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Takeover Vulnerability and the Discipline of ESG Overinvestment

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ABSTRACT

While takeovers serve a disciplinary role by replacing inefficient managers, the threat of takeovers may compel firms to divert attention from Environmental, Social and Governance (ESG) efforts as a strategic response to external pressure, especially when such firms are already overinvesting in ESG. We test this conjecture using a panel of 19,564 firm-year observations for NYSE and NASDAQ-listed firms from 1994 to 2019. Our findings indicate that ESG performance declines in the year preceding takeover attempts and, more generally, as firms' vulnerability to takeover bids increases. This effect is more pronounced in firms with prior ESG overinvestment, suggesting that firms respond to takeover threats by scaling back excess ESG initiatives. Further analysis reveals that this response is stronger in financially constrained firms, firms with more compliance-oriented and reputationally sensitive boards and firms where the CEO holds significant influence over the board. Conversely, the effect is weaker in firms led by highly capable managers and those with large shareholders, consistent with stronger governance constraining opportunistic ESG retrenchment under takeover pressure. Overall, our results suggest that firms' ESG decisions are shaped by takeover threats, with their response influenced by prior ESG investments, financial constraints and governance structure.

JEL Classification: G01, G31, G32

1 | Introduction

Does vulnerability to takeovers influence firms' Environmental, Social and Governance (ESG) decisions? Anecdotal and empirical evidence suggest that corporate managers are acutely aware of and concerned about their firms' exposure to corporate takeovers (also see, Billett and Xue 2007; Tunyi et al. 2024). When firms are acquired, senior executives frequently lose their positions and associated private benefits (Martin and McConnell 1991; Mikkelson and Partch 1997; Sudarsanam and Mahate 2006), creating strong incentives to take defensive or pre-emptive actions when takeover risk rises (Bagwell 1991; Billett and Xue 2007). Consistent with this view, prior research shows that managers respond to takeover threats by increasing dividends (Driver et al. 2019), repurchasing shares (Billett and Xue 2007), managing reported earnings (Tunyi et al. 2024) and divesting strategic assets (Jensen 1984; Billett and Xue 2007). These actions are typically aimed at boosting short-term valuation or deterring potential bidders.

ESG engagement is widely associated with improved financial performance, lower operational and downside risk, enhanced innovation and stronger reputational outcomes (Eccles et al. 2014; Bouslah et al. 2018; McWilliams and Siegel 2001; Flammer 2015; Luo et al. 2017). However, ESG also requires substantial discretionary expenditure whose benefits materialise only gradually. Prior work shows that when firms face heightened financial or legal pressure, they frequently scale back ESG investment (Koh et al. 2014; Carroll 2021). We extend this literature by examining whether exposure to

takeover threats represents a distinct and economically important source of such pressure and whether it induces managers to reallocate resources away from ESG in favour of more immediately value-relevant uses.

While takeovers can discipline managers by replacing underperforming leadership (Danbolt et al. 2016; Tunyi et al. 2019), rising takeover vulnerability also reshapes managerial incentives by shortening the horizon over which managers expect to capture private and reputational returns. This increases the weight placed on near-term performance and heightens firms' dependence on capital market actors, such as large shareholders, lenders, customers and regulators, whose evaluations are driven by liquidity, cash flow, valuation, compliance and ESG standing (Pfeffer and Salancik 1978; Hillman et al. 2009). In this environment, managers face pressure to prioritise actions that improve near-term valuation and bargaining position in the market for corporate control (Schuster et al. 2020; Cain et al. 2017). Because ESG investments are discretionary and yield benefits with delay and uncertainty, they become especially vulnerable to retrenchment when takeover risk rises, implying that greater takeover vulnerability may cause lower subsequent ESG performance.

We further argue that this retrenchment in ESG when firms face takeover pressure is likely strongest among those that have previously overinvested in ESG, defined as ESG engagement in excess of what would be expected given a firm's financial characteristics and its industry and regulatory environment. A growing literature shows that unusually high ESG engagement can reflect agency-driven private benefits or symbolic behaviour rather than value maximisation (Barnea and Rubin 2010; Masulis and Reza 2015; Waldau 2024). When takeover pressure increases, these firms face both stronger discipline and greater scope to unwind ESG overinvestment. At the same time, their accumulated ESG credit, the stock of symbolic, reputational and relational capital built through sustained ESG investment (Godfrey 2005), allows them to reduce ESG engagement without immediately losing legitimacy or stakeholder support. As a result, firms with prior ESG overinvestment might experience sharper ESG declines when takeover vulnerability increases.

To test our hypotheses, we assemble a panel dataset comprising 2545 US firms (19,564 firm-year observations) from 1991 to 2019. We collect data on takeover activity from LSEG (formerly Refinitiv) to construct a firm-level measure of takeover exposure or vulnerability following prior studies (Tunyi et al. 2024; Cremers et al. 2009; Danbolt et al. 2016). The vulnerability measure captures the likelihood that the firm will receive takeover bids (hostile or friendly) in the next period. Critically, this measure is different from the Cain et al. (2017) hostile takeover index, which captures firms' exposure to hostile takeover risk. Our ESG data comes from MSCI (formerly KLD Research & Analytics) and captures firm-level ESG strengths and concerns across three key areas: Environment, Social and Governance (Wang et al. 2021). Our primary analysis employs a panel regression model (with firm- and year-fixed effects) to examine the relationship between takeover vulnerability and ESG performance.

We find strong evidence that takeover vulnerability is associated with subsequent declines in ESG performance. Firms that become more exposed to takeover threats significantly reduce their ESG engagement in the following period. This effect is particularly pronounced among firms prone to ESG overinvestment, consistent with the view that takeover pressure induces firms to unwind excess ESG and draw down accumulated ESG credit. Finally, we document the role of governance in this setting by providing evidence that the tendency to reduce ESG engagement in response to takeover threats is weaker among firms with high-ability managers and those with large investors, including institutional investors and blockholders. Overall, our results suggest that firms' ESG decisions are contingent on the takeover threats they face and that their responses to these threats are shaped by existing levels of ESG engagement and the quality of governance within the firm.

Our study contributes to several strands of literature. First, we extend the growing body of work on corporate ESG behaviour (Li et al. 2025; Karampatsas et al. 2022; Hegde and Mishra 2019; Ikram et al. 2023; Welch and Yoon 2023; Eliwa et al. 2023; Maneenop et al. 2024; Tawiah et al. 2024) by identifying takeover vulnerability as a novel and economically significant determinant of ESG decision-making. Whereas prior studies emphasise managerial traits, economic incentives, litigation risk, or media scrutiny (Eccles et al. 2014; Cheng et al. 2014; McGuinness et al. 2017; Hegde and Mishra 2019; Ikram et al. 2023; Welch and Yoon 2023; Gillan et al. 2021), we provide comprehensive evidence that firms' general exposure to takeover activity also shapes ESG outcomes.

More specifically, we provide novel evidence on how exposure to both hostile and friendly takeover risk affects ESG engagement. This allows us to reconcile and extend existing evidence that has focused on hostile takeover threats alone (Wongsinhirun et al. 2022) and to contrast it with recent studies that argue takeover pressure can induce ESG signalling (Treepongkaruna, Kyaw, and Jiraporn 2024; Tsang et al. 2024; Wang et al. 2025). By showing that broader takeover vulnerability is associated with ESG retrenchment, we demonstrate that agency and self-preservation concerns dominate ESG signalling incentives in this setting.

Second, we introduce and empirically document the role of ESG credit as a strategic buffer arising from prior ESG overinvestment. We show that firms with high prior ESG engagement cut ESG more aggressively when takeover pressure rises, consistent with these firms drawing down accumulated reputational and relational capital built through earlier stakeholder investment. This provides direct evidence that ESG can function as an intertemporal store of legitimacy that firms exploit when external constraints tighten.

More broadly, we contribute to the takeover literature by identifying ESG as an important and previously underexplored margin of strategic response. Unlike earnings management (Tunyi et al. 2024), share repurchases (Billett and Xue 2007), or dividend payouts (Driver et al. 2019), ESG adjustments are less visible and more difficult to monitor, making them a subtle but powerful channel through which firms respond to takeover threats.

Our findings also advance theory. From an agency perspective, takeover vulnerability acts as a disciplinary force that curbs ESG overinvestment and managerial opportunism by

shortening horizons and increasing career risk (Ruback and Jensen 1983; Manne 1965). From a resource dependency perspective (Pfeffer and Salancik 1978), takeover threats heighten the salience of capital market actors and financial constraints, prompting firms to reallocate resources away from ESG spending that exceeds what is economically or institutionally justified towards uses that preserve liquidity and valuation. Taken together, our results show how external control pressure reshapes firms' ESG strategies through the interplay of agency incentives, governance and dependence on capital market resources.

The rest of the paper is organised as follows. Section 2 develops our hypotheses. Section 3 discusses the data and empirical models. Our results are discussed in Section 4, and concluding remarks are presented in Section 5.

2 | Related Literature and Hypotheses

2.1 | Motivation for ESG Engagement

Firms engage in ESG not only for ethical or normative reasons but also because ESG has become an integral part of how they manage investor relations, risk and corporate legitimacy (Carroll 1991). As institutional investors increasingly incorporate ESG criteria into capital allocation and monitoring (Christensen et al. 2022), ESG is now embedded in corporate strategy rather than treated as a peripheral activity. Consequently, ESG engagement functions both as a governance mechanism that disciplines firms and as a strategic signal to capital markets.

From a stakeholder perspective, ESG investments strengthen relationships with employees, customers and communities, enhancing reputation and long-term firm value (Freeman 1984; Flammer 2015). Consistent with this view, Eccles et al. (2014) show that high ESG firms systematically outperform peers. Signalling theory further suggests that ESG conveys information about firm quality and managerial commitment, reducing information asymmetry (Benlemlih and Bitar 2018) and lowering the cost of capital (Cheng et al. 2014). ESG thus operates simultaneously as a reputational asset and as an indicator of long-term financial viability.

The strategic value of ESG, however, is state-dependent. External shocks reveal whether ESG is deeply embedded or opportunistic. Prior research finds that firms with strong pre-shock ESG are more resilient during crises, as accumulated social capital stabilises cash flows and stakeholder support (Lins et al. 2017; Albuquerque et al. 2020; Yang et al. 2024). At the same time, crises expose symbolic ESG, as managers decouple rhetoric from practice and cut ESG to relieve short-term financial pressure (Eliwa et al. 2025). Between these extremes lies strategic ESG, in which firms actively adjust stakeholder investment in response to changing constraints, increasing ESG when legitimacy and support are valuable and retrenching ESG when financial and managerial slack tightens (Bansal et al. 2015; Cornett et al. 2016).

A large literature examines the determinants of ESG engagement (Gillan et al. 2021). At the managerial level, CEO traits such as gender, ability, age, tenure, marital status, political orientation and overconfidence shape ESG choices (McGuinness et al. 2017; Hegde and Mishra 2019; Ikram et al. 2023; Welch and Yoon 2023; Tawiah et al. 2024). Governance structures also matter, including board independence and co-option, ownership concentration, institutional investors, gender and ethnic diversity, family and state ownership and overall governance quality (Nofsinger et al. 2019; Eliwa et al. 2023; Maneenop et al. 2024). Firm characteristics such as financial constraints, performance and free cash flow further condition ESG investment (Attig 2024), while industry dynamics, peer effects and regulatory environments, including climate agreements and governance reforms, shape ESG incentives (Liao et al. 2021).

Despite its benefits, ESG is not costless. Agency-based theories predict that managers may overinvest in ESG for reputational or career motives, generating value-destroying excesses (Barnea and Rubin 2010; Fairhurst and Greene 2022). Consistent with this, excessive ESG can depress profitability in distress periods (Benlemlih and Bitar 2018), and firms often retrench ESG during crises, especially under strong board oversight (Chintrakarn et al. 2021). ESG, therefore, occupies an ambiguous space between value creation and managerial opportunism. These tensions may become particularly salient under takeover pressure.

Agency theory predicts that takeover threats intensify managerial myopia, shifting attention towards short-term performance (Stein 1988). Resource dependence theory similarly predicts that firms facing external threats reallocate resources to secure financial flexibility and reduce reliance on external stakeholders (Pfeffer and Salancik 1978; Hillman et al. 2009). Under takeover vulnerability, firms may either increase ESG to build legitimacy and deter bidders or retrench ESG to preserve liquidity and improve short-term valuation. Our study examines which of these forces dominates.

Research on the nexus between takeovers and ESG remains limited. Two US studies (Wongsinhirun et al. 2022; Treepongkaruna, Sarajoti, and Padungsaksawasdi 2024) examine hostile takeover threats in a related context, yielding contrasting conclusions. Wongsinhirun et al. (2022) find that hostile threats reduce corporate social responsibility (CSR), while Treepongkaruna, Sarajoti, and Padungsaksawasdi (2024) document a defensive increase in social engagement. Both studies employ the same measure of *hostile* takeover threats, namely, the hostile takeover index developed by Cain et al. (2017), but differ in their outcome variables, time windows and identification strategies. International evidence from Wang et al. (2025) further show that anti-takeover provisions in Korea are associated with stronger ESG. Taken together, these mixed findings suggest that ESG responses to takeover threats depend on how ESG is measured, which pillar is considered, and whether ESG is viewed as defensive or discretionary.

Despite this emerging research, two gaps remain. First, prior work focuses almost exclusively on hostile takeovers, overlooking firms' broader exposure to both friendly and hostile bids. Second, little is known about the mechanisms through which takeover vulnerability shapes ESG. We address these gaps by examining firms' vulnerability to both friendly and hostile takeovers and by studying the roles of ESG overinvestment and governance in shaping firms' ESG responses.

2.2 | Theory and Hypotheses

2.2.1 | Takeover Vulnerability, Managerial Myopia and ESG Retrenchment

From an agency perspective (Jensen and Meckling 1976; Jensen 1986), the separation of ownership and control, coupled with information asymmetry, creates scope for managers to pursue actions that maximise private benefits rather than long-term shareholder value. The market for corporate control plays a central role in enforcing market discipline through facilitating the replacement of underperforming managers or those who make sub-optimal or value-destroying decisions (Ruback and Jensen 1983; Jensen 1986; Manne 1965). For example, the literature documents that poorly performing firms are more likely to become takeover targets and that such takeovers frequently result in the removal of incumbent managers (Danbolt et al. 2016; Tunyi et al. 2019). For managers, therefore, takeover threats jeopardise both tangible personal outcomes, such as compensation and future employment prospects, and intangible outcomes, including reputation, professional standing and accumulated social capital (Ertugrul and Krishnan 2011; Gupta et al. 2020). This effect is exacerbated by the limited availability of comparable executive roles and the stigma associated with forced turnover (Tunyi et al. 2024).

While takeover threats may arise from agency problems (e.g., suboptimal and value-eroding decision-making), they may further exacerbate these agency problems by incentivising managerial myopia. Here, heightened job insecurity and reputational concerns may induce an excessive focus on short-term outcomes, such as short-term profit maximisation, at the expense of long-term value creation (Stein 1988; Chatjuthamard et al. 2022; Tunyi et al. 2024). Specifically, managers facing strong career concerns may prioritise actions that signal competence in the short run, even when such actions undermine long-term value creation (Nam et al. 2008). Indeed, recent evidence shows that career-concerned managers are more likely to cut long-term investments, such as R&D, marketing expenditures, brand-building investments and asset maintenance, with adverse long-run consequences, in order to boost short-term earnings (Chen et al. 2023; Mizik and Jacobson 2007). Such myopic retrenchment exemplifies the value-decreasing investment behaviour managers may adopt under pressure (Laverty 2004).

Indeed, prior research documents that managers facing takeover risk engage in pre-emptive actions to reduce the likelihood of a takeover or ensure self-preservation. For example, managers sometimes engage in strategic asset sales (Billett and Xue 2007; Jensen 1986), dividend increases (Driver et al. 2019), share repurchases (Billett and Xue 2007) and earnings management (Tunyi et al. 2024) to raise acquisition costs and thwart impending takeovers. Taken together, extant work suggests that takeover vulnerability alters managerial incentives and decision-making, encouraging actions that prioritise short-term performance, self-preservation or perceived shareholder alignment.

