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ORIGINAL ARTICLE

# The shadow of ESG: how sustainable investing affects stock ownership and delisting

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**Abstract**
ESG-investors reallocate capital based on sustainability criteria, resulting in reshaped ownership structures and financing conditions. This study examines how these shifts impact the ownership structure of publicly listed firms and their likelihood of delisting. Using a comprehensive dataset of 24,788 funds managing USD 24 trillion in assets and 5699 stocks, we identify conventional investment funds and investment companies, such as private equity funds, as the main "counterparts" to ESG-investors. Furthermore, we find that firms with low ESG-investor ownership are more likely to be delisted, especially through private equity buyouts. These findings highlight the broader, unintended consequences of ESG-driven capital allocation.

**Keywords** ESG investing · Ownership structure · Private equity · Delisting

**JEL classifications** G11 · G23 · G32 · G34 · M14

## Introduction

Sustainable investments have experienced remarkable growth over the past decade and have become a central pillar of global financial markets. Driven by institutional demand and regulatory frameworks, especially in Europe, the integration of environmental, social, and governance (ESG) criteria has evolved from a niche approach into an established investment strategy (Friede et al. 2015; GSIA 2022).

Investors who incorporate sustainability factors into their investment decisions have a significant impact on the development of capital markets and might influence the allocation of capital. Existing models suggest that sustainable investors, through capital withdrawal and selective investments, change not only company valuations but also ownership structures and access to external sources of financing (Heinkel et al. 2001; Pástor et al. 2021; Zerbib 2022). In view of social expectations, more restrictive regulation, and growing reporting requirements, companies with weak sustainability performance are increasingly experiencing disadvantages. This may also be observed within the context of access to the capital market. The restructuring of shareholders, especially in unsustainable companies, can therefore lead to other investor groups gaining influence due to the decline in sustainable investors.

This raises the key question: Who will replace ESG-investors when they withdraw from companies with poor sustainability performance? And how does this shift in ownership structure affect companies' willingness or ability to remain publicly traded? Initial empirical findings suggest that less sustainable companies might face an increased risk of delisting (Eccles et al. 2022). This might be partly driven through takeovers by private equity firms and strategic investors who could place less emphasis on ESG criteria. At the same time, there might be unplanned side effects of stringent ESG capital allocation. Under purely financial market or regulatory pressure, unsustainable companies are migrating to private markets, which can weaken transparency and sustainability reporting in the overall system (Böni et al. 2022).

Using a dataset covering the period from October 2018 to July 2022, comprising 24,788 mutual funds and ETFs with total assets of USD 24 trillion as well as 5,699 stocks

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with total assets of USD 64.2 trillion, this study examines the balancing forces in ESG investing that arise when sustainability-oriented investors adjust their equity ownership shares in publicly listed firms. We find that ESG-investor ownership affects the overall ownership structure of firms, even among strategic investors. Furthermore, we reveal that low ESG-investor ownership correlates with an increased likelihood of delisting, particularly through private equity buyouts. This suggests that ESG investing may accelerate the trend of public-to-private transitions (Doidge et al. 2017; Ljungqvist et al. 2016), causing unsustainable firms to "hide" in private markets.

Our analysis period covers a phase of broad-based growth in capital inflows into sustainable funds in both Europe and the United States (US). Since mid-2022, capital inflows in the US have been predominantly negative, and European capital inflows have also slowed starting in the end of 2023 (Morningstar 2025). Our findings therefore reflect the structural dynamics of this expansion phase and provide a basis for assessing whether this trend will continue under the current, more divergent capital flow conditions.

Our findings pioneer a new research direction and shed light on yet unexplored (unintended) consequences of ESG investing and the evolving landscape of corporate ownership.

## Related literature and thoughts

Ownership structures and investor motives play a central role in shaping corporate outcomes. The seminal work of Jensen and Meckling (1976) laid the foundation for understanding ownership structure through the lens of agency theory, highlighting the conflicts of interest between principals (owners) and agents (managers) and the resulting agency costs. Their theory explains how ownership concentration can mitigate these costs by aligning incentives, but also how it can lead to managerial entrenchment when control is excessive. This framework underpins much of the subsequent research on ownership and firm valuation. Early research by Morck et al. (1988) found that higher managerial ownership can increase firm valuation by aligning management and shareholder interests. More recent evidence shows that external institutional investors also significantly influence firm performance. Strategic institutional ownership has been found to enhance stock performance through prudent investment behavior (Belghitar et al. 2011) and improve firm governance as well as long-term performance (Appel et al. 2016). Maintaining higher ownership concentration after IPOs is associated with higher valuations and stronger future growth (Larrain et al. 2024) and increases in institutional ownership consistently correlate with higher firm valuation (Liu 2023).

Beyond valuation, ownership structure significantly influences corporate behavior, financing conditions, and the likelihood of remaining publicly listed. Concentrated ownership can shape managerial risk-taking and strategic priorities. For instance, dominant owners often prioritize long-term value creation over short-term gains, leading to more conservative investment policies and reduced earnings manipulation (Davies et al. 2005; Holderness 2009). Further, firms with stable institutional ownership benefit from lower capital costs due to reduced information asymmetry and enhanced creditor confidence (Bharath et al. 2013; Kim et al. 2025). The decision to delist from public markets is similarly shaped by ownership dynamics. Firms with fragmented ownership or transient investors face higher delisting risks, as dispersed shareholders struggle to coordinate during financial distress, making firms vulnerable to takeovers or bankruptcy (Doidge et al. 2010; Martinez and Serve 2017).

A possible extension of these ownership effects arises in the context of sustainability. Recent research indicates that ESG performance of stocks affects their ownership structure and vice versa. Institutional ownership tends to rise following corporate ESG improvements (Dimson et al. 2015). Additionally, higher institutional ownership, particularly by pension funds, promotes sustainable corporate behavior (Dyck et al. 2019; Alda 2019; Jiang et al. 2022). A potential cause for this might be that long-term investors pursue ESG-related shareholder proposals (Wei 2020; Flammer et al. 2021), while simultaneously favoring already ESG-aligned firms to mitigate downside risk (compare Hoepner et al. 2024).

