutual fund asset holdings in the context of sustainable investing. By exploring the link between ESG ratings and mutual fund asset holdings, we aim to understand the role of ESG metrics in fund asset allocations and its implications for corporate firms. Drawing from existing literature, we establish expectations regarding the relationship between ESG rating changes and mutual fund asset holdings and corporate responses. The findings contribute to the understanding of how asset managers integrate ESG factors into their investment processes and provide insights into the corporate behavior associated with sustainable investing. This research has implications for investors, asset managers, and policymakers in shaping sustainable investment strategies.

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1 Introduction

In recent decades, responsible investing, also known as sustainable investing, has gained significant traction due to the rising emphasis on sustainability and environmental considerations. This growing interest reflects the evolution of sustainable investing from its roots in socially responsible investing (SRI) to becoming a formidable presence in the financial industry. Initially, SRI primarily focused on excluding certain industries or companies based on ethical concerns, utilizing negative screens. However, sustainable investing has since expanded to encompass a wide array of strategies that actively incorporate environmental, social, and governance (ESG) criteria to evaluate companies' sustainability performance. This expansion has attracted substantial attention and capital, with trillions of dollars being managed based on sustainability principles. However, despite the increasing significance of CSR issues, it remains unclear whether managers of SR mutual funds and corporate firms have adapted their screening processes to effectively integrate ESG scores into their optimization and decision-making.

The rapid growth of sustainable investing raises important questions about its implications for asset holdings and corporate behavior. Responsible investing integrates environmental, social, and governance (referred to as ESG) factors into investment decisions alongside financial objectives (Liang et al., 2022; Pástor et al., 2021). Understanding the effects of sustainable investing in these aspects is crucial for investors seeking to align their financial goals with their values and for companies navigating the evolving landscape of ESG considerations. By examining how sustainable investing influences asset holdings and shapes corporate behavior, we can gain insights into the potential benefits and challenges associated with this investment approach.

Are investors who claim to invest sustainably truly living up to their claims? The absence of regulatory guidelines poses a barrier for institutional investors to effectively utilize ESG information and incorporate ESG strategies. One aspect to consider in evaluating sustainable investment practices is the concept of "greenwashing." This term refers to mutual funds that are labeled as ESG funds but may not align their portfolio holdings with genuine ESG considerations, particularly in response to changes in ESG ratings.

The objective of this research is to investigate whether mutual funds and corporate firms that

make claims of being sustainable demonstrate responsible investment and financing practices, or if there is a possibility of greenwashing taking place. The presence of greenwashing behavior poses a significant challenge to the effective integration of ESG strategies. The absence of regulatory guidelines creates a barrier for institutional investors to appropriately utilize ESG information and, consequently, hinder the incorporation of ESG strategies ([Amel-Zadeh and Serafeim 2018](#)).

In the realm of ESG investing, the significance of ESG ratings in driving investment decisions as well as corporate and market behavior becomes crucial. ESG ratings capture a company's environmental, social, and governance performance. If these ratings are considered meaningful by investors and managers, a change in ESG ratings should attract attention and potentially result in herd trading.

To our knowledge, there is no research on the relationship between ESG ratings changes and herd trading within the context of sustainable investing. This indicates a need for further investigation to better understand the dynamics of herding behavior in response to ESG ratings changes and its implications for asset holdings. Understanding the direction of the ratings change is also essential in comprehending herding behavior. We expect herding to be signed conditional on the direction of the ratings change. In other words, investors would be more likely to engage in herd trading when there is a consensus among market participants regarding the direction of the ratings change. For instance, if a company experiences an upward revision in its ESG rating, investors and managers may perceive it as a positive signal and follow the herd by increasing their holdings. Conversely, a downward revision in ESG ratings may trigger a negative sentiment and lead to herd selling. We aim to contribute to the existing literature by exploring the link between ESG ratings changes and herd trading in the context of sustainable investing. Through careful analysis and examination of empirical evidence, we seek to shed light on the role of ESG metrics and their impact on investor decision-making, market dynamics, and ultimately, asset holdings.

Moreover, the findings of Pastor et al. (2021) provide valuable insights that support our analysis of the impact of ESG rating changes on mutual fund asset holdings. Their study highlights relevant findings from previous research, such as the performance disparities between "brown" and "green" assets and the relationship between ESG scores and implied costs of capital. These findings align with our research objectives and provide a foundation for investigating the role of ESG rating

changes in shaping mutual fund asset holdings.

Furthermore, our study relates to previous theoretical studies on sustainable investing. Notable research explores how ethical investing and socially responsible investments can affect firm investment, risk sharing, pricing power, and customer loyalty (e.g., [Heinkel et al. 2001](#); [Albuquerque et al. 2019](#)). In comparison, our study focuses on the role of investors' tastes for holding green assets in pricing and its impact on asset holdings. By incorporating these theoretical perspectives, we aim to enhance our understanding of the market behavior associated with sustainable investing.

Additionally, empirical support from the mutual fund literature reinforces our assumptions in the model. Studies indicate that flows to socially responsible investment (SRI) funds exhibit distinct characteristics, such as lower volatility, reduced responsiveness to negative past performance, and a willingness to sacrifice financial performance for social preferences. These findings suggest that investors prioritize ESG factors beyond purely financial considerations.

In summary, our study seeks to investigate how asset managers integrate ESG factors in their investment processes. By examining the relationship between ESG rating changes and mutual fund asset holdings, we aim to contribute to the existing literature on sustainable investing. Through empirical analysis, we strive to provide insights into the role of ESG metrics in shaping investment behavior and outcomes, ultimately informing investors, asset managers, and policymakers in navigating the evolving landscape of ESG investing.

