Investment Responses to ESG Rating Changes During Financial Crises

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Abstract

This study contributes to the literature on ESG investing by examining how changes in ESG ratings influence mutual fund behavior during financial crises, with a particular focus on potential greenwashing practices. Our findings reveal that during crisis periods, mutual funds are less responsive to ESG score changes, maintaining existing investments even when scores decline, likely as a strategic measure to avoid market volatility. This muted response contrasts with non-crisis periods, where funds show a more pronounced reaction to ESG score changes, aligning more closely with ESG principles. The study also highlights that the impact of ESG ratings on fund ownership varies depending on the specific rating system and the economic context, with large firms and those with middle-range ESG scores experiencing the most significant effects during crises. These findings suggest that during financial crises, funds may prioritize stability over genuine ESG commitment, raising concerns about greenwashing.

Keywords: ESG ratings, Leverage, Debt Maturity, Security Issuances, Financial Crises

JEL: G21, G23

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1 Introduction

In recent decades, the rapid growth of sustainable investing, driven by increasing awareness of environmental and social concerns, has spurred a surge in assets managed based on ESG (Environmental, Social, and Governance) principles. This trend, however, has raised critical questions about the genuine commitment of funds labeled as "sustainable" or "ESG," particularly during periods of financial crisis. Concerns about potential "greenwashing"—where funds may not align their actions with their stated ESG objectives—have intensified, especially amidst market volatility. The 2007-2009 Global Financial Crisis (GFC) and the more recent COVID-19 pandemic have brought these issues to the forefront, highlighting the need to understand how ESG investments perform under stress and whether they truly align with sustainable principles during turbulent economic times. This study investigates the relationship between ESG ratings, fund flows, and investor behavior during financial crises. It evaluates how changes in ESG ratings influence fund ownership and investment decisions, shedding light on the potential for greenwashing and the dynamics between financial and sustainability considerations during these periods.

Existing literature has demonstrated a market-wide preference for sustainability, with improvements in ESG ratings attracting higher fund flows (Liang et al., 2022; Pástor et al., 2021). However, our research delves deeper, examining whether this preference remains consistent during crises, or if investors' behavior towards ESG-rated funds shifts in response to market stress. The existing body of research on ESG and financial performance offers mixed findings. While some studies argue that ESG activities can boost firm performance through product differentiation and reduced systematic risk (Albertini, 2013; Friede et al., 2015), others caution that ESG initiatives may lead to inefficient capital allocation or even adverse financial outcomes (Devinney, 2009; Oikonomou et al., 2012). This mixed evidence suggests that the relationship between ESG activities and financial performance may be more complex, particularly during periods of economic stress.

Our empirical analysis contributes to this discourse by exploring the investment response to ESG rating changes. We observe that downward changes in ESG rankings leads to a negative impact on fund ownership growth, but the severity of this impact is less pronounced during crisis periods than non-crisis periods. This suggests that investors exhibit caution in divesting from funds

with declining ESG ratings during volatile times, potentially due to risk aversion or the desire to avoid drastic reallocations in unstable markets.

Furthermore, our study highlights the crucial role of firm-specific characteristics in shaping the impact of ESG ratings on fund ownership. We find that large firms, which typically face greater visibility and scrutiny, tend to experience more significant shifts in fund ownership in response to ESG rating changes, especially during crises. In contrast, smaller firms, while generally benefiting from increased ESG investment during crises, may not experience as pronounced a response to changes in their ESG ratings. This suggests that investor scrutiny and expectations are particularly heightened for larger firms during turbulent times. It also raises the possibility that smaller firms, facing less scrutiny, may be more inclined to engage in greenwashing—publicly promoting their ESG credentials without making substantive changes to their practices—to attract and retain ESG-conscious investors.

Additionally, we explore how the initial ESG ranking position of a firm influences the relationship between rating changes and fund ownership growth, with a focus on crisis versus non-crisis periods. Our findings indicate that firms with lower initial ESG scores experience a negative impact when their scores decline, particularly during crises, suggesting heightened investor sensitivity to negative ESG signals for these firms. For firms with middle-range ESG ratings, improvements in ESG scores during crises are more likely to result in increased fund ownership, highlighting that investors reward positive ESG developments in this segment more during turbulent times. In contrast, firms with higher initial ESG ratings show relatively stable fund ownership in response to both upward and downward ESG rating changes, regardless of whether the period is a crisis or non-crisis. This stability suggests that investors perceive these firms as having already established strong ESG credentials, resulting in less dramatic shifts in response to rating changes. Overall, the impact of ESG score changes on fund ownership is highly contingent on the economic context and the firm's initial ESG standing, with more pronounced reactions seen during crises, particularly for firms with lower and middle-range ESG ratings.

Financial crises, characterized by heightened uncertainty and market volatility, often exacerbate the challenges associated with sustainable investing. During such times, investors may become more risk-averse, prioritizing financial stability over sustainability goals. This shift can lead to a

re-evaluation of ESG funds, where those perceived as less resilient or committed to their stated ESG objectives might experience outflows. However, the response to ESG rating changes during crises is not uniform, and the possibility of greenwashing remains a significant concern, as funds may seek to maintain appearances without making substantial adjustments to their ESG holdings.

Our study provides novel insights into how ESG ratings interact with market conditions during financial crises. Specifically, we document that the negative impact of downward ESG rating changes on fund ownership can be less pronounced during crises than in stable periods, suggesting a complex relationship between investor behavior and ESG performance during market downturns. Conversely, while upward ESG rating changes do attract positive fund flows, the magnitude of this effect is relatively muted during crises, indicating that investors may be more cautious in rewarding positive ESG performance when market conditions are uncertain.

The implications of our research extend beyond academic discourse, offering practical insights for practitioners and regulators. For investors and asset managers, our findings highlight the importance of rigorous due diligence in evaluating ESG funds, particularly during crises when the risk of greenwashing may be heightened. For policymakers, our study underscores the need for enhanced transparency and accountability in ESG reporting, particularly in times of economic uncertainty. By promoting more robust ESG disclosure standards, regulators can help ensure that ESG funds genuinely align with their stated objectives, thereby fostering greater trust and confidence in the sustainable investing market.

As the world continues to face environmental and social challenges, the role of ESG investing in promoting sustainability and resilience will only become more critical. Our research contributes to this ongoing conversation by providing empirical evidence on how ESG ratings influence investment decisions during crises, offering insights that can help shape the future of sustainable finance.

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 mitiga-

tion, particularly during financial crises when market volatility and uncertainty are heightened. The reasons for this integration are primarily driven by reputational, moral, and legal considerations, as well as the potential influence of climate risks on portfolio returns during economic downturns.

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 remains consistent during financial crises or if other motives, such as risk aversion or a flight to quality, become more prominent. Financial motivations, cultural origins, and social norms are among the incentives that drive institutional investors to encourage responsible behavior within their invested firms, but the relative importance of these factors may shift during periods of economic stress (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 and the prevailing economic conditions. US investors, for example, seem to encounter challenges in implementing ESG strategies consistently, particularly during financial crises, despite claiming to prioritize sustainability. Thus, merely labeling a fund as sustainable does not guarantee that sustainable investments are consistently prioritized, especially during periods of market turbulence. In essence, varied findings indicate the presence of greenwashing within this field, raising questions about the reliability and trustworthiness of responsible investment labels, particularly during financial crises when the temptation to prioritize short-term gains over long-term sustainability goals may be heightened.

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 behavior may be particularly pronounced during financial crises, when uncertainty and risk aversion are high. 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. The impact of ESG rating changes on herding behavior during crises remains an important area for further exploration.

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. However, it is crucial to examine whether this integration of ESG factors remains consistent during financial crises, or if other factors, such as short-term financial performance or risk mitigation, take precedence.

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, even during financial crises. 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, regardless of the economic climate.

Specifically, one would anticipate that negative changes in ESG ratings would result in a decrease in ESG ownership, while positive changes would lead to an increase. Furthermore, the magnitudes of changes in ownership would ideally reflect the relative magnitudes of the corresponding changes in the ratings, even during crises. However, the presence of financial crises may introduce additional complexities and potentially alter the relationship between ESG rating changes and fund ownership.

- **Hypothesis 1a:** Positive changes in ESG ratings should result in increases in ESG ownership, both during crisis and non-crisis periods.
- **Hypothesis 1b:** Negative changes in ESG ratings should result in decreases in ESG ownership, both during crisis and non-crisis periods.
- **Hypothesis 1c:** The impact of negative and positive changes in ESG ratings on ESG ownership may differ during crisis periods compared to non-crisis periods.

Additionally, we analyze greenwashing temptations at the fund level, with a particular focus on how these temptations may be amplified or mitigated during financial crises. This analysis aims 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, especially during periods of economic stress. Given that different investors hold varying beliefs regarding sustainability, it is essential to explore how these beliefs and risk tolerances shape their investment decisions during crises. 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, even during economic downturns. Additionally, there are investors who see sustainability investments as a profitable strategy in and of itself, potentially offering greater resilience during crises. 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 may shift during crises. Therefore, studying greenwashing temptations at the fund level, particularly during financial crises, 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 under challenging economic conditions.

