

ESG Ratings, Ownership Structure and Firm Value

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September 29, 2025

Abstract

I examine how MSCI Environmental, Social, and Governance (ESG) rating changes affect institutional ownership and stock returns in U.S. firms. Specifically, I focus on three observable ownership shocks: (1) ESG rating upgrades and downgrades, (2) rating changes that cross MSCI's rating threshold for potential ESG-index inclusion, and (3) firms that are added to, or deleted from, ESG-focused exchange-traded funds (ETFs). Market reactions to rating changes are modest, but positive for both upgrades and downgrades. In contrast, upgrades lead to increased ownership while downgrades exhibit institutional ownership declines, particularly for those that drop below MSCI's index inclusion threshold. Upgrade firms subsequently added to ESG-focused ETFs exhibit mixed market responses, but increased institutional ownership. However, downgrades followed by ETF removals have significant negative abnormal returns and reduced 13F holdings. Propensity-score matching and dynamic difference-in-differences analyses corroborate these patterns.

1 Introduction

Environmental, Social, and Governance (ESG) investing has become central to institutional portfolio strategy, transforming the way investment decisions are made in global markets. According to the 2025 BNP Paribas ESG Global Survey, about 90 percent of institutional investors now incorporate ESG considerations into their investment approach and more than 70 percent report that ESG integration has become a standard rather than a specialty practice.¹ This broad adoption has fueled rapid growth in ESG-linked financial products, especially indices and exchange-traded funds (ETFs) that increasingly depend on third-party ESG ratings to construct and rebalance portfolios.

As ESG considerations become institutionalized, ratings from agencies such as MSCI play a pivotal role in guiding investment decisions. MSCI is the dominant ESG data provider, with over \$1 trillion assets under management benchmark to its Sustainability and Climate Indexes and a roughly 70 percent market share — more than four times that of its nearest competitor.² These ratings shape perceptions of a firm’s sustainability, determine index eligibility, and influence capital allocation. Therefore, it is important to understand the relationship between ESG ratings and institutional ownership. Moreover, fundamental questions remain about their causal impact: Do changes in ESG ratings affect institutional investor holdings? Do ESG rating changes affect firms’ market valuations?

The cleanest way to study how ownership responds to ESG information is to track the history of index inclusions and exclusions, such as MSCI ESG-focused index rebalancing. However, comprehensive historical data on index additions and deletions are not publicly available. To approximate the same ownership shocks, instead, I focus on three related and observable events: (1) ESG rating changes - upgrades and downgrades that alter a firm’s perceived ESG status, (2) crossing the BB threshold, which determines eligibility for the MSCI ESG index, and (3) ETFs additions and removals, which proxy

¹See the BNP Survey and summary article [here](#).

²See MSCI Report July 2025

for ESG index additions and deletions, create potential mechanical ownership effects not related to firm fundamentals.

To examine these, I combine MSCI ESG ratings with institutional ownership data from 13F filings and firm-level financial information for U.S. firms from 2013 to 2023. Changes in ESG ratings serve as quasi-exogenous shocks to a firm’s perceived ESG profile while holding fundamentals constant. To isolate causal effects, I use several different econometric approaches including two-way fixed effects, propensity-score matching, and difference-in-differences estimation—methods in order address potential endogeneity from selection bias, reverse causality, and time-invariant firm characteristics.

The univariate results show that firms with an AAA ESG rating have an average institutional ownership of approximately 77%, compared to around 66% for firms below the BB threshold. This difference is both economically significant and statistically significant, providing initial evidence of a link between ESG ratings and ownership. Univariate event study analyses of cumulative abnormal returns (CARs) around rating changes show positive market reactions for upgrades and downgrades.

Building on this, multivariate analyses using changes in the composition of ESG-focused ETFs as a proxy for index additions and deletions show that 13F holdings change as a result. Specifically, the point estimate for ownership change for upgrades is 0.31 percentage points, albeit insignificant. In contrast, while in aggregate downgrades show no overall effect, for those that drop below MSCI’s index inclusion threshold of a BB rating show a decline in holdings of 0.59 percentage points, while firms removed from ESG-ETFs have a significant 1.23 percentage point decline in holdings. Propensity-score matching and dynamic difference-in-differences analyses corroborate these patterns, though the overall economic magnitudes vary.

This paper contributes to three key strands of literature. First, it adds to the growing empirical research on ESG ratings and capital allocation (e.g., Dyck et al., 2019; Berg, Heeb, and Kölbel, 2022) by providing evidence of shifts in institutional ownership following ESG rating changes. Second, it contributes to the ongoing debate on whether

ESG affects firm value by showing that market responses are more pronounced following downgrades than upgrades. Finally, the findings suggest that ESG-based exclusion criteria in index construction influence firms' institutional ownership and potentially their access to capital.

The remainder of the paper proceeds as follows. Section 2 reviews related literature and develops hypotheses. Section 3 describes the institutional setting and data. Section 4 explains sample construction and variable definitions. Section 5 outlines the empirical strategy. Section 6 presents the results, including robustness and supplemental analyses. Section 7 concludes.

2 Literature Review and Hypothesis Development

The interaction between Environmental, Social, and Governance (ESG) ratings, institutional ownership, and firm value has garnered increasing attention in financial economics. As ESG considerations become more embedded in investment mandates, understanding how institutional investors respond to ESG information—particularly changes in ESG ratings—remains a key research question. While theoretical frameworks suggest various channels through which ESG performance might affect institutional behavior and valuation, empirical evidence remains mixed.

A growing strand of literature posits that institutional investors increasingly incorporate ESG considerations into their capital allocation decisions. Heinkel, Kraus, and Zechner, 2001 argue that socially responsible investors may exclude firms with poor ESG profiles, thereby affecting the cost of capital and firm value. Friede, Busch, and Bassen, 2015, through a meta-analysis of over 2,000 studies, document a generally positive relationship between ESG factors and financial performance. Gillan, Koch, and Starks, 2021 further support this view, showing that institutional investors are increasingly integrating ESG metrics into their investment frameworks.

A second line of research highlights the governance role institutional investors

can play in influencing ESG performance. Large shareholders can discipline management either through exit threats or voice (Admati and Pfleiderer, 2009; Edmans, 2009). Empirical evidence suggests that institutional ownership—especially from investors in jurisdictions with strong investor protections—can positively impact firms’ ESG practices (Dyck et al., 2019). Further, Becht et al., 2009 demonstrate that active engagement by institutional shareholders can enhance corporate governance outcomes, including sustainability initiatives.

However, competing views question the efficacy of these mechanisms. Dasgupta and Piacentino, 2015 contend that competitive pressures among fund managers may dilute the effectiveness of exit as a disciplinary tool. Similarly, Appel, Gormley, and Keim, 2016 find that the influence of institutional investors on governance is attenuated by benchmarking constraints and short-term return objectives, which may limit their willingness to maintain positions in firms facing ESG downgrades.

Recent work further suggests that the investment horizon of institutions is critical in shaping their ESG-related responses. Cheng, Ioannou, and Serafeim, 2014 find that long-term investors are more likely to support and influence ESG initiatives, a view corroborated by Starks, Venkat, and Zhu, 2017 and Gibson, Krueger, and Mitali, 2020. However, even long-horizon investors may exit firms with ESG downgrades if such changes signal fundamental or reputational risks.

Taken together, these findings highlight a complex and often conflicting set of mechanisms linking ESG performance, institutional ownership, and firm value. While some investors respond positively to ESG improvements or engage to improve firm behavior, others may disengage following negative ESG signals due to mandate constraints.