In essence, we argue that it is essential to examine how ESG funds adjust their portfolio holdings when ESG ratings change, as this reflects their commitment to incorporating environmental, social, and governance factors into their investment decisions. If ESG funds consistently maintain holdings in companies with poor ESG scores despite significant increases in ratings, it raises suspicions about their genuine commitment to sustainable investing. This suggests that these funds may prioritize marketing and attracting ESG-focused investors without adequately aligning their portfolios with true ESG considerations. Consequently, the inability or unwillingness of ESG funds to rebalance their holdings in response to changes in ESG ratings can be indicative of potential greenwashing practices. By neglecting to make necessary adjustments based on changes in ESG ratings, these funds may fail to demonstrate a genuine commitment to sustainable investing and may mislead investors with a false perception of their environmental and social responsibility. When evaluating

sustainable investment practices, it is crucial to assess how ESG funds adjust their portfolio holdings in response to changes in ESG ratings. Failure to align portfolio holdings with improved ESG ratings suggests a potential lack of commitment to sustainable investing and raises concerns about greenwashing practices. Investors and stakeholders should remain vigilant in scrutinizing the actions and practices of investment funds, ensuring that their investment decisions genuinely prioritize ESG factors and align with sustainability goals.

Building on the existing literature and empirical findings, our study presents new empirical results that further enhance our understanding of the relationship between ESG rating changes and fund ownership growth. The univariate analysis examines the impact of ESG score changes on fund ownership and growth, highlighting the trends and patterns observed in the data. The results indicate that negative changes in ESG scores are generally associated with decreased mean and median percentage growth in ESG ownership, while positive changes in ESG scores are linked to increased mean and median percentage growth in ESG ownership. However, there are exceptions to these patterns, suggesting the need for a more nuanced understanding of the dynamics at play.

In the multivariate analysis, we delve deeper into the relationship between ESG ranking changes and fund ownership growth, controlling for various factors that could influence the relationship. The results reveal compelling insights. Both upward changes (Move Up) and downward changes (Move Down) in ESG rankings demonstrate economic and statistical significance. Investors show a stronger preference for firms that experience improvements in their ESG rankings, as reflected in increased fund ownership. Conversely, investors exhibit greater caution and reduce their fund ownership in firms that experience declines in their ESG rankings. Importantly, the effect of downward changes in ESG rankings is found to be more pronounced and significant than that of upward changes, indicating the asymmetric nature of market responses to ESG rating changes.

Further analysis based on firm size partitions reveals that the impact of ESG ranking changes on fund ownership growth is primarily observed in large firms. Improvements in ESG rankings have a significant effect on fund ownership growth for large firms, while the relationship is not statistically significant for small firms. This suggests that investors' response to ESG ranking improvements is more prominent for larger firms, potentially due to factors such as greater visibility and scrutiny, as well as their potential to influence market dynamics.

Additionally, the analysis examines the impact of starting ESG ranking positions on the relationship between ranking changes and fund ownership growth. The findings indicate that improvements in ESG rankings have a more significant impact on fund ownership growth for firms starting at ESG positions in the middle range. This highlights the market's response to firms' ability to enhance their ESG practices and suggests that continuous improvement in ESG performance is crucial for attracting and retaining ESG-focused investors. Moreover, both lower and higher starting ESG positions exhibit significant changes in fund ownership when experiencing downward changes in rankings, indicating the relevance and consequences of ranking deterioration across the spectrum of ESG performance.

Our empirical results provide incremental contributions to the existing literature by shedding light on the complex relationship between ESG rating changes and fund ownership growth. The findings highlight the asymmetric nature of market responses to ESG rating changes, with downward changes having a more substantial impact on fund ownership growth compared to upward changes. The results underscore the significance of enhancing ESG rankings to attract and retain investors with a focus on ESG considerations. This effect is particularly noteworthy for large firms and those initially positioned in the middle range of the ESG spectrum, as they experience upward shifts in ratings. Similarly, firms positioned at the extremes of the ESG spectrum encounter notable effects when experiencing downward shifts in ratings. These findings highlight the critical role of ESG ranking improvements in capturing and maintaining the interest of ESG-oriented investors.

This research highlights a lack of awareness of CSR issues among managers of SR mutual funds. Specifically, the findings indicate that the average mutual fund manager in our sample is not engaging in greenwashing. However, some mutual funds with investment portfolios tilted to a specific cross-section of firms, characterized by their insensitivity to ratings, shows evidence of greenwashing practices. This highlights the importance of distinguishing between SRI funds and firms that genuinely prioritize ESG principles and those that may employ greenwashing tactics to create a deceptive perception of their environmental and social responsibility.

By expanding on the existing literature and presenting these empirical results, our study adds valuable insights to the understanding of the relationship between ESG rating changes and fund ownership growth. These findings have implications for investors, asset managers, and policymak-

ers, providing guidance on the significance of ESG performance and the market’s response to ESG rating movements. Ultimately, our research contributes to the evolving landscape of sustainable investing, enhancing understanding of the role of ESG metrics in shaping investment behavior and outcomes.

2 Background Literature and Hypotheses

Survey results from institutional investors indicate significant concern about climate change and its potential impacts on portfolios (Krueger et al., 2020). Consequently, institutional investors incorporate climate risks into their investment processes, highlighting the importance of risk mitigation. The reasons for this integration are primarily driven by reputational, moral, and legal considerations, as well as the influence of climate risks on portfolio returns.