By examining how asset managers adjust their sustainability practices in response to ESG rating changes during both crisis and non-crisis periods, we can gain insights into their genuine commitment to sustainability and their ability to adapt to evolving ESG standards under different economic circumstances. This analysis helps identify companies that are proactive in improving their sustainability performance and aligning with investor expectations, regardless of the economic climate, as well as those that may engage in greenwashing or fail to prioritize sustainability despite claims to the contrary, particularly during crises when short-term financial pressures may be intense. Moreover, investigating the relationship between ESG rating changes and investment responses, with a focus on the moderating role of financial crises, contributes to the broader understanding of how ESG considerations influence corporate behavior and decision-making under varying economic conditions. It provides valuable insights into the effectiveness of ESG ratings as drivers of change within companies and their implications for sustainable practices during both stable and turbulent times.

3 Data and Summary Statistics

3.1 Data Description

The firm data utilized in this study encompass several key datasets, including Compustat and CRSP, which provide comprehensive financial information. These datasets are matched to three specific fund holding databases: Bloomberg, Morningstar, and the Social Investment Forum (SIF). Each of these databases provides insights into environmental, social, and governance (ESG) ratings.

Figure 1 illustrates the overlap between the funds identified across these three sources. The total number of funds covered by Bloomberg is 209, Morningstar includes 732 funds, and SIF encompasses 189 funds. The Venn diagram highlights the intersections between these sources: 98 funds are identified by all three sources (Bloomberg, Morningstar, and SIF); 86 funds are common between Bloomberg and Morningstar; 38 funds are common between Morningstar and SIF; 6 funds are common between Bloomberg and SIF. Additionally, 19 funds are unique to Bloomberg; 510 funds are unique to Morningstar; and 47 funds are unique to SIF.

This data allows for a robust analysis of ESG fund identification, ensuring that the study

captures a wide range of funds across different sources. By combining these datasets, the study enables a comprehensive assessment of ESG fund holdings, ensuring that the analysis covers the broadest possible spectrum of sustainable investing practices. The intersections of these datasets are crucial for understanding the consistency and reliability of ESG classifications across different data providers.

3.2 Summary Statistics

Table 1 presents the summary statistics for the key variables analyzed in this study, structured across three distinct panels: Panel A focuses on ESG measures, Panel B on the main independent variables, and Panel C on the traditional determinants of firm investment choices.

Panel A reports the descriptive statistics for four primary ESG-related variables: Asset4, KLD, ESG Disclosure, and Sustainalytics. These variables capture different dimensions of a firm's environmental, social, and governance (ESG) performance. The mean value of Asset4 is 39.42, with a standard deviation of 18.71, indicating a wide dispersion in ESG scores among firms. The range of Asset4 spans from a minimum of 0.39 to a maximum of 95.07, reflecting significant variability in ESG performance across the sample. KLD, another ESG measure, shows a mean value of 0.05 and a standard deviation of 0.63. The minimum and maximum values for KLD are -2.70 and 4.63, respectively, suggesting that while most firms exhibit modest KLD scores, some firms have either significantly positive or negative values. ESG Disclosure, which measures the extent of a firm's transparency regarding ESG factors, has a mean score of 20.23 and a standard deviation of 12.78, with scores ranging from 0.88 to 85.12. Finally, Sustainalytics has a mean value of 55.38 and a relatively narrower standard deviation of 8.69, with scores ranging from 33.00 to 91.00, indicating that while firms generally score within a closer range, there are still notable differences in their ESG performance as assessed by Sustainalytics.

Panel B highlights the main independent variables, specifically the binary indicators for upward and downward movements in ESG ratings, labeled as Move Up and Move Down, respectively. The summary statistics indicate that the mean value for Move Up is 0.31, with a standard deviation of 0.46, implying that approximately 31% of the observations experienced an upward change in ESG ratings. Conversely, Move Down has a mean value of 0.15 and a standard deviation of

0.36, indicating that 15% of the observations saw a decline in their ESG ratings. These statistics underscore the frequency of rating changes within the sample and provide a basis for analyzing the impact of these movements on corporate financing decisions. The interaction terms—Move Up x Crisis and Move Down x Crisis—capture the combined effect of ESG rating changes during periods of financial crises, with mean values of 0.10 and 0.05, respectively, suggesting that these combined events are relatively less frequent.

Panel C provides descriptive statistics for traditional determinants of firm investment choices, which are used as control variables in the investment regressions. These include variables such as Change in Percent of ESG Money Invested in the Firm, Change in Number of ESG Funds Invested, Annual Return, Positive Earnings Dummy, Share Turnover, Inverse Total Risk, Dividend Yield, Book/Market, Return on Assets, and Log Market Cap. For instance, the Change in Percent of ESG Money Invested in the Firm has a mean of 0.20 with a standard deviation of 0.66, indicating variability in how much ESG-focused capital is allocated to different firms. The Change in Number of ESG Funds Invested shows a mean of 1.04, with a wide range from -117 to 148, reflecting significant shifts in the number of ESG funds investing in firms over time. Annual Return, with a mean of 0.13 and a standard deviation of 0.61, captures the performance of firms, while Positive Earnings Dummy, with a mean of 0.77, indicates that the majority of firms in the sample report positive earnings. Other controls, such as Share Turnover, Inverse Total Risk, Dividend Yield, Book/Market, and Return on Assets, exhibit considerable variability, as reflected in their respective means and standard deviations. These controls are essential in isolating the impact of ESG rating changes on investment decisions, ensuring that the analysis accounts for broader financial and operational characteristics of the firms.

4 Empirical Analysis

5 Empirical Specification

The empirical specification employed in this study is designed to analyze the impact of various factors on the growth of ESG (Environmental, Social, and Governance) fund ownership in firms. The dependent variable in all models is the percentage growth in ESG fund ownership. The

primary independent variables of interest are *Move Up* and *Move Down*, which are binary indicators representing upward and downward movements in a firm's ESG rating, respectively.

The models also incorporate *Crisis*, a dummy variable indicating whether the observation occurs during a crisis period, and interaction terms between *Crisis* and the ESG rating movements (*Move Up* $\times$ *Crisis* and *Move Down* $\times$ *Crisis*). These interaction terms allow us to examine how the relationship between ESG rating changes and fund ownership growth is moderated by economic conditions, specifically during crises.

In addition, the models include *Annual Return*, which measures the firm's annual financial performance, and interaction terms between *Annual Return* and the movement indicators (*Annual Return* $\times$ *Move Up* and *Annual Return* $\times$ *Move Down*). This allows us to assess how the firm's financial performance influences the impact of ESG rating changes on fund ownership growth.

Other firm-specific financial variables are included as controls, such as:

- *Positive Earnings Dummy*: Indicates whether the firm reported positive earnings.
- *Share Turnover*: Reflects the trading volume of the firm's shares.
- *Inverse Total Risk*: Represents the inverse of the firm's total risk.
- *Dividend Yield*: Measures the dividend income relative to the firm's share price.
- *Book-to-Market Ratio*: A valuation metric comparing the book value of the firm to its market value.
- *Return on Assets*: A profitability ratio indicating how efficiently a firm is using its assets to generate earnings.
- *Log of Market Cap*: The natural logarithm of the firm's market capitalization, representing the size of the firm.

An ESG-specific variable, *ESG Starting Position*, is included in some specifications to capture the initial ESG standing of the firms. Additionally, *Industry Fixed Effects* are included to control for industry-specific characteristics that might affect ESG fund ownership growth.

The regression model is specified as follows:

$$\begin{aligned}\text{Fund Ownership Growth}_{it} = \beta_0 &+ \beta_1 \text{Move Up}_{it} + \beta_2 \text{Move Down}_{it} + \beta_3 \text{ESG Starting Position}_{it} \\ &+ \beta_4 \text{Annual Return}_{it} + \beta_5 (\text{Annual Return} \times \text{Move Up})_{it} \\ &+ \beta_6 (\text{Annual Return} \times \text{Move Down})_{it} + \beta_7 \text{Crisis}_{it} \\ &+ \beta_8 (\text{Move Up} \times \text{Crisis})_{it} + \beta_9 (\text{Move Down} \times \text{Crisis})_{it} \\ &+ X_{it}\beta + \sum_j \gamma_j \text{Industry Fixed Effects}_j + \epsilon_{it}\end{aligned}$$

Where:

- *Move Up* and *Move Down* are the main independent variables, indicating upward and downward movements in ESG ratings, respectively.
- *Crisis* is a dummy variable indicating whether the observation occurs during a crisis period.
- *Move Up* $\times$ *Crisis* and *Move Down* $\times$ *Crisis* are interaction terms exploring how economic conditions influence the impact of ESG rating changes on fund ownership growth.
- *Annual Return* represents the firm's annual return.
- *Annual Return* $\times$ *Move Up* and *Annual Return* $\times$ *Move Down* are interaction terms exploring how the firm's financial performance influences the impact of ESG rating changes on fund ownership growth.
- $\text{X}_{it}\beta$ denotes the matrix of control variables, which includes firm-specific controls such as the positive earnings dummy, share turnover, inverse total risk, dividend yield, book-to-market ratio, return on assets, and log of market capitalization.
- $\sum_j \gamma_j \text{Industry Fixed Effects}_j$ represents industry fixed effects to control for industry-specific factors that might influence the dependent variable.
- ϵ_{it} is the error term.

This empirical specification aims to identify the key drivers of ESG fund ownership growth, with a particular focus on the differential impact of ESG rating movements during crisis and non-

crisis periods. The inclusion of control variables and industry fixed effects ensures a comprehensive analysis, isolating the specific effects of ESG rating movements from other influencing factors.