Despite the growing academic and market interest, it remains unclear whether institutional investors meaningfully respond to ESG rating changes. Prior studies report mixed evidence. Starks, Venkat, and Zhu, 2017 find that firms with stronger ESG profiles attract long-term investors, while Berg, Heeb, and Kölbel, 2022 document that ESG-focused mutual funds respond to rating shifts, albeit over extended time horizons. Berk

and Van Binsbergen, 2025, examining firms excluded from ESG indices like FTSE4Good, detect no significant price reaction—suggesting limited investor response. Conversely, Glück, Hübel, and Scholz, 2021 find that ESG downgrades, particularly in environmental and social dimensions, are associated with negative abnormal returns in short windows.

Recent event studies reinforce this ambiguity. Shanaev and Ghimire, 2022 observe stock price declines following MSCI ESG downgrades over a one-month horizon, while Rzeźnik, Hanley, and Pelizzon, 2022 show that methodology-induced rating shifts in Sustainalytics produce temporary price pressure that dissipates over several months. These findings suggest that the event window length can significantly impact empirical conclusions. Longer windows risk capturing confounding events, complicating identification of causal effects.

To better isolate the effect of ESG ratings on investor behavior and valuation, I focus on short event windows around MSCI ESG rating changes. MSCI is the dominant ESG rating provider in the U.S., and its ESG rating changes constitute quasi-exogenous shocks to perceived firm sustainability. Following prior research, I use a combination of Propensity Score Matching (PSM), difference-in-differences (DiD), and event study methods to examine how ESG rating changes influence 13F institutional holdings and market value.

In this paper, I propose two core hypotheses:

Hypothesis 1 (Institutional Ownership). **Null ($H_{0,1}$):** ESG rating changes have no effect on institutional ownership. **Alternative ($H_{A,1}$):** ESG rating upgrades increase institutional ownership, while downgrades decrease it.

Hypothesis 2 (Firm Value). **Null ($H_{0,2}$):** ESG rating changes have no effect on firm value as reflected in stock prices. **Alternative ($H_{A,2}$):** ESG rating changes trigger abnormal stock-market reactions.

This study contributes to the growing literature at the intersection of institutional ownership, ESG ratings, and corporate valuation. Despite increasing attention to ESG considerations in asset management, it remains unclear whether institutional investors

meaningfully respond to changes in third-party ESG assessments. This paper addresses this gap by examining how institutional investors and equity markets respond to changes in ESG ratings, offering following main contributions.

First, the study provides new evidence on the response of institutional investors to ESG rating upgrades and downgrades. Previous work has shown that ESG preferences shape institutional portfolios (e.g., Dyck et al., 2019; Raghunandan and Rajgopal, 2022; Agrawal et al., 2023), and that long-term institutions are more likely to engage with high-ESG firms (Starks, Venkat, and Zhu, 2017; Cheng, Ioannou, and Serafeim, 2014). This paper extends the literature by utilizing 13F data to demonstrate that ESG upgrades are associated with increased institutional ownership, and the downgrades around the BB threshold result in a reduction in ownership by 13F institutions. The results suggest that ESG upgrades and downgrades trigger the “threat of exit” by institutional investors, consistent with the literature showing that concentrated or passive stakes can serve as effective governance mechanisms (Appel, Gormley, and Keim, 2016; Dasgupta and Piacentino, 2015).

The coefficient of 0.31% 0.81% is economically significant given that Russell index reconstitution induces only a small local change in 13F ownership ≈ 0 pp for total institutional ownership under unbiased designs and ≈ 2 pp for passive/quasi-indexer ownership, so effects of this magnitude are meaningful in this setting (Wei and Young, 2020; Glossner, 2019; Appel, Gormley, and Keim, 2016).

Second, the paper contributes to research on the valuation implications of ESG signals. While the literature offers mixed evidence—ranging from null results (Berk and Van Binsbergen, 2025) to significant but short-lived reactions (Glück, Hübel, and Scholz, 2021; Shanaev and Ghimire, 2022)—this study isolates market reactions by employing short event windows. The findings reveal a nuanced pattern in market reactions to ESG changes. While univariate analysis shows positive CARs for both upgrades and downgrades, examining the value impact around ETF additions and removals highlights an asymmetry: upgrades are mostly insignificant, whereas downgrades consistently elicit

negative market reactions. The results suggest that negative ESG news remains more financially consequential, particularly when it influences passive or institutional ownership.

Third, this paper adds methodological rigor by combining propensity score matching (PSM), difference-in-differences (DiD), and event study techniques to evaluate the causal impact of ESG rating changes on institutional ownership and firm value. This multi-method approach builds on prior empirical work (e.g., Berg, Heeb, and Kölbel, 2022; Rzeźnik, Hanley, and Pelizzon, 2022) while extending beyond ESG-focused funds to a broader institutional investor base. The use of MSCI rating revisions—widely followed and influential in investment mandates—as quasi-exogenous shocks strengthens causal inference.

Fourth, this paper contributes to the literature on the governance role of institutional investors (Admati and Pfleiderer, 2009; Edmans, 2009; Becht et al., 2009). While theory suggests that institutional investors can discipline management through voice or exit, the findings indicate the use of the exit mechanism, especially in the context of ESG. Institutional investors may selectively respond to ESG downgrades only when thresholds are crossed or when reputational risks rise, aligning with models of partial monitoring and constrained activism (Broccardo, Hart, and Zingales, 2022; Gollier and Pouget, 2014; Pedersen, Fitzgibbons, and Pomorski, 2021).

Together, these contributions offer new empirical insights into how ESG information is processed by institutional investors and priced by the market. They help reconcile prior conflicting evidence by showing that responses are context-dependent, and that ESG deterioration, rather than improvement, is more salient for investor behavior and valuation. This has implications for how firms manage sustainability signals and for policymakers evaluating the role of ESG in capital allocation.

3 Institutional Setting

3.1 ESG Ratings

Environmental, Social, and Governance (ESG) ratings are produced by several independent agencies, including MSCI, Moody’s, Sustainalytics, ISS, and S&P. While these providers aim to assess corporate sustainability, there is considerable variation in methodologies and significant disagreement in firm-level ESG ratings across agencies (Christensen, Serafeim, and Sikochi, 2022; Avramov et al., 2022). In this study, I focus exclusively on MSCI ESG ratings, which are among the most widely adopted in the U.S. investment landscape and have been shown to exhibit the strongest alignment with the portfolio decisions of ESG-focused funds (Berg, Heeb, and Kölbel, 2022).³

MSCI derives ESG ratings from a combination of structured data sources, including regulatory filings, company disclosures, media reports, NGO assessments, and other stakeholder inputs. These inputs inform scores across multiple environmental, social, and governance key issues. The overall ESG rating is calculated as a weighted average of pillar-level scores, adjusted for relative comparison with industry peers. Firms are then assigned a rating on a seven-point ordinal scale, ranging from AAA (leader) to CCC (laggard), with adjustments designed to account for sector-specific risks and opportunities.⁴

To simplify interpretation, MSCI further classifies firms into three rating tiers: Leaders (AAA, AA), Average (A, BBB, BB), and Laggards (B, CCC). While most ESG ratings are updated annually, MSCI incorporates interim data revisions—such as controversies or material disclosures—as inputs to rating adjustments throughout the year. For many ESG-oriented funds, MSCI ratings directly inform portfolio construction, both through explicit mandates and index inclusion rules. For instance, many ESG indices or ETFs require firms to maintain a rating above BB to remain eligible. Accordingly, I place particular emphasis on rating changes that cross the BB-to-BBB threshold, which

³See Opimas (2022): “ESG Data Is Now Worth It” — <https://www.opimas.com/research/742/detail/>

⁴See MSCI ESG Methodology: <https://www.msci.com/sustainable-investing/esg-ratings>

has practical implications for index eligibility and investor flows.