Building on the foundational role of ownership structure, recent research highlights how ESG-oriented capital allocation introduces unique dynamics that reshape investor behavior, financing conditions, and delisting trends. Theoretical models suggest that ESG-oriented capital allocation influences firms' ownership structure by altering other investors' portfolios (Heinkel et al. 2001). This might affect investor behavior of potentially all investor types and thereby firm valuations (Pástor et al. 2021; Pedersen et al. 2021; Zerbib 2022). As ESG-investors increase their stakes in firms with strong sustainability profiles, other investors, particularly those indifferent to ESG, may reduce their holdings. This could concentrate ownership among investors who deprioritize ESG considerations, potentially affecting corporate governance and decision-making (Zeidan 2022). Conversely, firms avoided by sustainable investors often experience ownership concentration among short-term investors who prioritize returns over sustainability, potentially weakening governance and strategic alignment with



long-term value creation (compare Hong and Kacperczyk 2009; Oikonomou et al. 2020; ESMA, 2020). This study identifies investor types opposing sustainability oriented investors, enhancing understanding of ESG investment's impact on ownership structure, financing conditions, and firm behavior.

These shifts could have direct implications for financing conditions. While sustainability aligned firms benefit from a "greenium", which is reflected in lower capital costs due to increased investor demand for sustainable assets (Heinkel et al. 2001; Zerbib 2022), excluded firms face escalating financing hurdles and heightened regulatory scrutiny. Recent research demonstrates that mutual fund decarbonization exerts sustained downward pressure on the stock prices of divested firms, compelling them to reduce carbon emissions in order to regain investor confidence (Rohleder et al. 2022). This decarbonization selling pressure not only depresses valuations but also signals a broader market shift, where exclusion from ESG portfolios could exacerbate financing constraints for firms lagging in sustainability (compare Kölbel et al. 2020).

For some companies, the costs of ESG compliance, such as operational restructuring to meet emission targets, increased reporting burdens or the exposure of proprietary business strategies to competitors due to the European Union's Non-Financial Reporting Directive (NFRD; Directive 2014/95/EU), may outweigh the benefits of remaining publicly listed (compare Huang 2024; Fiechter et al. 2025). A review of regulatory changes over time indicates that a significant increase in compliance costs and a strong incentive for companies to exercise greater discretion without strict public oversight can be a significant motivator to delist (Chaplinsky and Ramchand 2012; Doidge et al. 2010). Rohleder et al. (2022) further highlight that divested firms, despite eventually reducing emissions, initially face liquidity shortages and reputational risks that strain their financial flexibility. Firms confronted with both, tightened financing and rising ESG-related compliance costs may increasingly choose to delist, seeking refuge in private markets where sustainability expectations and disclosure requirements are less stringent. This underscores how ESG-driven ownership reallocation not only reshapes capital flows but also accelerates the migration of firms perceived as unsustainable away from public markets.

The steady decline in publicly listed companies, known as the "listing gap" (Doidge et al. 2017), is largely driven by firms' inability to secure capital from public markets. Contributing factors include poor financial performance, low investor interest, and high regulatory compliance costs (Pour and Lasfer 2013; Martinez and Serve 2017). Many firms delist to alleviate financial and administrative burdens. Additionally, the rise of private equity firms, which frequently acquire and privatize public companies (Ljungqvist et al. 2016), enables firms to escape public market pressures. We argue that the growing prominence of ESG investing could also influence the ongoing delisting trend, as companies perceived as unsustainable may be forced to delist to escape the associated public market constraints and costs. Empirical evidence shows that, following a delisting and transition into private equity ownership, firms typically become significantly less transparent in their ESG disclosures compared to their time as public companies, which raises concerns about reduced accountability and sustainability standards in private markets (Böni et al. 2022). Despite the high share of ESG-investor ownership and increasing number of delisting, substantial gaps remain in the academic literature. Overall, the existing literature has yet to connect ESG-induced shifts in ownership structures with firms' survival on public markets. Our study contributes by providing first empirical evidence on how ESG capital allocation affects both the composition of shareholders and the probability of delisting.

## Data

This study is based on a comprehensive database integrating Morningstar Direct fund-level data including holdings and Refinitiv LSEG Data & Analytics (LSEG) ownership data. Covering the period from October 2018 to July 2022 the sample comprises 24,788 equity mutual funds and ETFs domiciled in either the European Union or the United States, managing cumulative assets of USD 24 trillion. We categorize investment funds as either sustainable or conventional based on their prospectus disclosures (Birk et al. 2024). According to this classification, 7,756 funds (representing 31.3% of the total number of evaluated funds) are classified as sustainable, corresponding to USD 3,740 billion, which accounts for 15.5% of total assets under management (AuM) in our sample.[1]

The fund data was supplemented by holdings data, which provides a detailed insight into the underlying portfolio structures of the funds. From this holdings data, we get a global sample of 9,184 stocks. These shares represent a total market capitalization of USD 93.2 trillion as of July 2022. For analysis requiring the availability of control variables, the sample is reduced to 5,699 stocks, representing a total market capitalization of USD 64.2 trillion. According to Jacob et al. (2025) and Görgen et al. (2025) we use the active ESG weight (AESG) derived from the funds' holding

[1] These figures differ from broader market reports (e.g., Morningstar 2025) because our analysis is strictly limited to equity funds and our classification explicitly includes funds employing basic ESG integration and exclusion strategies.

data to estimate to which extent stocks are excessively over- or underweighted by sustainable funds compared to conventional funds.[2] AESG quantifies the extent to which a stock receives more or less capital from sustainable funds than would be expected based on the capital allocation of conventional funds. It is calculated as the difference in portfolio weightings between sustainable and conventional funds, scaled according to the total AuM of the entire sustainable fund universe considered in this analysis. Positive AESG values indicate excessive investment in a stock by sustainable funds, while negative values imply avoidance by sustainable funds. Therefore, we use a proxy for real ESG capital allocation without the need of criticized ratings (Berg et al. 2022; Birk et al. 2024).

However, we further use external ratings from established providers such as the LSEG ESG Score and the Morningstar Sustainalytics ESG Risk Rating to compare our results. In contrast to AESG, the use of external ratings does not provide additional information about ownership structures. AESG captures active portfolio choices of sustainable investors, where sustainable companies are overweight and less sustainable companies are underweight. These shifts imply that other investors must give up ownership shares on the overweighted side and absorb the underweights on the other side. This direct link to changes in shareholder structures represents a key advantage of AESG, which is why we focus primarily on this measure. Nevertheless, for completeness, we also consider external ratings.

On average, 71.8% of a company's shares are classified as free float, with the remaining portion held by strategic investors. Following the definition provided by LSEG, strategic investors are entities that hold more than 5% of a company's outstanding shares. As shown in Fig. 1, LSEG further categorizes these investors into six groups: pension funds, employees, governments, investment companies, cross-holdings by other companies, and others. These holdings are treated as strategic and are therefore excluded from the free float, which reflects the shares readily available to the general investing public.