Institutional investors exert pressure on the companies they invest in to adopt responsible practices in environmental and social domains (Dyck et al. 2019). However, it is essential to examine whether this interest is solely driven by societal concerns or if other motives are at play. Financial motivations, cultural origins, and social norms are among the incentives that drive institutional investors to encourage responsible behavior within their invested firms (Dyck et al., 2019).

Responsible investment has captured the attention of both investors and researchers. Research indicates that making claims of sustainable investment positively influences investors’ ESG scores, implying that institutional investors are integrating ESG strategies into their investment decisions. However, conflicting findings present a different perspective. For example, the effectiveness of incorporating ESG strategies into fund portfolios is shown to vary depending on the geographical location of the institutional investor. US investors, for example, seem to encounter challenges in implementing ESG strategies despite claiming to prioritize sustainability. Thus, merely labeling a fund as sustainable does not guarantee that sustainable investments are the primary objective. In essence, varied findings indicate the presence of greenwashing within this field. Hence, the question emerges regarding the reliability and trustworthiness of responsible investment labels.

Existing research provides valuable insights into the prevalence and implications of herding behavior among institutional investors (e.g., [Lakonishok et al. 1992](#), [Grinblatt et al. 1995](#), [Falkenstein](#)

1996, Wermers 1999, Sias 2004, Barberis et al. 2005, Dasgupta et al. 2011, Brown et al. 2014, Cipriani and Guarino 2014. For example, Barberis et al. 2005 present three views on the comovement of returns. The traditional view suggests that comovement in prices reflects comovement in fundamental values, while the friction-based view and sentiment-based view argue that comovement can be delinked from fundamentals due to frictions, irrational investors, and limits to arbitrage. These views include the category view, which groups assets into categories and induces common factors in returns based on correlated sentiment, the habitat view, where preferred habitats of investors lead to common factors in returns for specific subsets of securities, and the information diffusion view, where stocks that incorporate information at similar rates exhibit comovement in returns with some delay. This and other studies suggest that herding behavior can occur when investors imitate the trading actions of others, leading to the amplification of price movements and potential market inefficiencies. This literature documents a link between changes in analyst recommendations and the occurrence of "herd trading" among investors (Brown et al. (2014), Clement and Tse (2005)). For example, Brown et al. (2014) documents that mutual funds herd or trade together into stocks with consensus sell-side analyst upgrades, and herd out of stocks with consensus downgrades. While herding behavior has been extensively studied in the context of mutual funds and asset classes, its link to ESG rating changes has not been explored until our research. We aim to fill this gap by investigating the relationship between ESG rating changes and the occurrence of herding behavior, providing valuable insights into how investors respond to sustainability information in their investment decisions.

Institutional investors are generally adept at integrating ESG rating changes into their asset holdings. This is due to their large scale of operations and access to additional resources, such as specialized equity analysts and research teams with extensive knowledge of specific industries and firms. Socially responsible investment (SRI) funds have a proven track record of incorporating sustainability information into their investment decisions, highlighting their superior information processing abilities and focused approach to this type of information.

Based on the observation that institutional investors influence holdings towards greater sustainability, it is reasonable to hypothesize that this influence would be reflected in the ESG scores of the holdings and, consequently, in the portfolio's overall ESG scores (Dyck et al., 2019). Therefore,

ESG metrics are likely to play a significant role for actively managed mutual funds when making investment decisions. In the absence of greenwashing, where sustainable investment is the primary objective, it can be expected that fund managers would proactively rebalance their portfolios in response to changes in ESG ratings. Specifically, one would anticipate that negative changes in ESG ratings would result in a more pronounced decrease in ESG ownership compared to positive changes in ESG ratings. Furthermore, the magnitudes of changes in ownership would reflect the relative magnitudes of the corresponding changes in the ratings.

Hypothesis 1a: Positive changes in ESG ratings should result in increases in ESG ownership.

Hypothesis 1b: Negative changes in ESG ratings should result in decreases in ESG ownership.

Hypothesis 1c: Negative (positive) changes in ESG ratings should result in more pronounced decreases (increases) in ESG ownership.

In the second part of the study, we analyze greenswashing temptations at the fund level in order to gain a comprehensive understanding of how investments in sustainable and socially responsible initiatives align with the preferences of investors on a market-wide scale. This analysis goes beyond examining individual stocks and delves into the practices and strategies employed by mutual funds. Given that different investors hold varying beliefs regarding sustainability, it is essential to explore how these beliefs shape their investment decisions. While some investors prioritize profit maximization and may view sustainability as costly and conflicting, others strongly believe that companies should prioritize environmental concerns or pursue goals beyond mere profitability. Additionally, there are investors who see sustainability investments as a profitable strategy in and of itself. However, it is important to recognize that some investors may be unaware or indifferent to a company's sustainability practices, and the perspective of the average investor regarding sustainability remains uncertain. Therefore, studying greenswashing temptations at the fund level provides valuable insights into how different types of mutual funds engage with sustainability and the potential risks of misalignment between investors' preferences and the funds' practices. Analyzing fund-level greenswashing temptations helps shed light on the types of mutual funds that may engage in deceptive practices or misrepresent their commitment to sustainability. It enables us to identify whether certain funds might be exploiting the growing demand for sustainable investments without genuinely aligning with investors' preferences. By understanding the dynamics at the fund

level, regulators, investors, and stakeholders can make informed decisions and take appropriate actions to encourage transparency, accountability, and responsible investing practices.