5.1 Univariate Analyses of the Impact of ESG Score Changes on Fund Ownership and Growth During Financial Crises

To answer the research question of whether mutual funds are greenwashing, Tables 2 - 5 present an analysis of the percentage growth in ESG ownership, as well as the number of ESG funds investing in firms, with Asset4, KLD, Disclosure, and Sustainanalytics ESG Scores as key measures, separately for crisis years (Panel A) and non-crisis years (Panel B) to explore the differential impacts during these periods.

Table 2, provides insights into how changes in the Asset4 ESG scores impact ESG fund ownership during crisis and non-crisis years. In crisis years (Panel A), the data reveals a somewhat counterintuitive pattern. Even when a firm's Asset4 score decreases, the mean percentage growth in ESG ownership remains relatively high. For instance, firms with a decrease in score from -2 to -1 or from -1 to 0 still experience substantial growth in ESG ownership, with mean increases of 20.8% and 17.7%, respectively. This suggests that, despite a drop in the ESG rating, some funds continue to increase their investments, possibly due to strategic considerations that outweigh immediate ESG score concerns during times of economic uncertainty. The muted difference between positive and negative score changes during crises indicates that funds might not be as responsive to ESG score improvements, possibly because the prevailing uncertainty of a crisis environment diminishes the perceived importance of such changes. Investors might also be factoring in the potential for recovery or long-term improvement, leading them to maintain or increase holdings in firms even when their ESG scores decline.

In contrast, during non-crisis years (Panel B), the trends are more in line with traditional ESG investing logic. Negative changes in the Asset4 score lead to significantly lower mean percentage growth in ESG ownership, reflecting a more disciplined adherence to ESG principles. For example, when firms experience a score drop from -3 to -2, the mean percentage growth is much lower at 0.8% and 12.4%, with median values close to or below zero, indicating that funds are more likely to reduce their holdings in firms whose ESG performance declines. This suggests that in stable periods, ESG

considerations play a more central role in investment decisions, with funds divesting from firms that do not meet ESG criteria. Conversely, positive changes in ESG scores result in more substantial increases in ESG ownership, with firms showing improvements in their ESG scores, such as moving from +2 to +3, experiencing mean percentage increases of 14.6% and 13.8%, respectively. This stronger reaction to positive changes implies that funds are actively rewarding firms that enhance their ESG performance during stable periods, consistent with the objectives of ESG investing to channel capital towards sustainable practices.

The difference in means between positive and negative score changes is more pronounced in non-crisis years, reinforcing the idea that funds are more discerning in their ESG investment decisions when external pressures are lower. This alignment suggests a stronger commitment to ESG principles in non-crisis periods, where the economic environment allows for a more focused approach to sustainability. However, the contrasting behavior between crisis and non-crisis years raises questions about the consistency and authenticity of ESG commitments. During crises, the influence of ESG scores on investment decisions appears to diminish, with funds potentially prioritizing other strategic factors over immediate ESG performance. This could indicate that ESG investing is more susceptible to greenwashing during economic downturns, where the commitment to sustainability might be overshadowed by financial or strategic considerations.

Overall, these findings highlight the complexity of ESG investing and suggest that its application can vary significantly depending on the economic context. While non-crisis periods see a stronger alignment with ESG principles, the muted response to ESG improvements and continued investment despite score declines during crises suggest that the authenticity of ESG commitments may be more fragile in challenging economic times. This variability underscores the need for greater scrutiny and transparency in ESG investment practices, particularly during periods of economic stress, to ensure that ESG principles are genuinely integrated into investment decisions rather than being selectively applied based on broader market conditions.

In Table 3,the relationship between KLD score changes and ESG fund ownership during crisis and non-crisis years reveals several important patterns. During crisis years (Panel A), changes in KLD scores lead to significant variations in ESG fund ownership. Notably, negative changes in the KLD score—where scores decline by 1 or more points—show a mixed response. Despite a

decline, some funds continue to either maintain or even increase their investments in these firms. This could be attributed to strategic motivations during crises, where funds may seek to uphold their ESG appearances or manage investment risks differently, thus maintaining exposure to firms with declining KLD scores. In contrast, when the KLD score improves, especially from a score of 2 to 3, there is a notable increase in ESG ownership, with the mean percentage growth reaching 26.0%. This significant increase suggests that funds respond positively to improvements in KLD scores, potentially capitalizing on perceived enhancements in firm sustainability. However, the relatively small differences between positive and negative changes imply a cautious adjustment to ESG investments during crises. This cautious approach may reflect uncertainty or strategic conservatism in reallocating resources during turbulent times. Alternatively, the minimal differences could also indicate a potential divergence from genuine ESG commitment. During crises, funds may prioritize short-term financial stability over long-term ESG goals, leading to less pronounced adjustments in response to changes in ESG scores. This behavior might suggest that some funds are willing to overlook their ESG principles to avoid perceived risks or capitalize on other financial opportunities, thereby compromising their original commitment to sustainability. Overall, while the small differences might reflect a prudent approach during crises, they could also hint at a shift in priorities where ESG considerations become secondary to immediate financial concerns.

In non-crisis years (Panel B), the response to KLD score changes aligns more closely with the changes in scores. Negative changes in KLD scores result in smaller increases in ESG ownership compared to crisis years. This smaller adjustment indicates a more conservative response in stable conditions, where funds are less inclined to maintain or increase investments in firms with deteriorating ESG scores. Conversely, positive changes in KLD scores lead to moderate growth in ESG ownership. This trend suggests that, in non-crisis periods, funds are more responsive to improvements in KLD scores, reflecting a clearer alignment with ESG principles. Overall, the behavior observed in non-crisis years highlights a more straightforward relationship between ESG score changes and investment adjustments, with funds more likely to reduce their holdings in firms with declining KLD scores and increase their investments in firms with improving scores. This contrast underscores the different dynamics at play in crisis versus stable periods, where the former may involve strategic adjustments that could obscure true ESG commitment, while the latter

exhibits a more direct response to changes in sustainability performance.

These patterns continue to raise significant concerns regarding potential greenwashing in ESG fund management. During crisis years, despite declines in KLD scores, some funds either maintain or increase their investments in firms with deteriorating ESG metrics. This behavior may suggest a strategic shift where funds prioritize short-term financial stability over genuine ESG commitment, potentially masking a divergence from true sustainability goals. The relatively small differences between positive and negative changes in KLD scores during these periods further imply a cautious, and possibly insincere, adjustment in ESG investments. Funds may be leveraging the crisis environment to justify maintaining or expanding investments in less sustainable firms, thereby compromising their purported ESG principles. Conversely, in non-crisis years, funds exhibit a more straightforward response to changes in KLD scores, with clearer alignment between score improvements and increased investments. This more direct relationship supports the notion that, in stable conditions, funds are more likely to adhere to genuine ESG commitments. The contrasting behavior across crisis and non-crisis periods suggests that while ESG investments may appear aligned with sustainability goals in stable times, there is a risk that funds may engage in greenwashing during crises, prioritizing financial considerations over authentic ESG adherence.

In Table 4, the analysis of Disclosure score changes and their impact on ESG fund ownership during crisis and non-crisis years reveals notable differences in fund behavior. During crisis years (Panel A), the impact of Disclosure score changes on ESG ownership is mixed. Negative changes in the Disclosure score often lead to minimal or even negative growth in ESG ownership, reflecting a possible reluctance to invest in firms with deteriorating transparency. For instance, a decrease in the Disclosure score by 3 points results in a mean decline of 16.7% in ESG ownership. On the other hand, positive changes in the Disclosure score are associated with more substantial increases in ESG ownership, with a notable mean growth of 21.3% when the score improves from 2 to 3. These larger adjustments suggest that during crises, funds may respond more significantly to improvements in disclosure as they reassess their investment strategies to align with better transparency. This behavior could indicate a strategic focus on firms that enhance their disclosure practices amidst the turmoil.

In non-crisis years (Panel B), the trends are somewhat different. Negative changes in the

Disclosure score lead to smaller or even negative growth in ESG ownership, reflecting a more cautious approach to investments in firms with declining transparency. For instance, a decrease in the Disclosure score by 1 point results in a mean decline of 1.0% in ESG ownership. Conversely, positive changes in the Disclosure score result in more modest increases in ESG ownership, with the mean growth reaching 6.0% when the score improves from 2 to 3. This more restrained response during stable periods suggests that funds may place greater emphasis on transparency and disclosure when market conditions are stable, leading to more measured adjustments based on these scores.

Overall, the contrasting patterns between crisis and non-crisis years underscore a potential shift in priorities. During crises, funds appear to react more significantly to improvements in disclosure, possibly reflecting a strategic response to the heightened uncertainty and risk. In stable periods, however, the adjustments in ESG ownership are more conservative, indicating a steady alignment with disclosure practices. These findings suggest that while funds might prioritize disclosure improvements during turbulent times, their responses in stable conditions highlight a more balanced approach to incorporating transparency into their ESG investment strategies.