This focus not only reflects MSCI’s practical influence in shaping ESG-driven investment strategies but also facilitates the identification of quasi-exogenous shocks to firms’ perceived ESG quality. These shocks allow for a cleaner empirical design when testing how investors and markets respond to changes in ESG assessments.

3.2 Institutional Ownership

To examine how institutional investors respond to ESG rating changes, I use institutional holdings data compiled from SEC Form 13F filings, accessed via the Wharton Research Data Services (WRDS) platform. Under SEC regulations, institutional investment managers with at least \$100 million in assets under management are required to file Form 13F each quarter.

Each filing includes information on the number of shares held, issuer names, ticker symbols, and market value, enabling comprehensive tracking of institutional equity positions over time. The 13F dataset captures a broad spectrum of institutional investors, ranging from asset managers and pension funds to hedge funds and insurance firms, offering a rich view of investor behavior in response to ESG-related information.

For this study, I track changes in institutional ownership around ESG rating events, with a particular focus on rating upgrades and downgrades issued by MSCI. By analyzing these shifts, I aim to determine whether ESG signals result in measurable capital reallocation by institutions. This is particularly relevant for understanding whether investors use ESG information as part of an “exit” mechanism, consistent with governance theories that emphasize shareholder discipline (Admati and Pfleiderer, 2009; Edmans, 2009).

In addition to broad institutional holdings, a distinct channel operates through ESG indices and the ETFs benchmarked to them. These indices often impose rating-based eligibility rules—most prominently excluding firms rated below BB—so rating

changes can trigger additions or removals from ESG-oriented portfolios. Due to data limitations on index-level rebalancing, I proxy this mechanism using changes in ETF holdings. Since ESG ETFs adjust their portfolios to mirror underlying index revisions, these changes provide a tractable measure of rating-induced, primarily mechanical shifts in institutional ownership.

4 Sample Construction

Although MSCI provides ESG ratings beginning in 2007, comprehensive coverage became available in 2012, and consistent institutional holdings data from SEC Form 13F are available starting in 2013. Accordingly, the sample spans January 2013 through December 2023. I obtain ESG ratings from MSCI, merge them with institutional holdings from Thomson Reuters 13F filings, and supplement with firm-level controls from the CRSP–COMPUSTAT merged database. After combining these sources, the final sample comprises 28,571 firm-year observations, averaging roughly 2,600 firms per year.

INSERT FIGURE 1 HERE

Figure 1 illustrates the distribution of ESG ratings across the sample. Firms cluster heavily in the “Average” category, with nearly 70% of observations rated between BB and BBB. This distribution is critical because many ESG indices apply BB as a minimum eligibility cutoff, making firms at or near this threshold especially relevant for index inclusion decisions.

To analyze how institutions respond to these ESG ratings shocks, I construct a quarterly panel by merging three data sources: MSCI ESG ratings (Final Industry-Adjusted Score), institutional ownership from SEC 13F filings, and firm financials from the CRSP–COMPUSTAT Merged (CCM) database. Because MSCI reports ESG ratings monthly while 13F filings are quarterly, I aggregate ratings to the quarterly frequency. The resulting dataset consists of 105,086 firm-quarter observations. The primary depen-

dent variable is institutional ownership, measured as the percentage of shares held by 13F filers.

INSERT TABLE 1 HERE

Table 1 reports summary statistics for the firm-quarter-level sample. Institutional ownership averages 71.7% of shares outstanding, with a median of 79.2%, reflecting the significant institutional presence in these firms. ESG ratings are mapped from MSCI’s seven-point scale, where 1 represents CCC and 7 represents AAA. The average rating is 3.54, corresponding roughly to a BB/BBB classification. Control variables include leverage, firm size (log market capitalization), market-to-book ratio, profitability, and quarterly stock returns.

INSERT TABLE 2 HERE

Rating changes over the sample period are summarized in Table 2. The transition matrix highlights two features: first, the diagonal values are large, indicating that most firms retain their prior rating from quarter to quarter; second, meaningful movement occurs between adjacent categories, particularly between A and BBB, and between BB and B. This moderate rating volatility, concentrated around the BB threshold, has direct implications for ESG index eligibility. I identify 4,539 upgrades and 2,710 downgrades, with 1,233 upgrades and 1,113 downgrades occurring specifically at the BB threshold. These “rating change events” represent quasi-exogenous shocks to firms’ perceived ESG status and serve as the key variation in my empirical design.

5 Methodology

5.1 Univariate Analysis

I begin with a univariate analysis to explore the association between ESG ratings and ownership structure, proxied by institutional holdings reported in 13F filings. Specifically, I examine how institutional ownership varies across the seven ESG rating levels. To test for overall differences, I conduct an F-test (ANOVA) across all rating groups, and to assess threshold effects more directly, I complement this with an independent samples t-test comparing firms above and below the BB cutoff. This dual approach provides descriptive evidence on whether ownership patterns vary systematically across the ESG spectrum and whether the BB threshold in particular marks a discontinuity in institutional investment behavior.

To assess how financial markets respond to ESG rating changes, I conduct a standard event study. I calculate cumulative abnormal returns (CAR) using a market model, where abnormal returns are computed as the deviation from expected returns over multiple event windows: short-term windows $[0,0]$, $[0,2]$, $[0,4]$ and extended windows $[-1,0]$, $[-2,2]$, $[-4,4]$ to capture potential information leakage. I then compare mean CARs across upgrade and downgrade events, as well as between BB-threshold and non-threshold changes. This expanded univariate framework provides initial descriptive evidence of how both ownership and market value respond to the performance of the ESG rating.

5.2 Addressing Endogeneity

While informative, the univariate analysis is limited by potential endogeneity concerns, including reverse causality and omitted variable bias. For instance, it is difficult to establish whether institutional investors influence ESG outcomes or respond to them. Moreover, unobserved factors may simultaneously affect both ownership structure and ESG ratings, biasing simple comparisons.

To address these issues, I use changes in ESG ratings as a quasi-exogenous shock to firms' ESG profiles. These rating changes are plausibly outside direct managerial control and provide a setting resembling a natural experiment. I then assess the effects of these rating shocks on institutional ownership and firm value using a two-way fixed effects (FE) regression model that accounts for unobservable heterogeneity at both the firm and time levels.

The following specifications are estimated:

Ownership Structure Model:

$$13F\text{ Holding}_{t+1} = \alpha + \delta \text{ Upgrade}_t + \gamma \text{ Downgrade}_t + \rho \text{ BBUpgrade}_t + \sigma \text{ BBDowngrade}_t + \mu_i + \theta_t + \epsilon_{it} \quad (1)$$

The variables Upgrade and Downgrade are dummies equal to 1 if there is an upgrade or downgrade in ESG rating for the firm, and 0 otherwise. The BBUpgrade and BBDowngrade are also dummies equal to 1 if the upgrade or downgrade is across the BB threshold. Also, μ_i captures firm fixed effects, and θ_t captures time fixed effects.

5.3 ETF Mechanism: Additions and Removals

To capture the index-linked channel through which ESG ratings affect institutional ownership, I study additions to and removals from ESG-focused ETFs. Because ESG indices often use a BB threshold as an eligibility cutoff, rating changes can mechanically trigger ETF rebalancing. Comprehensive index-level rebalancing data are not available, so I use ETF holdings as a practical proxy for this mechanism.

I extend the baseline specification of 13F ownership by including indicators for ETF additions and removals, alongside ESG rating changes. This regression framework tests whether institutional ownership responses to rating changes are amplified when firms are added to or removed from ESG ETFs.

