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POISON AS PROTECTION: ESG PERFORMANCE OF POISON PILL STRATEGIES IN HOSTILE M&A

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Abstract

Poison pill strategies are not only designed to defend against hostile M&As, but may also serve as instruments to safeguard long-term ESG commitments. This scenario reflects the role of sufficiently strong poison pill mechanisms that can preserve governance autonomy and enhancing corporate sustainability performance. Poison pills thus offer a potential win-win solution by protecting firms from short-term control pressures while promoting long-term ESG resilience. Therefore, the objective of this paper is to investigate the effect of hostile M&A activity on ESG performance, conditional on the strength of poison pill defenses, using a panel of listed firms from 2006 to 2023. The results of dynamic panel system GMM estimation reveal that the interaction term between hostile M&As and poison pill strength has a positive and significant effect on ESG outcomes. This implies that while hostile acquisitions may initially jeopardize sustainability practices, firms equipped with robust poison pill strategies can transform this challenge into an opportunity to reinforce their ESG priorities. Accordingly, the strategic deployment of poison pills may contribute to the dual goal of deterring takeover threats and sustaining long-term corporate responsibility.

Keywords: Hostile M&A, Poison Pill Strategies, ESG, GMM.

1. INTRODUCTION

In today’s increasingly capital-intensive and competition-driven global economy, mergers and acquisitions (M&A) have become a strategic tool for a firm to accelerate growth, to realize operating efficiencies, and to respond to changing market conditions (Hossain, 2021). As shown in Figure 1, ESG-related M&A activity has been steadily rising over the past two decades, from 13% of all deals in 2002 to over 20% in 2023. This trend is due not only to a growing demand from investors for sustainable business models, but also to a broader establishment of ESG criteria in strategy and capital markets (Porter and Kramer, 2011).

At the same time, ESG criteria have become an essential part of the assessment of a company's performance and resilience. Hence, investors, regulators, and the broader public are not only focusing on the financial and structural effects of M&As, but also on their long-term impact on the company's long-term sustainability, ethical governance, and social responsibility. The new evaluation standards have added a new layer of complexity to the M&A decision-making process, raising questions about how the different forms of control transactions impact ESG performance.

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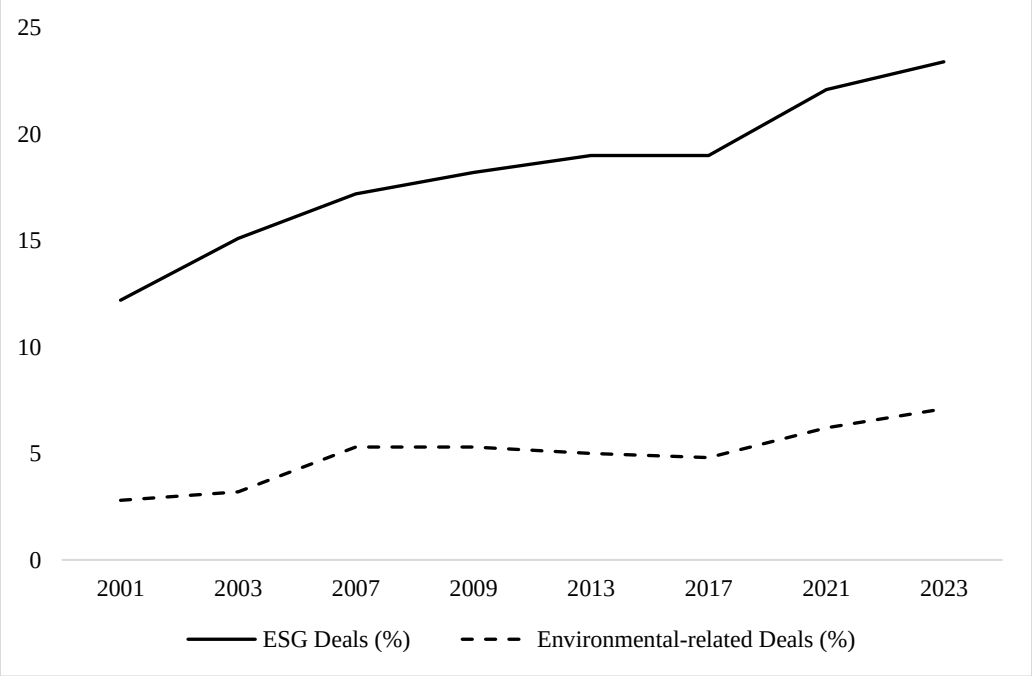

Figure 1: The shares of ESG and environmental-related deals (based on global data)

Source: BCG analysis (accessible via sub: https://www.bcg.com/subscription).