Over the observation period, 509 companies were delisted, and for 427 of these cases, the specific reason for delisting could be identified. This comprehensive ownership and delisting information enables an empirical examination of how sustainability-related investor preferences shape the ownership structure of firms. In turn, this structure can influence key corporate outcomes, including the likelihood that companies with weaker sustainability profiles exit public markets compared to those with stronger sustainability characteristics.

## Analysis

### Stock ownership structure

As demonstrated in the descriptive statistics ((Table 1 – Panel A), the dataset distinguishes between free float and strategic investors. Strategic investors, which are categorized as pension funds, employees, governments, investment companies, cross-company holdings, and others, hold an average of approximately 30% of a company's shares. Among them, cross-company holdings account for the




**Fig. 1** Classification of shareholdings into free float and strategic holdings.

[2] We thank the authors for providing the data.

**Table 1** Descriptive statistics of ownership structure

| Panel a | Strategic investors | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Government | Cross-companies | Pension funds | Investment companies | Employees | Others | Sustainable funds | Conventional funds | Remaining |
| Mean | 1.44% | 11.68% | 0.60% | 6.33% | 6.99% | 1.30% | 1.96% | 11.36% | 58.34% |
| Standard deviation | 7.86% | 20.45% | 2.82% | 8.51% | 15.21% | 7.45% | 3.63% | 9.85% | 20.35% |
| N | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 |

| Panel b | AESG (%) | Market capitalization (Bn $) | Total assets (Bn $) | Net sales (Bn $) | Leverage (%) | Dividend yield | 12-Month return (%) | 12-Month volatility (%) | Return on assets (%) | LSEG ESG score | Morningstar ESG score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.19 | 14.80 | 36.20 | 9.34 | 132.00 | 2.14% | 1.12% | 11.01% | 6.38% | 51.21 | 2.87 |
| Standard deviation | 3.79 | 60.20 | 182.00 | 25.90 | 1,862.05 | 2.42% | 4.17% | 6.54% | 11.72% | 18.49 | 0.93 |
| 10 Percentile | −2.48 | 0.56 | 0.60 | 0.30 | 3.04 | 0.00% | −3.13% | 5.41% | 0.07% | 26.11 | 2.00 |
| 50 Percentile | −0.15 | 3.62 | 4.43 | 2.19 | 64.37 | 1.59% | 0.79% | 9.63% | 2.17% | 51.82 | 3.00 |
| 90 Percentile | 2.58 | 29.20 | 53.30 | 20.30 | 270.38 | 5.15% | 5.73% | 17.84% | 17.94% | 75.68 | 4.00 |
| N | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 186,349 | 192,490 |

This table shows descriptive statistics of the ownership structure for a sample of 5,699 stocks from October 2018 to July 2022. Panel a categorizes ownership into strategic investors, defined by LSEG Data & Analytics as those holding at least 5% of a company's shares, and the remaining free float, which is further divided into shares held by sustainable funds, shares held by conventional funds, and remaining shares. The table includes the mean, standard deviation, and the number of observations (N) for each category. Panel b shows the AESG describing the overweight or underweight position of a stock in a sustainable fund compared to a conventional fund, as defined by Jacob et al. (2025), along with the control variables included in the regression if all control variables are available. Market capitalization, total assets, and net sales are expressed in billions of USD, while leverage, dividend yield, 12-month return, 12-month volatility, and return on assets (ROA) are presented as percentages. Further it shows the LSEG Data & Analytics as well as the Morningstar Direct ESG Score.

largest share with nearly 12%, followed by employees with 7% and investment companies with slightly more than 6%.

We further refine the free float by matching it with our available fund data. Sustainable funds hold on average nearly 2% of a company's shares, while conventional funds hold about 11%. However, nearly 60% of the free float remains unidentified, likely consisting of funds that do not report portfolio data to Morningstar, individual (retail) investors, and other shareholders below the 5% threshold. Table 1, Panel b contains summary statistics for AESG, and the control variables used in the analysis, as well as external ESG Ratings from LSEG and Morningstar Direct.

Figure 2 provides an overview of the distribution of strategic ownership and fund data and their holdings across AESG quintiles. Lower quintiles represent firms underweighted by sustainability-oriented investors, while higher quintiles indicate firms overweighted by those investors.

The data reveals distinct investment patterns among various strategic investor types across AESG quintiles, highlighting their differential preferences for firms based on their sustainability performance.

In the lowest AESG quintile, which represents firms most underinvested by sustainable funds compared to conventional funds, investment companies account for a significant share of strategic ownership, indicating a preference for less sustainable firms. Specifically, with nearly 14% of ownership in this quintile, investment companies appear to exhibit a pronounced preference for less sustainable firms. This could indicate that investment companies can act as a counterweight to sustainability-oriented investors. The underweighting of sustainable funds in these companies is at least partially offset by investment companies, which thereby increase their relative presence in less sustainable companies. Notably, this share is almost halved in the next higher (second-lowest) quintile, underlining the strong concentration of investment companies in the most sustainability-averse segment.

These observations align with existing literature suggesting that certain types of investment companies, particularly those with a focus on short-term financial gains, may be less concerned with long-term ESG performance (compare Heinkel et al. 2001; Oikonomou et al. 2020; ESMA, 2020; Pástor et al. 2023). Such investors typically exhibit shorter investment horizons and focus on timely earnings rather than sustainable value creation, creating pressure for companies to forego sustainability investments to meet immediate financial targets.

In contrast, higher AESG quintiles demonstrate a markedly different ownership composition. Cross-shareholding companies are significant strategic investors in more sustainable firms, and their representation increases substantially across higher quintiles. Similarly, government ownership tends to increase with higher levels of sustainability, though it remains relatively low in absolute terms. These trends