Agency frictions are particularly salient in the context of ESG because ESG initiatives are often discretionary, difficult to monitor and characterised by long investment horizons, making them susceptible to managerial opportunism. Self-serving managers may over-allocate resources to ESG initiatives that enhance their personal outcomes by, for example, increasing their reputation and social standing and enhancing their social networks. Indeed, prior research finds that firms with weaker governance structures are more prone to excessive or misaligned ESG spending that reflects managerial preferences rather than value creation (Bertrand and Mullainathan 2003; Giroud and Mueller 2011). In this setting, takeover threats may function as an external governance mechanism that disciplines managerial discretion, prompting a reassessment of ESG investments and a sharper focus on activities perceived as enhancing short-term financial performance. This will translate to a decline in excessive ESG spending when takeover threats increase.

Resource dependence theory provides further theoretical support for this central argument. The theory posits that firms are embedded in networks of external actors who control critical resources, such as capital, legitimacy, labour and regulatory approval, and that organisational strategies are shaped by efforts to manage these dependencies and the power imbalances they create (Pfeffer and Salancik 1978). Because no firm is self-sufficient, survival depends on securing stable access to these externally controlled resources, often by adapting policies, structures and investments to meet the expectations of dominant stakeholders (Pfeffer and Salancik 1978). Strategic choices are therefore not driven solely by efficiency considerations, but also by the need to reduce vulnerability to external control and to maintain bargaining power vis-à-vis resource providers.

When firms face heightened takeover vulnerability, financial uncertainty intensifies and power shifts towards external capital providers and market participants (Tunyi et al. 2024). Managers are then confronted with a strategic trade-off between conserving liquidity and signalling short-term financial strength to deter opportunistic bids, or sustaining long-term investments that support competitive advantage and stakeholder relationships. Indeed, consistent with this view, prior research shows that firms routinely adjust strategic priorities in response to external shocks, such as regulatory changes or financial instability (Hillman et al. 2009). In periods of heightened pressure, firms often curtail discretionary initiatives, including ESG engagement, to preserve cash and managerial attention (Bansal et al. 2015). At the same time, some firms may selectively expand stakeholder-oriented investments when such engagement is critical for maintaining access to financing, trust, or legitimacy (Cornett et al. 2016).

From a resource dependency perspective, therefore, takeover vulnerability heightens firms' need to stabilise critical resource flows, including cash, credit and investor support. Under such conditions, managers are incentivised to reallocate attention and capital towards actions that generate immediate and contractible financial benefits, while deprioritising projects, including many ESG initiatives, whose payoffs are deferred, uncertain, or only indirectly linked to resource acquisition. As a result, ESG investment, particularly discretionary or beyond compliance levels, is more likely to be scaled back as takeover

pressure increases. Taken together, agency theory and resource dependency theory therefore predict that takeover threats tilt managerial decision-making towards short-term value preservation, crowding out long-term and discretionary investments such as ESG.

Given that ESG initiatives require sustained commitment and deliver benefits primarily over longer horizons, agency theory and resource dependency theory jointly imply that firms facing heightened takeover vulnerability are likely to scale back ESG engagement in favour of initiatives that generate more immediate and verifiable financial returns. As takeover pressure intensifies, managers have stronger incentives to prioritise short-term earnings, liquidity and market valuation signals, making ESG retrenchment a rational response to both career concerns and resource constraints. Empirically, this behaviour should be reflected in a decline in observed ESG performance among firms that are more exposed to takeover threats. Accordingly, we propose the following hypothesis:

Hypothesis 1 (H1). *Firms facing higher vulnerability to takeovers experience a decline in ESG performance.*

Notwithstanding this baseline prediction, stakeholder theory offers a countervailing perspective. ESG investments can create long-term value by strengthening relationships with key stakeholders, enhancing corporate reputation and supporting financial performance (Flammer 2015). A strong ESG profile may therefore serve not only as an ethical or governance signal but also as an indicator of long-term viability, thereby increasing firms' attractiveness to investors and other capital providers. Under this view, some firms may strategically sustain or even expand ESG engagement when facing takeover threats, particularly when stakeholder support and reputational capital are critical to preserving firm value. Accordingly, the effect of takeover vulnerability on ESG engagement is unlikely to be uniform and may depend on boundary conditions, including prior ESG intensity, governance quality and the balance between agency-driven motives and strategic stakeholder considerations. These considerations motivate our subsequent hypotheses, which examine heterogeneity in firms' ESG responses to takeover pressure.

2.2.2 | The Moderating Role of ESG Credit

Our first boundary condition concerns firms' prior ESG engagement and the accumulation of what we term *ESG credit*. ESG credit in our setting refers to the stock of symbolic, reputational and relational capital built through sustained ESG investment, which provides firms with legitimacy and stakeholder goodwill that can be drawn upon during periods of stress. Building on the moral capital and insurance-like logic of Godfrey (2005), firms that have historically invested in ESG accumulate reputational reserves that protect them from stakeholder sanctions when adverse events occur or when ESG engagement temporarily declines. Consistent with this view, Lins et al. (2017) show that firms with stronger pre-shock social capital perform better during crises, even when ESG investment is curtailed, because accumulated stakeholder trust continues to buffer firm value.

From both agency and resource-dependency perspectives, this accumulated ESG credit alters managerial incentives under takeover pressure. When firms face heightened vulnerability to takeover, managers confront acute pressure to demonstrate financial discipline, preserve liquidity and signal shareholder alignment. Because ESG expenditures beyond regulatory or contractual requirements are discretionary and often characterised by delayed and intangible payoffs, they are particularly susceptible to retrenchment. In firms with substantial prior ESG engagement, managers can cut ESG without immediately jeopardising legitimacy or stakeholder support, since their accumulated ESG credit continues to sustain reputational standing and relational capital (Lins et al. 2017).

Moreover, reducing ESG can itself be a strategic signal in takeover contexts. Scaling back ESG may convey cost discipline, operational efficiency and responsiveness to shareholder interests, attributes that reduce the perceived scope for value-extracting intervention. Supporting this view, Utz (2017) show that firms perceived to have overinvested in ESG face heightened reputational and financial risks when such investments become unsustainable. Similarly, Chintrakarn et al. (2021) find that during periods of stress, especially in firms with stronger governance, managerial focus shifts away from ESG and towards core financial performance. In takeover settings, these dynamics imply that high ESG firms have both greater capacity and stronger incentives to curtail ESG overinvestments to signal financial discipline and limit vulnerability to takeover bids.

Taken together, ESG credit creates both the ability and the incentive to cut ESG when takeover pressure rises. Firms with higher ex ante ESG have accumulated sufficient reputational and relational capital to absorb reductions in ESG without incurring immediate legitimacy costs, and they also face greater scope to eliminate perceived excesses. As a result, the negative effect of takeover vulnerability on ESG engagement should be stronger among firms that have previously overinvested in ESG.

Hypothesis 2 (H2). *The tendency for firms to cut ESG when faced with takeover threats is more pronounced among firms with higher ex ante ESG investments.*

2.2.3 | Governance Mechanisms That Attenuate ESG Retrenchment

Takeover vulnerability increases the risk that managers will not remain in office long enough to realise returns from long-horizon investments, including ESG investments. This horizon-shortening increases managerial incentives to improve near-term financial metrics, even if they weaken long-run stakeholder relationships. From a resource dependency perspective, the same shock raises firms' reliance on capital market actors, whose assessments are often based on liquidity, cash flow and valuation multiples. Together, these forces create strong incentives to reallocate resources away from ESG when takeover risk rises.

However, governance determines whether this reallocation is indiscriminate or selective. Well-functioning governance

does not simply prevent ESG curtailment; it plausibly shapes which ESG activities are preserved and which are unwound. Because ESG investments differ in their strategic value, informational content and stakeholder salience, takeover pressure creates scope for opportunistic retrenchment of low-value or symbolic ESG, while high-value ESG may still be protected if governance is effective. Prior evidence shows that high-ability managers make better investment decisions (Suryaningrum et al. 2023), negotiate more effectively (Chen and Lin 2018) and engage in ESG in ways that enhance shareholder value (Welch and Yoon 2023). In our setting, these high-ability managers may identify which ESG investments genuinely contribute to firm value through lower risk, better financing conditions or reputational capital and which primarily reflect agency-driven overinvestment. They may also communicate this distinction to investors and boards, reducing the need to cut ESG simply to satisfy short-term market expectations. They may, therefore, focus retrenchment towards low-value ESG while preserving strategically material ESG, implying that managerial ability may attenuate the negative effect of takeover vulnerability on overall ESG performance.

Ownership structure operates through a complementary channel. Long-horizon institutional investors and blockholders reduce managerial discretion to engage in short-termism by increasing monitoring, reputational accountability and the cost of opportunistic behaviour (Bushee 1998; Edmans 2014). These investors, particularly dedicated institutional investors, also have stronger incentives to protect stakeholder and reputational capital that supports long-run value (Dimson et al. 2015; Bushee 1998). In takeover settings, where incentives to window-dress, cut investment and boost short-term metrics intensify (Sul 2024a), institutional ownership constrains managers' tendency to liquidate ESG capital for short-term gain. Thus, governance does not eliminate ESG retrenchment under takeover pressure, but it disciplines its form.

Taken together, strong managerial ability and effective monitoring from large shareholders shift retrenchment away from value-creating ESG towards agency-driven components, thus attenuating the negative effect of takeover vulnerability on ESG engagement. We therefore propose the following hypothesis.

Hypothesis 3 (H3). *Governance mechanisms that strengthen monitoring and managerial alignment attenuate the negative effect of takeover vulnerability on ESG performance.*

3 | Research Methodology

3.1 | Data Sources

To test our three hypotheses, we use a large sample of US firms listed on the NYSE and NASDAQ. Our sample selection and data analysis are in two phases. The first phase involves estimating firms' takeover vulnerability using a universe of US-listed firms with available financial data from 1985 to 2021. The second phase examines the relationship between this measure of takeover vulnerability and firms' ESG engagement. We collect firm financial data from Compustat, stock price data from CRSP, governance data from Boardex, ESG data from MSCI (KLD) and takeover activity data from LSEG (formerly Refinitiv). We retain only observations with data on the variables required for our study. We will discuss these variables and our sampling in more depth later in this section.

3.2 | Model and Variables

3.2.1 | Empirical Model

Our baseline model for exploring our hypotheses is a panel regression model with firm- and year-fixed effects, where ESG engagement in one period is determined by the firm's vulnerability to takeovers at the start of the period (i.e., lagged effects) after controlling for other firm, industry and institutional factors that may drive ESG performance. To partly address endogeneity arising from omitted variables, we also control for firm and year fixed effects. We specify the following baseline model and discuss the variables therein in the sections that follow;

$$ESG\ Score_{it} = \beta_0 + \beta_1 Vulnerability_{it-1} + \sum \beta_k Controls_{it-1} + v_i + v_t + \epsilon_{it} \quad (1)$$

In equation (1), $ESG\,Score_{it}$ is firm i's ESG engagement in period t. $Vulnerability_{it-1}$ captures its exposure to takeovers (hostile and friendly) at the beginning of the period $(t-1)$. $Controls_{it-1}$ capture other firm, industry and institutional determinants of ESG engagement from prior literature. Finally, v_i and v_t represent firm and year fixed effects. To test our second and third hypotheses, we introduce various measures of $Overinvestment_{it-1}$ and $Governance\,quality_{it-1}$ as moderators in the baseline regression. For brevity, we do not present these models here. We discuss the derivation of our key variables below.

3.2.2 | Measure of Vulnerability to Takeovers

We follow prior studies in estimating firms' vulnerability to takeovers in one period from their financial characteristics in the previous period (Palepu 1986; Powell 2001; Cremers et al. 2009; Danbolt et al. 2016; Billett and Xue 2007; Tunyi et al. 2024). We deploy the following logit model:

$$Takeover\,Likelihood_{it} = \frac{1}{1 + e^{-Z_{it-1}}} \quad (2)$$

In the model, $Takeover\,Likelihood_{it}$ is the probability that firm i will receive a takeover bid in the current period (t). Z_{it-1} is a vector of firm i's characteristics in the previous period $(t-1)$. $Takeover\,Likelihood_{it}$ in the model is a binary variable that takes the value of one if a firm (i) is the subject of a takeover bid in period t and a value of zero otherwise.

The vector of firm characteristics (Z_{it-1}) consists of measures of average monthly abnormal returns, profitability, Tobin's Q, sales growth, liquidity, leverage, growth-resource mismatch, industry disturbance, firm size, the square of firm size, free cash flow, tangible assets, firm age and block holders. These variables are

fully defined in Table A1 and have been shown in prior research to explain firms' likelihood of being taken over.[1]

The dataset used to estimate Equation (2) comprises 8792 unique firms and 102,700 observations from 1985 to 2021. We use a recursive process to estimate takeover likelihood to avoid look-ahead bias (Danbolt et al. 2016; Tunyi 2014). Our first estimate in the recursive modelling process uses takeover data for 1986–1995, matched with accounting data for 1985–1994 (with a 1-year lag). We use the estimated model to predict the likelihood of a takeover for our sample of firms in 1996, based on their 1995 accounting data. Following this, we retain 1985 as the base year and re-estimate the model using financial (takeover) data for the period 1985–1995 (1986–1996). We continue this process, adding 1 year of data to the estimation process each time.

We report our regression model coefficients in Table B1. Results for the pooled model, covering the full sample, are presented in Columns 1–3 of Table B1. In Columns 4–7 of Table B1, we present descriptive statistics of the coefficients of the recursive regression models. Consistent with prior research, takeover likelihood is negatively related to measures of performance and value (abnormal returns, Tobin's Q, growth) as well as firm age (i.e., younger firms are more susceptible to takeovers) (Palepu 1986; Danbolt et al. 2016). We report our model's goodness of fit in Panel B of Table B1, which shows that the model has predictive ability beyond a null model. In addition, following prior studies (Tunyi et al. 2024), we assess the model's out-of-sample predictive ability by evaluating its ability to predict actual targets.

In Figure 1, we explore the proportion of firms in each vulnerability quintile that subsequently (within 12 months) receive takeover bids. As shown in the figure, in out-of-sample tests, the proportion of actual targets increases as vulnerability to takeovers increases. For example, about 10% of the decile of firms with the highest takeover likelihood (Decile 10), receive a takeover bid in the next year, while less than 1% of the first with the lowest takeover likelihood (Decile 1) receive a bid. Consistent with prior research (Danbolt et al. 2016; Tunyi et al. 2024), this supports our confidence that the likelihood model effectively captures firms' vulnerability to takeovers out-of-sample.

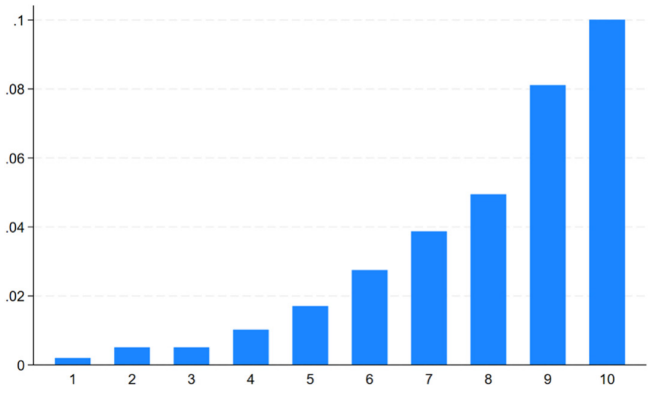

FIGURE 1 | Out-of-sample predictive ability and performance of the vulnerability model.