In Table 5, changes in Sustainalytics scores during crisis years (Panel A) show a varied response in ESG ownership. When Sustainalytics scores decrease, such as with a 3-point drop, ESG fund ownership declines by an average of 4.9%. This reduction is notably more severe during crises, suggesting that funds are less inclined to hold onto investments in firms with deteriorating scores. Conversely, when scores increase, especially with a 2-point rise, ESG ownership grows significantly, averaging 20.3%. This growth indicates a positive response to improvements in transparency and risk management, despite the overarching instability of crisis periods. The differences in ESG ownership changes between positive and negative score adjustments during crises are pronounced, highlighting a strategic shift by funds. For example, the mean increase in ESG ownership for firms with improved scores (+2) versus those with deteriorating scores (-2) shows a substantial 8.31% difference. This trend suggests that during crises, funds may prioritize aligning with firms demonstrating better scores to mitigate risks or enhance their ESG profiles amidst market turbulence. Panel B: Non-Crisis Years exhibits a more straightforward correlation between Sustainalytics score changes and ESG ownership. Negative changes in scores, such as a 3-point decline, result in a modest increase of 2.4% in ESG ownership. This relatively restrained adjustment in stable periods

reflects a less reactive approach to negative changes in transparency. Conversely, positive score changes yield moderate increases in ESG ownership, with a 6.5% rise associated with a 1-point improvement. This trend underscores a more consistent and less volatile response to improvements in ESG metrics during stable times. The differences observed in non-crisis years are smaller compared to crisis periods. For instance, the mean change in ESG ownership between firms with improved scores (+1) and those with deteriorating scores (-1) is only 2.63%, indicating a more stable but less pronounced response to score changes in non-crisis periods. Overall, the data suggests that during crises, funds show a more dramatic reaction to changes in Sustainalytics scores, potentially as a strategic response to market uncertainties. In contrast, during stable periods, adjustments in ESG ownership are more subdued, reflecting a steadier alignment with score changes and potentially indicating less volatility in fund behavior. These patterns highlight the differential impact of market conditions on fund responses to transparency and sustainability metrics, raising questions about the consistency of ESG commitment across varying economic environments.

Across all tables, a clear pattern emerges from these uivariate analyses: mutual funds tend to show a less pronounced reaction to changes in ESG scores during crisis years compared to non-crisis years. This observation suggests that in times of economic turmoil, funds may opt to retain their ESG investments more out of strategic necessity—such as avoiding significant portfolio shifts in unstable markets—rather than adhering to ESG principles. Such behavior may point to greenwashing, where funds maintain the appearance of ESG commitment without making substantive changes to their holdings. In contrast, during non-crisis years, mutual funds demonstrate a more noticeable response to fluctuations in ESG scores. Negative changes in ESG scores generally lead to reductions in ESG ownership, while positive changes result in more substantial adjustments. This trend indicates a stronger adherence to ESG principles in stable conditions, where funds seem more willing to adjust their portfolios in line with their ESG commitments. Overall, these findings suggest that mutual fund behavior regarding ESG investments is influenced by both the type of ESG score (e.g., Asset4, KLD, Disclosure, Sustainalytics) and the prevailing economic conditions (crisis vs. non-crisis years). The variations in responsiveness across different ESG metrics and economic contexts underscore the complexity of ESG investing and highlight the potential for greenwashing, especially during economic downturns.

5.2 Multivariate Analyses of the Impact of ESG Ranking Changes on Fund Ownership Growth During Financial Crises

Table 6 presents a multivariate analysis examining the impact of Asset4 ESG score changes on the growth of ESG fund ownership, with a particular focus on how these effects differ between crisis and non-crisis years. The analysis is divided into various partitions, including firm size and ESG starting position, to explore the cross-sectional effects across different segments.

In the full sample analysis, the "Move Up" variable, representing an improvement in ESG scores, shows a positive but statistically insignificant effect on ESG fund ownership during non-crisis years. However, during crisis periods, the interaction term "Move Up x Crisis" is positive and highly significant (0.084***), indicating that firms improving their ESG scores experience a more substantial increase in ESG fund ownership during crises compared to non-crisis periods. This suggests that in times of economic distress, funds may reward firms that demonstrate improvements in ESG performance, possibly as part of a flight to perceived quality or resilience. On the other hand, the "Move Down" variable, indicating a decline in ESG scores, has a significant negative impact on ESG fund ownership during non-crisis years (-0.054***), showing that decreases in ESG scores lead to reductions in ESG investments. Interestingly, during crisis periods, the interaction term "Move Down x Crisis" is positive and significant (0.125***), suggesting that the negative impact of declining ESG scores is somewhat mitigated during crises. This could imply that funds are more hesitant to divest from firms with declining ESG scores during volatile periods, possibly due to a more cautious or strategic approach to portfolio adjustments under market stress. Additionally, this behavior could also signal greenwashing temptations, where funds might choose to maintain or even increase their investments in firms with deteriorating ESG performance to uphold an appearance of ESG commitment, despite the underlying decline in sustainability metrics.

When the analysis is partitioned by firm size, it reveals that for large firms, the effect of "Move Up" during non-crisis years is positive but not statistically significant. However, during crisis periods, the interaction "Move Up x Crisis" becomes highly significant (0.099***), indicating that large firms that improve their ESG scores during crises attract significantly more ESG investment. This suggests that large firms are under greater scrutiny during crises, and positive ESG developments in these firms are more substantially rewarded by ESG-focused investors. For small firms, the results

differ. The "Move Up" variable is positive but not significant, indicating that improvements in ESG scores do not significantly impact ESG investments in small firms during non-crisis periods. However, during crises, the interaction term "Move Up x Crisis" is positive but not statistically significant (0.067), suggesting that even during turbulent times, the reward for positive ESG performance in small firms is relatively muted compared to large firms. Interestingly, the "Move Down" variable for small firms shows a positive and significant effect during crisis periods (0.165***), implying that small firms continue to attract ESG investments even when their ESG scores decline during crises. This could suggest that investors are willing to overlook negative ESG signals in small firms during crises, perhaps due to other favorable characteristics or potential greenwashing behavior, where firms or funds maintain the appearance of ESG commitment despite deteriorating scores.

The partitioning by ESG starting position offers additional insights. For firms with lower initial ESG scores (D-, D, D+, C-), the "Move Up" variable remains largely insignificant, indicating that improvements in ESG scores do not significantly impact fund ownership during both crisis and non-crisis periods. However, during crises, the interaction term "Move Up x Crisis" is positive but not significant, suggesting that even in turbulent times, positive ESG movements in these lower-rated firms do not substantially influence ESG fund ownership. On the other hand, the "Move Down" variable is significantly negative in non-crisis years (-0.062**), showing that declines in ESG scores typically reduce ESG fund ownership. Yet, during crises, this negative effect is mitigated, as reflected by the positive and significant interaction term (0.205***). This suggests that the reduction in fund ownership is less severe for these firms during turbulent times, possibly due to funds' reluctance to divest or potential greenwashing tendencies, where firms or funds may maintain the appearance of ESG commitment despite deteriorating scores.

For firms with middle-range ESG scores (C, C+, B-, B), the "Move Up" variable shows a positive effect, though it is not statistically significant during non-crisis years, indicating that improvements in ESG scores have some impact on ESG fund ownership but are not strongly influential in stable periods. The "Crisis" variable itself is positive, suggesting that overall, ESG fund ownership tends to increase during turbulent times. During crises, the interaction term "Move Up x Crisis" is positive and significant (0.067*), indicating that improvements in ESG scores during crises are

particularly beneficial for firms in this range, as they attract more ESG investments. This suggests that investors are more responsive to positive ESG developments in these firms during turbulent periods. Conversely, the "Move Down" variable is negatively significant during non-crisis years (-0.042*), indicating that declines in ESG scores lead to reduced ESG fund ownership in stable periods. However, during crises, the interaction term "Move Down x Crisis" shows a positive but insignificant effect (0.074), suggesting no evidence of a significant change in investor behavior during turbulent periods.

For firms with higher initial ESG scores (B+, A-, A, A+), both the "Move Up" and "Move Down" variables, as well as their interaction terms with crisis, show insignificant effects, indicating that there is no notable response to ESG score changes during either crisis or non-crisis periods. This lack of response might suggest a greenwashing tendency where investments are maintained despite ESG movements, reflecting a superficial commitment to ESG principles without corresponding changes in investment behavior.

The findings suggest that the impact of ESG score changes on fund ownership is highly context-dependent, varying by economic conditions (crisis vs. non-crisis periods) and firm-specific characteristics such as size and initial ESG rating. During crises, improvements in ESG scores are particularly rewarded, especially for large firms and those with middle-range ESG ratings, as funds may view these improvements as signals of resilience or quality. Conversely, while the negative impact of declining ESG scores is typically significant in non-crisis periods, this effect is somewhat mitigated during crises, suggesting a more cautious approach by funds. However, this cautiousness might also indicate greenwashing tendencies, where funds maintain or increase their investments in firms with declining ESG scores to sustain the appearance of ESG commitment, despite the underlying deterioration in sustainability metrics.

The interaction between annual returns and ESG score changes further highlights potential greenwashing behavior. Specifically, when the "Move Down" variable shows a positive and significant interaction with annual returns, it suggests that funds are prioritizing financial performance over sustainability. This pattern is observed across various firm types, with the exception of firms with higher initial ESG scores. In these cases, financial returns appear to drive inflows even when ESG performance declines, signaling that the primary motivation behind these investments may not

be genuine sustainability but rather the pursuit of financial gains. In small firms, the positive and significant effect of the "Move Down" variable during crisis periods suggests that investors might overlook negative ESG signals due to other favorable characteristics, potentially tied to financial returns or strategic benefits. This behavior raises concerns about greenwashing, as it implies that the appearance of ESG commitment may be maintained despite deteriorating ESG performance. For firms with lower initial ESG scores, the positive and significant interaction term for "Move Down x Crisis" indicates that the negative impact of declining ESG scores on fund ownership is reduced during crises. This reduction could be due to investor hesitation to divest in volatile markets or a superficial commitment to sustainability, where financial considerations take precedence. Overall, these findings underscore the importance of scrutinizing the true drivers of ESG fund inflows. The evidence suggests that greenwashing—where financial returns take precedence over genuine sustainability efforts—is a potential risk, particularly when financial returns are strong. This highlights the need for greater transparency and accountability in ESG investing to ensure that sustainability claims are backed by real commitments, not just financial motivations.