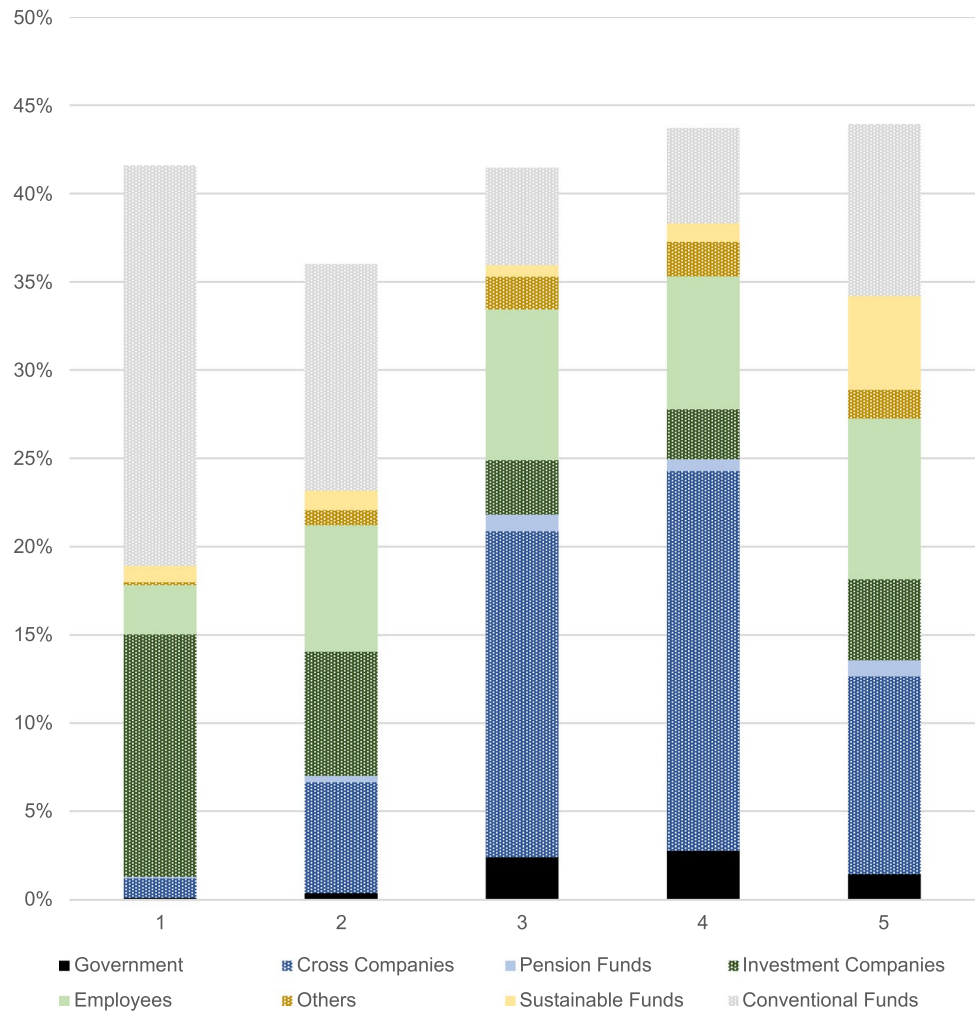



**Fig. 2** Ownership of strategic investors by AESG Quintiles. This figure illustrates the distribution of strategic investors and the percentage of shares held by sustainable and conventional funds across five AESG quintiles, as defined by Jacob et al. (2025). The lower AESG quintiles represent stocks that are more heavily underweighted by sustainable funds compared to conventional funds, indicating non-sustainable companies, while the higher quintiles reflect stocks that are excessively overweighted by sustainable funds, representing sustainable companies. The bars display the average ownership share of strategic investors, defined by LSEG Data & Analytics as investors holding more than 5% of shares outstanding across various categories: Government (shares held by a government or government institution), Cross-Companies (shares held by one company in another), Pension Funds (shares held by pension funds or endowment funds), Investment Companies (shares held as long-term strategic holdings by investment banks or institutions seeking long-term returns), Employees (shares held by company employees or individuals with a substantial position that provides significant voting power at an annual general meeting, typically family members), and Others (shares held strategically outside of the other ownership categories)

are both plausible given that these types of investors, such as cross-shareholding firms and state entities, are typically characterized by a long-term strategic orientation. For these investors, the long-term financial performance and broader societal impact of their portfolio companies are of central importance. Empirical evidence supports this perspective, indicating that cross-shareholding positively affects corporate environmental investment and is strategically aligned with long-term sustainability objectives (Tian et al. 2021).

Overall, a significant increase in the share of strategic investors can be observed in the higher AESG quintiles. The composition at the lower end consists almost exclusively of investment companies. In contrast, the proportion of various strategic investors rises markedly with increasing corporate sustainability. The highest share of strategic holdings is recorded in the fourth AESG quintile, indicating the greatest concentration in this segment. Although the value slightly declines in the highest quintile (fifth category), the overall share of strategic holdings remains significantly higher in both the fourth and fifth quintiles compared to the first two AESG quintiles. This pattern illustrates that a higher AESG is generally correlated with an increased overall ownership density of strategic investors. It demonstrates their preference for firms with strong sustainability performance.

As the ownership of firms might be affected by fundamentals or industry effects, we complement the descriptive statistics with a regression analysis examining the relationship between ESG ownership and ownership structure. Table 2 provides the results for regressions where we explain the ownership shares of the different owner types.

Panel a provides the results for a regression including control variables to account for stock-level fundamentals. The AESG coefficients provide information on how overweighting by investors in sustainable funds affects the ownership structure of other types of investors. The coefficients significantly affect all the ownership positions but mainly for cross-companies, investment companies, employees and the remaining shares. The results confirm that with a higher sustainable funds share also governments, cross-companies, pension funds, employees, and other strategic investors align their investments in the same direction, contributing to a more sustainability-oriented ownership structure. Regarding our finding for the investment corporation, our results comply with Pástor et al. 2023; who document that investment companies, banks in particular, tilt their investment portfolios towards less sustainable assets. The negative correlation with investment company ownership may be due to investment companies withdrawing from sustainability efforts and allocating more assets to low-ESG investments (Zou 2023). In this sense, they function as counterparts to sustainable investors, taking over the positions released when ESG-oriented funds underweight or divest from less sustainable firms.

Panel b shows the regression including industry and time fixed effects. These fixed effects take into account, for example, differences in industry-specific ownership structures or common shocks affecting all companies in a given period. The results are economically similar to those presented in Panel a, even though ownership of cross-companies, employees, and remaining decline. This finding offers further credibility to the hypothesis that strategic investors' focus on sustainability-oriented ownership is consistent across industries and time periods.

Since external sustainability ratings represent an independent assessment widely used by investors, they provide an alternative perspective on fund behavior. When using external sustainability ratings, a different picture emerges descriptively regarding ownership structures as shown in Fig. 3.