3.2.3 | Measure of ESG Engagement

We follow prior studies (Lioui and Tarelli 2022; Gibson Brandon et al. 2021; Shackleton et al. 2022; Welch and Yoon 2023) to estimate firms' ESG engagement from MSCI (formerly KLD) data. MSCI provides annual assessments of firms' ESG performance (strengths and concerns) across several areas, including environment, community, employee relations, diversity, human rights, product and governance. Building on prior studies, we utilise pre-existing categories for environment and governance to assess firms' performance in these two areas.[2] Consistent with the literature, we consider community, diversity, employee relations, human rights and product as jointly contributing to the social pillar (Lioui and Tarelli 2022; Gibson Brandon et al. 2021; Shackleton et al. 2022). For robustness, later in our study, we also utilise LSEG (formerly Refinitiv) ESG data. LSEG has far less coverage for our sample firms. However, we find that our results are robust to the choice of dataset.

We estimate firm-level scores for the three pillars by taking the difference between each firm's total number of strengths, normalised by the total number of potential strengths assessed for that firm-year observation, and the firm's total number of concerns, normalised by the total number of potential concerns (Lioui and Tarelli 2022; Gibson Brandon et al. 2021; Shackleton et al. 2022).[3] For robustness, we consider two additional variants of the measure. First, we compute percentile ranks of the normalised score to account for the noisy nature of the score data (Lioui and Tarelli 2022). Second, to mitigate concerns that unobserved industry components exist in firms' ESG performance, following Shackleton et al. (2022), we take the index minus the median index within a firm's Fama & French 48 industry in the observation year. Our results across these three measures are qualitatively similar; therefore, we do not repeat the analyses for brevity.

3.2.4 | Control Variables

We follow the literature to select adequate controls for our analysis. Our controls reflect variables that have been shown in prior research (see, for example, Eliwa et al. 2023; Zhu and Chen 2025; McGuinness et al. 2017, amongst others) to influence firms' ESG engagement. These variables include measures of firms' profitability, value (Tobin's Q), sales growth, leverage, size, free cash flow availability, tangible assets, audit quality (Big 4 auditor), level of capital expenditures, bankruptcy risk and industry competition (concentration). In robustness tests later in our study, we also control for governance characteristics, including board size, board independence and board gender diversity.[4] We provide further details, including full variable definitions, in Table A1.

3.3 | Sample

After computing our key variables (i.e., measures of ESG engagement, vulnerability and controls) as described above, we merge them into our dataset and drop observations with insufficient data. While our dataset starts from 1985, our vulnerability data are only available from 1995, as we need historical data to estimate it. MSCI (formerly KLD) data are available from 1991

to 2019, when MSCI stopped updating the database. Consistent with prior research, we exclude all observations for firms in the financial (SIC codes 6000–6999) and utilities (SIC codes 4000–4999) industries. We further exclude all observations lacking data on our key control variables. Our final dataset for testing our hypotheses comprises 2933 US-listed firms, yielding 19,564 observations from 1994 to 2019.

4 | Results and Discussions

4.1 | Descriptive Statistics

Descriptive statistics of our variables are presented in Table 1. Our main dependent and independent variables are described in Panel A. These include the overall ESG Score, its three components—environmental, social and governance—as well as the measure of takeover vulnerability. Control variables are described in Panel B, and additional variables (controls and moderating) used in the study are summarised in Panel C. Higher scores indicate greater engagement in ESG. Sample firms have an average (median) ESG score of 0.016 (0.000) with a standard deviation of 0.259. The mean (median) environment score is 0.045 (0.000), the social score is 0.024 (0.000) and the governance score is −0.022 (0.000). This suggests that for all components except governance, the average firm in our sample reports more strengths than concerns.

Takeover vulnerability represents the firms' exposure to takeovers and has a mean (median) value of 0.026 (0.014). The mean of Target —an indicator variable that denotes whether or not a firm receives a takeover bid—is 0.013, suggesting that about 1.3% of firms in our sample become takeover targets. Descriptive statistics for our control variables, reported in Panel B, are broadly consistent with prior US studies covering a similar period. For example, we report mean profitability (ROA) of 5%, mean annual sales growth of 8.9%, free cash flow of 5.6%, leverage of 16.9% and capital expenditure of 5.3%, which reflect values reported in prior studies covering a similar period (E-Vahdati et al. 2023; Rahman and Kabir 2023; Tunyi et al. 2025). Our governance data covers fewer observations than our financial data due to missing data problems in Boardex. We will therefore estimate multistage models to mitigate data loss in our analysis.

4.2 | Univariate Analysis

Table 2 examines whether firms that are vulnerable to takeovers reduce their ESG activities in a univariate setting. Panel A reports the distribution of ESG scores across vulnerability quintiles. Firms in Q1 have the lowest takeover vulnerability while those in Q5 face the most threats of a takeover.

The results in Panel A of Table 2 indicate a systematic decline in ESG scores as takeover vulnerability increases (i.e., from Q1 to Q5), consistent with H1. The difference between the means of Q5 and Q1 (i.e., Q5 − Q1) for all ESG scores is negative and significant at the 1% level. This suggests that firms facing high takeover threats tend to reduce their ESG engagement compared to other firms.

Although comparing Q5 and Q1 is consistent with prior literature (Danbolt et al. 2016; Tunyi et al. 2024), both quintiles only account for 40% of the sample. Therefore, Panel B evaluates the entire sample by testing the difference in ESG scores between the medians for firms with high versus low takeover vulnerability. In this context, the industry-year median of takeover vulnerability is used to categorise the sample into high- and low-subsamples. Consistent with the results in Panel A, we find that firms with high takeover vulnerability exhibit lower ESG performance, which is significant at the 1% level. These results provide early evidence to support our argument that firms respond to takeover threats by shifting attention away from ESG.

Before our multivariate analysis, we run pairwise correlations for all variables and compute the variance inflation factors (see Table C1). This allays concerns around biases arising from multicollinearity.

4.3 | Vulnerability to Takeovers and ESG Engagement

The next step in our analysis is to examine whether takeover vulnerability impacts ESG performance in a multivariate setting. Table 3 presents the results of the panel fixed-effects regression (Equation 1) examining the relationship between takeover vulnerability and ESG performance. Our first measure of vulnerability is *Target*, which identifies firms that become takeover targets in the next year. This is a biased measure of vulnerability as it assumes that target firms have full knowledge of impending takeovers. Our second measure is *Vulnerability*, which estimates the likelihood that a firm receives a bid.

In Columns 1 and 2, we present results for a simple model, with no controls. In Columns 3 and 4, we include firm- and year-fixed effects. In Columns 5 and 6, we include firm characteristics, as well as firm- and year-fixed effects. Across all columns, the coefficients of *Target* and *Vulnerability* are negative and statistically significant. In Column 5, for example, the coefficient of *Target* is −0.020, suggesting that in the year before a firm receives a takeover bid, its ESG score is 0.020 units less than that of its comparative that does not receive a takeover bid. These results should be interpreted with caution as they inherently reflect a look-ahead bias. In other words, firms do not know with certainty if they will become targets, and hence, we cannot argue that they make ESG decisions in response.

Column 6 of Table 3 reports results for our measure of takeover vulnerability, which is the estimated probability of firms becoming a target based on their financial characteristics, consistent with several prior studies (Cremers et al. 2009; Danbolt et al. 2016; Tunyi et al. 2024). The results in Column 6 suggest a statistically significant negative relationship between the probability of becoming a target (i.e., *Vulnerability*) and the *ESG score* at the 1% level (i.e., coefficient of −1.960). This finding is consistent with our predictions in H1 and the results of the univariate analysis. The results suggest that firms vulnerable to takeovers shift their attention away from ESG, leading to reduced ESG engagement.

TABLE 1 | Descriptive statistics.

Variables	*N* (1)	Mean (2)	SD (3)	p1 (4)	p25 (5)	p50 (6)	p75 (7)	p99 (8)
Panel A: Main dependent and independent variables								
ESG score	19,564	0.016	0.259	−0.470	−0.122	0.000	0.097	0.968
Environmental score	19,564	0.045	0.174	−0.350	0.000	0.000	0.000	0.750
Social score	19,564	0.024	0.604	−1.100	−0.333	0.000	0.200	2.167
Governance score	19,564	−0.022	0.231	−0.500	−0.083	0.000	0.000	1.000
ESG percentile	19,564	46.501	28.503	1.000	23.000	45.000	72.000	99.000
Environmental percentile	19,564	22.521	32.536	1.000	7.000	7.000	7.000	99.000
Social percentile	19,564	45.291	29.019	1.000	19.000	42.000	72.000	99.000
Governance percentile	19,564	26.825	23.765	1.000	22.000	23.000	23.000	97.000
Target	19,564	0.013	0.112	0.000	0.000	0.000	0.000	1.000
Vulnerability	19,564	0.026	0.034	0.001	0.008	0.014	0.028	0.180
Panel B: Control variables								
Profitability	19,564	0.050	0.090	−0.282	0.023	0.055	0.091	0.235
Tobin's Q	19,564	2.074	1.328	0.748	1.260	1.677	2.410	7.297
Sales growth	19,564	0.089	0.175	−0.352	0.000	0.074	0.165	0.653
Leverage	19,564	0.169	0.157	0.000	0.008	0.149	0.270	0.626
Firm size	19,564	21.078	1.541	18.069	19.950	20.957	22.068	25.013
Free cash flow	19,564	0.056	0.082	−0.199	0.018	0.059	0.100	0.256
Tangible assets	19,564	0.267	0.218	0.015	0.099	0.201	0.376	0.887
Concentration	19,564	0.096	0.080	0.037	0.055	0.075	0.107	0.436
Big 4 auditor	19,564	0.887	0.316	0.000	1.000	1.000	1.000	1.000
Capital expenditure	19,564	0.053	0.052	0.004	0.020	0.037	0.066	0.265
Bankruptcy risk	19,564	5.230	7.227	−0.699	2.516	3.863	5.972	28.476
Panel C: Additional governance control and moderating variables								
Board size	12,464	9.209	2.231	5.000	8.000	9.000	11.000	15.000
Board independence	12,464	0.742	0.145	0.300	0.667	0.778	0.857	0.923
CEO chair	12,464	0.620	0.485	0.000	0.000	1.000	1.000	1.000
Board females	12,464	0.121	0.102	0.000	0.000	0.111	0.182	0.400
Board diversity	12,464	0.811	0.321	0.000	0.714	1.000	1.000	1.000
Female CEO	19,564	0.024	0.152	0.000	0.000	0.000	0.000	1.000
Critical mass	19,564	0.402	0.490	0.000	0.000	0.000	1.000	1.000
Board co-option	6625	0.463	0.316	0.000	0.200	0.429	0.727	1.000
Managerial ability	10,820	0.002	0.131	−0.212	−0.078	−0.032	0.045	0.483
Institutional ownership	19,564	0.732	0.220	0.023	0.611	0.780	0.902	1.000
Block holding	19,270	0.222	0.134	0.000	0.119	0.211	0.312	0.565

Note: The table presents descriptive statistics for key variables used in the study. All continuous variables are winsorised at the 1st and 99th percentile to eliminate outliers. Full variable definitions are available in Table A1.

In Table 4, we examine whether firms facing takeover threats reduce investment across all three pillars of ESG or prioritise certain pillars over others. Columns 1–3 report the result in a simple model, while Columns 4–6 include all controls and suggest that firms vulnerable to takeovers cut ESG spending for all three pillars, evidenced by a reduction in *Environmental*,

TABLE 2 | Vulnerability to takeovers and ESG engagement: Univariate analysis.

	Score				Percentile			
	ESG score	Environment	Social	Governance	ESG score	Environment	Social	Governance
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Panel A: Quintiles								
Q1 (low)	0.105	0.106	0.208	0.001	53.417	38.995	52.595	30.279
Q2	0.015	0.044	0.016	−0.015	47.317	22.822	45.471	27.041
Q3	0.000	0.033	−0.006	−0.026	45.626	19.646	44.215	26.456
Q4	−0.010	0.024	−0.014	−0.040	44.093	17.237	43.798	24.752
Q5 (high)	−0.026	0.021	−0.071	−0.029	41.962	14.711	40.462	25.824
Diff (Q5 − Q1)	−0.131***	−0.085***	−0.279***	−0.030***	−11.454***	−24.284***	−12.133***	−4.455***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: Median								
Low	0.039	0.064	0.065	−0.012	48.400	27.908	46.880	28.230
High	−0.007	0.025	−0.016	−0.031	44.600	17.126	43.700	25.418
Diff (high − low)	−0.046***	−0.039***	−0.081***	−0.019***	−3.800***	−10.782***	−3.180***	−2.812***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: The table presents univariate analyses exploring the impact of vulnerability to takeovers on ESG engagement. In Panel A, we present mean ESG scores/percentiles for different quintiles of vulnerability. In Panel B, we present mean ESG scores/percentiles for high (above median) and low (below median) levels of vulnerability. "Diff" captures the difference in mean ESG scores/percentiles between subgroups. All variables are fully defined in Table A1. ***, ** and * indicate statistically significant difference at the 1%, 5% and 10% levels, respectively.

TABLE 3 | Vulnerability to takeovers and ESG engagement.

	ESG score					
Lagged variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Target	−0.046***		−0.020**		−0.020**	
	(0.013)		(0.010)		(0.009)	
Vulnerability		−0.260***		−1.478***		−1.960***
		(0.045)		(0.156)		(0.186)
Profitability					0.013	0.034
					(0.023)	(0.023)
Tobin's Q					−0.012***	−0.015***
					(0.002)	(0.002)
Sales growth					0.012	−0.022**
					(0.009)	(0.010)
Leverage					0.115***	0.110***
					(0.019)	(0.019)
Firm size					0.005	0.006
					(0.006)	(0.006)
Free cash flow					0.007	0.046*
					(0.027)	(0.027)
Tangible assets					−0.046	−0.059*
					(0.030)	(0.030)
Concentration					0.015	−0.009
					(0.060)	(0.060)
Big 4 auditor					0.024***	0.022***
					(0.007)	(0.007)
Capital expenditure					0.026	0.032
					(0.056)	(0.055)
Bankruptcy risk					0.001***	0.001***
					(0.001)	(0.001)
Constant	0.016***	0.023***	0.016***	0.054***	−0.112	−0.069
	(0.002)	(0.002)	(0.001)	(0.004)	(0.119)	(0.118)
Observations	19,564	19,564	19,564	19,564	19,564	19,564
Adj. *R*-squared	0.000	0.001	0.542	0.543	0.544	0.546
Firm FE	No	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Years	24	24	24	24	24	24
Industries	43	43	43	43	43	43

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions exploring the relationship between vulnerability to takeovers and ESG engagement. The base model is specified in Equation (1). All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Social, *Governance* engagement scores, statistically significant at the 1% level. In terms of the magnitude of these reductions, our results indicate that, for a unit increase in vulnerability, the decrease in the *Social* pillar is twice as much (−3.060 units) compared to *Environmental* (−1.267 units) or *Governance* (−1.553).

TABLE 4 | Vulnerability to takeovers and ESG engagement across the three pillars.