Finally, we investigate the relationship between ESG rating changes and corporate responses. Understanding how companies react to changes in their ESG ratings provides insights into their commitment to sustainability and responsible practices. When ESG ratings change, companies face the challenge of aligning their practices with the new ratings. Positive changes in ESG ratings may be seen as a validation of a company's sustainability efforts and can potentially lead to increased market recognition and investor interest. In response to upward revisions in their ESG ratings, companies may strive to maintain or enhance their sustainability practices to capitalize on the positive perception and attract ESG-focused investors. Conversely, negative changes in ESG ratings can signal weaknesses in a company's sustainability performance and may indicate areas that require improvement. In such cases, companies may need to reassess their practices, implement corrective measures, and communicate their commitment to addressing the identified shortcomings. Failure to respond effectively to downward revisions in ESG ratings may result in reputational risks, loss of investor confidence, and potential divestment by ESG-focused investors. By examining how companies adjust their sustainability practices in response to ESG rating changes, we can gain insights into their genuine commitment to sustainability and their ability to adapt to evolving ESG standards. This analysis helps identify companies that are proactive in improving their sustainability performance and aligning with investor expectations, as well as those that may engage in greenwashing or fail to prioritize sustainability despite claims to the contrary. Moreover, investigating the relationship between ESG rating changes and corporate responses contributes to the broader understanding of how ESG considerations influence corporate behavior and decision-making. It provides valuable insights into the effectiveness of ESG ratings as drivers of change within companies and their implications for sustainable practices. By combining the analysis of greenwashing temptations at the individual stock and mutual fund levels with the examination of corporate responses to ESG rating changes, our research aims to provide a comprehensive understanding of the interplay between investors, funds, and companies in the context of sustainable investing. This holistic approach enables us to explore the alignment between investor preferences, fund practices, and corporate behavior, ultimately contributing to the advancement of responsible

investing practices and the promotion of genuine sustainability efforts.

3 Data and Summary Statistics

3.1 Data Description

3.2 Summary Statistics

4 Empirical Analysis

4.1 Empirical Specifications

4.2 Univariate Analysis of the Impact of ESG Score Changes on Fund Ownership and Growth

To answer the research question of whether mutual funds are greenwashing, Table 2 analyzes percentage growth in ESG ownerships, as well as the number of ESG funds that invests in the firm by focusing on the ESG Score, as one of the main Asset4 measures.

When the Asset4 measure grade decreases (e.g., from -5 to -4, -4 to -3, etc.), there is a general trend of a decrease in the mean and median percentage growth in ESG Ownership. However, there are some exceptions, such as the change from -3 to -2 where there is a slight increase in the mean and median percentage growth in ESG Ownership.

When the Asset4 measure grade increases (e.g., from -2 to -1, -1 to 0, etc.), there is a general trend of an increase in the mean and median percentage growth in ESG Ownership. The magnitude of the increase tends to be larger for higher changes in the grade.

Overall, similar to the previous analysis, negative changes in the Asset 4 measure grade are associated with more negative mean and median percentage growth in ESG Ownership, indicating a decrease in ESG Ownership. Positive changes in the grade are associated with more positive mean and median percentage growth in ESG Ownership, suggesting an increase in ESG Ownership. However, it's important to note that the magnitude of the changes in ownership does not always directly reflect the magnitude of the changes in Rank YOY.

4.3 Univariate Analyses of the Impact of ESG Ranking Changes on Fund Ownership Growth

To further evaluate whether greenwashing is occurring among mutual funds, Table 2 presents information on the change in rank year over year (YOY) and the percentage growth in ESG ownership for different deciles of firms based on their ESG measures. Firms are ranked according to their ESG Measure in a given year using deciles. Ranks are defined within 2-digit SIC in a given year. Next, they are tracked whether rank changes YOY. For example, a change in rank 3 may represent firms going from 2 to 5 or 6 to 9. The tables are divided based on two different sources of ESG data (KLD and Asset4) and provide statistics such as mean, median, minimum, and maximum values for each change in rank category.

Each panel in the table shows the change in rank of firms over time. The negative values indicate a decline in rank, while positive values represent an improvement in rank. The magnitude of the change suggests the extent of movement within the ranking system. Higher positive values indicate greater improvements in rank, while lower negative values indicate larger declines in rank. ESG ownership represents the extent to which firms' shares are held by investors focused on environmental, social, and governance factors. The mean, median, minimum, and maximum values provide insights into the distribution and range of changes in ESG ownership. The tables provide statistics for different sources of ESG data, namely KLD, Asset4, and ESG Disclosure. Comparing the statistics across these sources can reveal variations in rankings and ownership measures. For example, the mean and median values of change in rank and percentage growth in ESG ownership may differ between KLD and Asset4, suggesting divergent assessments of ESG performance. These tables offer insights into the changes in rank and ESG ownership for firms over time. They provide a basis for analyzing trends in ESG performance and investor behavior, allowing for comparisons between different sources of ESG data.

We would expect more negative or less positive mean or median percentage growth in ESG Ownership in response to negative changes in Rank YOY compared to positive changes in Rank YOY, with the relative magnitudes in changes in ownership reflecting the relative magnitude of the changes in Rank YYY.

Analyzing the mean (median) percentage growth in ESG Ownership for negative and positive

changes in Rank YOY using Asset4 ratings, we can observe the following patterns: The mean (median) percentage growth in ESG Ownership for negative changes in Rank YOY ranges from 7.37% (0.21%) to 14.89% (3.66%). The mean (median) percentage growth in ESG Ownership for positive changes in Rank YOY ranges from 14.34% (3.42%) to 15.01% (3.98%). Based on these comparisons, it appears that, on average, positive changes in Rank YOY tend to exhibit higher percentage growth in ESG Ownership compared to negative changes. For example, the average growth for positive mean (median) changes is 14.34% (3.75%), while for negative changes, it is 11.57% (2.11%).