Not all M&As are in line with a company's long-term strategic and sustainable goals. Like friendly M&As, where the integration process is usually negotiated and shared, hostile M&As often result in public proxy battles and post-acquisition reorganizations that overturn incumbent leadership. Hostile M&As, launched without the consent of the target company's board, often result in leadership disruption, disruption of the company's governance and the reprioritization of the company's sustainability policy (Brusoni et al., 2021; Wang et al., 2023).

Several recent cases can be seen as evidence. In the second half of last year, when Baoneng attempted to take over China Vanke, fierce boardroom clashes led to the resignation of the founder Wang Shi, and the conflicting interests of shareholders led to the deterioration of the company's internal control system, resulting in a major impact on the company's strategic goals, the deterioration of its personnel policy, and the elimination of its company's governance. These examples indicate that hostile M&As not only weaken the control of managers, but also bring significant ESG costs.

The disputed acquisition of Teck Resources' coal business in 2023 by Glencore sparked similar concerns about the firm's sustainability, with major investors such as Legal & General divesting from the company in 2024 because of its inadequate climate transition strategy. Figure 2 shows the negative effect of hostile M&As on ESG indicators. During hostile M&As, the governance indicators (G) tend to fall the most, while the environment (E) and social (S) indicators fall less.

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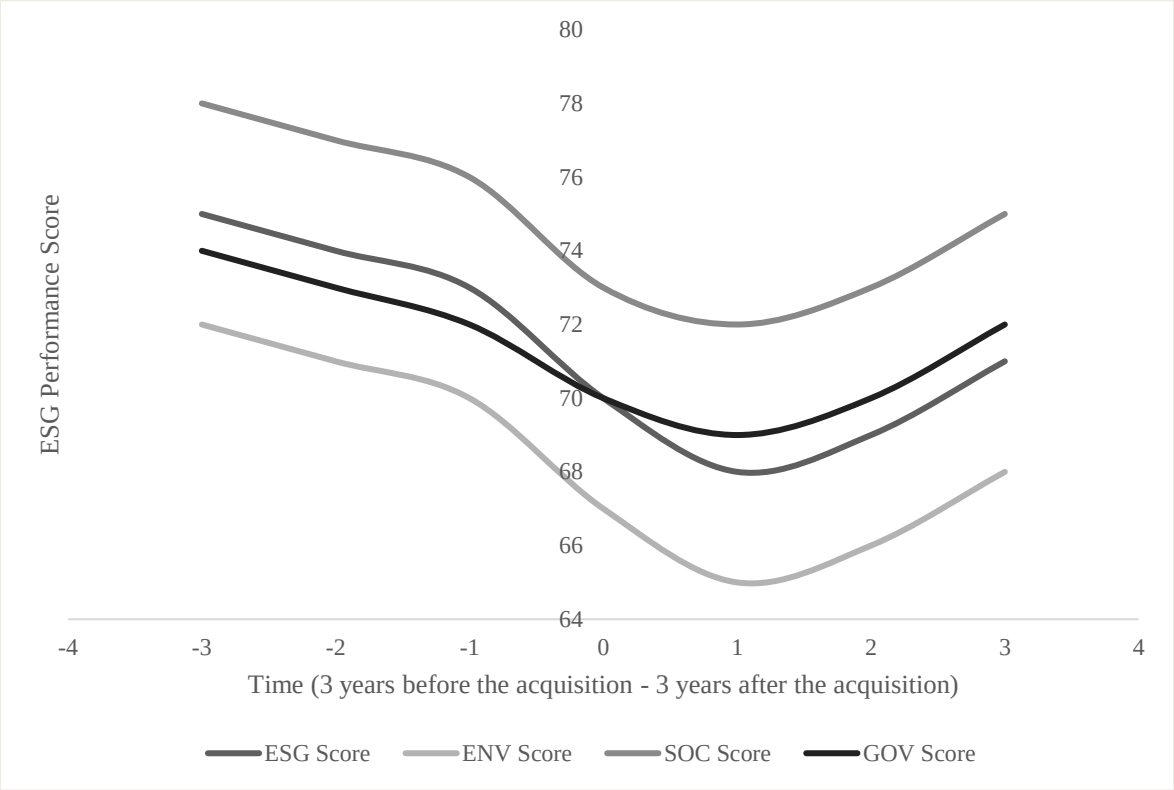