Lagged variables	Environmental (1)	Social (2)	Governance (3)	Environmental (4)	Social (5)	Governance (6)
Vulnerability	−1.022***	−2.247***	−1.166***	−1.267***	−3.060***	−1.553***
	(0.095)	(0.375)	(0.188)	(0.115)	(0.433)	(0.217)
Profitability				0.062***	0.024	0.015
				(0.015)	(0.053)	(0.025)
Tobin's Q				−0.009***	−0.023***	−0.014***
				(0.001)	(0.005)	(0.002)
Sales growth				−0.018***	−0.035	−0.012
				(0.007)	(0.023)	(0.011)
Leverage				0.094***	0.209***	0.027
				(0.013)	(0.046)	(0.021)
Firm size				−0.028***	0.064***	−0.017***
				(0.004)	(0.013)	(0.006)
Free cash flow				0.017	0.132**	−0.010
				(0.017)	(0.063)	(0.030)
Tangible assets				−0.128***	0.030	−0.077**
				(0.021)	(0.071)	(0.033)
Concentration				0.067*	0.049	−0.143**
				(0.041)	(0.142)	(0.058)
Big 4 auditor				0.009*	0.037**	0.021***
				(0.005)	(0.018)	(0.008)
Capital expenditure				0.064*	0.010	0.021
				(0.034)	(0.129)	(0.063)
Bankruptcy risk				0.001***	0.003**	0.001*
				(0.000)	(0.001)	(0.000)
Constant	0.071***	0.082***	0.008*	0.673***	−1.292***	0.411***
	(0.003)	(0.010)	(0.005)	(0.083)	(0.270)	(0.127)
Observations	19,564	19,564	19,564	19,564	19,564	19,564
Adj. *R*-squared	0.504	0.525	0.302	0.509	0.528	0.305
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Years	24	24	24	24	24	24
Industries	43	43	43	43	43	43

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions exploring the relationship between vulnerability to takeovers and engagement across the three ESG pillars. The base model is specified in Equation (1). All independent variables are lagged by 1 year. All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Notably, vulnerable firms' preference for cutting social activities more than environmental or governance activities aligns with prior research suggesting that the benefits of social initiatives are often long-term (Flammer 2015). As firms face external pressures, investment in such activities is withdrawn (Bansal et al. 2015). Hence, our findings are consistent with our first hypothesis and extend the ESG literature by showing that not only do firms become more defensive when exposed to takeover threats (Billett and Xue 2007; Tunyi et al. 2024; Driver et al. 2019), but they also actively reduce their ESG engagement.

4.4 | Vulnerability, ESG Overinvestment and Further ESG Engagement

Our second hypothesis predicts that governance conditions shape how firms retrench ESG under takeover pressure. Takeover vulnerability shortens managerial horizons and heightens dependence on capital market assessments, which are often driven by near-term financial metrics. This creates strong incentives to cut ESG when takeover risk rises. However, governance determines whether this retrenchment is indiscriminate or selective. High-ability managers and effective owners can distinguish between value-creating ESG and agency-driven or symbolic ESG, enabling them to protect strategically important ESG even as short-term pressures intensify. We therefore expect the negative vulnerability, ESG relation to be weaker in firms with stronger managerial ability and more effective shareholder monitoring. We examine these mechanisms in Table 6.

Columns 1–3 of Table 6 show that higher *Managerial ability*, *Institutional ownership* and *Block holding* are each associated with lower ESG engagement. Although this appears counterintuitive, it is consistent with the idea that better-governed firms are less prone to agency-driven or symbolic ESG overinvestment (Welch and Yoon 2023; Lopez-de Silanes et al. 2024).[5] More importantly, Columns 4–6 indicate that the interaction terms are positive and significant at the 1% level, implying that these governance mechanisms attenuate the negative effect of takeover vulnerability on ESG. This pattern suggests that able managers and well-monitored firms curtail low-value ESG when takeover risk rises, but are better able to preserve strategically material ESG. Thus, managerial ability, institutional ownership and blockholding discipline the form of ESG retrenchment rather than eliminating it, weakening the overall vulnerability, ESG nexus in line with Hypothesis 3.

Following Wang et al. (2021), we estimate industry-year regressions to obtain expected ESG based on firm profitability, size, Tobin's Q, leverage, sales growth and lagged ESG to capture persistent firm-level differences in ESG engagement. Deviations from this fitted value capture ESG overinvestment.[6] We then use this measure in our main specification as reported below.

$$\begin{aligned} &ESG\ Engagement_{it} \\ =\ &\beta_0 + \beta_1 ESG\ Engagement_{it-1} + \beta_2 Firm\ size_{it} + \beta_3 Tobins\ Q_{it} \\ &+ \beta_4 Leverage_{it} + \beta_5 Sales\ growth_{it} + \beta_6 Free\ cash\ flow_{it} + \epsilon_{it} \end{aligned} \quad (3)$$

All variables are defined in Table A1. We estimate this regression for each Fama & French 48 industry-year subgroup and use the resulting residuals (*ESG residual*) in Column 2 as our second measure of ESG overinvestment. For robustness, we also construct indicator variables from these residuals. *ESG residual above zero* in Column 3 captures positive residuals as excess ESG, while *ESG residual above Tercile 3* in Column 4 identifies extreme overinvestment using the top tercile.

As shown in Table 5, the interaction terms are negative and statistically significant across all specifications. Columns 1–4 show that the negative effect of *Vulnerability* on ESG engagement documented in Table 3 is stronger for firms with ex ante ESG overinvestment.[7] These findings indicate that firms with elevated ESG spending cut back more when exposed to takeover threats, consistent with Hypothesis 2.

4.5 | The Role of Managerial Ability and Large Shareholders

Our second hypothesis predicts that governance conditions shape how firms retrench ESG under takeover pressure. Specifically, we argued that high-ability managers and institutional owners can distinguish between value-creating ESG and agency-driven or symbolic ESG, enabling them to protect strategically important ESG even as short-term pressures intensify. We therefore expect the negative vulnerability–ESG relation to be weaker as managerial ability and institutional ownership increase. We examine these mechanisms in Table 6.

Columns 1–3 of Table 6 show that higher *Managerial ability*, *Institutional ownership* and *Block holding* are each associated with lower ESG engagement. Although this appears counterintuitive, it is consistent with the idea that better-governed firms are less prone to agency-driven or symbolic ESG overinvestment (Welch and Yoon 2023; Lopez-de Silanes et al. 2024).[8] More importantly, Columns 4–6 indicate that the interaction terms are positive and significant at the 1% level, implying that these governance mechanisms attenuate the negative effect of takeover vulnerability on ESG. This pattern suggests that able managers and well-monitored firms curtail low-value ESG when takeover risk rises, but are better able to preserve strategically material ESG. Thus, managerial ability, institutional ownership and blockholding discipline the form of ESG retrenchment rather than eliminating it, thereby weakening the overall vulnerability–ESG link, consistent with Hypothesis 3.

4.6 | Additional Analysis

4.6.1 | The Role of Financial Constraints and Board Dynamics

Financial constraints impact decision-making across many areas. Such constraints are possibly central to how takeover vulnerability translates into ESG retrenchment. Constrained firms face binding limits on their ability to fund investment and absorb cash flow shocks (He and Ren 2023), making discretionary and long-horizon ESG spending especially easy to cut (Attig 2024). The quiet life hypothesis predicts that managers in constrained firms become more risk-averse under takeover pressure and shift attention towards short-term performance (Likitapiwat et al. 2023; Chindasombatcharoen et al. 2024). Constrained firms facing takeover threats, therefore, have particularly strong incentives to divert resources away from ESG towards liquidity preservation and near-term financial metrics, resulting in deeper ESG retrenchment. Empirically, we, therefore, expect our results to be more pronounced in constraint firms. We use the White-Wu (WW) index, which estimates a firm's difficulty in obtaining external finance for investment, as a proxy for *Financial constraints* (Whited and Wu 2006). A higher WW index indicates that firms are more financially constrained and vice versa. Consistent with our

TABLE 5 | Vulnerability to takeovers and ESG engagement: Overinvestment in ESG.

	ESG Score			
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Vulnerability	−1.142***	−1.810***	−1.730***	−2.463***
	(0.177)	(0.235)	(0.188)	(0.365)
ESG score above median	0.136***			
	(0.004)			
Vulnerability # ESG score above median	−0.909***			
	(0.086)			
ESG residual		0.393***		
		(0.029)		
Vulnerability # ESG residual		−1.053*		
		(0.584)		
ESG residual above zero			0.068***	
			(0.004)	
Vulnerability # ESG residual above zero			−0.252***	
			(0.079)	
ESG residual in Tercile 3				0.086***
				(0.006)
Vulnerability # ESG residual in tercile 3				−0.287**
				(0.136)
Profitability	0.042*	−0.001	0.040*	−0.005
	(0.022)	(0.028)	(0.022)	(0.047)
Tobin's Q	−0.012***	−0.016***	−0.014***	−0.023***
	(0.002)	(0.003)	(0.002)	(0.005)
Sales growth	−0.014	−0.020	−0.023**	−0.041**
	(0.009)	(0.013)	(0.010)	(0.019)
Leverage	0.090***	0.103***	0.104***	0.090***
	(0.018)	(0.023)	(0.019)	(0.032)
Firm size	0.011**	0.020***	0.010*	0.013
	(0.005)	(0.007)	(0.006)	(0.010)
Free cash flow	0.026	0.029	0.038	0.044
	(0.026)	(0.035)	(0.027)	(0.054)
Tangible assets	−0.052*	−0.047	−0.052*	−0.028
	(0.028)	(0.040)	(0.030)	(0.056)
Concentration	0.001	−0.080	−0.027	−0.130
	(0.058)	(0.076)	(0.060)	(0.105)
Big 4 auditor	0.014**	0.013	0.023***	0.000
	(0.007)	(0.010)	(0.007)	(0.014)
Capital expenditure	0.028	0.063	0.019	0.044

(Continues)

TABLE 5 | (Continued)

Variables	ESG Score			
	(1)	(2)	(3)	(4)
	(0.053)	(0.071)	(0.055)	(0.106)
Bankruptcy risk	0.001**	0.002**	0.001***	0.003**
	(0.000)	(0.001)	(0.001)	(0.001)
Constant	−0.249**	−0.340**	−0.189	−0.165
	(0.111)	(0.150)	(0.116)	(0.208)
Observations	19,564	14,040	19,564	8954
Adj. *R*-squared	0.584	0.582	0.558	0.577
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Years	24	22	24	22
Industries	43	33	43	32

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions that explore the relationship between vulnerability to takeovers and ESG, taking into account prior overinvestment in ESG. The base model is specified in Equation (1). All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

expectation, we find a negative and statistically significant interaction effect in Column 1 of Table 7. This suggests that financial constraints exacerbate the negative relationship between vulnerability and ESG.

Regarding board dynamics, we focus on director gender as a key moderator of firms' ESG responses to takeover threats. Prior research shows that female directors and executives tend to be more risk-averse and conservative in corporate decision-making (Carter et al. 2017; Tunyi et al. 2023; Adams and Ferreira 2009; Torchia et al. 2011), although this characterisation is context-dependent and increasingly contested. Gender-diverse leadership teams also place greater emphasis on compliance, reputational protection and stakeholder oversight (Bear et al. 2010; Hyun et al. 2016), with risk preferences varying across institutional and governance settings (Adams and Ferreira 2009; Adams and Funk 2012; Huang and Kisgen 2013; Faccio et al. 2016; Sila et al. 2016). Importantly, prior work suggests that female influence becomes salient only when a critical mass of at least three women sits on the board (Tunyi et al. 2023; Adams and Ferreira 2009; Torchia et al. 2011).

In high-stakes settings such as takeover threats, gendered governance traits may heighten pressures to demonstrate financial discipline, leading firms with a female CEO or a critical mass of female directors to reduce ESG spending more aggressively in response. The results of this analysis are presented in Columns 2 and 3 of Table 7. In Column 2, we interact vulnerability with an indicator for female CEO and document a significant (at 1%) negative interaction effect. This suggests that the negative effect of takeover vulnerability on ESG performance is more pronounced among firms with female CEOs. Similarly, in Column 3, we find that the effect is more pronounced among firms with a critical mass of female directors on their boards.

The final governance channel we examine is CEO influence over the board. Takeovers disproportionately affect CEOs, who typically lose their positions following acquisitions, thereby creating strong incentives for them to pre-empt or deter takeover threats (Tunyi et al. 2024). In contrast, directors, especially independent ones, are tasked with safeguarding broader stakeholder interests and may be less inclined to sacrifice ESG for short-term defensive gains. We therefore expect ESG retrenchment under takeover pressure to be more pronounced when CEOs wield greater influence over board decisions.

We proxy for CEO influence using *board co-option*, defined as the fraction of directors appointed after the incumbent CEO assumed office (Coles et al. 2014). Higher co-option reflects weaker board independence and lower monitoring intensity, allowing CEOs to more easily pursue self-preservation strategies. Because takeover threats pose direct career risk to CEOs (Sul 2024b), greater co-option should amplify incentives to prioritise short-term metrics at the expense of long-horizon investments such as ESG. Consistent with this prediction, the interaction between vulnerability and board co-option in Columns 4 and 5 of Table 7 is negative and statistically significant, indicating that ESG cuts are deeper when CEOs exert stronger control over the board.

4.6.2 | Does Environmental Salience Matter?

Because ESG is not equally material across industries, the effect of takeover vulnerability on ESG engagement should vary with firms' exposure to environmental, regulatory and reputational risk. In sectors with large social and environmental externalities, ESG investments are more visible, more costly and more tightly linked to near term cash flows through regulation, litigation risk and stakeholder scrutiny. If takeover vulnerability induces managerial short-termism, its impact should be strongest in ESG-salient industries, where retrenching ESG yields the greatest immediate financial relief, even though such investments remain strategically valuable in the long run.

TABLE 6 | Vulnerability and ESG: Managerial ability and large shareholders.

	ESG score					
Lagged variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Managerial ability	−0.148***			−0.160***		
	(0.032)			(0.038)		
Institutional ownership		−0.081***			−0.086***	
		(0.015)			(0.016)	
Block holding			−0.130***			−0.142***
			(0.018)			(0.021)
Vulnerability				−1.593***	−2.419***	−2.197***
				(0.229)	(0.282)	(0.217)
Vulnerability # Managerial ability				1.553**		
				(0.688)		
Vulnerability # Institutional ownership					0.662**	
					(0.261)	
Vulnerability # Block holding						1.051***
						(0.403)
Profitability	0.150***	0.032	0.013	0.144***	0.037*	0.026
	(0.040)	(0.026)	(0.026)	(0.035)	(0.023)	(0.023)
Tobin's Q	−0.026***	−0.016***	−0.018***	−0.026***	−0.015***	−0.017***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)
Sales growth	0.021	0.009	0.004	−0.010	−0.021**	−0.027***
	(0.014)	(0.010)	(0.010)	(0.014)	(0.010)	(0.010)
Leverage	0.163***	0.111***	0.119***	0.135***	0.105***	0.114***
	(0.029)	(0.021)	(0.021)	(0.027)	(0.019)	(0.019)
Firm size	−0.024***	0.002	−0.006	−0.012	0.009*	0.003
	(0.008)	(0.006)	(0.006)	(0.008)	(0.006)	(0.006)
Free cash flow	−0.042	−0.000	−0.007	−0.005	0.047*	0.037
	(0.040)	(0.030)	(0.030)	(0.037)	(0.027)	(0.027)
Tangible assets	−0.085**	−0.052	−0.034	−0.116***	−0.067**	−0.050*
	(0.040)	(0.033)	(0.034)	(0.038)	(0.030)	(0.030)
Concentration	0.220***	0.044	0.058	0.169**	−0.010	0.005
	(0.085)	(0.063)	(0.063)	(0.079)	(0.060)	(0.059)
Big 4 auditor	0.018*	0.017**	0.019**	0.024**	0.023***	0.024***
	(0.010)	(0.008)	(0.008)	(0.009)	(0.007)	(0.007)
Capital expenditure	−0.060	0.053	0.025	−0.014	0.042	0.014
	(0.072)	(0.060)	(0.061)	(0.067)	(0.055)	(0.056)
Bankruptcy risk	0.005***	0.003***	0.003***	0.004***	0.001***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.484***	0.011	0.133	0.292*	−0.068	0.036

(Continues)

TABLE 6 | (Continued)

Lagged variables	ESG score					
	(1)	(2)	(3)	(4)	(5)	(6)
	(0.179)	(0.133)	(0.134)	(0.163)	(0.118)	(0.119)
Observations	9506	16,094	15,895	10,773	19,564	19,224
Adj. *R*-squared	0.479	0.499	0.499	0.482	0.546	0.546
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Years	23	23	23	23	24	24
Industries	42	43	43	43	43	43

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions that explore the relationship between vulnerability to takeovers and ESG, taking into account managerial ability and ownership structure. The base model is specified in Equation (1). All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8 tests this prediction by comparing firms in environmental salient and non-salient sectors using two classifications of environmental-salience; Saliance (1) and Salience (2). Under both classifications of environmental salience, takeover vulnerability is associated with lower ESG engagement, but the magnitude is systematically larger for salient firms.[9] For example, the coefficient on Vulnerability is about twice as large in salient industries, at −3.21 versus −1.53 under Salient (1) and −2.57 versus −1.58 under Salient (2). This pattern indicates that firms in environmentally and socially exposed sectors cut ESG more aggressively when facing takeover pressure.