For the LSEG ESG Score, the ownership structure is nearly identical across all quintiles. When using the Morningstar ESG Risk Rating, the quintile with the companies with the highest ESG risk (Quintile 1) also has the highest proportion of strategic investors. Based on external ratings, there appears to be no clear preference of investor groups regarding corporate sustainability. This discrepancy to AESG and within external ratings highlights the well-documented differences among provider-specific sustainability metrics (Berg et al. 2022). Since different ESG rating

**Table 2** Panel regressions of ownership shares of different owner types on AESG

| Dependent | Strategic investors | | | | | | |
|---|---|---|---|---|---|---|---|
| | Governments | Cross-companies | Pension funds | Investment companies | Employees | Others | Remaining |
| Panel a: No fixed effects | | | | | | | |
| AESG | 0.042*** | 0.295*** | 0.104*** | −0.395*** | 0.254*** | 0.054*** | −0.317*** |
| | (0.002) | (0.010) | (0.002) | (0.007) | (0.008) | (0.003) | (0.011) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ (%) | 1.8 | 2.6 | 2.1 | 8.2 | 1.0 | 0.7 | 2.2 |
| N | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 |
| Panel b: Industry and time fixed effects | | | | | | | |
| AESG | 0.051*** | 0.251*** | 0.106*** | −0.390*** | 0.203*** | 0.055*** | −0.252*** |
| | (0.002) | (0.010) | (0.002) | (0.007) | (0.008) | (0.003) | (0.011) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ (%) | 9.0 | 8.2 | 3.1 | 11.7 | 3.9 | 2.4 | 7.0 |
| Within $R^2$ (%) | 0.6 | 2.2 | 2.2 | 6.7 | 0.9 | 0.4 | 2.4 |
| N | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 | 198,784 |

This table shows the regression results where the ownership shares of different investor types are explained by AESG. The explained ownership types are those of strategic investors which held at least 5% of the outstanding shares, like governments, cross-companies, pension funds, investment companies, employees and others and the remaining shares not covered by strategic ownership shares or fund shares of the used sample. AESG estimates how much of a stocks market value is excessively held by sustainable funds, compared to conventional funds. It is based on comparing portfolio data of funds that explicitly adhere to ESG criteria in their fund prospectus with that of funds that do not. All regressions control for stock-level fundamentals, like market capitalization, total assets, net sales, leverage, dividend yield, prior 12-month average volatility, as well as return on assets. Panel a shows the results without fixed effects, Panel b further shows effects in the cross section using industry and time fixed effects. Robust standard errors are provided in parentheses. *, **, *** denote significance on the 10%, 5%, and 1% level, respectively.

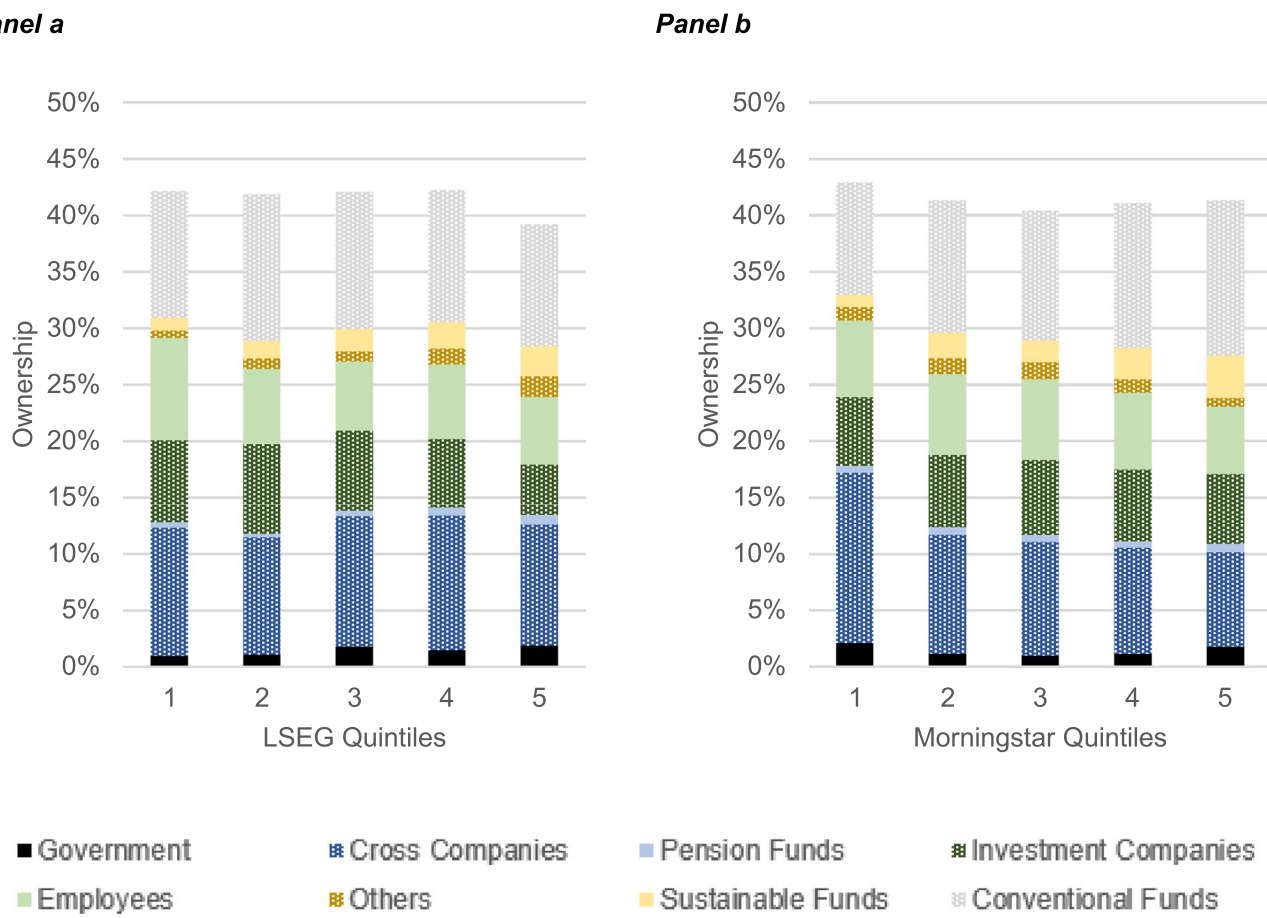



**Fig. 3** Ownership of strategic investors by external ESG rating Quintiles. These figures illustrate the distribution of strategic investors and the percentage of shares held by sustainable and conventional funds across five external sustainability rating quintiles. Panel a on the left uses Refinitiv LSEG Data & Analytics ESG data and Panel b on the right uses Morningstar Direct ESG data. Lower quintiles represent firms with weaker ESG ratings, typically associated with higher ESG risks and less sustainability, whereas higher quintiles capture firms with stronger ESG ratings, indicating lower ESG risks and more sustainability. The bars display the average ownership share of strategic investors, defined by LSEG Data & Analytics as investors holding more than 5% of shares outstanding across various categories: Government (shares held by a government or government institution), Cross-Companies (shares held by one company in another), Pension Funds (shares held by pension funds or endowment funds), Investment Companies (shares held as long-term strategic holdings by investment banks or institutions seeking long-term returns), Employees (shares held by company employees or individuals with a substantial position that provides significant voting power at an annual general meeting, typically family members), and Others (shares held strategically outside of the other ownership categories)

providers use different methods, scopes, and measurement criteria, relying on external ratings rather than the sustainability orientation communicated by the fund itself can lead to inconsistent insights regarding investor preferences. To control for stock fundamentals, we again employ the regression framework introduced in Table 2, this time explaining ownership structures with external ratings instead of AESG. The corresponding results are presented in Table 3.