Table 7 presents a multivariate analysis examining the relationship between changes in KLD ESG rankings and the growth of ESG fund ownership, with a focus on differentiating between crisis and non-crisis periods. The analysis is conducted on the full sample, as well as partitions based on firm size, to understand how these effects vary across different types of firms.

In the full sample analysis (Column 1), the "Move Up" variable, which represents an improvement in KLD rankings, shows an insignificant effect on ESG fund ownership during non-crisis years (-0.012), indicating that upward movements in KLD scores do not significantly impact ESG investments during stable economic periods. However, during crisis periods, the interaction term "Move Up x Crisis" is positive and highly significant (0.090***), suggesting that improvements in KLD rankings lead to a substantial increase in ESG fund ownership during crises, possibly because investors place more value on firms demonstrating resilience in sustainability during turbulent times. Conversely, the "Move Down" variable in the full sample (Column 1), representing a decline in KLD rankings, has a significant negative effect on ESG fund ownership during non-crisis periods (-0.022*), indicating that a drop in KLD scores leads to reduced ESG investments. During crisis periods, the interaction term "Move Down x Crisis" is positive and significant (0.038**), which

suggests that while declines in KLD rankings still have a negative impact, the effect is somewhat softened during crises. This softening effect might be due to a more cautious or strategic approach by investors who are hesitant to make drastic portfolio changes in volatile periods. However, this behavior could also be indicative of greenwashing tendencies, where funds continue to invest in or even increase their holdings in firms with deteriorating ESG scores, potentially to maintain the appearance of an ESG commitment despite the underlying decline in sustainability performance. This raises concerns that financial returns or other factors might take precedence over genuine sustainability motives during times of economic stress.

When the analysis is partitioned by firm size, different patterns emerge. For large firms (Column 2), the "Move Up" variable is positive but insignificant during non-crisis periods (0.011), showing that improvements in KLD scores do not significantly influence ESG investments in large firms when the market is stable. However, during crisis periods, the interaction term "Move Up x Crisis" is positive and significant (0.072***), indicating that large firms that improve their KLD rankings during crises attract more ESG investments. This suggests that investors might perceive these improvements as a sign of strength or commitment to sustainability under pressure. For small firms (Column 3), the "Move Up" variable shows a significant negative effect during non-crisis periods (-0.101***), indicating that upward movements in KLD rankings are associated with a decrease in ESG investments when the market is stable. However, during crisis periods, the interaction term "Move Up x Crisis" is positive and significant (0.136***), showing that improvements in KLD scores during crises lead to a substantial increase in ESG fund ownership, suggesting that investors might be rewarding these firms for perceived resilience or improved sustainability performance in challenging conditions. The "Move Down" variable also behaves differently depending on firm size. For large firms (Column 2), the "Move Down" variable shows a negative but insignificant effect during non-crisis periods (-0.022), with the interaction term "Move Down x Crisis" being positive and significant (0.058***), indicating that the negative impact of declining KLD scores is somewhat mitigated during crises, though still present. This might suggest that investors are more forgiving of large firms' ESG score declines during turbulent times, potentially due to the firms' other strengths or overall stability. For small firms (Column 3), the "Move Down" variable shows a significant negative impact on ESG fund ownership during non-crisis periods (-0.047**), but this

effect becomes insignificant during crisis periods, as indicated by the interaction term "Move Down x Crisis" (0.031), which is not statistically significant. This suggests that the negative impact of declining KLD scores on small firms' ESG fund ownership is lessened during crises, possibly because investors are more focused on financial performance or other factors during periods of economic stress. This again raises the concern of greenwashing, where investors might prioritize financial returns over genuine sustainability commitments, particularly in small firms during volatile periods.

In the next part of the analysis, where the focus shifts to the full sample but includes additional financial performance interactions (Column 4), the "Move Up" variable shows a negative and significant effect during non-crisis periods (-0.035***), which suggests that improvements in KLD scores can actually lead to a reduction in ESG investments under stable conditions. This is consistent with the earlier finding in Column 1 that improvements in ESG rankings do not always result in increased ESG investments and may even cause a reduction when other factors, such as financial performance, are not considered. However, during crisis periods, the interaction term "Move Up x Crisis" is positive and highly significant (0.098***), indicating that the previously negative impact of ESG improvements is reversed during crises, leading to an increase in ESG fund ownership. This result aligns with the earlier observation that crises amplify the positive response to ESG improvements, likely because investors seek signals of resilience or sustainability in challenging times.

When analyzing the interactions with annual returns (Columns 5 and 6), the findings reveal that financial performance plays a significant role in shaping ESG investment decisions. In both large firms (Column 5) and small firms (Column 6), the interactions between annual returns and both "Move Up" and "Move Down" variables are positive and significant. Specifically, the interaction between annual returns and "Move Up" (0.137*** for large firms and 0.207*** for small firms) suggests that higher financial returns enhance the positive impact of ESG improvements on fund ownership, reinforcing the idea that investors may prioritize financial performance alongside or even above sustainability considerations.

More critically, the interaction between annual returns and "Move Down" (0.233*** for large firms and 0.086*** for small firms) is also positive and significant. This indicates that even when

a firm's KLD score declines—typically a negative signal for ESG investments—high financial returns can still drive ESG fund inflows. This result is particularly concerning from a greenwashing perspective, as it suggests that financial performance can overshadow deteriorating ESG metrics. In other words, investors may continue to allocate funds to firms with declining ESG performance if those firms are delivering strong financial returns, potentially undermining the authenticity of ESG commitments and leading to a superficial appearance of sustainability.

These findings suggest that the inclusion of financial performance, particularly annual returns, into the analysis changes the interpretation of how ESG score changes affect fund ownership. While ESG improvements are rewarded during crises, the role of financial returns in driving fund inflows—even when ESG performance declines—raises significant concerns about greenwashing. This behavior implies that in some cases, the financial gains of a firm may mask or outweigh the negative sustainability signals, calling into question the genuine motivations behind ESG investments.

Overall, the findings from this analysis highlight that the impact of KLD ranking changes on ESG fund ownership is highly context-dependent, with crisis periods generally amplifying the positive response to ESG improvements and softening the negative response to declines. This suggests that ESG investors may place greater emphasis on sustainability performance during times of economic uncertainty, rewarding firms that demonstrate resilience or improvement in their ESG practices. The results also reveal that firm size plays a crucial role, with large firms experiencing more consistent effects, while small firms exhibit greater variability depending on the economic context. Moreover, the significant interactions with annual returns underscore the importance of financial performance in ESG investment decisions, sometimes at the expense of genuine sustainability motives. The positive and significant interactions between annual returns and both "Move Up" and "Move Down" variables raise concerns about potential greenwashing behavior, particularly when strong financial returns drive fund inflows despite deteriorating ESG metrics. This behavior suggests that in certain scenarios, financial gains may overshadow negative sustainability signals, calling into question the authenticity of ESG commitments and highlighting the need for greater scrutiny and transparency in ESG investing practices.

Table 8 provides a multivariate analysis examining the relationship between changes in Sustainalytics ESG rankings and the growth of ESG fund ownership. The analysis is conducted on the

full sample and is further partitioned by firm size to explore how these effects vary across large and small firms, particularly during crisis and non-crisis periods.

In the full sample analysis (Column 1), the "Move Up" variable, representing an improvement in Sustainalytics rankings, shows a negative but statistically insignificant effect on ESG fund ownership (-0.003). This suggests that improvements in Sustainalytics scores do not have a strong impact on ESG investments under normal economic conditions. During crisis periods, the interaction term "Move Up x Crisis" is positive but remains statistically insignificant (0.046), indicating that even during times of economic distress, improvements in Sustainalytics rankings do not lead to a substantial change in ESG investment behavior. The "Move Down" variable, which represents a decline in Sustainalytics rankings, shows a small positive but insignificant effect on ESG fund ownership during both crisis and non-crisis periods (0.016), indicating that declines in Sustainalytics rankings do not significantly deter ESG investments. Additionally, the interaction term "Move Down x Crisis" is negative and insignificant (-0.037), suggesting that the economic context does not meaningfully alter the impact of declining Sustainalytics scores on ESG fund ownership.

When the analysis is partitioned by firm size (Columns 2 and 3), the results are consistent with the full sample analysis. For large firms, both the "Move Up" and "Move Down" variables remain insignificant during crisis and non-crisis periods, indicating that changes in Sustainalytics rankings do not significantly influence ESG fund ownership decisions for these firms. Similarly, the interaction terms for "Move Up x Crisis" and "Move Down x Crisis" are insignificant for large firms, reinforcing the notion that the economic context does not meaningfully alter the impact of Sustainalytics ranking changes on ESG investments for these companies.

Interestingly, for small firms, the "Crisis" variable itself shows a significant positive effect (0.579**), indicating that small firms tend to attract more ESG investment during crises. This could suggest that investors perceive small firms as safer or more nimble investments during turbulent times. However, similar to large firms, the effects of "Move Up" and "Move Down," and their interaction terms with the crisis variable, remain statistically insignificant for small firms. This indicates that while small firms generally benefit from increased ESG investment during crises, changes in their Sustainalytics rankings do not significantly influence this trend.