In parallel, I conduct an event study of cumulative abnormal returns (CARs)

around rating changes and ETF events. Abnormal returns are computed using a market model over multiple windows ($[0,1]$, $[0,2]$, $[0,4]$), with additional horizons ($[-1,0]$, $[-2,2]$, $[-4,4]$) to capture potential information leakage. I distinguish four timing conditions: the full sample, ETF additions/removals in the same month as the rating change, those within four months, and those occurring beforehand.

Together, this combined regression–event study approach isolates whether changes in ownership and market value reflect informational effects of ESG ratings or mechanical trading pressure from ETF index-tracking behavior.

5.4 Addressing Selection Bias

To further mitigate biases arising from non-random treatment assignment, I implement a Propensity Score Matching (PSM) procedure. Selection bias can arise if, for example, larger firms simultaneously improve ESG performance and attract institutional investors. Similarly, institutional investors may systematically favor certain types of firms—such as those in specific industries or with particular size profiles.

To correct for this, each treated firm (experiencing a rating change) is matched with a control firm that did not experience a rating change in the same quarter, based on a propensity score estimated from firm size (log of market capitalization), industry (as defined by MSCI), and prior ESG rating. Matching is performed separately for upgrades and downgrades.

After matching, I compute the Average Treatment Effect (ATE) and the Average Treatment Effect on the Treated (ATET) for institutional holdings. This approach reduces the influence of observable confounders and strengthens causal interpretation.

5.5 Difference-in-Difference Approach

To complement the PSM approach and allow for pre- and post-event comparisons, I implement a Difference-in-Differences (DiD) framework. This method compares the evolution of institutional holdings around ESG rating changes (treatment firms) with that of matched firms without rating changes (control firms).

The DiD regression model is specified as follows:

$$13F\text{ Holding}_{i,t} = \beta * d[s + k]_{i,t} + \gamma * RatingChange * d[s + k]_{i,t} + \mu_i + \theta_t + \epsilon_{i,t} \quad (2)$$

where,

- $d[s + k]$ with $-2 \leq k \leq 2$ is a set of indicator variables for the quarter relative to rating change or placebo quarter and Quarter $s-1$ is the omitted base quarter. Thus, $d[s + k]$ captures the difference in the level of the 13F holding among control firms between quarters $s - 1$ and $s + k$.
- The interaction term $Rating\ change * d[s + k]$ captures the difference in the 13F holding from $s - 1$ and $s + k$ between the firms that have rating change and control firms.
- μ_i represents firm fixed effects, controlling for time-invariant characteristics of the firms.
- θ_t represents time-fixed effects, controlling for time-specific factors that affect all firms.

In summary, my methodological approach combines univariate analysis, Propensity Score Matching (PSM), Difference-in-Differences (DiD), and event study techniques to rigorously investigate the relationship between ESG ratings and ownership structure and firm value. By addressing potential endogeneity and selection bias, my aim to provide robust and credible estimates of the causal impact of ESG ratings on institutional

holdings and firm value. The subsequent section presents the results of my analysis, detailing the empirical findings and their implications for understanding the dynamics between ESG performance and ownership structure.

6 Results

6.1 Univariate Evidence: ESG Ratings, Institutional Ownership, and Market Reactions

As a first step, I examine whether institutional ownership varies systematically across the ESG rating categories, providing initial evidence on the association between ESG ratings and portfolio allocation by 13F institutions.

Panel A of Table 3 shows a clear association between ESG ratings and institutional ownership. With each step up in rating quality, mean 13F holdings rise monotonically: firms rated AAA and AA average 76.9% and 78.6%, compared with 66.9% for B-rated firms and only 61.9% for CCC-rated firms. The medians follow the same ordering. An ANOVA F-test rejects the null of equal means across categories at the 1% level, confirming that the observed differences in holdings are statistically significant. Economically, this pattern implies that higher ESG ratings are systematically accompanied by greater institutional ownership, consistent with the notion that institutions either directly value ESG performance or treat ratings as signals of underlying firm quality.

INSERT TABLE 3 HERE

Panel B partitions the sample into two groups based on the BB threshold—often used in ESG indices to determine eligibility. Firms with ratings BB and above (“Above”) exhibit average institutional holdings of 73.3%, while firms rated below BB (“Below”) show a lower average of 66.3%. This approximately 7-percentage difference is economically meaningful and highlights the potential salience of ESG thresholds in driving in-

stitutional allocation decisions. Firms above the BB threshold are also larger and more profitable on average.

Panel C restricts to firms that transition across the BB cutoff. Those upgraded above BB average 70.4% institutional ownership, versus 67.1% for firms downgraded below BB—a 3.28% gap that is statistically significant. Taken together, these results suggest that ownership is strongly correlated with ESG standing, and particularly sensitive around the BB threshold.

Turning to financial market reactions, Table 4 reports cumulative abnormal returns (CARs) around ESG rating changes across several event windows. For ESG upgrades, CARs are modestly positive but generally not statistically significant over short-term windows: (0,0) day: -0.014%; (0,2) days: 0.021%; (0,4) days: 0.0885%, with significance only in the (0,4) window. For ESG downgrades, CARs are also positive over these windows: (0,0) day: 0.0925%; (0,2) days: 0.1000%; (0,4) days: 0.0070%, with significance on the announcement day and the (0,2) window. The positive reactions, albeit small, indicate that markets do not strongly penalize downgrades immediately, possibly reflecting limited informational content or anticipation effects.

INSERT TABLE 4 HERE

Focusing on rating changes that cross the BB cutoff, the CARs are slightly larger. For BB upgrades, the CARs over (0,0): -0.0363%; (0,2): 0.0755%; (0,4): 0.2196%, with significance emerging in the (0,4) window. For BB downgrades, CARs are positive and statistically significant in short windows: (0,0): 0.1235%; (0,2): 0.1831%; (0,4): 0.0074%. These results suggest that BB threshold events may draw slightly stronger market attention, particularly for upgrades, though downgrades still generate modest positive returns. To control for potential information leakage, I also examine pre-event and asymmetric windows, including (-1,0), (-3,2), and (-5,4). The results are broadly consistent with the main event windows, suggesting that market responses to ESG upgrades and downgrades are not driven by prior information leakage and that investors gradually incorporate ESG

news around the announcement date.

6.2 Multivariate Analysis of Institutional Ownership

To formally test whether institutional ownership responds to ESG rating changes, I estimate fixed effects regressions presented in Table 5. The dependent variable is the percentage of outstanding shares held by 13F mutual funds. The regressors are indicator variables for ESG upgrades and downgrades, as well as separate indicators for rating changes that cross the BB threshold.

INSERT TABLE 5 HERE

In specification (1), upgrades are associated with a significant increase of 0.31 percentage points in institutional holdings, while downgrades are insignificant. In specification (2), restricting to BB threshold events, upgrades do not produce significant effects. However, BB downgrade leads to 0.58% decrease in institutional holdings. Specification (3), which includes all event types jointly, confirms a positive effect of general upgrades (0.45 points, $p < 0.01$), while BB upgrades are negative (-0.55 points, $p < 0.10$) and BB downgrades are negative but insignificant.

Taken together, these results provide evidence that institutional investors respond to ESG upgrades, particularly when the change is not solely driven by BB threshold crossing. Downgrades, when they involve a loss of index eligibility, appear to provoke strong ownership shifts. (Note: Additional specifications are available in the Appendix A for completeness but are not the focus of the main analysis.)

6.3 ETF Mechanism as Proxy for Index rebalancing

As direct data on ESG index constituents is not publicly available, I use additions and removals from ESG-focused ETFs as a proxy for index rebalancing. Table 6 augments the baseline ownership regressions with ETF event dummies.