Analyzing the mean (median) percentage growth in ESG Ownership for negative and positive changes in Rank YOY using KLD ratings, we observe similar patterns. The mean (median) percentage growth in ESG Ownership for negative changes in Rank YOY ranges from 13.93% (3.15%) to 15.51% (3.46%). The mean (median) percentage growth in ESG Ownership for positive changes in Rank YOY ranges from 16.03% (3.94%) to 16.12% (4.97%). Based on these comparisons, it seems that, on average, positive changes in Rank YOY tend to exhibit higher percentage growth in ESG Ownership compared to negative changes. For instance, the average growth for positive mean (median) changes is 16.19% (4.41%), while for negative changes, it is 14.92% (3.80%).

Overall, while there is some variability, the general trend of negative changes in Rank YOY corresponding to negative or lower median percentage growth in ESG Ownership holds true in the dataset.

4.4 Multivariate Analyses of the Impact of ESG Ranking Changes on Fund Ownership Growth

Table 4 presents the results of a multivariate analysis examining the impact of ESG ranking changes on fund ownership growth. The dependent variable of interest is the change in the percentage of ESG money invested in the firm. The main variables of interest are "Move Up" and "Move Down," which represent the changes in the ESG ranking of the firm. In addition to the main variables of interest, the table includes several control variables to account for potential factors that could influence the relationship between ESG ranking changes and fund ownership growth, such as annual return and its interactions with rating changes, positive earnings dummy, share turnover,

inverse total risk, dividend yield, book-to-market ratio, return on assets, and log of market cap. The inclusion of annual return and its interactions with rating changes is particularly important as recent papers emphasize the existence of a trade-off for value-driven investors when it comes to portfolio selection, as they must consider both financial returns and corporate social responsibility (CSR) (e.g., Barracchini Adessi, 2012; Dorfleitner Utz, 2012). The regression analyses in the study include control for the ESG starting position variable, except when the partitioning is specifically based on the ESG starting position itself. In addition, all regressions control for industry-specific effects that could impact fund ownership growth. When analyzing the impact of ESG ranking changes on fund ownership growth, controlling for the ESG starting position allows us to isolate the effects of changes in rankings on fund ownership, while considering the baseline ESG performance of each firm. It helps to distinguish the influence of the rank movement itself from the inherent differences in ESG performance across firms. However, in situations where the partitioning is based on the ESG starting position, it becomes redundant to include the ESG starting position as a control variable. This is because the partitioning already groups the firms based on their initial ESG rankings, and the analysis focuses on examining the effects within those specific groups. By including these control variables, the analysis aims to isolate the specific impact of ESG ranking changes (Move Up and Move Down) on fund ownership growth while accounting for other relevant factors that could influence the relationship.

In our study, we perform a multivariate analysis using the overall sample as well as various cross-sectional partitions based on firm characteristics. The ways in which fund managers utilize ESG ratings, as well as the circumstances in which ESG rating information proves valuable for their asset holdings, are still areas that require further investigation. To contribute to the understanding of these questions, we investigate firm and capital market factors that we hypothesize would impact the relationship between changes in ESG ratings and mutual fund asset holdings. By examining these factors, we aim to shed light on the conditions under which ESG ratings are influential for fund managers' investment decisions. In addition, we aim to identify the specific firm characteristics that influence whether fund managers adhere to their commitment to ESG principles or, alternatively, engage in greenwashing practices. By analyzing these characteristics, we seek to uncover the factors that shape the relationship between ESG ratings and mutual fund asset holdings. This investigation

will provide valuable insights into the determinants of ESG-related investment decisions and shed light on the drivers of genuine ESG integration versus potential greenwashing behavior within the mutual fund industry.

The analysis provides compelling findings regarding the influence of ESG ranking changes on fund ownership growth. In the overall sample, both the "Move Up" and "Move Down" variables demonstrate economic as well as statistical significance. The positive coefficient of 0.021 for "Move Up" suggests that when a firm experiences an upward shift in its ESG ranking, there is a corresponding positive change in the percentage of ESG money invested in the firm. This finding implies that an improvement in the ESG ranking is associated with an increase in ESG fund ownership. While statistically significant, the economic impact of this effect may be relatively modest. Conversely, the negative coefficient of -0.045 for "Move Down" indicates that when a firm's ESG ranking declines, there is a negative change in the percentage of ESG money invested in the firm. This finding signifies that a decrease in the ESG ranking is associated with a decrease in ESG fund ownership. Importantly, the magnitude of this effect is not only statistically significant but also economically significant, suggesting a more pronounced impact compared to "Move Up." Taken together, these results emphasize that investors show a stronger preference for firms that demonstrate improvement in their ESG ranking. Conversely, they exercise greater caution when a firm's ESG ranking deteriorates. The findings highlight the significance of ESG ranking changes in influencing the allocation of ESG funds and their impact on the level of fund ownership in a firm.