Similar patterns emerge for the LSEG ESG Score as for the AESG once stock characteristics are controlled for. In particular, cross-companies significantly increase their ownership when ESG scores are higher, while investment companies reduce their positions. Only employees and remaining exhibit different economic behavior patterns. Overall, once we control for factors relevant to investors such as firm size, return on assets, and total assets, we find significant evidence of increased interest in firms with higher sustainability ratings.

When using the Morningstar ESG Risk Rating, markedly different results can be observed. With lower sustainability risks, governments, cross-companies and pension funds tend to reduce their ownership positions. However, since the Morningstar rating measures ESG risk rather than overall sustainability performance[3], one plausible explanation for this pattern could be that these strategic investors prioritize actual sustainability of companies over managed

[3] We assign a lower value to a higher ESG risk rating. Thus, lower values indicate a higher ESG risk and vice versa.

**Table 3** Panel regressions of ownership shares of different owner types on LSEG ESG-Score and Morningstar ESG-rating

| Dependent | Strategic investors | | | | | | |
|---|---|---|---|---|---|---|---|
| | Governments | Cross-companies | Pension funds | Investment companies | Employees | Others | Remaining |
| Panel a: No fixed effects | | | | | | | |
| LSEG ESG-score | 0.014*** | 0.034*** | 0.010*** | −0.054*** | −0.045*** | 0.013*** | 0.029*** |
| | (0.001) | (0.003) | (0.000) | (0.001) | (0.002) | (0.001) | (0.003) |
| Morningstar ESG-risk-rating | −0.379*** | −2.536*** | −0.033*** | 0.258*** | 0.274*** | 0.027 | 0.773*** |
| | (0.026) | (0.059) | (0.007) | (0.023) | (0.041) | (0.019) | (0.058) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ (%) | 2.1 | 3.5 | 0.6 | 7.4 | 0.8 | 0.9 | 2.4 |
| N | 177,384 | 177,384 | 177,384 | 177,384 | 177,384 | 177,384 | 177,274 |
| Panel b: Industry and time fixed effects | | | | | | | |
| LSEG ESG-score | 0.009*** | 0.021*** | 0.010*** | −0.046*** | −0.045*** | 0.011*** | 0.039*** |
| | (0.001) | (0.003) | (0.000) | (0.001) | (0.002) | (0.001) | (0.003) |
| Morningstar ESG-rating | 0.045 | −2.362*** | −0.003 | −0.094*** | −0.043 | 0.178*** | 1.153*** |
| | (0.028) | (0.064) | (0.009) | (0.026) | (0.046) | (0.023) | (0.064) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ (%) | 9.8 | 9.0 | 1.7 | 11.5 | 3.7 | 2.8 | 7.2 |
| Within $R^2$ (%) | 0.6 | 2.6 | 0.5 | 5.4 | 0.9 | 0.6 | 2.8 |
| N | 177,384 | 177,384 | 177,384 | 177,384 | 177,384 | 177,384 | 177,274 |

This table shows the regression results where the ownership shares of different investor types are explained by external ESG ratings.

The explained ownership types are those of strategic investors which held at least 5% of the outstanding shares, like governments, cross-companies, pension funds, investment companies, employees and others and the remaining shares not covered by strategic ownership shares or fund shares of the used sample.

LSEG ESG Score and Morningstar ESG Risk Rating are external ESG ratings from LSEG Data & Analytics and Morningstar Direct.

All regressions control for stock-level fundamentals, like market capitalization, total assets, net sales, leverage, dividend yield, prior 12-month average volatility, as well as return on assets. Panel a shows the results without fixed effects, Panel b further shows effects in the cross section using industry and time fixed effects. Robust standard errors are provided in parentheses.

*, **, *** denote significance on the 10%, 5%, and 1% level, respectively.

sustainability risks. Applying industry and time fixed effects in Panel b of Table 3 substantially reduces the explanatory power, leading to insignificant coefficients for governments, pension funds, and employees. This suggests that industry-specific factors and timing are more relevant determinants for strategic investors than an external ESG risk rating. Overall, these findings imply that ownership structures may vary depending on whether corporate sustainability or ESG risk is considered.

## Stock Delistings

The ownership structures analyzed above form the basis for understanding other key corporate developments. In particular, ownership concentration and institutional shareholdings can have a significant impact on the likelihood and motives for delisting (Martinez and Serve 2017). As sustainability-oriented investors increasingly take on roles in capital allocation, both ownership profiles and corporate incentives are changing, which in turn has implications for public listings. In the following section we analyze the delisting behavior of companies in the period from 2018 to 2022 in order to shed light on the connections between sustainability-related ownership structures and the trend toward companies moving away from the public market.

We collected data on 427 delisted stocks, of which 209 were delisted following a private equity takeover and 218 after an acquisition by a publicly listed firm. The overall delisting probability in our sample was 4.68% (1.2% annually). Figure 4 illustrates the delisting of companies over the observation period, categorized by their AESG quintiles.

The descriptive statistics suggest that stocks with below-average AESG are more likely to delist compared to those with above-average AESG, which may be driven by factors such as reduced investor interest, financing constraints, or increasing pressure from sustainability-focused regulations as discussed in the literature section.

When considering external ESG ratings (Fig. 5), the picture is even more pronounced for the LSEG ESG Score, as firms with below-average ratings in the extreme unsustainable category are delisted approximately five times more often than those with the highest rating. Again, Morningstar's ESG Risk Rating shows a different pattern, with firms in the middle category being delisted most frequently, followed by those with the highest ESG risk.