INSERT TABLE 6 HERE

ETF removals are associated with statistically significant declines in institutional holdings of -1.23 percentage points ($p < 0.10$) across specifications. By contrast, ETF additions are statistically insignificant.

The market impact of these events is reported in Tables 7 and 8. The results reveal that ETF removals amplify the negative valuation effects of downgrades. CARs around ETF removals range from -0.7% to -1.7% across all event windows, with especially strong reactions when downgrades and removals coincide in the same month. Conversely, ETF additions do not generate consistent positive abnormal returns; in some cases.

INSERT TABLE 7 HERE

INSERT TABLE 8 HERE

Overall, the evidence suggests that ETF-driven rebalancing operates as an important mechanism, with exclusion effects dominating inclusion effects. Downgrades that trigger removals are met with significant reductions in both institutional ownership and market value.

6.4 PSM and Dynamic Model Approaches

To examine the causal effect of ESG rating changes on institutional ownership, I use two approaches: propensity score matching (PSM) and difference-in-differences (DiD). These models help isolate the impact of upgrades and downgrades from other firm-level characteristics that could confound the analysis.

Table 10 presents the results from the PSM analysis. I construct a control group of firms matched on prior ESG rating, firm size, MSCI industry classification, and past return performance. The sample is divided by the type of ESG rating change: general upgrade or downgrade. In the basic specification, upgrades are associated with a 3.83

percentage increase in 13F holdings. This effect remains statistically significant when I include firm and time fixed effects, although the magnitude drops to 0.37 percentage. Downgrades are associated with a decline in institutional ownership, ranging from -2.61 to -1.02 percentage across specifications. When I restrict attention to BB threshold events, BB upgrades show a positive but statistically insignificant effect, while BB downgrades result in negative and marginally significant effects in simpler models. These results suggest that rating changes, especially downgrades, are associated with meaningful shifts in institutional holdings.

INSERT TABLE 10 HERE

Table 11 reports estimates from the DiD model, which uses quarterly data and controls for firm and time fixed effects. This specification compares treated firms to matched controls over time. In the case of general rating upgrades, I do not find significant changes in ownership either in the treatment quarter or the quarters that follow. However, for downgrades, I observe a large and statistically significant reduction in institutional holdings in the treatment quarter, with the effect remaining negative in the following periods. The coefficient for the treatment quarter is -0.65 and statistically significant.

INSERT TABLE 11 HERE

These results support a causal interpretation of the earlier findings. ESG downgrades lead to a reduction in institutional ownership, particularly when they push a firm below the BB threshold used for ESG index eligibility. ESG upgrades, on the other hand, are followed by more muted responses.

6.5 Robustness Analyses

6.5.1 Alternative ESG Rating Provider

To test the robustness of my findings to the choice of ESG rating provider, I repeat the institutional ownership analysis using ESG Risk Scores from Sustainalytics. While MSCI ESG Ratings are ordinal and broadly used in index construction, Sustainalytics provides continuous ESG risk scores that are becoming increasingly prominent among asset managers. I construct up/downgrade indicators using changes in the Sustainalytics ESG Risk Score, where a decline indicates improvement in ESG standing. I find the correlation between MSCI and Sustainalytics ESG assessments is positive and statistically significant but modest ($\rho = 0.25$), consistent with prior studies highlighting divergence across ESG data providers. The regression results for subsample of data where both MSCI and Sustainalytics rating changes as independent variables produce similar results. The estimated effects for both sets of indicators are small and statistically insignificant. This suggests that the institutional ownership responses documented earlier are not specific to one ESG signal. (Note: Additional specification is available in the Appendix D for completeness but is not the focus of the main analysis.).

7 Conclusion

This paper investigates whether changes in MSCI ESG ratings influence institutional ownership and firm valuation using a decade of U.S. firm-level data from 2013 to 2023. By combining ESG rating transitions with 13F institutional holdings and employing univariate comparisons, panel regressions, and causal identification strategies—including two-way fixed effects, propensity-score matching, and difference-in-differences—I examine how investors and markets respond to ESG information shocks.

The evidence shows that ESG rating upgrades are generally followed by modest increases in institutional ownership, but these effects are limited when upgrades do not

cross key index-relevant thresholds such as MSCI’s BB cutoff. In contrast, downgrades that push firms below the BB threshold or lead to ESG-ETF removals trigger statistically and economically significant declines in institutional holdings. Stock-price reactions are similarly asymmetric: event studies reveal small positive cumulative abnormal returns (CARs) around upgrades, but sharper negative CARs when ratings are downgraded, particularly when accompanied by index exclusions. Together, these results indicate that both investors and markets respond more strongly to negative ESG signals than to positive ones, consistent with the notion that ESG-based index eligibility and ETF flows are key channels through which ratings affect ownership and valuation.

Overall, the results demonstrate that ESG ratings provide actionable information that shapes capital allocation and firm value. Threshold effects and ETF-related flows amplify these impacts, underscoring how benchmark eligibility and index-tracking strategies transmit ESG signals into real shifts in institutional ownership.

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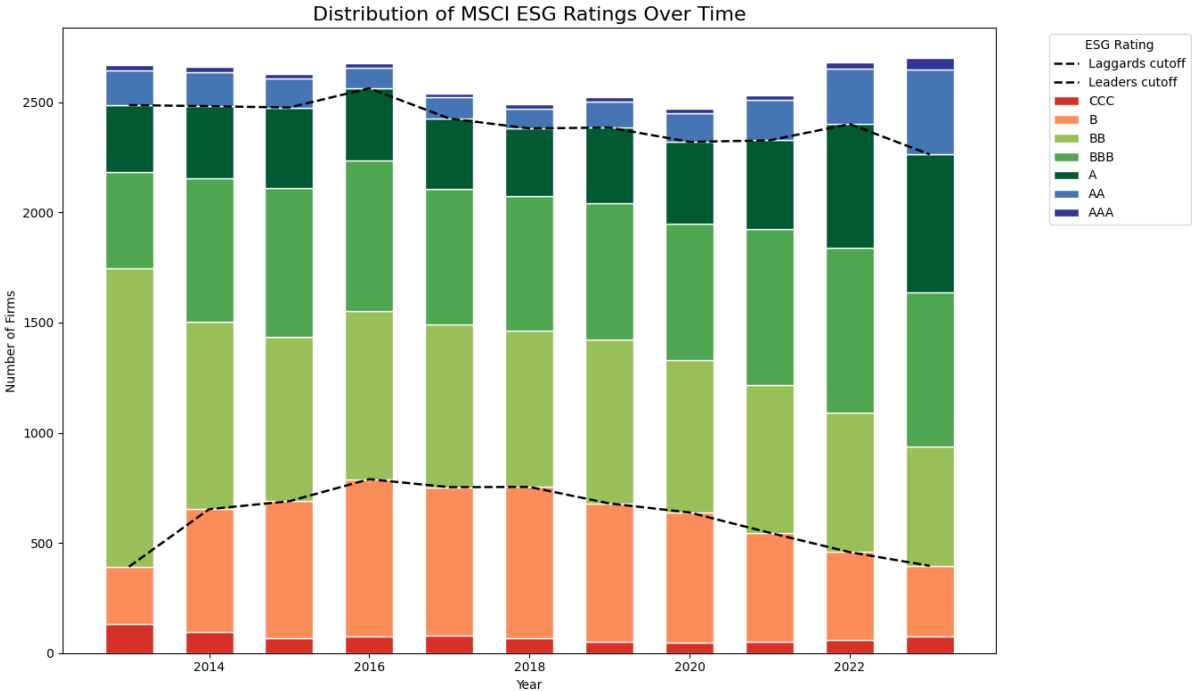
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Figure 1: MSCI ESG Ratings over Time



This figure reports the distribution of ESG ratings over time. The sample covers 28,571 firm-year observations from January 2013 to December 2023. Each company's Final Industry-Adjusted Score corresponds to a rating ranging from the highest (AAA) to the lowest (CCC). MSCI categorizes ESG ratings into three groups: *Leaders* (AAA and AA), *Average* (A, BBB, and BB), and *Laggards* (B and CCC).