Although the point estimates suggest economically meaningful heterogeneity, formal interaction tests are not statistically significant. This implies that takeover vulnerability depresses ESG broadly across industries, but its economic impact is concentrated in sectors where ESG is most tightly linked to firm value and external scrutiny.

4.7 | Robustness Checks

We conduct several robustness checks to allay concerns that our results are spurious. Our first robustness check focuses on our ESG engagement measures. Because ESG data are inherently qualitative in nature and ESG scoring is prone to measurement errors that may arise from coding errors and/or data unavailability. Following Lioui and Tarelli (2022), we reduce the impact of measurement errors by converting ESG scores to percentile ranks. We use the normalised percentile ranks in place of ESG scores to conduct our analysis. The results, presented in Columns 1–4 of Table 9 are consistent with our baseline. That is, the negative relationship between takeover vulnerability and ESG remains robust (negative and significant at the 1% level) across all ESG pillars.

Next, we have followed prior studies (Lioui and Tarelli 2022; Shackleton et al. 2022) by using MSCI (formerly KLD) data on ESG. Prior studies (see, for example, Gibson Brandon et al. 2021) document significant disagreements in firms' ESG scores across ESG rating providers. To address concerns that our results are driven by the choice of rating provider (i.e., MSCI ESG ratings), we also collect ESG ratings for our sample firms from LSEG (formerly Refinitiv). After matching LSEG ESG data to our sample by ISIN and year, we find that the coverage for our sample firm is much lower—only 2829 compared to 19,564 useful observations—when using MSCI data. Nonetheless, as shown in Table D1, our results are generally consistent. Specifically, we find a negative and significant (at 1%) relationship between vulnerability and LSEG's ESG combined score. We also find consistent results for LSEG's Environmental and Governance pillar scores, but not for the social pillar score.

Our second robustness check is on our measure of vulnerability. Following prior studies (Tunyi et al. 2024), we sort our takeover-likelihood measure into percentiles and quintiles and use these as an alternative measure of vulnerability. We also use the hostile takeover index (Cain et al. 2017) as an alternative measure, although it only captures firms' exposure to the risk of hostile takeovers. Across all three alternatives (see Columns 4–6 of Table 9), we find that our results remain robust. Specifically, the relationship between takeover likelihood and ESG remains negative and statistically significant at 1%.

While we have drawn a causal inference—vulnerability to takeovers *cause* firms to alter their ESG behaviour—our results may be prone to endogeneity. We partially addressed endogeneity arising from omitted variable bias by estimating firm fixed-effects models throughout the study. However, our models did not control for corporate governance features, which may directly affect firms' ESG engagement decisions. We excluded this due to missing data; specifically, models without governance controls utilise 19,564 observations, whereas those with governance controls use only 12,375 observations. In Columns 8 and 9 of Table 9, we demonstrate that our results remain robust when controlling for governance characteristics, including board size, board independence, CEO Chair duality and board gender diversity.

Another source of endogeneity is reverse causality. We have argued that vulnerability causes firms to reduce ESG engagement. However, the reverse may be true, that is, firms that fail to engage in ESG may become more vulnerable to takeovers. In unreported tests, we first lag all independent variables in our baseline

TABLE 7 | Vulnerability and ESG: Constraints, female directors and board co-option.

	ESG score				
Lagged variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Vulnerability	−6.952***	−1.894***	−1.654***	−1.566***	−1.506***
	(1.602)	(0.186)	(0.199)	(0.547)	(0.527)
Financial constraints	0.095				
	(0.105)				
Vulnerability # Financial constraints	−5.252***				
	(1.704)				
Female CEO		0.087***			
		(0.022)			
Vulnerability # Female CEO		−2.288***			
		(0.550)			
Critical mass			0.065***		
			(0.007)		
Vulnerability # Critical mass			−0.378***		
			(0.131)		
Board co-option				0.016	
				(0.014)	
Vulnerability # Board co-option				−1.094**	
				(0.549)	
Board co-option (TW)					0.025
					(0.016)
Vulnerability # Board co-option (TW)					−1.464**
					(0.571)
Profitability	0.033	0.034	0.033	0.146**	0.144**
	(0.024)	(0.023)	(0.023)	(0.064)	(0.065)
Tobin's Q	−0.016***	−0.015***	−0.014***	−0.029***	−0.029***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)
Sales growth	−0.021	−0.021**	−0.025**	−0.014	−0.014
	(0.014)	(0.010)	(0.010)	(0.021)	(0.021)
Leverage	0.108***	0.112***	0.106***	0.129***	0.128***
	(0.019)	(0.019)	(0.019)	(0.039)	(0.039)
Firm size	0.008	0.006	0.016***	0.002	0.003
	(0.007)	(0.006)	(0.006)	(0.011)	(0.011)
Free cash flow	0.052*	0.044	0.047*	0.036	0.036
	(0.027)	(0.027)	(0.027)	(0.058)	(0.058)
Tangible assets	−0.058*	−0.055*	−0.053*	−0.023	−0.021
	(0.030)	(0.030)	(0.030)	(0.055)	(0.055)
Concentration	−0.010	−0.018	−0.011	0.349***	0.352***

(Continues)

TABLE 7 | (Continued)

	ESG score				
Lagged variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
	(0.060)	(0.059)	(0.060)	(0.118)	(0.118)
Big 4 auditor	0.022***	0.022***	0.021***	−0.007	−0.007
	(0.007)	(0.007)	(0.007)	(0.014)	(0.014)
Capital expenditure	0.032	0.030	0.047	0.038	0.039
	(0.055)	(0.055)	(0.055)	(0.105)	(0.105)
Bankruptcy risk	0.001***	0.001***	0.001***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Constant	−0.000	−0.068	−0.307**	0.006	−0.003
	(0.123)	(0.118)	(0.121)	(0.241)	(0.241)
Observations	19,564	19,564	19,564	6579	6579
Adj. *R*-squared	0.546	0.547	0.549	0.525	0.525
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Years	24	24	24	22	22
Industries	43	43	43	42	42

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions that explore the relationship between vulnerability to takeovers and ESG, taking into account financial constraints, risk-aversion (female directors) and CEO influence (board co-option). The base model is specified in Equation (1). All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

regression (Column 6 of Table 3), so that vulnerability in one period explains ESG in the next period. We find that our results are consistent, with negative and significant coefficients at the 1% level. However, we formally address the reverse causality issue by employing a two-stage least squares regression approach.

Our two-stage least squares model employs two instruments for vulnerability: the lagged average peer vulnerability (excluding the focal firms) and an indicator of whether the firm is registered in the State of Delaware. The use of peer firms' vulnerability as an instrument is consistent with Tunyi et al. (2024) and motivated by the Economic Disturbance Theory (Palepu 1986; Gort 1969), which suggests that takeovers cluster by industry as a completion of a takeover within an industry incentivises other players to merge in order to retain their competitive position. We therefore expect a positive relationship between peer firms' vulnerability and the focal firm's vulnerability to takeovers. Our second instrument—Delaware registration—is motivated by prior research (Daines 2001) showing that US firms registered in the State of Delaware are significantly more likely to receive takeover bids and be acquired under Delaware Law. Our instruments are exogenous as they are not determined by the focal firm. However, the instruments meet the exclusion criteria because peer vulnerability and Delaware registration are unlikely to affect a focal firm's ESG engagement decision, except by impacting their vulnerability to takeovers.

As shown in Column 1 of Table 10, both instruments are positive and significantly (at 1%) related to vulnerability. Our underidentification (Kleibergen-Paap rk LM Statistic) of 556.38 with a significant *p*-value (0.000), the weak identification test statistic (Cragg-Donald Wald F statistic) of 501.126 with a maximum Stock-Yogo critical value of 19.93 and our over-identification test (Hansen J statistic) of 0.288 with an insignificant *p*-value (0.592) suggest that our instruments are valid. We use these instruments in the first-stage regression to generate our instrumented vulnerability measure, which then enters the second-stage regressions together with our lagged independent variables. As shown in Columns 2–5 of Table 10, our results remain robust. Our instrumented measure of takeover vulnerability is negatively associated with firms' ESG engagement across all pillars. The results for all but the social pillar are significant at 1%. These results suggest a causal relationship between takeover vulnerability and ESG engagement as predicted in H1.

Finally, the characteristics of vulnerable firms may be significantly different from those of others (Danbolt et al. 2016; Palepu 1986)—self-selection bias—which weakens our inferences of a *causal* relationship between vulnerability and ESG engagement. We use a matching strategy (entropy balancing) to address this form of endogeneity.

Jiang et al. (2018) suggest that matching through entropy balancing is superior to propensity score matching as it is based on an equal percent bias-reducing technique. The matching technique allocates weights to a control group so that the moments of a treated group align with those of the post-weighted control group (Hainmueller and Xu 2013). To deploy this strategy in our analysis, we first split the sample into two subsamples: treated (i.e., firms vulnerable to takeovers) and control (i.e.,

TABLE 8 | Vulnerability and ESG: ESG salience.

	ESG Score			
	Non-salient (1)	Salient (1)	Non-salient (2)	Salient (2)
Lagged variables	**(1)**	**(2)**	**(3)**	**(4)**
Vulnerability	−1.527***	−3.205***	−1.575***	−2.574***
	(0.199)	(0.470)	(0.210)	(0.384)
Profitability	0.044*	0.013	0.039	0.034
	(0.025)	(0.051)	(0.025)	(0.047)
Tobin's Q	−0.013***	−0.025***	−0.011***	−0.029***
	(0.003)	(0.006)	(0.003)	(0.005)
Sales growth	−0.021*	−0.009	−0.031***	0.003
	(0.011)	(0.022)	(0.011)	(0.020)
Leverage	0.095***	0.184***	0.089***	0.167***
	(0.021)	(0.050)	(0.021)	(0.043)
Firm size	0.012*	−0.026*	0.020***	−0.041***
	(0.006)	(0.015)	(0.006)	(0.013)
Free cash flow	0.042	0.097	0.053*	0.028
	(0.029)	(0.071)	(0.030)	(0.060)
Tangible assets	−0.165***	0.234***	−0.139***	0.033
	(0.033)	(0.066)	(0.037)	(0.050)
Concentration	0.101	−0.233	−0.034	0.022
	(0.065)	(0.162)	(0.061)	(0.118)
Big 4 auditor	0.022***	0.009	0.019**	0.025
	(0.008)	(0.020)	(0.008)	(0.017)
Capital expenditure	0.066	−0.024	0.007	0.025
	(0.060)	(0.125)	(0.067)	(0.100)
Bankruptcy risk	0.001**	0.001**	0.001*	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−0.181	0.576*	−0.350***	0.945***
	(0.126)	(0.320)	(0.128)	(0.273)
Observations	16,126	3438	14,421	5143
Adj. *R*-squared	0.531	0.603	0.532	0.580
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Years	24	24	24	24
Industries	36	11	30	18
Firms	2065	480	1866	679

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions exploring the relationship between vulnerability to takeovers and ESG engagement across different industries. The base model is specified in Equation (1). All independent variables are lagged by 1 year. All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

firms not vulnerable to takeovers). Second, we match treatment and control groups on the first three moments (mean, variance and skewness) of the control variables in baseline models. The matching procedure re-weights the control sample so that its mean, variance and skewness across the matching variables converge to those of the test sample.[10] The results show that the

TABLE 9 | Vulnerability and ESG: Alternative measures and governance controls.

	Percentile (relative) ESG scores				Alternative vulnerability measures			Governance controls	
	ESG score perc.	Environment perc.	Social perc.	Governance perc.	ESG scores			ESG scores	
Lagged variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Vulnerability quintiles					−0.039***				
					(0.004)				
Vulnerability deciles						−0.031***			
						(0.003)			
Hostile takeover index							−0.334***		
							(0.097)		
Target								−0.041***	
								(0.013)	
Vulnerability	−177.473***	−203.884***	−115.306***	−164.592***					−3.129***
	(21.590)	(22.114)	(21.403)	(23.868)					(0.382)
Profitability	4.503*	8.543***	1.939	5.389**	0.032	0.038*	0.105***	0.010	0.024
	(2.551)	(2.868)	(2.578)	(2.731)	(0.023)	(0.023)	(0.037)	(0.039)	(0.039)
Tobin's Q	−0.886***	−0.930***	−0.237	−1.567***	−0.015***	−0.017***	−0.025***	−0.024***	−0.027***
	(0.249)	(0.252)	(0.245)	(0.257)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)
Sales growth	−3.092***	−4.231***	−2.875***	−1.873	−0.022**	−0.042***	0.018	0.022	−0.017
	(1.094)	(1.223)	(1.082)	(1.167)	(0.010)	(0.010)	(0.013)	(0.014)	(0.015)
Leverage	7.482***	9.562***	5.446**	1.150	0.112***	0.104***	0.153***	0.102***	0.091***
	(2.103)	(2.436)	(2.153)	(2.158)	(0.019)	(0.019)	(0.030)	(0.026)	(0.026)
Firm size	1.868***	−2.055***	5.041***	−1.885***	0.003	0.002	−0.024***	0.019**	0.017**
	(0.594)	(0.685)	(0.593)	(0.645)	(0.006)	(0.006)	(0.008)	(0.008)	(0.008)
Free cash flow	3.914	6.967**	3.330	−4.381	0.045*	0.070**	−0.032	0.039	0.085**
	(3.098)	(3.332)	(3.090)	(3.339)	(0.027)	(0.027)	(0.038)	(0.042)	(0.042)
Tangible assets	−3.083	−19.411***	7.481**	−7.698**	−0.071**	−0.089***	−0.113***	−0.009	−0.025
	(3.356)	(3.767)	(3.413)	(3.698)	(0.030)	(0.030)	(0.042)	(0.045)	(0.045)

(Continues)

TABLE 9 | (Continued)

	Percentile (relative) ESG scores				Alternative vulnerability measures			Governance controls	
	ESG score perc.	Environment perc.	Social perc.	Governance perc.	ESG scores			ESG scores	
Lagged variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Concentration	−3.956	3.592	0.244	−11.461*	−0.034	−0.061	0.253***	0.051	0.014
	(5.923)	(6.536)	(6.127)	(6.336)	(0.060)	(0.060)	(0.090)	(0.082)	(0.082)
Big 4 auditor	2.780***	2.663***	1.228	2.302**	0.024***	0.023***	0.023**	0.008	0.008
	(0.865)	(0.900)	(0.862)	(0.957)	(0.007)	(0.007)	(0.009)	(0.010)	(0.010)
Capital expenditure	−1.377	7.675	−3.739	−8.111	0.033	0.037	−0.038	0.095	0.093
	(6.329)	(6.789)	(6.223)	(7.301)	(0.055)	(0.055)	(0.069)	(0.085)	(0.085)
Bankruptcy risk	0.071	0.026	0.051	0.090	0.002***	0.002***	0.005***	0.004***	0.004***
	(0.054)	(0.048)	(0.053)	(0.058)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Board size								0.001	0.001
								(0.002)	(0.002)
Board independence								−0.102***	−0.104***
								(0.022)	(0.022)
CEO chair								−0.000	−0.001
								(0.006)	(0.006)
Board females								0.408***	0.408***
								(0.039)	(0.039)
Constant	10.546	72.907***	−61.636***	75.055***	0.071	0.167	0.525***	−0.355**	−0.234
	(12.629)	(14.441)	(12.618)	(13.710)	(0.118)	(0.118)	(0.179)	(0.174)	(0.173)
Observations	19,564	19,564	19,564	19,564	19,564	19,564	9392	12,375	12,375
Adj. *R*-squared	0.554	0.546	0.555	0.265	0.547	0.548	0.447	0.557	0.559
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions that explore the relationship between vulnerability to takeovers and ESG across alternative measures of ESG score, alternative vulnerability measures and additional governance controls. The base model is specified in Equation (1). All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

TABLE 10 | Two-stage least squares.