Based on these descriptive patterns, we analyze if AESG and external ratings have a significant effect on the delisting

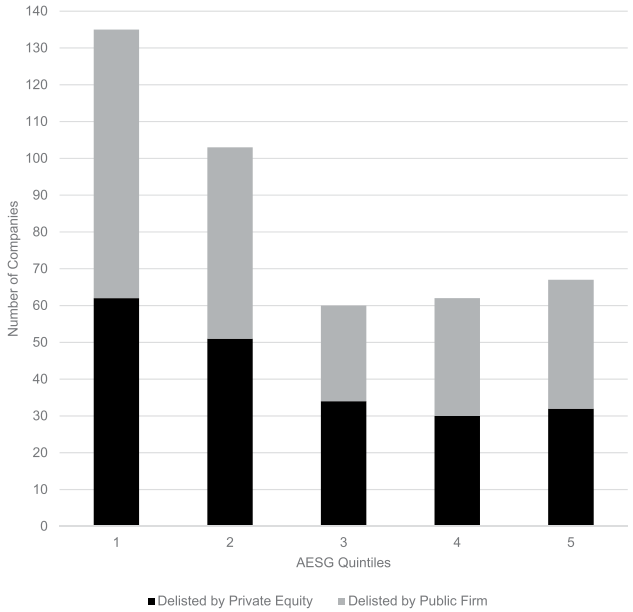



**Fig. 4** Delisting of companies by AESG quintiles. This figure illustrates the number of delistings of companies during the observation period, classified by AESG quintiles, as defined by Jacob et al. (2025). The lower AESG quintiles represent stocks that are more heavily underweighted by sustainable funds compared to conventional funds, indicating non-sustainable companies, while the higher quintiles reflect stocks that are excessively overweighted by sustainable funds, representing sustainable companies. The bars are stacked, with the black bars representing delisting by private equity, and the grey bars indicating delisting by other publicly listed firms

probability. Thereby we use logistic regressions and control for fundamental variables known to affect the likelihood of delisting, like size, financing structure, and profitability (Charitou et al. 2007).

As shown in Columns M1 to M3 of Panel a, Table 4, AESG exhibits a consistently significant negative relationship with delisting across all specifications, indicating that firms with stronger demand from ESG-oriented funds are less likely to exit from public markets. Economically, a one standard deviation decrease in AESG increases the odds of delisting by approximately 12 to 21%, with the largest effect observed for private equity transactions (column (M2)), as shown in Panel b. This effect is stronger compared to profitability (ROA), but smaller than the influence of past stock performance, highlighting that ESG-related investor demand exerts a meaningful, though not dominant, role in shaping delisting probabilities.

In terms of external ratings, the LSEG ESG Score also shows a significant negative effect on delisting. Companies with weaker LSEG ratings are exposed to a much higher risk of exit (Panel a), with a one standard deviation decline associated with a 33 to 36% increase in the odds of delisting (Panel b). In contrast, the Morningstar ESG Risk Rating shows a positive relationship, meaning that better ESG risk ratings significantly increase the probability of delisting. Here, the changes in odds range between 10 and 31%, meaning that companies with increased ESG risk are systematically less vulnerable to market exit. Again, this contrast in empirical outcomes between the two external rating providers directly reflects the aggregate confusion identified by Berg et al. (2022).

While traditional financial variables such as past returns remain the most powerful drivers, sustainability-related factors exert a significant influence, underscoring their growing role in capital market dynamics.

## Conclusion

While prior studies have mainly highlighted the beneficial aspects of ESG investing, this study provides novel evidence that capital allocation based on sustainability criteria may also trigger unintended consequences for public markets.

We find that firms with higher AESG attract stronger engagement from strategic investors, in particular from governments, pension funds, employees, and cross-companies, while investment companies concentrate in firms with low AESG values. This indicates that sustainability-oriented ownership is associated with a more stable and long-term oriented shareholder base, whereas firms avoided by ESG-investors increasingly rely on investors with short-term financial motives. In other words, investment companies and also the remaining emerge as the key counterparts to sustainable investors: they step in when ESG-investors withdraw, taking over the shares released by underinvestment by sustainable funds.

The LSEG ESG Score as an external sustainability rating aligns well with AESG by capturing a preference of long-term strategic investors for sustainable firms. The Morningstar ESG Risk Rating offers mixed signals and appears less informative for ownership allocation.

These ownership dynamics are directly reflected in delisting outcomes. Firms with low AESG do show significantly higher possibilities in exiting public markets, particularly through private equity transactions. This suggests that reduced demand from sustainability-oriented investors increases financing constraints, thereby making unsustainable firms more attractive takeover targets. The external ESG rating by LSEG ESG Score, showing a strong negative relation to delisting, confirms these findings. The Morningstar ESG Risk Rating indicates that firms with higher ESG risk are less likely to delist.

A limitation of our study concerns the sample period, which ends in July 2022. Since mid-2022, capital inflows in the US have been predominantly negative, and European capital inflows have also slowed since the end of