Table 1: **Descriptive Statistics for Firm–Quarter-Level Variables**

Variable	p25	Mean	Median	p75	SD	N
13F Holding (%)	60.49	71.66	79.22	90.26	24.30	105,086
Change in 13F Holding	-1.52	0.06	0	1.79	5.71	100,656
Leverage	0.09	0.30	0.27	0.44	0.23	105,063
Log Market Cap	6.77	7.90	7.73	8.83	1.53	105,055
Market to Book	1.32	3.73	2.28	4.31	7.73	104,967
Profitability	-0.00	-0.00	0.01	0.02	0.04	105,062
Quarterly Return	-0.09	0.02	0.02	0.12	0.22	104,842
Rating Number	3.00	3.54	3.00	4.00	1.28	105,086

Note: This table shows descriptive statistics of the firm-quarter-level characteristics we use in our studies. Our sample comprises 4430 listed U.S. firms with available MSCI ESG rating data. Observations cover the period from January 2013 to December 2023. 13F Holding is the percentage of a company’s outstanding shares owned by 13F mutual funds. We obtain firm-level financial data from the CRSP-COMPUSTAT merged database. Leverage is a firm’s long-term debt plus debt in current liabilities, divided by total assets in percentage points. The log of firms’ market capital controls for the size of the firm. Book-to-market is the firms’ book value of equity divided by the market valuation. Profitability is income before extraordinary items over total assets. Quarterly return is an ex-dividend return for the past quarter. Rating number is MSCI’s assessment of how well companies manage ESG risks relative to industry peers on a scale from 1 to 7, with 1 being the worst (CCC) and 7 being the best (AAA).

Table 2: **ESG Rating Transition Matrix**

Current Rating	AAA	AA	A	BBB	BB	B	CCC	Total
AAA	-	69	11	2	2	0	0	84
AA	24	-	502	37	10	7	0	580
A	5	245	-	1,054	107	10	2	1,423
BBB	3	33	520	-	1,441	84	6	2,087
BB	0	6	40	714	-	1,012	25	1,797
B	0	2	17	43	921	-	158	1,141
CCC	0	0	1	1	25	110	-	137
Total	32	355	1,091	1,851	2,506	1,223	191	7,249

Note: This table presents the transitions of firms across ESG rating categories from 2013 to 2023. Rows correspond to the previous rating, and columns correspond to the current rating. Each cell reports the number of firms moving from one rating to another, with diagonal entries indicating firms that retained their rating. Cells above the diagonal represent upgrades (movement to a higher rating) and are highlighted in green, while cells below the diagonal represent downgrades (movement to a lower rating) and are highlighted in red.

Table 3: Univariate Analysis of Institutional Holdings (13F) by ESG Rating and BB Cutoff

Panel A: Percentage of institutional holdings based on ESG rating								
ESG Rating	Count	Mean Holding	Median Holding	Leverage	Log Market Cap	Market-to-Book	Profitability	Quarterly Return
AAA	1084	76.94	81.03	0.29	9.70	5.97	0.02	0.024
AA	7023	78.64	83.77	0.31	8.77	5.46	0.01	0.021
A	16275	76.02	82.66	0.29	8.23	4.21	0.00	0.017
BBB	26322	73.52	80.53	0.29	7.93	3.76	-0.00	0.022
BB	30139	70.20	77.43	0.29	7.64	3.43	-0.00	0.024
B	21451	66.85	74.28	0.31	7.54	3.23	0.00	0.018
CCC	2792	61.89	71.44	0.34	8.25	2.54	0.01	0.019
Total	105086	71.66	79.22	0.30	7.90	3.73	0.00	0.021
ANOVA F-test: $F = 463.33$, $\text{Prob} > F = 0.0000$								
<i>Panel A Note:</i> This table reports statistics of institutional holdings (13F holdings) across ESG rating categories. The sample covers the period from January 2013 to December 2023. Mean holdings are reported along with medians. 13F holdings are reported in percentages. ANOVA F-test indicates significant differences in mean holdings across ESG ratings.								
Panel B: Percentage of institutional holdings based on BB cutoff								
BB Cutoff	Count	Mean Holding	Median Holding	Leverage	Log Market Cap	Market-to-Book	Profitability	Quarterly Return
Above	80843	73.28	80.43	0.29	7.98	3.91	-0.00	0.022
Below	24243	66.28	73.93	0.31	7.63	3.15	0.00	0.018
Total	105086	71.66	79.22	0.30	7.90	3.73	0.00	0.021
Difference (Above – Below): 6.997***								
<i>Panel B Note:</i> This panel categorizes firms according to their average 13F holdings relative to the BB rating cutoff. “Above” includes firms with ESG ratings of BB or higher (BB, BBB, A, AA, AAA), while “Below” includes firms with ESG ratings lower than BB (B, CCC). Observations cover January 2013 to December 2023.								
Panel C: Percentage of institutional holdings for BB cutoff rating changes								
BB Cutoff	Count	Mean Holding	Median Holding	Leverage	Log Market Cap	Market-to-Book	Profitability	Quarterly Return
Upgrade	1233	70.38	78.81	0.31	7.92	3.42	0.00	0.04
Downgrade	1113	67.09	74.64	0.29	7.45	8.41	-0.00	0.30
Difference (Upgrade – Downgrade): 3.28***								
<i>Panel C Note:</i> This panel presents firms experiencing rating changes around the BB cutoff. “Upgrade” refers to firms that improved their rating across BB, while “Downgrade” refers to firms that fell below BB. Observations cover January 2013 to December 2023.								

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Table 4: Descriptive Statistics for CAR around Rating Changes

Variable	p25	Mean	Median	p75	SD	N
ESG rating Upgrades						
CAR (0,0) day	-0.8900	-0.0135	-0.0140	0.9030	2.0558	4,895
CAR (-1,0) day	-1.3214	0.0159	0.0137	1.3979	3.0153	4,895
CAR (0,2) days	-1.7108	0.0208	-0.0077	1.7516	3.7095	4,895
CAR (-3,2) days	-2.4332	-0.0017	0.0427	2.5630	5.2636	4,895
CAR (0,4) days	-2.2268	0.0885*	-0.0417	2.2931	4.7241	4,895
CAR (-5,4) days	-3.2076	-0.0423	0.1193	3.3737	6.8384	4,894
ESG rating Downgrades						
CAR (0,0) day	-0.8910	0.0925***	0.0061	1.0221	2.0258	2,995
CAR (-1,0) day	-1.2247	0.1815***	0.0764	1.4215	2.9198	2,995
CAR (0,2) days	-1.6282	0.1000*	0.0399	1.8282	3.7223	2,995
CAR (-3,2) days	-2.3503	0.2933***	0.1516	2.6656	5.1238	2,995
CAR (0,4) days	-2.3301	0.0070	-0.0756	2.2635	4.8764	2,995
CAR (-5,4) days	-3.2002	0.0887	-0.0567	3.1797	6.7354	2,995
ESG rating BB Upgrades						
CAR (0,0) day	-0.9864	-0.0363	0.0221	0.9413	2.2628	1,289
CAR (-1,0) day	-1.2850	0.1731**	0.0475	1.6196	3.2725	1,289
CAR (0,2) days	-1.7565	0.0755	0.1368	1.8299	3.9396	1,289
CAR (-3,2) days	-2.3551	0.2659**	0.3099	3.0458	5.5992	1,289
CAR (0,4) days	-2.4020	0.2196*	0.0376	2.3815	5.0727	1,289
CAR (-5,4) days	-3.1277	0.4039**	0.4229	3.9316	7.3265	1,289
ESG rating BB Downgrades						
CAR (0,0) day	-0.8382	0.1235**	0.0665	1.1332	1.9762	1,175
CAR (-1,0) day	-1.1507	0.2312***	0.1660	1.5178	2.8536	1,175
CAR (0,2) days	-1.4842	0.1831**	0.0431	1.8799	3.7909	1,175
CAR (-3,2) days	-2.0308	0.5126***	0.3110	2.6680	5.4856	1,175
CAR (0,4) days	-2.2276	0.0074	-0.1085	2.1688	4.8428	1,175
CAR (-5,4) days	-3.1610	0.2508	-0.0635	2.9685	6.9787	1,175