The "Annual Return" variable is consistently positive and highly significant across all models, in-

dicating that financial performance plays a crucial role in determining ESG fund ownership. Higher annual returns are associated with greater ESG investment, reinforcing the idea that investors prioritize financial performance alongside, or even over, sustainability metrics in their decision-making process.

These findings suggest that changes in Sustainalytics ESG rankings do not significantly impact ESG fund ownership, regardless of whether the period is a crisis or non-crisis. The lack of significant response to changes in Sustainalytics rankings, combined with the strong influence of financial returns, suggests that investors may not be fully integrating ESG metrics into their decision-making processes. This is especially concerning during crises, where one might expect a greater emphasis on sustainability, but the anticipated shift in investment behavior does not materialize.

The potential for greenwashing is evident as ESG investments might be driven more by financial performance than by genuine improvements in sustainability. This raises the risk that firms can maintain or even increase their ESG fund inflows despite deteriorating sustainability metrics, undermining the authenticity of their ESG commitments. These findings highlight the need for greater scrutiny and transparency in how ESG metrics are reported and utilized in investment decisions to avoid the superficial application of ESG principles, particularly during periods of economic stress.

Table 9 provides a firm-fund level analysis of the relationship between changes in Asset4 ESG scores and the percentage change in the number of shares of a firm held by a specific fund. The analysis examines how these relationships vary during crisis and non-crisis periods, with a particular focus on the "Move Up" and "Move Down" variables, representing improvements and declines in ESG scores, respectively.

The results indicate that when a firm's Asset4 score improves (Move Up), there is a statistically significant positive effect on the percentage change in the number of shares held by the fund. Specifically, across all models, the coefficient for "Move Up" is consistently positive and significant, ranging from 0.041 to 0.050. This suggests that funds tend to increase their holdings in firms that demonstrate better ESG performance, reflecting a positive investment response to ESG improvements.

Conversely, when a firm's Asset4 score declines (Move Down), the results are more nuanced. The "Move Down" variable is generally negative, but it only reaches statistical significance in the

last model (-0.022**). This suggests a potential negative impact on fund holdings when ESG scores decline, though this effect is not robust across all models, indicating that fund managers may not consistently penalize firms for declining ESG performance unless the decline is substantial.

The interaction terms between ESG score changes and the crisis variable provide further insights. The interaction of "Move Up" with the crisis variable is negative across all models but not statistically significant, except in one instance (Column 4). This suggests that while the positive response to an improvement in ESG scores may be somewhat dampened during crisis periods, this effect is generally not strong enough to draw definitive conclusions. This could imply that during crises, while ESG improvements are still valued, other factors may dilute their impact. Similarly, the interaction of "Move Down" with the crisis variable is also insignificant, suggesting that the negative impact of declining ESG scores on fund ownership remains consistent, regardless of whether the period is a crisis or non-crisis.

The annual return variable, which controls for the financial performance of the firm, shows a generally negative but weakly significant effect on the percentage change in shares held. This suggests that higher financial returns might be associated with a slight reduction in ESG-focused investments, possibly indicating that funds might prioritize financial performance over ESG considerations when returns are high, although this relationship is not particularly strong.

A critical finding is the positive and significant sign on the interaction between annual returns and the "Move Down" variable in several models. This suggests that even when a firm's ESG score declines, funds may still increase their holdings if the firm is performing well financially. This raises concerns about potential greenwashing, as it indicates that financial returns might overshadow deteriorating ESG performance. In other words, despite a negative ESG signal, funds may prioritize firms with strong financial performance, possibly undermining the authenticity of their ESG commitment. This behavior suggests that ESG investments might be driven more by financial gains than by genuine sustainability considerations, particularly during periods when financial performance is strong.

The inclusion of the ESG starting position variable in the last two models reveals a significant negative effect (-0.010***), indicating that firms with higher initial ESG scores tend to see smaller changes in fund ownership. This suggests that funds may be more responsive to changes in firms

with lower initial ESG scores, where improvements or declines could be more impactful and possibly more indicative of significant shifts in corporate behavior.

These findings highlight that fund managers tend to increase their holdings in firms with improving ESG scores, with a consistent and strong positive response to the "Move Up" variable. The response to declining ESG scores is weaker and less consistent, with significant negative reactions only occurring in certain models, indicating that declines in ESG performance may not always trigger a strong divestment response unless the decline is substantial.

The lack of significant interaction effects with the crisis variable suggests that the overall relationship between ESG score changes and fund ownership does not substantially differ between crisis and non-crisis periods. This raises questions about the depth of ESG integration in investment decisions during times of economic stress, potentially pointing to a superficial commitment to ESG principles. The significance of the ESG starting position variable also implies that changes in ESG scores may be more influential for firms with lower initial ESG ratings, which could indicate a more cautious approach by funds towards firms that are already performing well on ESG metrics.

Overall, while the positive response to ESG improvements is encouraging, the muted reaction to declines and the potential dilution of ESG impacts during crises could suggest that ESG considerations are not yet fully embedded in investment decision-making. The positive relationship between financial performance and increased fund holdings despite declining ESG scores further suggests the potential for greenwashing, where financial returns take precedence over sustainability concerns. This raises important questions about the authenticity of ESG investments and underscores the need for more robust scrutiny of how ESG criteria are integrated into investment strategies.

6 Conclusion

This study contributes to the literature on ESG investing by examining the behavior of mutual funds during financial crises, with a focus on potential greenwashing practices. Utilizing a comprehensive dataset encompassing various ESG ratings and firm-level financial data, we employed both univariate and multivariate analyses to investigate how changes in ESG scores influence fund ownership and investment decisions.

The univariate analyses reveal a consistent pattern: mutual funds exhibit a muted response to ESG score changes during crisis years compared to non-crisis years. This suggests that during periods of economic uncertainty, funds may be more inclined to maintain existing ESG investments, even in the face of declining scores, potentially as a strategic measure to avoid drastic reallocations in volatile markets. This behavior could be indicative of greenwashing, where funds aim to uphold their ESG image without making substantial changes to their holdings. In contrast, during non-crisis years, mutual funds demonstrate a more pronounced response to ESG score changes, with a clearer distinction between negative and positive changes. This pattern indicates a stronger alignment with ESG principles during stable periods, where funds are more confident in making adjustments that reflect their ESG commitments.

The multivariate analyses further explore the complexities of these relationships, revealing that the impact of ESG score changes on fund ownership is contingent on both the specific ESG rating (e.g., Asset4, KLD, Sustainalytics) and the economic context. During crises, funds tend to reward improvements in ESG scores, particularly for large firms and those with middle-range ESG ratings. The negative impact of declining ESG scores is less pronounced during crises, though still significant, suggesting a reluctance to divest during turbulent periods. Interestingly, changes in Sustainalytics rankings appear to have a limited impact on ESG fund ownership, regardless of the economic context. This finding challenges the notion that all ESG ratings are equally influential in shaping investment decisions.

Our study provides evidence that mutual funds engage in greenwashing practices during financial crises, prioritizing stability and reputation management over a genuine commitment to ESG principles. This highlights the need for increased scrutiny and transparency in ESG investing, particularly during periods of economic turmoil. The varying degrees of responsiveness to ESG scores across different contexts emphasize the complex interplay of financial and sustainability considerations in investment decision-making. Future research could further explore the mechanisms behind greenwashing, the role of investor sentiment, and the potential for regulatory interventions to promote more authentic ESG investing practices.

Our findings reinforce previous research demonstrating a marketwide preference for sustainability, with funds experiencing improvements in ESG ratings attracting higher fund flows. This

suggests that investors collectively value sustainability and are increasingly incorporating ESG factors into their investment strategies. However, our study reveals a nuanced picture when considering the impact of financial crises. During crises, mutual funds exhibit a more muted response to ESG score changes compared to non-crisis periods. This behavior may be attributed to strategic considerations, such as avoiding drastic portfolio reallocations in volatile markets, rather than a genuine commitment to ESG principles. This potential disconnect between stated ESG intentions and actual investment behavior during crises raises concerns about greenwashing practices, where funds may prioritize short-term stability and reputation management over long-term sustainability goals.

Furthermore, our analysis highlights the asymmetric nature of market responses to ESG rating changes during crises. While improvements in ESG scores generally lead to increased fund ownership, the positive impact is often dampened during crises, suggesting a more cautious approach by investors. Conversely, the negative impact of declining ESG scores is less pronounced during crises, potentially indicating a reluctance to divest from companies facing ESG challenges during periods of economic uncertainty. Our findings also emphasize the role of firm-specific characteristics, such as size and initial ESG rating, in shaping the relationship between ESG score changes and fund ownership. Large firms tend to experience more consistent effects, while small firms exhibit greater variability in their response to ESG score changes, particularly during crises. Moreover, the impact of ESG score changes is more pronounced for firms initially positioned in the middle range of the ESG spectrum, highlighting the importance of continuous improvement in ESG performance to attract and retain investor interest.

Overall, our study underscores the dynamic and complex nature of ESG investing, particularly during financial crises. While investors generally favor companies with strong ESG performance, the influence of ESG ratings on investment decisions can be moderated by economic conditions and firm-specific factors. Greater potential for greenwashing during crises calls for increased vigilance and transparency in ESG investing practices. Asset managers, investors, and policymakers must work collaboratively to ensure that ESG considerations remain integral to investment strategies, even during periods of market turbulence, to foster a sustainable and resilient financial system.