Lagged variables	Vulnerability (1)	Environment (2)	Social (3)	Governance (4)	ESG score (5)
Lagged mean peer vulnerability	0.215***				
	(0.000)				
Delaware registration	0.009***				
	(0.000)				
Vulnerability_instrumented		−0.971***	−1.022*	−1.485***	−1.159***
		(0.000)	(0.081)	(0.000)	(0.000)
Profitability	−0.027***	0.012	−0.286***	0.037	−0.079***
	(0.000)	(0.524)	(0.000)	(0.229)	(0.008)
Tobin's Q	−0.002***	0.009***	0.071***	−0.008***	0.024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales growth	−0.002	−0.074***	−0.049*	−0.008	−0.044***
	(0.267)	(0.000)	(0.087)	(0.521)	(0.001)
Leverage	0.020***	0.007	−0.087**	0.002	−0.026*
	(0.000)	(0.525)	(0.015)	(0.905)	(0.087)
Firm size	−0.005***	0.027***	0.127***	−0.005**	0.050***
	(0.000)	(0.000)	(0.000)	(0.029)	(0.000)
Free cash flow	0.021***	0.098***	0.447***	−0.088***	0.152***
	(0.000)	(0.000)	(0.000)	(0.009)	(0.000)
Tangible assets	−0.018***	−0.095***	−0.346***	0.011	−0.143***
	(0.000)	(0.000)	(0.000)	(0.475)	(0.000)
Concentration	−0.023***	0.032	−0.278***	−0.057**	−0.101***
	(0.002)	(0.148)	(0.001)	(0.038)	(0.003)
Big 4 auditor	0.003***	0.012***	0.019	0.008	0.013**
	(0.002)	(0.001)	(0.160)	(0.135)	(0.021)
Capital expenditure	0.035***	0.120***	1.044***	0.120*	0.428***
	(0.000)	(0.001)	(0.000)	(0.057)	(0.000)
Bankruptcy risk	−0.000	−0.001***	−0.003***	0.000	−0.001***
	(0.331)	(0.000)	(0.000)	(0.256)	(0.000)
Constant	0.124***	−16.903***	−55.764***	−24.606***	−32.424***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	15,521	15,521	15,521	15,521	15,521
R-squared	0.202	0.143	0.178	0.043	0.201
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Note: This table presents coefficient estimates from two-stage least squares regressions exploring the relationship between vulnerability to takeovers and ESG. The first-stage regression predicts vulnerability using two instruments; the lag of the average peer vulnerability and Delaware registration. The instrumented vulnerability measure derived from the first stage is used in the second stage to explain ESG engagement across the three ESG pillars. All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

TABLE 11 | Entropy balancing.

	ESG score	
	Treated: Target in 5 years	Treated: High vulnerability
Variables	(1)	(2)
Vulnerability	−0.280***	−0.108***
	(0.087)	(0.038)
Profitability	−0.029	−0.001
	(0.036)	(0.021)
Tobin's Q	0.008**	0.011***
	(0.003)	(0.001)
Sales growth	0.014	−0.026***
	(0.019)	(0.009)
Leverage	−0.058***	−0.058***
	(0.022)	(0.011)
Firm size	0.034***	0.030***
	(0.003)	(0.002)
Free cash flow	0.072	0.062**
	(0.049)	(0.025)
Tangible assets	0.004	−0.016
	(0.028)	(0.012)
Concentration	−0.089	−0.125**
	(0.118)	(0.053)
Big 4 auditor	0.032***	0.049***
	(0.010)	(0.004)
Capital expenditure	0.342***	0.142***
	(0.091)	(0.042)
Bankruptcy risk	0.000	−0.001***
	(0.000)	(0.000)
Constant	−0.842***	−0.737***
	(0.132)	(0.051)
Observations	19,564	19,564
R-squared	0.299	0.281
Industry FE	Yes	Yes
Year FE	Yes	Yes

Note: This table presents coefficient estimates from cross-sectional regressions, with industry- and year-fixed effects, that explore the relationship between vulnerability to takeovers and ESG engagement within an entropy-balanced sample. Column 1 reports results when treated firms are defined as those that become targets in the next 5 years. Column 2 reports results when treated firms are defined as those with vulnerability scores above the industry-year median. All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

treated and control groups become balanced, with equal moments across variables, after the balancing procedure. We then re-estimate our baseline results using the reweighted sample and present them in Table 11.

To ensure robustness, we employ two strategies to identify treatment and control firms. First, treatment (control) firms are considered those that (do not) receive a bid at any point over the next 5 years. The results obtained from this strategy are presented in Column 1 of Table 11. Second, we define treated (control) firms as those with a vulnerability value greater (lesser) than the industry-year median. The results obtained from using this strategy are presented in Column 2. As shown in Table 11, our results remain valid after addressing sample selection bias via entropy balancing. Specifically, we find that vulnerability to takeovers is associated with a decline in ESG engagement, supporting our main hypothesis (H1).

5 | Conclusion

5.1 | Summary and Discussion of Findings

This study examines how takeover vulnerability shapes firms' ESG decisions. Using a large panel of US firms from 1994 to 2019, we show that the threat of acquisition leads to systematic ESG retrenchment, particularly among firms that have previously overinvested in ESG. These patterns indicate that firms actively adjust ESG when they face heightened control pressure, either to conserve financial flexibility or to improve short-term metrics that matter in the market for corporate control. Importantly, these responses are heterogeneous and depend on firms' financial constraints, governance structures, board characteristics and CEO influence.

Three central findings emerge. First, takeover vulnerability is robustly associated with subsequent declines in ESG performance. This result implies that ESG investments, especially those with long horizons, are subject to short-term pressures stemming from external discipline in the market for corporate control, extending prior work on managerial myopia into the ESG domain. Second, the effect is substantially stronger for firms with high prior ESG engagement. These firms appear to draw down accumulated reputational and stakeholder capital, treating ESG as an intertemporal buffer that can be used when external pressure intensifies. Rather than abandoning ESG altogether, they selectively retrench, scaling back investments that are most vulnerable in a takeover setting. This highlights both the strategic value of ESG credit and the fragility of ESG commitments under threats of corporate control. Third, governance conditions meaningfully shape these responses. Firms led by more capable managers or those with strong blockholder or institutional ownership exhibit a weaker tendency to cut ESG, consistent with stronger oversight that constrains short-termism. By contrast, firms with more conservative boards or greater CEO dominance exhibit sharper ESG retrenchment, indicating that agency frictions and board dynamics materially influence firms' responses to takeover pressure.

Taken together, these results show that ESG is not insulated from the market for corporate control. Instead, it is a strategic

margin that firms adjust in response to external threats, with governance determining whether these adjustments reflect opportunism or disciplined reallocation.

5.2 | Research Implications

For managers, the findings underscore a central tension between financial resilience and long-term sustainability commitments. While cutting ESG may provide short-term relief under takeover pressure, it risks eroding stakeholder trust and long-term value. Strong governance and independent oversight are therefore critical to preserving the credibility of ESG strategies when firms face external shocks.

For policymakers and regulators, the results suggest that ESG outcomes reflect not only firms' intrinsic sustainability orientation but also their strategic environment. Periods of heightened takeover vulnerability can induce ESG retrenchment even among previously committed firms, implying that ESG ratings and disclosures may partly capture corporate control pressures. Policies that promote transparency around ESG investment decisions and that strengthen incentives for long-horizon governance may help stabilise sustainability outcomes during control contests.

5.3 | Research Contributions

This study establishes takeover vulnerability as an economically important determinant of corporate ESG behaviour. Across a broad panel of US firms, we show that exposure to both hostile and friendly takeover risk leads to systematic ESG retrenchment, extending prior work that has focused almost exclusively on hostile bids (Treepongkaruna, Sarajoti, and Padungsaksawasdi 2024; Wongsinhirun et al. 2022; Wang et al. 2025) and helping reconcile mixed evidence on whether takeover threats induce ESG signalling or cutbacks.

The findings also reposition ESG within the market for corporate control. Rather than being a passive byproduct of managerial preferences or stakeholder pressure, ESG emerges as a strategic adjustment channel alongside earnings management, payouts and repurchases. Its relative opacity and long horizon make it a particularly flexible instrument for responding to takeover pressure.

At a theoretical level, the evidence clarifies how agency and resource dependency interact under external control threats. ESG retrenchment reflects managerial self-preservation and horizon shortening, but these forces are constrained by governance quality and by accumulated ESG capital. From a resource dependence perspective, takeover vulnerability heightens firms' reliance on capital markets and liquidity, inducing reallocation away from discretionary, long-horizon ESG activities towards uses that preserve financial flexibility.

Taken together, the results show that takeover vulnerability does not simply discipline managers; it reshapes how firms deploy ESG as both a buffer and a bargaining instrument when control is at stake.

5.4 | Future Research

Several avenues remain open. Future work could examine the persistence of ESG retrenchment, whether firms restore ESG investment after takeover pressure subsides, or whether cutbacks have lasting effects. Cross-country studies would also be valuable, as institutional differences in takeover regulation, investor protection and ESG norms may alter how firms balance sustainability and control risk.

Endnotes

[1] For brevity, we do not further discuss the selection of these predictor variables as these have been extensively explored in previous studies (Palepu 1986; Powell 2001; Danbolt et al. 2016; Tunyi et al. 2019; Cremers et al. 2009; Tunyi et al. 2024).

[2] Environmental strengths cover areas such as beneficial products and services, pollution prevention, recycling and clean energy, while concerns cover areas such as hazardous waste, regulatory problems, ozone-depleting chemicals, substantial emissions and agricultural chemicals, amongst others. Governance strengths cover areas such as limited compensation, transparency, ownership, corruption and political instability and financial system instability, while concerns capture high compensation, business ethics, ownership concerns and controversial investments, amongst others.

[3] The number of strength and concern indicators across each category is not fixed and hence, to mitigate the concern of comparability, we divide the number of strengths (or concerns) by the maximum number of strengths (or concerns) before subtracting the strength index from the concern index to arrive at the score for each category.

[4] We do not control for governance characteristics in our baseline analysis, as it leads to significant sample restriction due to governance data unavailability for several firms.

[5] This is not our primary research question, so we do not tease this further. It is, however, an interesting area for future research.

[6] In unreported tests, we include several more variables in this model and find consistent results. For parsimony, we retain this simple model for our analysis.

[7] In unreported analysis, to augment these results, we re-estimate our baseline across sub-samples of high and low ESG overinvestment. We find that, consistent with the moderation results, our baseline results hold for both subsamples. However, the effect is stronger in the subsample of firms with ex ante overinvestment in ESG.

[8] This is not our primary research question, so we do not tease this further. It is, however, an interesting area for future research.

[9] We use two classifications for environmental salience. Salient (1) includes mining and extraction (SIC 1000–1499), paper and pulp, chemicals (SIC 2800–2899), petroleum refining (SIC 2900–2999), primary metals (SIC 3300–3399) and utilities (SIC 4900–4999). Salient (2) additionally includes oil and gas (SIC 1300–1399), transportation (SIC 4000–4799), food and beverages (SIC 2000–2099), tobacco (SIC 2100–2199), alcoholic beverages (SIC 2080–2085), textiles and apparel (SIC 2200–2399) and financial services (SIC 6000–6999).

[10] In Table E1, we report variable distributions before (Panel A) and after (Panel B) entropy balancing.

References

Adams, R. B., and D. Ferreira. 2009. "Women in the Boardroom and Their Impact on Governance and Performance." *Journal of Financial Economics* 94, no. 2: 291–309.

Adams, R. B., and P. Funk. 2012. "Beyond the Glass Ceiling: Does Gender Matter?" *Management Science* 58, no. 2: 219–235.

Albuquerque, R., Y. Koskinen, S. Yang, and C. Zhang. 2020. "Resiliency of Environmental and Social Stocks: An Analysis of the Exogenous Covid-19 Market Crash." *Review of Corporate Finance Studies* 9, no. 3: 593–621.

Attig, N. 2024. "Relaxed Financial Constraints and Corporate Social Responsibility." *Journal of Business Ethics* 189, no. 1: 111–131.

Bagwell, L. S. 1991. "Share Repurchase and Takeover Deterrence." *Rand Journal of Economics*: 72–88.

Bansal, P., G. F. Jiang, and J. C. Jung. 2015. "Managing Responsibly in Tough Economic Times: Strategic and Tactical CSR During the 2008–2009 Global Recession." *Long Range Planning* 48, no. 2: 69–79.

Barnea, A., and A. Rubin. 2010. "Corporate Social Responsibility as a Conflict Between Shareholders." *Journal of Business Ethics* 97: 71–86.

Bear, S., N. Rahman, and C. Post. 2010. "The Impact of Board Diversity and Gender Composition on Corporate Social Responsibility and Firm Reputation." *Journal of Business Ethics* 97, no. 2: 207–221.

Benlemlih, M., and M. Bitar. 2018. "Corporate Social Responsibility and Investment Efficiency." *Journal of Business Ethics* 148: 647–671.

Bertrand, M., and S. Mullainathan. 2003. "Enjoying the Quiet Life? Corporate Governance and Managerial Preferences." *Journal of Political Economy* 111, no. 5: 1043–1075.

Billett, M. T., and H. Xue. 2007. "The Takeover Deterrent Effect of Open Market Share Repurchases." *Journal of Finance* 62, no. 4: 1827–1850.

Bouslah, K., L. Kryzanowski, and B. M'zali. 2018. "Social Performance and Firm Risk: Impact of the Financial Crisis." *Journal of Business Ethics* 149: 643–669.

Bushee, B. J. 1998. "The Influence of Institutional Investors on Myopic R&D Investment Behavior." *Accounting Review*: 305–333.

Cain, M. D., S. B. McKeon, and S. D. Solomon. 2017. "Do Takeover Laws Matter? Evidence From Five Decades of Hostile Takeovers." *Journal of Financial Economics* 124, no. 3: 464–485.

Carroll, A. B. 1991. "The Pyramid of Corporate Social Responsibility: Toward the Moral Management of Organizational Stakeholders." *Business Horizons*.

Carroll, A. B. 2021. "Corporate Social Responsibility (CSR) and the Covid-19 Pandemic: Organizational and Managerial Implications." *Journal of Strategy and Management* 14, no. 3: 315–330.

Carter, M. E., F. Franco, and M. Gine. 2017. "Executive Gender Pay Gaps: The Roles of Female Risk Aversion and Board Representation." *Contemporary Accounting Research* 34, no. 2: 1232–1264.

Chatjuthamard, P., V. Ongsakul, and P. Jiraporn. 2022. "Corporate Complexity, Managerial Myopia, and Hostile Takeover Exposure: Evidence From Textual Analysis." *Journal of Behavioral and Experimental Finance* 33: 100601.

Chen, C., T. Wang, and X. Jia. 2023. "Short-Termism in Financial Decision-Making: Uncovering the Influence of Managerial Myopia on Corporate Financial Asset Allocation Through md&a Textual Analysis." *International Review of Financial Analysis* 90: 102900.

Chen, S.-S., and C.-Y. Lin. 2018. "Managerial Ability and Acquirer Returns." *Quarterly Review of Economics and Finance* 68: 171–182.

Cheng, B., I. Ioannou, and G. Serafeim. 2014. "Corporate Social Responsibility and Access to Finance." *Strategic Management Journal* 35, no. 1: 1–23.

Chindasombatcharoen, P., P. Chatjuthamard, P. Jiraporn, and N. Wongsinhirun. 2024. "Climate Change Exposure and the Takeover Market: A Text-Based Analysis." *Business Strategy and the Environment* 33, no. 8: 8587–8592.