A noteworthy observation is the asymmetric response to rating changes, with the effect of "Move Down" being more pronounced than that of "Move Up." For example, in the overall sample, the coefficient for "Move Up" is 0.021 with a significance level of 90%, indicating a moderately positive relationship between improvements in ESG rankings and fund ownership growth. Similarly, the coefficient for "Move Down" is -0.045 with a significance level of 99%, suggesting a strongly negative relationship between declines in ESG rankings and fund ownership growth. This observation highlights the asymmetric response to rating changes, with "Move Down" having a larger magnitude and stronger significance than "Move Up." The larger effect for "Move Down" implies that a decrease in ESG rankings leads to a more substantial reduction in the percentage of ESG money invested in a firm, reflecting investors' heightened sensitivity to negative changes in ESG

performance. Conversely, while upward changes in ESG rankings result in increased fund ownership, the absolute magnitude of the effect is comparatively smaller. These findings emphasize the importance of maintaining and improving ESG rankings to attract and retain ESG-focused investors, underscoring the market's response to firms' ESG ranking movements and the relevance of ESG performance in fund allocation decisions.

This asymmetry suggests that downward changes in ESG rankings have a more substantial impact on fund ownership growth compared to upward changes. The larger magnitude of the effect for "Move Down" and its stronger statistical significance imply that when a firm experiences a decline in its ESG ranking, there is a more substantial reduction in the percentage of ESG money invested in the firm. This finding underscores the heightened sensitivity of investors to negative changes in ESG performance and their propensity to reallocate funds away from firms with deteriorating ESG rankings. On the other hand, while upward changes in ESG rankings also result in increased fund ownership, the effect is comparatively smaller and weaker. By highlighting the differential impact of "Move Up" and "Move Down," these results shed light on the asymmetric nature of market responses to ESG rating changes. Investors appear to exhibit a more cautious and discerning approach when it comes to firms experiencing downward rating changes, showing a heightened sensitivity to ESG performance deterioration. These findings emphasize the importance of maintaining and improving ESG rankings for firms seeking to attract and retain ESG-focused investors. Therefore, the analysis reveals a significant and asymmetric relationship between ESG ranking changes and fund ownership growth. The results indicate that negative changes in ESG rankings have a larger and more noticeable impact on fund ownership compared to positive changes. These findings underscore the importance of ESG performance and highlight the market's response to firms' ESG ranking movements.

The analysis examining the relationship between "Move Up" and fund ownership, partitioning on firm size, reveals that the effect is significant only for large firms. This suggests that when large firms experience an improvement in their ESG ranking, there is a corresponding increase in the percentage of ESG money invested in them. Investors show a stronger preference for allocating ESG funds to larger firms that demonstrate progress in their ESG rankings. However, it is important to note that the effect of "Move Up" does not reach statistical significance for small firms, indicating

that improvements in ESG rankings may not have a significant impact on the percentage of ESG money invested in these firms. The differential impact of "Move Up" based on firm size highlights the varying market responses and investor preferences in allocating ESG funds.

The lack of significance for the relationship between "Move Up" and fund ownership in small firms could be influenced by several factors. One possibility is that investors targeting small firms have different investment preferences or risk appetites compared to those focusing on larger firms. Small firms may operate in different sectors or face unique challenges that make their ESG rankings less influential in attracting ESG fund investments. Additionally, small firms may have limited resources to dedicate to ESG initiatives, which could affect the perceived impact of their ESG ranking changes on fund ownership. Another potential explanation is that ESG ratings are more informative or carry greater weight in the context of large firms. Large firms often have greater visibility and are subject to more scrutiny from investors, stakeholders, and the public. Consequently, their ESG rankings may have a stronger influence on investment decisions and the allocation of ESG funds. In contrast, small firms may have less visibility, and their ESG rankings may not be as widely considered or trusted by investors.

Similarly, when examining the effect of "Move Down" across different firm size partitions, the findings indicate that it is significant only for large firms. This aligns with expectations, as a decline in ESG ranking would lead to a negative change in the percentage of ESG money invested in the firm. The negative relationship between "Move Down" and fund ownership for large firms highlights that investors are more cautious and tend to reduce their ESG fund ownership in larger firms that experience a deterioration in their ESG rankings. However, the relationship between "Move Down" and fund ownership in small firms does not reach statistical significance.

These results indicate that the impact of ESG ranking changes on fund ownership growth is primarily observed in the context of large firms. The relationship between ESG ranking changes and fund ownership in small firms appears to be less prominent or inconclusive, suggesting that other factors may have a more significant influence on fund allocation decisions for this subgroup.

Regarding the effect of starting ESG ranking positions, the significance of "Move Up" is primarily observed within a specific range of starting ESG positions. Specifically, improvements in ESG rankings have a significant impact on fund ownership growth for firms with an initial ESG

starting position in the middle range, encompassing C, C+, B-, and B positions. Economically speaking, this result suggests that firms with initial ESG positions in the middle range experience a more pronounced response in fund ownership when they improve their ESG rankings. Firms starting at these positions may be perceived as having room for enhancement in their environmental, social, and governance practices, making improvements in their ESG rankings more meaningful to investors. As a result, when these firms demonstrate progress and move up in their rankings, investors respond by increasing their allocation of ESG funds. On the other hand, the lack of statistical significance for firms starting at other ESG positions may be attributed to different factors. Firms with higher initial ESG positions may already be considered leaders in ESG performance, leading to a reduced impact of further improvements in their rankings on fund ownership. Similarly, firms starting at lower ESG positions may face more significant challenges or have limited resources to dedicate to ESG initiatives, resulting in a less pronounced response from investors to improvements in their rankings. Overall, these findings suggest that improvements in ESG rankings have a more significant impact on fund ownership growth for firms starting at ESG positions in the middle range. This highlights the relevance and market sensitivity to changes in ESG rankings for firms that have the potential to enhance their ESG practices. It also underscores the importance of continuous improvement in ESG performance for firms within this range to attract and retain ESG-focused investors.