Further research is needed to explore the underlying mechanisms driving greenwashing behavior,

the role of investor sentiment in shaping ESG investment decisions, and the potential for regulatory interventions to promote greater accountability and transparency in the sustainable investing landscape.

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Figure 1: ESG Fund Identification

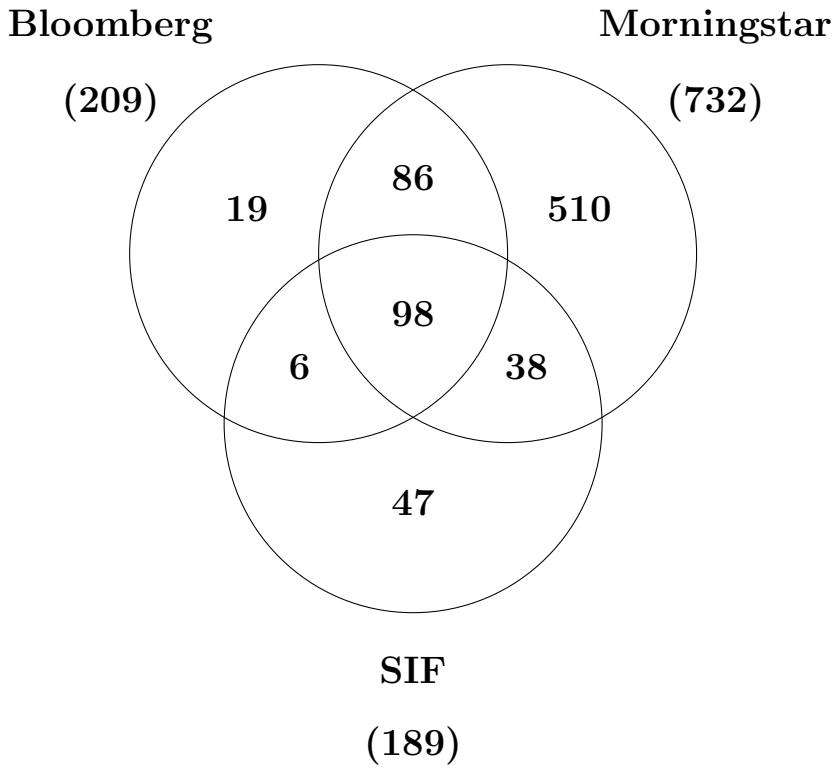

Table 1: Summary Statistics

Panel A: ESG Measures

	Mean	St. Dev	Min	p50	Max
Asset4	39.42	18.71	0.39	35.90	95.07
KLD	0.05	0.63	-2.70	0.00	4.63
ESG Disclosure	20.23	12.78	0.88	14.88	85.12
Sustainalytics	55.38	8.69	33.00	54.00	91.00

Panel B: Main Independent Variables

	Mean	St. Dev	Min	p50	Max
Move Up	0.31	0.46	0.00	0.00	1.00
Move Down	0.15	0.36	0.00	0.00	1.00
Crisis	0.26	0.44	0.00	0.00	1.00
Move Up X Crisis	0.10	0.30	0.00	0.00	1.00
Move Down x Crisis	0.05	0.21	0.00	0.00	1.00

Panel C: Controls in Investment Regressions

	Mean	St. Dev	Min	p50	Max
Change in Percent of ESG Money Invested in Firm	0.20	0.66	-0.82	0.04	2.25
Change in Number of ESG Funds Invested	1.04	5.70	-117.00	1.00	148.00
Annual Return	0.13	0.61	-0.99	0.07	25.08
Positive Earnings Dummy	0.77	0.42	0.00	1.00	1.00
Share Turnover	33.16	69.02	0.86	17.92	569.71
Inverse Total Risk (000s)	198.00	221.45	7.55	121.18	1241.05
Dividend Yield	0.02	0.17	0.00	0.00	21.23
Book/Market	0.61	0.58	0.00	0.50	24.95
Return on Assets	0.09	0.19	-6.99	0.11	2.57
Log Market Cap	21.01	1.69	13.76	20.89	27.55

Table 2: Asset4 Score Letter Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Panel A: Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	101	17.3%	4.0%	101	3.861	2.000
-2	187	20.8%	11.5%	188	0.995	2.000
-1	379	17.7%	5.7%	380	1.187	1.000
0	765	15.1%	5.8%	765	0.937	1.000
1	362	20.3%	8.8%	363	2.804	2.000
2	198	17.1%	10.6%	200	2.125	1.000
3	200	14.4%	3.5%	201	2.463	2.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		2.66%	0.71	1.618	2.86	
(+2) minus (-2)		-3.64%	(0.71)	1.130	1.41	
(+3 or more) minus (-3 or more)		-2.90%	(0.52)	(1.399)	(1.16)	

Panel B: Non-Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	122	0.8%	-3.9%	122	-0.279	-1.000
-2	245	12.4%	2.8%	245	0.208	0.000
-1	942	11.9%	1.3%	942	1.013	1.000
0	3766	13.6%	3.7%	3768	0.982	1.000
1	1550	13.9%	3.2%	1553	1.243	1.000
2	620	14.6%	5.3%	620	1.611	1.000
3	429	13.8%	2.1%	429	0.904	1.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		2.07%	1.11	0.230	0.96	
(+2) minus (-2)		2.20%	0.64	1.403	3.24	
(+3 or more) minus (-3 or more)		13.07%	3.31	1.183	1.62	

Table 3: KLD Score Letter Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Panel A: Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	744	21.3%	9.1%	748	0.699	0.000
-2	426	18.7%	4.0%	426	1.869	1.000
-1	997	24.2%	9.1%	1000	1.518	1.000
0	7384	18.8%	1.4%	7390	1.835	2.000
1	825	23.6%	7.6%	825	1.390	1.000
2	518	26.0%	10.5%	519	2.343	2.000
3	814	26.0%	13.1%	816	1.221	1.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		-0.65%	(0.21)	(0.128)	(0.47)	
(+2) minus (-2)		7.25%	1.71	0.474	1.14	
(+3 or more) minus (-3 or more)		4.70%	1.46	0.521	1.77	

Panel B: Non-Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	1841	15.1%	2.9%	1854	0.721	0.000
-2	1264	12.8%	5.1%	1270	0.731	1.000
-1	2405	13.0%	2.1%	2422	0.725	0.000
0	5256	15.4%	3.8%	5276	0.696	0.000
1	1962	16.4%	4.4%	1979	0.741	1.000
2	977	13.2%	4.9%	985	1.104	1.000
3	2070	12.1%	1.8%	2074	0.879	0.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		3.35%	2.19	0.017	0.10	
(+2) minus (-2)		0.43%	0.22	0.373	1.66	
(+3 or more) minus (-3 or more)		-2.99%	(1.93)	0.158	0.98	

Table 4: Disclosure Score Letter Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Panel A: Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	76	0.4%	-16.7%	78	-0.897	-1.000
-2	49	16.6%	-9.7%	49	0.551	1.000
-1	241	11.5%	-1.0%	246	1.211	1.000
0	5292	20.4%	5.5%	5452	1.231	1.000
1	1847	21.5%	7.7%	1887	0.680	0.000
2	277	21.9%	10.3%	279	1.495	1.000
3	308	21.3%	5.4%	315	1.178	1.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		9.97%	2.64	(0.531)	(1.13)	
(+2) minus (-2)		5.23%	0.47	0.944	0.93	
(+3 or more) minus (-3 or more)		20.90%	2.97	2.075	2.60	

Panel B: Non-Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	190	13.2%	-2.7%	192	0.031	0.000
-2	502	21.5%	4.2%	509	0.674	0.000
-1	4309	15.9%	5.3%	4357	0.711	0.000
0	11507	11.4%	0.7%	11868	0.464	0.000
1	1577	14.5%	3.9%	1604	0.983	0.000
2	702	17.0%	3.5%	711	1.146	1.000
3	963	19.6%	6.0%	971	1.024	1.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		-1.36%	(0.90)	0.273	1.79	
(+2) minus (-2)		-4.50%	(1.34)	0.472	1.73	
(+3 or more) minus (-3 or more)		6.38%	1.42	0.992	2.69	

Table 5: Sustainalytics Score Letter Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Panel A: Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	39	-4.9%	-12.5%	39	-1.564	-1.000
-2	173	12.0%	7.2%	175	0.137	1.000
-1	327	13.3%	4.6%	329	0.161	0.000
0	410	11.0%	3.3%	417	-0.079	0.000
1	190	12.1%	2.1%	196	0.184	0.000
2	93	20.3%	13.1%	95	0.979	1.000
3	96	10.2%	4.7%	98	-0.786	0.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		-1.26%	(0.31)	0.023	0.03	
(+2) minus (-2)		8.31%	1.47	0.842	0.95	
(+3 or more) minus (-3 or more)		15.13%	2.02	0.778	0.60	

Panel B: Non-Crisis Years

Change in Rank YOY	N	Change in Percent of ESG Money Invested in Firm		Change in Number of ESG Funds Invested		
		Mean	Median	N	Mean	Median
-3	71	2.4%	-3.6%	72	0.278	0.000
-2	213	5.2%	-1.4%	217	-0.014	0.000
-1	1216	3.9%	-3.0%	1227	0.565	0.000
0	3396	3.2%	-2.8%	3432	0.441	0.000
1	1233	6.5%	0.4%	1243	0.567	0.000
2	351	6.0%	1.2%	356	0.601	0.000
3	170	8.4%	3.0%	172	0.494	1.000
Difference			Diff Mean		Diff Mean t-stat	
(+1) minus (-1)		2.63%	1.73	0.002	0.01	
(+2) minus (-2)		0.85%	0.25	0.615	1.06	
(+3 or more) minus (-3 or more)		6.06%	1.16	0.216	0.25	