Figure 2: ESG Performance Before and After Hostile M&A

Source: Bloomberg Terminal (www.bloomberg.com/professional/products/bloomberg-terminal/)

The recent revival of hostile M&A is also a reflection of the growing disjunction between the economies of the major powers, such as China and the United States.

Among these are: the breakdown of the capital markets, the lack of certainty in the regulatory framework, the tension between the interests of the state and those of private capital, the disruption of capital movements, the greater susceptibility of companies to unsolicited offers.

In such a situation, the acquirers may be tempted to adopt a more aggressive approach and use hostile tactics to bypass long negotiations and exploit the weaker defenses of the target companies.

The trend is confirmed by the following data. Figure 3 shows that, between 2006 and 2023, hostile acquisitions were mainly concentrated in the financial and real estate, industrial and energy, and technology and communication sectors, and were less frequent in the consumer, health, media and government sectors.

These findings underscore the importance of strategic defenses in mitigating the broader risks posed by hostile M&A.

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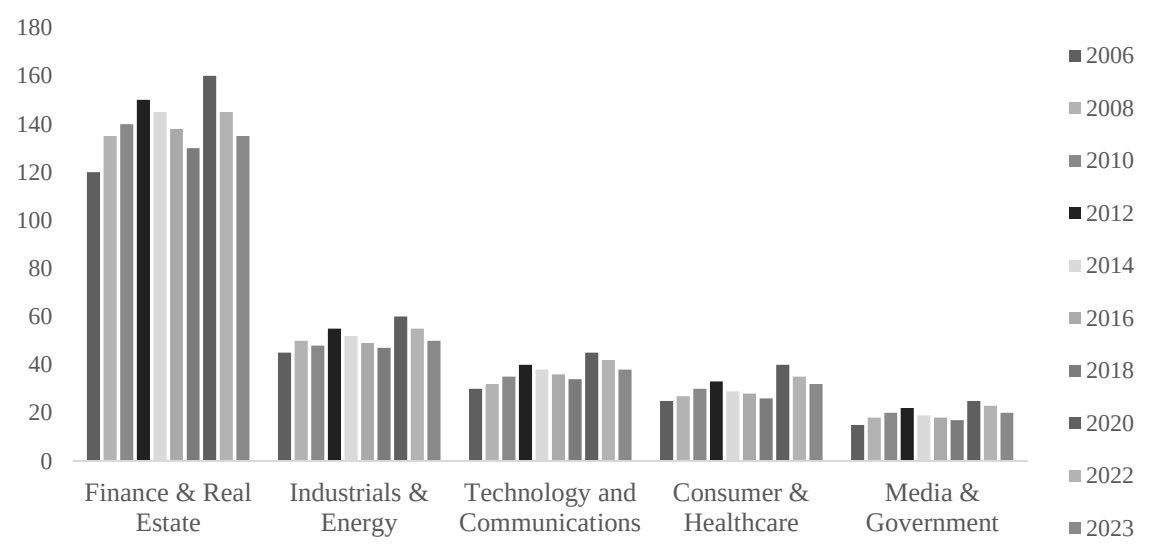

Figure 3: Global Trends in Hostile M&A Transactions by Industry (2006-2023)

Source: Data obtained from Bloomberg Terminal; figure adapted from the author's prior manuscript currently under review.

Thus, the increasing adoption of diverse defense mechanisms reflects firms' strategic responses to growing hostile acquisition threats. Table 1 summarizes the most common defense mechanisms employed by firms to counter hostile M&As. These strategies vary in terms of structural complexity and managerial discretion.