Note: This table shows descriptive statistics of the firm-level cumulative abnormal return CAR (in percentage points using the market-adjusted model) following the ESG rating date. Observations cover the period from January 2013 to December 2023. The Up indicator describes the CAR following upgrades in ESG rating, whereas the Down indicator describes the following ESG rating downgrades. Similarly, BB upgrade and BB downgrade indicators provide the CAR following ESG downgrades and upgrades around the BB cut-off. The rating changes around a BB rating determine a firm's eligibility for major ESG indices. (The upgrade/downgrade is considered a BB cutoff upgrade/downgrade if rating adjustments place the firm above/below the ESG rating BB).

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Table 5: **ESG Ratings and Institutional Ownership**

VARIABLES	(1)	(2)	(3)
	13F Holding (%)		
Upgrade Indicator	0.311*** (2.537)		0.448*** (3.259)
Downgrade Indicator	-0.189 (-1.043)		0.0273 (0.129)
BB Upgrade Indicator		-0.147 (-0.536)	-0.548* (-1.774)
BB Downgrade Indicator		-0.584* (-1.728)	-0.592 (-1.485)
Constant	71.66*** (10.271)	71.68*** (13.878)	71.66*** (10.097)
Observations	105,016	105,016	105,016
R-squared	0.875	0.875	0.875
Controls	NO	NO	NO
Firm FE	YES	YES	YES
Time FE	YES	YES	YES

Notes: The table reports regression results of the type presented in Equation $y_{it} = \alpha + \delta \text{Upgrade} + \theta \text{Downgrade} + \rho \text{BBUpgrade} + \sigma \text{BBDowngrade} + \mu_i + \theta_t + \varepsilon_{it}$, where y_{it} is 13F Holding (percentage of a company's outstanding shares owned by 13F funds). 13F Holding is the percentage of a company's outstanding shares owned by 13F mutual funds. The variables Upgrade /Downgrade are dummies equal 1 if there is Upgrade and Downgrade in ESG rating for the firm, 0 otherwise. The rating changes around a BB rating determine a firm's eligibility for major ESG indices. The BB Upgrade/BB Downgrade are dummies equal to 1 if the Upgrade/downgrade is across the BB threshold. Specification (1) shows the coefficients for the ESG downgrades and upgrades, estimating the reaction of 13F holding to ESG rating changes. Specification (2) shows the coefficients for the ESG downgrades and upgrades around the BB cutoff (The upgrade/downgrade is considered as BB cutoff upgrade/downgrade if rating adjustments place the firm above/below the ESG rating BB). Specification (3) includes all four dummy indicators. The t statistics are based on standard errors clustered at the event level shown in parentheses. Asterisks mark coefficient estimates that are significantly different from zero (* p<0.10, ** p<0.05, *** p<0.01).

Table 6: **13F holding and ESG ratings with ETF change**

VARIABLES	(1)	(2)	(3)
	13F Holding (%)		
Upgrade Indicator	0.310** (2.53)		0.448*** (3.26)
Downgrade Indicator	-0.190 (-1.05)		0.027 (0.13)
BB Upgrade Indicator		-0.149 (-0.54)	-0.549* (-1.78)
BB Downgrade Indicator		-0.586* (-1.73)	-0.594 (-1.49)
Added	0.250 (1.43)	0.253 (1.44)	0.252 (1.44)
Removed	-1.231* (-1.82)	-1.232* (-1.82)	-1.232* (-1.82)
Constant	71.660*** (8.34)	71.680*** (10.02)	71.66*** (8.27)
Observations	105,016	105,016	105,016
R-squared	0.875	0.875	0.875
Controls	NO	NO	NO
Firm FE	YES	YES	YES
Time FE	YES	YES	YES

Notes: The table reports regression results of the type presented in Equation $y_{it} = \alpha + \delta \text{Upgrade} + \theta \text{Downgrade} + \rho \text{BBUpgrade} + \sigma \text{BBDowngrade} + \text{Added} + \text{Removed} + \mu_i + \theta_t + \varepsilon_{it}$, where y_{it} is 13F Holding which is the percentage of a company's outstanding shares owned by 13F funds. The variables Upgrade /Downgrade are dummies equal 1 if there is Upgrade and Downgrade in ESG rating for the firm, 0 otherwise. The rating changes around a BB rating determine a firm's eligibility for major ESG indices. The BB Upgrade/BB Downgrade are dummies equal to 1 if the Upgrade/downgrade is across the BB threshold. The variables added/removed are dummies equal to 1 if a firm is being added/removed from the ESG-focused ETFs. Specification (1) shows the coefficients for the ESG downgrades and upgrades, estimating the reaction of 13F holding to ESG rating changes. Specification (2) shows the coefficients for the ESG downgrades and upgrades around the BB cutoff (The upgrade/downgrade is considered as BB cutoff upgrade/downgrade if rating adjustments place the firm above/below the ESG rating BB). Specification (3) includes all four dummy indicators. The t statistics are based on standard errors clustered at the event level shown in parentheses. Asterisks mark coefficient estimates that are significantly different from zero (* p<0.10, ** p<0.05, *** p<0.01).

Table 7: **Cumulative Abnormal Returns (CARs) Around ESG Rating Upgrades and ETF Additions**

Days	CAR at Upgrade (Full)	CAR at Added (Full)	CAR at Upgrade (Same Month)	CAR at Added (Same Month)	CAR at Upgrade (≤ 4 mo)	CAR at Added (≤ 4 mo)	CAR at Upgrade (Before)	CAR at Added (Before)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(0,0)	0.0879	-0.0019	-0.1516	-0.3220*	0.1405	-0.0422	-0.0619	0.2307
(-1,0)	0.1001	0.0427	0.0355	-0.0297	0.0363	0.0194	-0.0417	0.1252
(0,2)	0.1733	0.0173	0.0168	-0.5836**	0.2848*	0.0342	-0.2623	0.2600
(-3,2)	0.2010	-0.0676	0.4387	-0.2314	0.1502	-0.0156	-0.2641	-0.1008
(0,4)	0.1093	0.0449	0.3067	-0.9531***	0.1150	0.2356	-0.3519	0.1062
(-5,4)	-0.0254	-0.1105	0.4646	0.0252	-0.2214	-0.0170	-0.6746*	-0.3689
N (approx.)	1093	1385	173	180	813	816	385	390