On the other hand, the results indicate that firms starting at lower ESG positions (D-, D, D+, C-) or higher ESG positions (B+, A-, A, A+) experience significant changes in ESG fund ownership when they move down in their rankings. This suggests that both firms with lower initial ESG rankings and those with higher initial ESG rankings face significant consequences when their rankings deteriorate. For firms starting at lower ESG positions, a decline in their rankings reflects a deterioration in their ESG performance and may signal increased scrutiny and reduced interest from ESG-focused investors. Conversely, for firms starting at higher ESG positions, a decline in their rankings may indicate a failure to meet or maintain high ESG standards, leading to a loss of confidence and reduced investment from ESG-focused investors.

The multivariate analysis examining the impact of ESG ranking changes on fund ownership growth reveals compelling findings. Both "Move Up" and "Move Down" variables demonstrate

economic and statistical significance. Negative changes in ESG rankings have a larger impact on fund ownership compared to positive changes, highlighting the market’s sensitivity to ESG performance deterioration. The relationship between ”Move Up” and fund ownership is significant for large firms, while the lack of significance for small firms suggests limited impact of ESG ranking improvements. Notably, improvements in ESG rankings have a more significant impact on fund ownership growth for firms starting at ESG positions in the middle range (C, C+, B-, and B), underscoring the market’s response to improvements in firms’ environmental, social, and governance practices. These findings shed light on the importance of ESG ranking changes in driving fund allocation decisions and the relevance of continuous ESG performance improvement for attracting and retaining ESG-focused investors.

5 Conclusion

The expansion of sustainable investing has led to the incorporation of environmental, social, and governance (ESG) criteria into investment strategies, attracting significant attention and capital. With assets managed based on sustainability principles reaching trillions of dollars, understanding the implications of sustainable investing for asset holdings and corporate behavior has become paramount. To this end, we examined whether mutual funds and firms claiming to be sustainable demonstrate responsible investment and corporate practices or engage in greenwashing. Our findings indicate that investors and firms view sustainability as a positive attribute, as funds experiencing improvements in ESG ratings attract higher fund flows. This suggests a marketwide preference for sustainability.

Additionally, our study builds upon previous research on sustainable investing, theoretical studies on ethical investing and socially responsible investments, and empirical support from the mutual fund literature. By incorporating these insights, we aimed to enhance our understanding of the market behavior associated with sustainable investing and the implications for asset managers, investors, and policymakers. Our study provides compelling evidence that the investors collectively value sustainability, refuting the notions of investor indifference or penalization towards funds with sustainable portfolios. We observe that funds experiencing improvements in ESG ratings attract

higher levels of fund flows, while those with declining ratings experience a reduction in fund flows. This indicates that a significant portion of the market perceives sustainability as a favorable attribute for companies. Furthermore, our findings highlight the influence of rating categories on financial decision-making and marketwide variables such as fund flows. Constructing rating categories effectively can have a substantial impact on investment decisions within a financial context.

We also explored the relationship between ESG rating changes and herd trading behavior among investors. While existing literature on this topic is limited, our study contributes to understanding the dynamics of herding behavior in response to ESG ratings changes. The direction of the ratings change and consensus among market participants play a significant role in driving herding behavior. We find that, for the typical fund portfolio, positive changes in ESG ratings lead to increased holdings, while negative changes result in herd selling.

Our study's empirical results provide valuable contributions to the existing literature by revealing the asymmetric nature of market responses to ESG rating changes. Downward changes in ESG rankings have a more pronounced impact on fund ownership growth compared to upward changes. This highlights the market's cautious response to deteriorating ESG rankings and the significance of ESG ranking improvements in attracting and retaining ESG-focused investors.

Moreover, our study relates to previous research on sustainable investing and reinforces empirical evidence from the mutual fund literature. It emphasizes the need to examine how ESG funds adjust their portfolio holdings in response to changes in ESG ratings. Failure to align portfolios with shifting ratings raises concerns about greenwashing and a lack of genuine commitment to sustainable investing. Our empirical analyses reveal that the impact of ESG ranking changes on fund ownership growth is primarily observed in large firms, indicating the importance of visibility and scrutiny in market dynamics. Failure to align portfolio holdings with improved ESG ratings among small firms suggests a potential lack of commitment to sustainable investing and raises concerns about greenwashing practices. Additionally, starting ESG ranking positions play a role. The impact is particularly significant for firms initially positioned in the middle range of the ESG spectrum, as they witness improvements in their ratings. Conversely, firms at the extremes of the ESG spectrum experience notable effects when their ratings decline. These findings underscore the crucial importance of enhancing ESG rankings in attracting and retaining the attention of investors

focused on ESG considerations.

Overall, our study provides insights into the role of ESG metrics in investment decision-making, market dynamics, and asset holdings. It contributes to the literature on sustainable investing and informs investors, asset managers, and policymakers in navigating the evolving landscape of ESG integration. Further research in this area is necessary to deepen our understanding of the relationship between ESG ratings, investment behavior, and market outcomes.

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Table 1: Summary Statistics

This table presents summary statistics for our data sample, consisting of ... All variables are defined in the Appendix.