Table 6: Multivariate Analysis of Asset4 Score Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Dependent Variable	Change in Percent of ESG Money Invested in Firm											
Sample	Full Sample	Partition by Firm Size		Partition by ESG Starting Position			Full Sample	Partition by Firm Size		Partition by ESG Starting Position		
		Large Firms	Small Firms	D-, D, D+, C-	C, C+, B-, B	B+, A-, A, A+		Large Firms	Small Firms	D-, D, D+, C-	C, C+, B-, B	B+, A-, A, A+
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ESG Measure: **Δ Asset4 Letter Grade (with -/+)**												
Move Up	0.005	0.007	0.008	0.001	0.010	0.006	-0.007	0.003	-0.003	-0.011	0.016	0.001
	(0.361)	(0.405)	(0.344)	(0.024)	(0.544)	(0.196)	(-0.485)	(0.178)	(-0.152)	(-0.405)	(0.860)	(0.018)
Move Down	-0.054***	-0.046**	-0.064**	-0.062**	-0.042*	-0.069	-0.085***	-0.075***	-0.091***	-0.110***	-0.037	-0.125**
	(-3.034)	(-2.067)	(-2.309)	(-2.147)	(-1.662)	(-1.375)	(-4.639)	(-3.082)	(-3.238)	(-3.708)	(-1.388)	(-2.273)
Crisis	0.031*	0.046**	0.024	0.001	0.053**	0.084**	0.032*	0.045**	0.028	0.005	0.054**	0.081**
	(1.715)	(2.016)	(0.865)	(0.043)	(2.128)	(2.086)	(1.774)	(1.987)	(0.999)	(0.171)	(2.141)	(2.006)
Move up x Crisis	0.084***	0.099***	0.067	0.061	0.067*	0.068	0.085***	0.099***	0.067	0.058	0.065*	0.072
	(3.086)	(2.931)	(1.556)	(1.078)	(1.878)	(1.209)	(3.127)	(2.938)	(1.564)	(1.033)	(1.827)	(1.265)
Move down x Crisis	0.125***	0.085*	0.165***	0.205***	0.074	0.033	0.130***	0.088**	0.171***	0.207***	0.072	0.057
	(3.622)	(1.920)	(3.108)	(3.652)	(1.461)	(0.374)	(3.785)	(2.005)	(3.230)	(3.712)	(1.434)	(0.632)
Annual return	0.483***	0.563***	0.449***	0.424***	0.604***	0.575***	0.436***	0.533***	0.402***	0.373***	0.627***	0.518***
	(42.141)	(30.177)	(29.706)	(26.033)	(31.854)	(13.388)	(30.571)	(21.687)	(21.868)	(19.520)	(23.720)	(8.558)
Annual return x Move up							0.087***	0.026	0.097***	0.081**	-0.049	0.053
							(3.347)	(0.655)	(2.767)	(1.977)	(-1.231)	(0.596)
Annual return x Move down							0.229***	0.169***	0.256***	0.331***	-0.038	0.390**
							(6.139)	(2.982)	(4.982)	(6.384)	(-0.606)	(2.522)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,699	4,354	4,345	3,470	4,122	1,107	8,699	4,354	4,345	3,470	4,122	1,107
R-squared	0.213	0.236	0.214	0.212	0.233	0.222	0.217	0.237	0.219	0.222	0.234	0.226

Table 7: Multivariate Analysis of KLD Score Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Dependent Variable:	Change in Percent of ESG Money Invested in Firm					
Sample	Full Sample	Partition by Firm Size		Full Sample	Partition by Firm Size	
		Large Firms	Small Firms		Large Firms	Small Firms
	(1)	(2)	(3)	(4)	(5)	(6)
ESG Measure:						
Δ KLD Rank						
Move Up	-0.012	0.011	-0.101***	-0.035***	-0.013	-0.113***
	(-0.967)	(0.773)	(-4.266)	(-2.812)	(-0.844)	(-4.774)
Move Down	-0.022*	-0.022	-0.047**	-0.046***	-0.065***	-0.054**
	(-1.774)	(-1.547)	(-2.049)	(-3.737)	(-4.432)	(-2.361)
Crisis	0.061***	0.089***	0.026	0.056***	0.085***	0.021
	(5.045)	(6.262)	(1.070)	(4.646)	(6.030)	(0.871)
Move up x Crisis	0.090***	0.072***	0.136***	0.098***	0.075***	0.153***
	(4.782)	(3.234)	(3.904)	(5.190)	(3.406)	(4.399)
Move down x Crisis	0.038**	0.058***	0.031	0.049***	0.076***	0.036
	(2.029)	(2.612)	(0.936)	(2.619)	(3.435)	(1.079)
Annual return	0.431***	0.464***	0.366***	0.363***	0.385***	0.318***
	(65.025)	(54.070)	(35.288)	(42.318)	(33.784)	(24.426)
Annual return x Move up				0.171***	0.137***	0.207***
				(10.090)	(6.620)	(6.819)
Annual return x Move down				0.159***	0.233***	0.086***
				(9.619)	(10.533)	(3.480)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,956	16,537	7,419	23,956	16,537	7,419
R-squared	0.178	0.185	0.203	0.183	0.191	0.208

Table 8: Multivariate Analysis of Sustainalytics Score Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Dependent Variable:	Change in Percent of ESG Money Invested in Firm					
Sample	Full Sample	Partition by Firm Size		Full Sample	Partition by Firm Size	
		Large Firms	Small Firms		Large Firms	Small Firms
	(1)	(2)	(3)	(4)	(5)	(6)
ESG Measure:						
Δ Sustainalytics Rank						
Move Up	-0.003	-0.002	-0.040	-0.006	-0.008	-0.035
	(-0.201)	(-0.142)	(-0.453)	(-0.433)	(-0.536)	(-0.392)
Move Down	0.016	0.018	-0.049	0.016	0.018	-0.056
	(1.128)	(1.284)	(-0.593)	(1.120)	(1.213)	(-0.668)
Crisis	0.084***	0.074***	0.579**	0.083***	0.074***	0.566**
	(3.578)	(3.170)	(1.975)	(3.573)	(3.158)	(1.926)
Move up x Crisis	0.046	0.051	-0.385	0.048	0.053	-0.381
	(1.362)	(1.490)	(-1.073)	(1.404)	(1.560)	(-1.057)
Move down x Crisis	-0.037	-0.034	-0.509	-0.037	-0.034	-0.499
	(-1.150)	(-1.055)	(-1.507)	(-1.161)	(-1.060)	(-1.476)
Annual return	0.632***	0.637***	0.558***	0.627***	0.626***	0.657***
	(39.848)	(38.824)	(7.552)	(26.949)	(25.971)	(5.830)
Annual return x Move up				0.026	0.042	-0.212
				(0.672)	(1.050)	(-1.260)
Annual return x Move down				-0.006	-0.001	-0.119
				(-0.156)	(-0.022)	(-0.655)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,586	6,343	243	6,586	6,343	243
R-squared	0.221	0.217	0.357	0.221	0.217	0.363

Table 9: Firm-fund Level Analysis of Asset4 Score Changes and ESG Fund Ownership during Crisis and Non-Crisis Years

Dependent Variable:	Percent Change in Number of Shares of Firm i held by Fund A					
	(1)	(2)	(3)	(4)	(5)	(6)
ESG Measure:						
Δ Asset4 Letter Grade (with -/+)						
Move Up	0.041***	0.044***	0.044***	0.047***	0.048***	0.050***
	(5.693)	(5.516)	(5.963)	(5.817)	(6.329)	(6.126)
Move Down	-0.002	-0.011	-0.005	-0.014	-0.012	-0.022**
	(-0.198)	(-1.066)	(-0.541)	(-1.440)	(-1.305)	(-2.113)
Crisis	0.015	0.015	0.004	0.004	0.001	0.000
	(0.566)	(0.562)	(0.147)	(0.138)	(0.029)	(0.017)
Move up x Crisis	-0.020	-0.021	-0.026	-0.027*	-0.024	-0.025
	(-1.221)	(-1.331)	(-1.578)	(-1.695)	(-1.396)	(-1.491)
Move down x Crisis	-0.016	-0.012	-0.015	-0.011	-0.015	-0.010
	(-1.077)	(-0.838)	(-1.022)	(-0.745)	(-0.968)	(-0.692)
Annual return	-0.039*	-0.041*	-0.022	-0.024	-0.030	-0.033
	(-1.845)	(-1.824)	(-0.968)	(-1.030)	(-1.315)	(-1.393)
Annual return x Move up		-0.020		-0.017		-0.015
		(-0.939)		(-0.780)		(-0.656)
Annual return x Move down		0.054*		0.059*		0.058*
		(1.823)		(1.902)		(1.876)
ESG Starting Position					-0.010***	-0.010***
					(-4.121)	(-4.087)
Observations	120,289	120,289	115,135	115,135	115,135	115,135
R-squared	0.003	0.003	0.007	0.007	0.007	0.007
Control variables	No	No	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Clustered st errors at fund level	Yes	Yes	Yes	Yes	Yes	Yes