Notes: This table reports average cumulative abnormal returns (CARs) over various event windows centered on ESG rating upgrades and ETF additions. Each column reflects a different timing condition. “Full” indicates the entire sample; “Same Month” refers to firms added to ESG ETFs in the same month as the rating upgrade; “ ≤ 4 mo” includes additions within four months after the rating change; and “Before” includes ETF additions that occurred prior to the ESG rating upgrade. CARs are expressed in percentage points and tested against zero using one-sample t-tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8: **Cumulative Abnormal Returns (CARs) Around ESG Rating Downgrades and ETF Removals**

Days	CAR at Down- grade (Full)	CAR at Removed (Full)	CAR at Down- grade (Same Month)	CAR at Removed (Same Month)	CAR at Down- grade (≤ 4 mo)	CAR at Removed (≤ 4 mo)	CAR at Down- grade (Before)	CAR at Removed (Before)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(0,0)	-0.2386	-0.3652*	-0.3190	-0.6763**	-0.8001***	0.1557	-0.1297	-0.7750*
(-1,0)	-0.0860	-0.7176**	-0.4959	-0.7871**	-0.8056***	0.0520	0.5862**	-1.5048**
(0,2)	-0.5088**	-0.6898*	-0.6273*	-0.7965**	-0.9891***	0.2375	-0.4109	-1.6276*
(-3,2)	-0.3816	-1.2794**	-0.9651*	-1.1540**	-1.1992***	-0.3932	0.6295*	-2.2813*
(0,4)	-0.9649***	-0.5395	-0.8223**	-1.0767**	-1.591***	0.5975	-0.8454**	-1.5000*
(-5,4)	-0.7608**	-1.0086*	-1.0412	-1.6304**	-1.7463***	0.3002	0.3117	-2.1127*
N (approx.)	540	587	107	109	246	247	212	234

Notes: This table reports average cumulative abnormal returns (CARs) over various event windows centered on ESG rating downgrades and ETF removals. Each column reflects a different timing condition. “Full” indicates the entire sample; “Same Month” refers to firms removed to ESG ETFs in the same month as the rating downgrade; “ ≤ 4 mo” includes removals within four months after the rating change; and “Before” includes ETF removals that occurred prior to the ESG rating downgrade. CARs are expressed in percentage points and tested against zero using one-sample t-tests. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 9: **Descriptive Statistics for Propensity Score Matching (PSM) Samples**

Variable	Treated Sample			Control Sample		
	N	Mean	SD	N	Mean	SD
Treatment: Upgrades						
Size	4,403	8.21	1.56	4,269	8.22	1.65
ESG rating before upgrade	4,403	3.19	1.10	4,269	3.19	1.19
MSCI Indus	4,403	44.81	25.76	4,269	44.04	25.88
Quarterly Return	4,403	0.04	0.26	4,269	0.03	0.26
Treatment: Downgrades						
Size	2,624	7.77	1.55	2,543	7.81	1.55
ESG rating before downgrade	2,624	4.03	1.11	2,543	4.03	1.17
MSCI Indus	2,624	44.00	25.67	2,543	43.85	25.78
Quarterly Return	2,624	0.05	0.34	2,534	0.05	0.41

Notes: This table presents summary statistics for key firm-level variables used in the propensity score matching (PSM) procedure, comparing treated and control groups for both ESG upgrades and downgrades. Variables include firm size (log of market capitalization), ESG rating prior to the event, MSCI industry classification, and quarterly stock return. The statistics confirm strong balance across observable characteristics between treated and control samples, supporting the validity of the matching strategy.

Table 10: **PSM: Average Treatment Effect – 13F Holdings around ESG Rating Changes**

Dependent Variable	13F Holding							
	Upgrade	Upgrade	Downgrade	Downgrade	BB Upgrade	BB Upgrade	BB Downgrade	BB Downgrade
Sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rating Change	3.828*** (7.60)	0.373* (1.66)	-2.613*** (-4.02)	-1.021*** (-2.77)				
BB Rating Change					3.847*** (3.70)	-0.264 (-0.50)	-2.828 (-2.65)	-0.190 (-0.24)
Observations	8,672	7,778	5,158	3,865	2,377	1,655	2,161	1,065
Adj. R-squared	0.035	0.879	0.050	0.854	0.028	0.040	0.042	0.056
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES	NO	YES	NO	YES
Time FE	NO	YES	NO	YES	NO	YES	NO	YES

Notes: This table reports regression results analyzing the impact of ESG rating changes on institutional ownership, measured by 13F holdings. The sample includes firms experiencing four types of rating changes: Upgrade, Downgrade, BB Upgrade, and BB Downgrade. For each treated firm, a matched control group is constructed via propensity score matching, based on prior rating, firm size, MSCI industry classification, and lagged quarterly returns, with matching starting from the quarter of the rating change. The coefficients represent the difference in 13F holdings between treated firms and matched controls in the quarter of the rating event. The models include indicator variables for rating changes (main effects) and interactions capturing rating changes around the BB cutoff threshold. Columns vary by fixed effects: firm and time fixed effects are included in some specifications to control for unobserved heterogeneity. t-statistics are reported in parentheses. Statistical significance is denoted as follows: ***p < 0.01, **p < 0.05, *p < 0.10 (two-tailed tests).

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Table 11: **Dynamic model– 13F Holding around ESG Rating Changes**

Dependent Variable	13F Holding			
	Upgrade	Downgrade	BB Upgrade	BB Downgrade
Sample	(1)	(2)	(3)	(4)
Rating Change d[s-2]	0.083 (0.74)	0.400** (2.67)		
Rating Change	0.101 (1.02)	-0.647*** (-4.36)		
Rating Change d[s+1]	-0.104 (-0.91)	0.237 (1.55)		
Rating Change d[s+2]	-0.108 (-0.86)	0.235 (1.44)		
BB Rating Change d[s-2]			0.152 (0.77)	0.413* (1.86)
BB Rating Change			0.234 (1.07)	0.180 (0.69)
BB Rating Change d[s+1]			0.253 (1.14)	0.301 (1.31)
BB Rating Change d[s+2]			0.237 (0.99)	0.158 (0.66)
Observations	35,347	22,180	10,221	9,774
Adj. R-squared	0.903	0.900	0.053	0.075
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
<i>p -values for partial F -tests comparing coefficients</i>				
d[s] vs d[s-2]	0.447	0.000	0.419	0.142
d[s+1] vs d[s-2]	0.392	0.019	0.466	0.122
d[s+2] vs d[s-2]	0.421	0.021	0.529	0.174

Notes: This table presents difference-in-differences analyses of 13F holdings around rating changes. Columns 1 and 2 examine the Upgrades and Downgrades in ESG ratings and models 3 and 4 control for the rating changes around the BB cutoff point. For target firms that experience rating changes (“Rating Change”; all columns), we select untargeted control firms (based on size, previous ESG rating, MSCI Industry, and past quarter returns) by propensity score matching in the quarter that the rating changes. For target firms that experience a rating change around the BB cutoff point (columns 3 and 4), we select untargeted control firms by propensity score matching on the no rating change firms. The tabulated coefficients measure how the difference between treatment firm 13F holding and control firm 13F holding has changed from the quarter before treatment/placebo (the omitted base quarter) to quarter $s \pm k$. All columns include dummies for the main effect of the rating change (BB rating change). All columns include a set of 4 $d[s \pm k]$ dummies, one for each quarter relative to the rating change quarter (for treatment firms) and matched placebo quarter (for control firms). In addition, columns 3 and 4 include a set of 4 $d[s \pm k]$ dummies, one for each quarter relative to the BB cutoff rating change and matched placebo quarter. At the bottom of the table, p -values of partial F -tests indicate the statistical significance of difference-in-differences estimations of 13F holding around rating changes using quarter $s - 1$ as the base quarter. Coefficients and standard errors are estimated using OLS. t -statistics appear in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively (two-tailed).

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