Mean	SD	P10	P50	P90	N
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Table 2: Impact of ESG Score Changes on Fund Ownership and Growth

ESG Score		Percentage Growth in ESG Ownership				Percentage Change in ESG Num Funds			
Δ	N	Mean	Median	Min	Max	Mean	Median	Min	Max
-5	2	-27.6%	-27.6%	-51.6%	-3.6%	-11.9%	-11.9%	-33.3%	9.5%
-4	4	11.5%	17.9%	-10.5%	21.0%	4.9%	4.0%	0.0%	11.5%
-3	10	6.1%	-14.0%	-36.7%	184.2%	8.4%	-2.0%	-14.3%	79.2%
-2	100	5.9%	-3.7%	-58.6%	184.2%	8.0%	3.8%	-33.3%	111.1%
-1	1,228	8.7%	1.8%	-61.0%	184.2%	5.9%	1.3%	-33.3%	145.5%
0	5,515	10.1%	2.0%	-61.0%	184.2%	6.4%	2.4%	-34.8%	133.3%
1	2,129	10.4%	2.3%	-61.0%	184.2%	7.9%	4.7%	-34.8%	145.5%
2	486	9.7%	2.6%	-61.0%	184.2%	7.9%	4.1%	-34.8%	145.5%
3	96	10.6%	2.2%	-58.6%	133.5%	6.5%	3.7%	-34.8%	111.1%
4	33	8.7%	8.1%	-58.6%	113.3%	7.9%	7.9%	-28.6%	60.0%
5	9	7.9%	-6.8%	-45.4%	49.9%	23.6%	20.7%	-7.1%	88.9%

Table 3: Impact of ESG Ranking Changes on Fund Ownership Growth

Change in Rank	N	Mean	Median	Min	Max
Asset4					
-3 or more	163	7.37%	0.21%	-59.32%	110.82%
-2	340	14.89%	3.66%	-59.32%	168.89%
-1	1,137	12.45%	2.46%	-59.32%	168.89%
0	3,796	13.31%	3.45%	-59.32%	168.89%
1	1,577	14.34%	3.98%	-59.32%	168.89%
2	688	15.01%	3.86%	-59.32%	168.89%
+3 or more	525	14.92%	3.42%	-59.32%	168.89%
KLD					
-3 or more	1,939	15.51%	3.46%	-65.03%	175.48%
-2	1,326	13.93%	4.78%	-65.03%	168.95%
-1	2,599	15.31%	3.15%	-65.03%	175.48%
0	7,420	14.80%	2.97%	-65.03%	175.48%
1	2,106	16.12%	4.31%	-65.03%	175.48%
2	1,156	16.03%	4.97%	-65.03%	175.48%
+3 or more	2,344	16.12%	3.94%	-65.03%	168.95%

Table 4: Impact of ESG Ranking Changes on Fund Ownership Growth

Dependent Variable Sample	Change in Percent of ESG Money Invested in the Firm					
	Full Sample All Firms	Large Firms	Small Firms	D-, D, D+, C-	Partition by ESG Starting Position C, C+, B-, B B+, A-, A, A+	
Independent Variables						
Move Up 1	0.021* (1.722)	0.037** (2.281)	0.018 (0.933)	0.003 (0.127)	0.040** (2.514)	0.040 (1.454)
Move Down	-0.045*** (-2.843)	-0.048** (-2.224)	-0.038 (-1.590)	-0.048* (-1.876)	-0.014 (-0.613)	-0.093** (-2.034)
Annual Return	0.436*** (30.474)	0.535*** (21.654)	0.401*** (21.735)	0.373*** (19.444)	0.627*** (23.667)	0.515*** (8.469)
Annual Return * Move Up	0.082*** (3.132)	0.020 (0.488)	0.094*** (2.659)	0.080* (1.936)	-0.056 (-1.408)	0.053 (0.596)
Annual Return * Move Down	0.221*** (5.910)	0.166*** (2.926)	0.244*** (4.748)	0.327*** (6.281)	-0.051 (-0.804)	0.375** (2.424)
Positive Earnings Dummy	0.005 (0.252)	0.003 (0.099)	0.012 (0.483)	0.000 (0.006)	-0.024 (-0.923)	0.069 (1.338)
Share Turnover	0.001** (2.512)	0.002*** (4.397)	0.000 (0.727)	0.001*** (2.911)	-0.000 (-0.327)	0.003*** (3.146)
Inverse Total Risk	-0.000*** (-5.269)	-0.000*** (-5.087)	-0.000** (-2.411)	-0.000** (-2.232)	-0.000*** (-5.835)	-0.000* (-1.843)
Dividend Yield	-0.328*** (-5.923)	-0.283*** (-3.965)	-0.363*** (-4.260)	-0.277*** (-3.126)	-0.328*** (-3.981)	-0.249 (-1.553)
Book/Market	-0.073*** (-5.188)	-0.041* (-1.744)	-0.076*** (-4.029)	-0.128*** (-4.213)	-0.043** (-2.559)	-0.059 (-1.240)
Return on Assets	-0.207*** (-4.378)	-0.149* (-1.891)	-0.195*** (-2.997)	-0.189*** (-2.746)	-0.149* (-1.789)	-0.255 (-1.275)
Log of Market Cap	-0.019*** (-3.664)	-0.004 (-0.555)	-0.045*** (-4.027)	-0.034*** (-3.509)	-0.019*** (-2.842)	-0.003 (-0.213)
ESG Starting Position	-0.013*** (-4.279)	-0.013*** (-3.604)	-0.016*** (-3.090)			
Constant	1.104*** (4.320)	0.361* (1.869)	1.631*** (4.836)	1.401*** (4.311)	0.594*** (3.345)	0.075 (0.219)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,699	4,354	4,345	3,470	4,122	1,107
R-squared	0.211	0.229	0.215	0.217	0.228	0.213