Chintrakarn, P., P. Jiraporn, and S. Treepongkaruna. 2021. "How Do Independent Directors View Corporate Social Responsibility (CSR) During a Stressful Time? Evidence From the Financial Crisis." *International Review of Economics & Finance* 71: 143–160.

Christensen, D. M., G. Serafeim, and A. Sikochi. 2022. "Why Is Corporate Virtue in the Eye of the Beholder? The Case of ESG Ratings." *Accounting Review* 97, no. 1: 147–175.

Coles, J. L., N. D. Daniel, and L. Naveen. 2014. "Co-Opted Boards." *Review of Financial Studies* 27, no. 6: 1751–1796.

Cornett, M. M., O. Erhemjamts, and H. Tehranian. 2016. "Greed or Good Deeds: An Examination of the Relation Between Corporate Social Responsibility and the Financial Performance of us Commercial Banks Around the Financial Crisis." *Journal of Banking & Finance* 70: 137–159.

Cremers, K. J. M., V. B. Nair, and K. John. 2009. "Takeovers and the Cross-Section of Returns." *Review of Financial Studies* 22, no. 4: 1409–1445.

Daines, R. 2001. "Does Delaware Law Improve Firm Value?" *Journal of Financial Economics* 62, no. 3: 525–558.

Danbolt, J., A. Siganos, and A. Tunyi. 2016. "Abnormal Returns From Takeover Prediction Modelling: Challenges and Suggested Investment Strategies." *Journal of Business Finance & Accounting* 43, no. 1-2: 66–97.

Demerjian, P., B. Lev, and S. McVay. 2012. "Quantifying Managerial Ability: A New Measure and Validity Tests." *Management Science* 58, no. 7: 1229–1248.

Dimson, E., O. Karakaş, and X. Li. 2015. "Active Ownership." *Review of Financial Studies* 28, no. 12: 3225–3268.

Driver, C., A. Grosman, and P. Scaramozzino. 2019. "Dividend Policy and Investor Pressure." *Economic Modelling*.

Eccles, R. G., I. Ioannou, and G. Serafeim. 2014. "The Impact of Corporate Sustainability on Organizational Processes and Performance." *Management Science* 60, no. 11: 2835–2857.

Edmans, A. 2014. "Blockholders and Corporate Governance." *Annual Review of Financial Economics* 6, no. 1: 23–50.

Eliwa, Y., A. Aboud, and A. Saleh. 2023. "Board Gender Diversity and Esg Decoupling: Does Religiosity Matter?" *Business Strategy and the Environment* 32, no. 7: 4046–4067.

Eliwa, Y., A. Saleh, and A. H. Ahmed. 2025. "Aligning Pay With Purpose: ESG-Linked Compensation and ESG Decoupling." *Business Strategy and the Environment*.

Ertugrul, M., and K. Krishnan. 2011. "Can CEO Dismissals be Proactive?" *Journal of Corporate Finance* 17, no. 1: 134–151.

E-Vahdati, S., J. Oradi, and J. Nazari. 2023. "CEO Gender and Readability of Annual Reports: Do Female CEOs' Emographic Attributes Matter?" *Journal of Applied Accounting Research* 24.

Faccio, M., M.-T. Marchica, and R. Mura. 2016. "CEO Gender, Corporate Risk-Taking, and the Efficiency of Capital Allocation." *Journal of Corporate Finance* 39: 193–209.

Fairhurst, D. D., and D. T. Greene. 2022. "Too Much of a Good Thing? Corporate Social Responsibility and the Takeover Market." *Journal of Corporate Finance* 73: 102172.

Flammer, C. 2015. "Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach." *Management Science* 61, no. 11: 2549–2568.

Freeman, R. E. 1984. *Strategic Management: A Stakeholder Approach*. Pitman.

Gibson Brandon, R., P. Krueger, and P. S. Schmidt. 2021. "ESG Rating Disagreement and Stock Returns." *Financial Analysts Journal* 77, no. 4: 104–127.

Gillan, S. L., A. Koch, and L. T. Starks. 2021. "Firms and Social Responsibility: A Review of ESG and CSR Research in Corporate Finance." *Journal of Corporate Finance* 66: 101889.

Giroud, X., and H. M. Mueller. 2011. "Corporate Governance, Product Market Competition, and Equity Prices." *Journal of Finance* 66, no. 2: 563–600.

Godfrey, P. C. 2005. "The Relationship Between Corporate Philanthropy and Shareholder Wealth: A Risk Management Perspective." *Academy of Management Review* 30, no. 4: 777–798.

Gort, M. 1969. "An Economic Disturbance Theory of Mergers." *Quarterly Journal of Economics*: 624–642.

Gupta, V. K., S. C. Mortal, S. Silveri, M. Sun, and D. B. Turban. 2020. "You're Fired! Gender Disparities in CEO Dismissal." *Journal of Management* 46, no. 4: 560–582.

Hainmueller, J., and Y. Xu. 2013. "Ebalance: A Stata Package for Entropy Balancing." *Journal of Statistical Software* 54, no. 7.

He, G., and H. M. Ren. 2023. "Are Financially Constrained Firms Susceptible to a Stock Price Crash?" *European Journal of Finance* 29, no. 6: 612–637.

Hegde, S. P., and D. R. Mishra. 2019. "Married CEOs and Corporate Social Responsibility." *Journal of Corporate Finance* 58: 226–246.

Hillman, A. J., M. C. Withers, and B. J. Collins. 2009. "Resource Dependence Theory: A Review." *Journal of Management* 35, no. 6: 1404–1427.

Huang, J., and D. J. Kisgen. 2013. "Gender and Corporate Finance: Are Male Executives Overconfident Relative to Female Executives?" *Journal of Financial Economics* 108, no. 3: 822–839.

Hyun, E., D. Yang, H. Jung, and K. Hong. 2016. "Women on Boards and Corporate Social Responsibility." *Sustainability* 8, no. 4: 300.

Ikram, A., Z. F. Li, and D. Minor. 2023. "CSR-Contingent Executive Compensation Contracts." *Journal of Banking & Finance* 151: 105655.

Jensen, M. C. 1984. "Takeovers: Folklore and Science." *Harvard Business Review* 62: 109–114.

Jensen, M. C. 1986. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers." *American Economic Review* 76, no. 2: 323–329.

Jensen, M. C., and W. H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3, no. 4: 305–360.

Jiang, F., K. John, C. W. Li, and Y. Qian. 2018. "Earthly Reward to the Religious: Religiosity and the Costs of Public and Private Debt." *Journal of Financial and Quantitative Analysis* 53, no. 5: 2131–2160.

Karampatsas, N., N. Aktas, and A. Witkowski. 2022. "Do Firms Adjust Corporate Social Responsibility Engagement After a Focal Change in Credit Ratings?" *Business & Society* 61, no. 6: 1684–1722.

Koh, P.-S., C. Qian, and H. Wang. 2014. "Firm Litigation Risk and the Insurance Value of Corporate Social Performance." *Strategic Management Journal* 35, no. 10: 1464–1482.

Laverty, K. J. 2004. "Managerial Myopia or Systemic Short-Termism? The Importance of Managerial Systems in Valuing the Long Term." *Management Decision* 42, no. 8: 949–962.

Li, J., X. Qin, and Y.-E. Lin. 2025. "Strategy Corporate Social Responsibility and Investment Efficiency: The Role of Substitute and Complement." *Business & Society* 64, no. 4: 757–803.

Liao, C.-H., Z. San, A. Tsang, and L. Yu. 2021. "Board Reforms Around the World: The Effect on Corporate Social Responsibility." *Corporate Governance: An International Review* 29, no. 5: 496–523.

Likitapiwat, T., S. Treepongkaruna, and P. Jiraporn. 2023. "CSR Variability, Managerial Risk Aversion, and Hostile Takeover Threats." *Corporate Social Responsibility and Environmental Management* 30, no. 2: 773–790.

Lins, K. V., H. Servaes, and A. Tamayo. 2017. "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility During the Financial Crisis." *Journal of Finance* 72, no. 4: 1785–1824.

Lioui, A., and A. Tarelli. 2022. "Chasing the ESG Factor." *Journal of Banking & Finance* 139: 106498.

Lopez-de Silanes, F., J. A. McCahery, and P. C. Pudschedl. 2024. "Institutional Investors and ESG Preferences." *Corporate Governance: An International Review* 32, no. 6: 1060–1086.

Luo, X. R., D. Wang, and J. Zhang. 2017. "Whose Call to Answer: Institutional Complexity and Firms' CSR Reporting." *Academy of Management Journal* 60, no. 1: 321–344.

Maneenop, S., C. Padungsaksawasdi, and S. Treepongkaruna. 2024. "Co-Opted Board, Environment, Social and Governance." *Business Strategy and the Environment* 33, no. 2: 1161–1172.

Manne, H. G. 1965. "Mergers and the Market for Corporate Control." *Journal of Political Economy* 73, no. 2: 110–120.

Martin, K. J., and J. J. McConnell. 1991. "Corporate Performance, Corporate Takeovers, and Management Turnover." *Journal of Finance* 46, no. 2: 671–687.

Masulis, R. W., and S. W. Reza. 2015. "Agency Problems of Corporate Philanthropy." *Review of Financial Studies* 28, no. 2: 592–636.

McGuinness, P. B., J. P. Vieito, and M. Wang. 2017. "The Role of Board Gender and Foreign Ownership in the CSR Performance of Chinese Listed Firms." *Journal of Corporate Finance* 42: 75–99.

McWilliams, A., and D. Siegel. 2001. "Corporate Social Responsibility: A Theory of the Firm Perspective." *Academy of Management Review* 26, no. 1: 117–127.

Mikkelson, W. H., and M. M. Partch. 1997. "The Decline of Takeovers and Disciplinary Managerial Turnover." *Journal of Financial Economics* 44, no. 2: 205–228.

Mizik, N., and R. Jacobson. 2007. "Myopic Marketing Management: Evidence of the Phenomenon and Its Long-Term Performance Consequences in the SEO Context." *Marketing Science* 26, no. 3: 361–379.

Nam, J., J. Wang, and G. Zhang. 2008. "Managerial Career Concerns and Risk Management." *Journal of Risk and Insurance* 75, no. 3: 785–809.

Nofsinger, J. R., J. Sulaeman, and A. Varma. 2019. "Institutional Investors and Corporate Social Responsibility." *Journal of Corporate Finance* 58: 700–725.

Palepu, K. G. 1986. "Predicting Takeover Targets: A Methodological and Empirical Analysis." *Journal of Accounting and Economics* 8, no. 1: 3–35.

Pfeffer, J., and G. R. Salancik. 1978. *The External Control of Organizations: A Resource Dependence Perspective*. Harper & Row.

Powell, R. G. 2001. "Takeover Prediction and Portfolio Performance: A Note." *Journal of Business Finance & Accounting* 28, no. 7-8: 993–1011.

Rahman, D., and M. Kabir. 2023. "Does Board Independence Influence Annual Report Readability?" *European Accounting Review*: 1–28.

Ruback, R. S., and M. C. Jensen. 1983. "The Market for Corporate Control: The Scientific Evidence." *Journal of Financial Economics* 11: 5–50.

Schuster, C. L., A. T. Nicolai, and J. G. Covin. 2020. "Are Founder-Led Firms Less Susceptible to Managerial Myopia?" *Entrepreneurship Theory and Practice* 44, no. 3: 391–421.

Shackleton, M., J. Yan, and Y. Yao. 2022. "What Drives a Firm's ES Performance? Evidence From Stock Returns." *Journal of Banking & Finance* 136: 106304.

Sila, V., A. Gonzalez, and J. Hagendorff. 2016. "Women on Board: Does Boardroom Gender Diversity Affect Firm Risk?" *Journal of Corporate Finance* 36: 26–53.

Stein, J. C. 1988. "Takeover Threats and Managerial Myopia." *Journal of Political Economy* 96, no. 1: 61–80.

Sudarsanam, S., and A. A. Mahate. 2006. "Are Friendly Acquisitions Too Bad for Shareholders and Managers? Long-Term Value Creation and Top Management Turnover in Hostile and Friendly Acquirers." *British Journal of Management* 17, no. S1: S7–S30.

Sul, E. S. 2024a. "Takeover Threats, Job Security Concerns, and Earnings Management." *Accounting Review* 99, no. 3: 451–477.

Sul, E. S. 2024b. "Takeover Threats, Job Security Concerns, and Earnings Management." *Accounting Review* 99, no. 3: 451–477.

Suryaningrum, D. H., A. A. Abdul Rahman, A. Meero, and P. A. Cakranegara. 2023. "Mergers and Acquisitions: Does Performance Depend on Managerial Ability?" *Journal of Innovation and Entrepreneurship* 12, no. 1: 30.

Tawiah, V., R. Matemane, B. Oyewo, and T. T. Lemma. 2024. "Saving the Environment With Indigenous Directors: Evidence From Africa." *Business Strategy and the Environment* 33, no. 3: 2445–2461.

Torchia, M., A. Calabrò, and M. Huse. 2011. "Women Directors on Corporate Boards: From Tokenism to Critical Mass." *Journal of Business Ethics* 102: 299–317.

Treepongkaruna, S., K. Kyaw, and P. Jiraporn. 2024. "ESG Controversies, Corporate Governance, and the Market for Corporate Control." *Journal of Sustainable Finance & Investment* 14, no. 4: 815–842.

Treepongkaruna, S., P. Sarajoti, and C. Padungsaksawasdi. 2024. "Strategic Responses to Hostile Takeover Threats: Empirical Evidence on Enhancing Corporate Social Engagement." *Corporate Social Responsibility and Environmental Management* 31, no. 6: 5208–5219.

Tsang, A., S. Yan, and L. Zheng. 2024. "Can Firms' ESG Initiatives Deter Hostile Takeovers?" *Journal of International Money and Finance* 146: 103131.

Tunyi, A. A. 2014. "Takeover Likelihood Modelling: Target Profile and Portfolio Returns." (PhD Thesis).

Tunyi, A. A., G. Areneke, A. Tob-Ogu, and S. Khalid. 2023. "Doing More With More: Women on the Board and Firm Employment." *Journal of Business Research* 154: 113385.

Tunyi, A. A., T. Hussain, G. Areneke, and J. Agyemang. 2025. "Co-Opted Boards and the Obfuscation of Financial Reports." *Abacus*.

Tunyi, A. A., C. G. Ntim, and J. Danbolt. 2019. "Decoupling Management Inefficiency: Myopia, Hyperopia and Takeover Likelihood." *International Review of Financial Analysis* 62: 1–20.

Tunyi, A. A., J. Yang, H. Agyei-Boapeah, and M. Machokoto. 2024. "Takeover Vulnerability and Pre-Emptive Earnings Management." *European Accounting Review* 33, no. 2: 677–711.

Utz, S. 2017. "Over-Investment or Risk Mitigation? Corporate Social Responsibility in Asia-Pacific, Europe, Japan, and the United States." *Review of Financial Economics*.

Waldau, R. 2024. "A Systematic Literature Review on Determinants and Outcomes of ESG Performance in Family Firms." *Management Review Quarterly*: 1–59.

Wang, B., H. Shin, and J. Lee. 2025. "Takeover Threats and Environmental, Social, and Governance Performance: Evidence From Korea." *Finance Research Letters*: 106927.

Wang, Z., W. Lu, and M. Liu. 2021. "Corporate Social Responsibility Overinvestment in Mergers and Acquisitions." *International Review of Financial Analysis* 78: 101944.

Welch, K., and A. Yoon. 2023. "Do High-Ability Managers Choose ESG Projects That Create Shareholder Value? Evidence From Employee Opinions." *Review of Accounting Studies* 28, no. 4: 2448–2475.

Whited, T. M., and G. Wu. 2006. "Financial Constraints Risk." *Review of Financial Studies* 19, no. 2: 531–559.

Wongsinhirun, N., P. Chatjuthamard, P. Jiraporn, and P. Phiromswad. 2022. "Do Takeover Threats Influence Corporate Social Responsibility? Evidence From Hostile Takeover Vulnerability." *Corporate Social Responsibility and Environmental Management* 29, no. 5: 1203–1213.