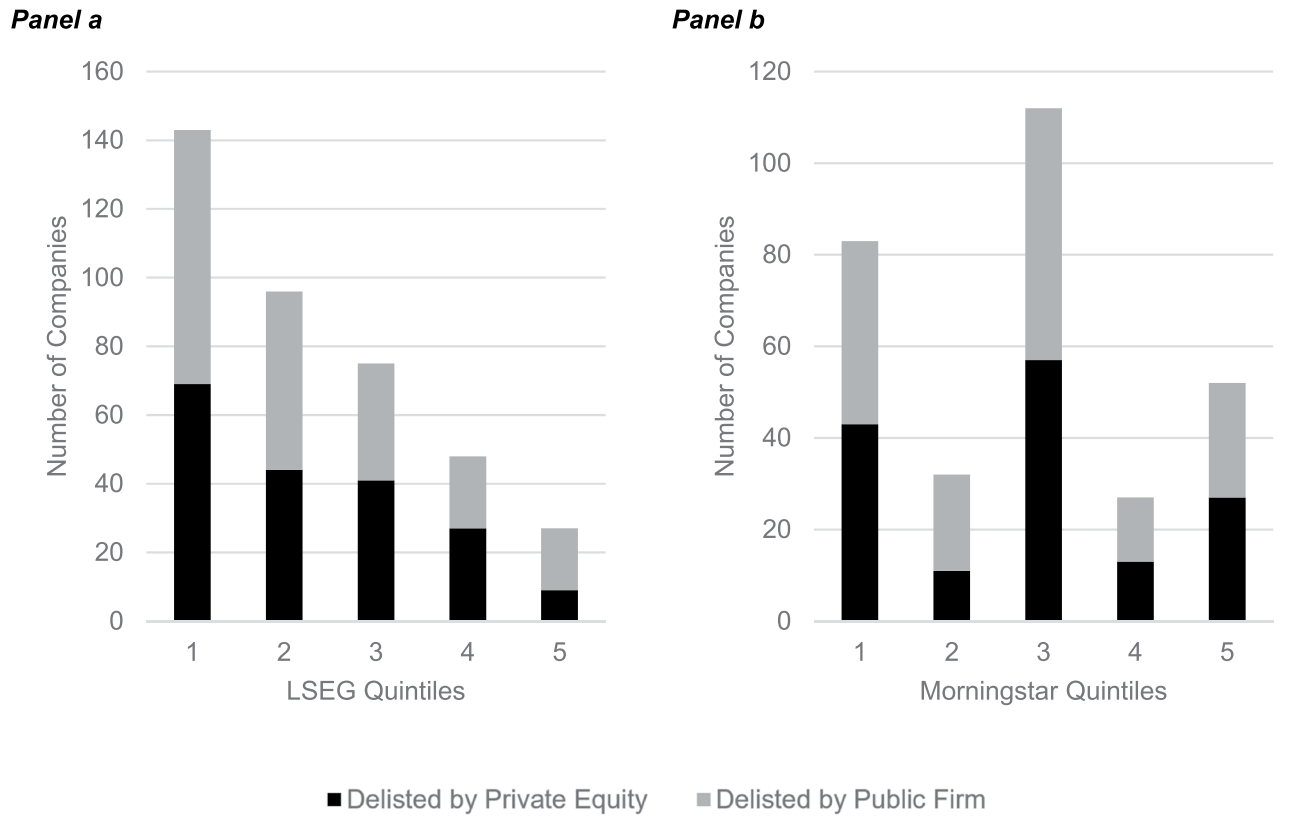



**Fig. 5** Delisting of companies by external ESG rating quintiles. This figure illustrates the number of delistings of companies during the observation period, classified by external ESG rating quintiles. Panel **a** on the left uses Refinitiv LSEG Data & Analytics ESG data and Panel **b** on the right uses Morningstar Direct ESG data. Lower quintiles represent firms with weaker ESG ratings, typically associated with higher ESG risks and less sustainability, whereas higher quintiles capture firms with stronger ESG ratings, indicating lower ESG risks and more sustainability. The bars are stacked, with the black bars representing delisting by private equity, and the grey bars indicating delisting by other publicly listed firms

2023 (Morningstar 2025). Our findings therefore describe the dynamics of ownership structures and delistings that prevailed during a period of sustained, ESG-driven capital growth, and it remains an open question whether these mechanisms persist under the more recent, weaker capital flow conditions. Future research could address this by extending the study period to cover both the growth phase examined here and the subsequent phase of negative capital flows, and by analyzing the US and European markets separately, as the two regions have differed significantly in their capital flow dynamics since 2022.

Taken together, our findings suggest that ESG investing not only reallocates capital across firms but also fundamentally reshapes ownership structures, which in turn affects firms' probability of staying public. While sustainable ownership supports transparency and long-term governance, firms excluded from ESG portfolios face a higher risk of delisting and often migrate into private markets where disclosure requirements are weaker. Our results suggest that a withdrawal by ESG-investors may lead to an increase in ownership by investment companies, while cross-companies and pension funds tend to reduce their stakes, reflecting their differing roles as counterparts. This shift involves a reallocation from long-term strategic to more short-term oriented shareholders, thereby amplifying the delisting risk for unsustainable firms. This creates an important trade-off, as ESG investing strengthens incentives for sustainable behavior but at the same time reduces the visibility of unsustainable firms by shifting them away from public markets.

**Table 4** Logit regressions of stock delistings on AESG and external ESG ratings

| Panel a | | | | | | |
|---|---|---|---|---|---|---|
| Dependent | Delisted overall | Delisted by private equity | Delisted by public firm | Delisted overall | Delisted by private equity | Delisted by public firm |
| | (M1) | (M2) | (M3) | (M4) | (M5) | (M6) |
| AESG | −6.305*** | −7.755*** | −4.094*** | | | |
| | (0.607) | (0.724) | (0.867) | | | |
| LSEG ESG-score | | | | −2.522*** | −2.286*** | −2.387*** |
| | | | | (0.113) | (0.134) | (0.174) |
| Morningstar ESG-risk-rating | | | | 0.218*** | 0.311*** | 0.108*** |
| | | | | (0.023) | (0.031) | (0.034) |
| Return | −5.853*** | −6.497*** | −4.555*** | −5.674*** | −6.554*** | −4.050*** |
| | (0.336) | (0.463) | (0.457) | (0.369) | (0.515) | (0.497) |
| ROA | 0.824*** | 0.995*** | 0.348*** | 0.862*** | 1.023*** | 0.310*** |
| | (0.059) | (0.066) | (0.098) | (0.055) | (0.060) | (0.111) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 198,784 | 198,784 | 198,784 | 185,988 | 185,988 | 185,988 |
| Pseudo $R^2$ (%) | 2.85 | 4.63 | 1.91 | 3.66 | 5.68 | 2.47 |
| Industry fixed matched | No | No | No | No | No | No |
| Time fixed matched | No | No | No | No | No | No |
| Size propensity score matched | No | No | No | No | No | No |
| Panel b | | | | | | |
| Odds change for −1 SD in AESG (%) | 17.37 | 20.92 | 11.65 | | | |
| Odds change for −1 SD in LSEG (%) | | | | 35.79 | 33.07 | 34.25 |
| Odds change for −1 SD in MStar (%) | | | | −20.84 | −30.93 | −9.81 |
| Odds change for −1 SD in return (%) | 24.02 | 26.28 | 19.24 | 23.38 | 26.48 | 17.31 |
| Odds change for −1 SD in ROA (%) | −10.17 | −12.40 | −4.18 | −10.66 | −12.77 | −3.70 |

This table shows in Panel a the results of logit regressions where the dummy variable, whether a firm has been delisted or not is explained by AESG (M1 – M3) and by external ESG ratings (M4 – M6).

Overall, 427 stocks have been delisted during the period from 2018 to 2022.

From those 209 stocks have been delisted after an acquisition of a private equity fund and 218 have been delisted by other publicly listed firms.

AESG estimates how much of a stocks market value is excessively held by ESG funds, compared to conventional funds.

It is based on comparing portfolio data of funds that explicitly adhere to ESG criteria in their fund prospectus with that of funds that do not. LSEG ESG Score and Morningstar ESG Risk Rating are external ESG ratings from LSEG Data & Analytics and Morningstar Direct.

All regressions control for stock-level fundamentals, like market capitalization, total assets, net sales, leverage, dividend yield, prior 12-month average return and volatility, as well as return on assets.

Robust standard errors are provided in parentheses.

At the bottom of the table (Panel b) the odds changes of negative one standard deviation changes of AESG, LSEG ESG Score, Morningstar ESG Risk Rating, return, and return on assets (ROA) are presented, calculated under the assumption of a stock with average characteristics, ceteris paribus.

*, **, *** denote significance on the 10%, 5%, and 1% level, respectively.

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