Yang, X., A. F. S. Hassan, and Y. Karbhari. 2024. "Can Good ESG Performance Help Companies Resist External Shocks?" *Investment Analysts Journal*: 1–25.

Zhu, Y., and J. Chen. 2025. "How Does Board Gender Diversity Shape ESG Performance?" *Finance Research Letters* 74: 106717.

Appendix A

TABLE A1 | Definition of variables.

Variables	Variable definition
Panel A: Main variables	
Target	Dummy variable which takes a value of one if a firm is the subject of a takeover bid in the next year and a value of zero otherwise.
Vulnerability	The likelihood that a firm will be a takeover target derived from Equation (2).
High (low) vulnerability	Indicator variable capturing whether a firm's level of vulnerability in each year is greater than (i.e., high) or less than (i.e., low) the median vulnerability (defined above).
Vulnerability quintiles	Vulnerability sorted into five equal groups with Q1 (Q5) indicating the 20% of firms with lowest (highest) takeover vulnerability.
Vulnerability deciles	Vulnerability sorted into 10 equal groups with D1 (D10) indicating the 10% of firms with lowest (highest) takeover vulnerability.
Hostile takeover index	The Hostile takeover index derived by Cain et al. (2017). The data are freely available from the authors' webpage.
Environmental score	A firm's environmental engagement or performance score. The score is computed as the difference between each firm's total number of environment-related strengths, normalised by the total number of potential environment-related strengths assessed for that firm-year observation, and the firm's total number of environment-related concerns, normalised by the total number of potential environment-related concerns. The data are obtained from MSCI (formerly KLD).
Social score	A firm's social engagement or performance score. Social-related dimensions include community, employment, diversity human rights and product. The social score is computed as the difference between each firm's total number of social-related strengths, normalised by the total number of potential social-related strengths assessed for that firm-year observation, and the firm's total number of social-related concerns, normalised by the total number of potential social-related concerns. The data are obtained from MSCI (formerly KLD).
Governance score	A firm's governance engagement or performance score. The score is computed as the difference between each firm's total number of governance-related strengths, normalised by the total number of potential governance-related strengths assessed for that firm-year observation, and the firm's total number of governance-related concerns, normalised by the total number of potential governance-related concerns. The data are obtained from MSCI (formerly KLD).
ESG score	ESG score is the average score across the three ESG pillars
Environmental percentile	The environmental score sorted into 100 equal groups, with P1 (P100) indicating the 1% of firms with the lowest (highest) environmental score.
Social percentile	The social score sorted into 100 equal groups, with P1 (P100) indicating the 1% of firms with the lowest (highest) social score.
Governance percentile	The governance score sorted into 100 equal groups, with P1 (P100) indicating the 1% of firms with the lowest (highest) governance score.
ESG percentile	ESG score sorted into 100 equal groups, with P1 (P100) indicating the 1% of firms with the lowest (highest) ESG score.
ESG residual	The residual from Equation (3) predicting a firm's level of ESG as a function of firm size, Tobin's Q, leverage, sales growth, free cash flow and lagged ESG engagement.
ESG residual above zero	An indicator variable for ESG residual being greater than zero.
ESG residual in tercile 3	An indicator variable for ESG residual being in the third tercile.
Panel B: Control variables	
Profitability	Return on assets; operating profit to total asset ratio.
Tobin's Q	The market value of equity plus the book value of debt, scaled by the book value of total assets.
Sales growth	Change in sales as a ratio of previous sales.
Leverage	The ratio of a firm's long-term debt to its total assets.
Firm size	The natural log of total assets.
Free cash flow	Cash flow from operations minus capital expenditures as a proportion of total assets.
Tangible assets	Fixed assets (including property, plant & equipment) as a proportion of total assets.
Concentration	The Herfindahl-Hirschman index (HHI) estimated from revenue-based market shares within 4-digit SIC code industries.
Big 4 auditor	Indicator variable which takes a value of one when a firm is audited by a Big 4 auditor and a value of zero, otherwise.
Capital expenditure	Total capital expenditure as a fraction of total assets.

(Continues)

TABLE A1 | (Continued)

Variables	Variable definition
Bankruptcy risk	The Altman Z-score measure of the risk of financial distress.
Panel C: Additional control, moderating and instrumental variables	
Board size	Natural log of the number of directors on the board.
Board independence	The proportion of independent directors on the board.
CEO chair	Indicator variable for firms in which the CEO and chair roles are occupied by the same individual.
Board females	The proportion of female directors on the board.
Managerial ability	The Demerjian et al. (2012) measure of managerial ability obtained from the authors' webpage: https://faculty.washington.edu/pdemerj/data.html. The measure captures how efficiently managers convert firm resources into revenues. Firm-level efficiency is first estimated using data envelopment analysis, where sales are the output and major operating inputs, including cost of goods sold, selling and administrative expenses, property, plant, and equipment, and intangible investments, are treated as inputs. The efficiency score is then regressed on firm characteristics that affect operational efficiency, such as firm size, market share, firm age, business segment concentration, and industry effects. The regression residual represents managerial ability, isolating the manager's contribution to efficiency beyond firm-specific attributes. Higher values indicate greater managerial ability.
Institutional ownership	The proportion of shares held by institutional investors.
Block holding	The proportion of shares held by block holders, i.e., holders of at least 5% of the shares in the firm.
Financial constraints	The Whited-Wu measure of financial constraints (Whited and Wu 2006).
Female CEO	An indicator variable for firms led by a female CEO.
Critical mass	An indicator variable for the presence of three or more female directors on a firm's board.
Board co-option	The fraction of the board consisting of directors appointed after the sitting CEO assumed office (Coles et al. 2014, 1751).
Board co-option TW	Tenure weighted co-option is estimated as the sum of the tenure of all co-opted directors as a proportion of the total tenure of all directors on the board (Coles et al. 2014, 1757).
Peer vulnerability	Average vulnerability of firms in the industry (excluding the focal firm).
Delaware registration	An identifier for firms incorporated in the U.S state of Delaware.
Environmentally Sensitive Industry	An indicator variable equal to one if a firm operates in an industry with heightened environmental exposure and regulatory scrutiny, and zero otherwise. Following prior literature, we classify firms as environmentally sensitive if their primary SIC code falls within mining and extraction (SIC 1000–1499), paper and pulp manufacturing (SIC 2600–2699), chemicals (SIC 2800–2899), petroleum refining (SIC 2900–2999), primary metals (SIC 3300–3399), or utilities (SIC 4900–4999). These industries are characterised by relatively high pollution intensity, resource extraction, or energy usage, and are therefore subject to greater environmental risk and regulatory oversight.
Panel D: Variables in the takeover vulnerability model	
Abnormal returns	Abnormal returns of the last year computed using the OLS market model. Alpha and beta estimates are first computed from the previous year by regressing stock returns on market returns. Estimates of alpha and beta are then used to compute abnormal return in the current year.
Profitability	See Panel B.
Tobin's Q	See Panel B.
Firm age	Log of 1 plus the number of years since incorporation.
Sales growth	See Panel B.
Liquidity	Cash and short-term investments to total assets.
Leverage	See Panel B.
Growth-resource dummy	Dummy that takes a value of one if a firm has high growth and low resources or vice versa, and a value of zero otherwise. "High" and "low" are defined relative to the industry year median values.
Tangible assets	See Panel B.
Firm size	See Panel B.
Disturbance	A dummy variable which takes a value of one if any merger is completed within a firm's two-digit SIC industry in the year before the bid, and a value of zero otherwise.
Free cash flow	See Panel B.
Block holder	See Panel B.

Appendix B

TABLE B1 | Modelling vulnerability to takeovers: Coefficients and model power.

Panel A: Regression coefficients and descriptive statistics							
		Logit regression coefficients: Pooled sample		Descriptive statistics of yearly regression coefficients			
	Pred.	Margins	*p*-value	Mean	SD	Min	Max
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Abnormal returns	—	−1.894***	(0.000)	−49.486	73.702	−210.146	145.630
Profitability	—	−0.000	(0.964)	−0.010	0.361	−1.008	0.859
Tobin's Q	—	−0.005***	(0.000)	−0.232	0.230	−0.619	0.086
Firm age	—	−0.007***	(0.000)	−0.252	0.324	−1.549	0.035
Sales growth	+/−	−0.003*	(0.098)	−0.245	0.454	−1.848	0.289
Liquidity	+/−	−0.013	(0.210)	−0.188	1.303	−2.673	2.193
Leverage	+/−	0.008	(0.357)	−0.087	0.909	−2.201	1.478
Growth-resource	+	−0.000	(0.916)	−0.012	0.415	−1.109	0.607
Tangible assets	+	0.008	(0.190)	0.193	0.869	−1.348	2.223
Firm size	+	0.136***	(0.000)	3.642	2.166	−0.426	7.412
Firm size # Firm size	−	−0.004***	(0.000)	−0.094	0.058	−0.197	0.012
Disturbance	+	0.003	(0.325)	0.087	0.456	−0.938	0.875
Free cash flow	+	0.040***	(0.002)	0.910	1.698	−2.043	5.583
Block holders	+	0.006	(0.430)	0.016	0.894	−2.474	1.975
Observations		24,802					
Firm FE		Yes					
Year FE		Yes					
χ^2		460	(0.000)				
Pseudo R^2		0.057					

Panel B: Within sample performance diagnostics: Goodness-of-fit of prediction versus null model			
	Prediction	vs.	Null
Efron's R^2	2.6%		1.4%
McKelvery and Zaroina's R^2	23.2%		8.9%
McFadden's R^2	6.2%		3.5%
Cragg and Uhler's R^2	7.4%		4.1%
Maximum Likelihood R^2	2.4%		1.2%
Area under ROC curve	69.9%		50.0%

Note: The table presents regression results for Equation (2), which estimates each firm's takeover likelihood from a vector of its characteristics. The dependent variable takes a value of one if a firm receives a takeover bid in the next period and a value of zero otherwise. All predictor variables are fully defined in Table A1. The marginal effects presented in Column 1 are generated from the entire sample (1985–2021). *p*-values are presented in parentheses. We present descriptive statistics for coefficients generated from yearly regressions in Columns 3–6. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Appendix C

TABLE C1 | Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	VIF
1. ESG score	1.000												
2. Vulnerability	−0.034*	1.000											1.100
3. Profitability	0.062*	−0.138*	1.000										1.860
4. Tobin's Q	0.082*	−0.010	0.310*	1.000									1.610
5. Sales growth	−0.045*	0.000	0.196*	0.265*	1.000								1.150
6. Leverage	0.063*	0.000	−0.156*	−0.257*	−0.080*	1.000							1.370
7. Firm size	0.294*	−0.203*	0.102*	−0.129*	−0.101*	0.356*	1.000						1.320
8. Free cash flow	0.073*	−0.020	0.567*	0.312*	0.000	−0.171*	0.034*	1.000					2.080
9. Tangible assets	−0.037*	−0.147*	−0.020	−0.170*	−0.037*	0.280*	0.191*	−0.269*	1.000				2.190
10. Concentration	0.024*	−0.101*	0.054*	0.010	−0.024*	0.032*	0.066*	0.032*	−0.022*	1.000			1.020
11. Big 4 auditor	0.091*	0.020	−0.037*	−0.022*	−0.041*	0.083*	0.187*	0.010	−0.010	−0.032*	1.000		1.050
12. Capital expenditure	−0.028*	−0.057*	0.051*	0.034*	0.125*	0.058*	0.023*	−0.368*	0.665*	−0.030*	−0.043*	1.000	2.370
13. Bankruptcy risk	−0.010	−0.021*	0.267*	0.511*	0.141*	−0.334*	−0.204*	0.214*	−0.127*	−0.010	−0.052*	0.000	1.480

Appendix D

TABLE D1 | Baseline results with LSEG (formerly Refinitiv) ESG data.

	Environmental score	Social score	Governance score	ESG combined score
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Vulnerability	−32.944***	5.772	−80.908***	−33.881***
	(11.869)	(10.434)	(11.778)	(8.250)
Profitability	20.248**	5.833	22.226***	11.416*
	(8.883)	(7.339)	(8.571)	(6.112)
Tobin's Q	1.731***	2.640***	−0.206	1.578***
	(0.473)	(0.461)	(0.454)	(0.362)
Sales growth	−19.532***	−9.990***	−12.892***	−12.354***
	(2.970)	(2.493)	(2.905)	(2.128)
Leverage	−0.115	−4.704	4.221	3.005
	(3.293)	(2.925)	(3.333)	(2.497)
Firm size	11.791***	8.961***	3.195***	5.850***
	(0.367)	(0.295)	(0.347)	(0.258)
Free cash flow	17.827*	16.278**	24.129***	15.739**
	(9.775)	(8.096)	(9.265)	(6.840)
Tangible assets	2.975	−4.617**	−0.819	−8.574***
	(3.015)	(2.298)	(2.736)	(2.026)
Concentration	−4.013	13.866***	2.873	−2.759
	(5.456)	(4.661)	(6.090)	(4.081)
Big 4 auditor	1.234	4.136***	1.930	3.600***
	(1.510)	(1.346)	(1.904)	(1.171)
Capital expenditure	−44.083***	−14.561	−11.128	−8.228
	(13.723)	(10.688)	(13.260)	(9.411)
Bankruptcy risk	−0.160	−0.074	−0.047	−0.147
	(0.099)	(0.146)	(0.121)	(0.117)
Constant	−234.878***	−164.500***	−23.714***	−94.324***
	(8.056)	(6.665)	(7.799)	(5.823)
Observations	2829	2829	2829	2829
Adj. *R*-squared	0.348	0.294	0.108	0.233
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Years	16	16	16	16
Industries	41	41	41	41
Firms	540	540	540	540

Note: This table presents coefficient estimates from panel (firm-year) fixed effects regressions exploring the relationship between vulnerability to takeovers and ESG engagement using ESG scores from LSEG (formerly Refinitiv). The base model is specified in Equation (1). All independent variables are lagged by 1 year. All variables are fully defined in Table A1. Standard errors are presented in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Appendix E

TABLE E1 | Variable moments before and after entropy balancing.

	Treatment group			Control group		
	Mean	Variance	Skewness	Mean	Variance	Skewness
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Before entropy balancing						
Profitability	0.038	0.009	−2.287	0.060	0.006	−2.394
Tobin's Q	2.061	1.666	2.646	2.085	1.853	3.525
Sales growth	0.093	0.033	0.503	0.086	0.028	0.924
Leverage	0.160	0.029	0.954	0.177	0.021	0.743
Firm size	20.600	1.563	0.306	21.510	2.714	0.174
Free cash flow	0.055	0.008	−0.626	0.058	0.006	−0.789
Tangible assets	0.232	0.046	1.372	0.299	0.047	0.985
Concentration	0.082	0.002	3.645	0.107	0.010	4.394
Big 4 auditor	0.883	0.103	−2.388	0.891	0.097	−2.503
Capital expenditure	0.050	0.003	2.847	0.055	0.003	2.611
Panel B: After entropy balancing						
Profitability	0.038	0.009	−2.287	0.038	0.009	−2.287
Tobin's Q	2.061	1.666	2.646	2.061	1.666	2.647
Sales growth	0.093	0.033	0.503	0.093	0.033	0.503
Leverage	0.160	0.029	0.954	0.160	0.029	0.954
Firm size	20.600	1.563	0.306	20.600	1.564	0.306
Free cash flow	0.055	0.008	−0.626	0.055	0.008	−0.626
Tangible assets	0.232	0.046	1.372	0.232	0.046	1.372
Concentration	0.082	0.002	3.645	0.082	0.002	3.711
Big 4 auditor	0.883	0.103	−2.388	0.883	0.103	−2.388
Capital expenditure	0.050	0.003	2.847	0.050	0.003	2.847

Note: This table presents descriptive statistics (variable moments) for the treatment and control groups before and after entropy balancing.