Table 1：Classification and Comparison of Common Anti-M&A Mechanisms

Category	Strategy	Description	Advantage	Limitation
Structural	Poison Pill	Shareholder rights plan diluting hostile acquirer after trigger.	Strong deterrence; preserves governance autonomy.	May entrench managers; subject to legal challenge.
	Staggered Boards	Directors serve staggered terms to slow board turnover.	Long-term protection against proxy battles.	Weakens shareholder rights; reduces accountability.
	Dual-Class Shares	Insiders retain voting control through weighted share structures.	Ensures founder vision and stability.	Undemocratic voting; difficult to unwind.
Tactical	White Knight	Target seeks friendly buyer to block hostile bid.	May offer better valuation or strategic fit.	Uncertainty in execution; may still disrupt ESG focus.
	Golden Parachutes	Large payouts to manager's post-acquisition.	Discourages hostile bids by raising acquisition cost.	Could be excessive; may misalign incentives.

Sources: Adapted from Bebchuk et al. (2002); Kahan & Rock (2019).

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Of these, poison pills have the greatest speed, independence, and flexibility. They operate as a parametric right that enables the firm to regulate its defenses based on a trigger threshold—once exceeded, shareholder stock dilutes and renders the hostile bid economically impossible (Gaughan, 2010). Hostile M&As often deprioritize sustainability goals due to managerial turnover, strategy realignment, and pressure to maximize short-term gains. While poison pills may restrict shareholder participation and reduce governance transparency, they can also create protected space for the preservation of long-term ESG commitments.

Despite their increasing adoption, few studies have examined how poison pills affect ESG performance under hostile M&A pressure. Existing research largely focuses on their financial impact (Bradley et al., 1988; Bebchuk & Ferrell, 2000; Milhaupt & Shishido, 2023), while the wider ESG implications remain underexplored. This is increasingly important as ESG gains relevance in investment decisions, particularly in sensitive industries such as technology, finance, and energy. Although a few studies begin to link governance tools with ESG outcomes (Chen et al., 2017; Hovatter, 2022), their effects during hostile takeovers are still unclear.

Two knowledge gaps persist. First, poison pills may shape a firm's capacity to uphold ESG under external pressure. Second, their influence likely varies across ESG dimensions and industries. This study addresses these gaps by exploring whether poison pills moderate the ESG impact of hostile M&As, and whether this moderation is industry-dependent.

The remainder of this paper is organized as follows: Section 2 reviews poison pills' theoretical and empirical foundations and their influence on ESG performance. Section 3 outlines the model specification and statistical methods. Section 4 presents the estimation results. Section 5 concludes with the main findings and suggestions.

2. LITERATURE REVIEW

Empirical review

A common concept in financial and managerial research is the important role of corporate governance frameworks, financial outcomes, regulatory environments, and defensive acquisition tactics in determining ESG performance. This is based on the notion of agency theory (Jensen and Meckling, 1976), which argues that companies, when they are faced with the need to make a profit in the short term, often choose to take the ESG performance into account in their long-term strategies. The theory suggests that the ESG performance of the company is often undermined by this short-term monetary policy (Shleifer and Vishny, 1997).

It has been shown that hostile M&As have a negative impact on ESG performance, mostly because of a change in management and cost-cutting measures (Goranova and Ryan, 2014; Brav et al., 2008). "The case of large companies, which must deal with both shareholders' interests and the public interest is a case in point. After a hostile purchase, companies frequently divert resources from sustainability programs, undermining long-

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term ESG commitments. Additionally, researchers have analyzed the intricacies of upholding ESG principles during hostile M&A pressures, especially in sectors facing rigorous regulatory scrutiny (Bebchuk & Weisbach, 2010). In contrast, if a company successfully introduces ESG principles into an acquisition, its financial and sustainable results will usually improve, especially in regions with stricter ESG requirements (Flammer, 2021; Hart & Zingales, 2017; Ferrell et al., 2016). Poor ESG integration and aggressive acquisition strategies are associated with increased ESG risks, which can undermine the reputation of the company and the trust of investors.

The acquisition of ESG responsibility is exacerbated by the increase in hostile M&As, which calls for robust governance and countermeasures to prevent negative outcomes (Pástor et al., 2021). To reduce the negative effects of M&As and ensure the viability of the organization, defensive strategies such as poison pills have been widely implemented (Kyaw et al., 2022). Beyond the deterrent effect, such measures also serve a broader strategic purpose. They provide management with the flexibility and time to withstand short-term opportunism and consider long-term alternatives. By dilution of the acquirer's shareholdings, above a certain percentage, poison pills impose significant economic barriers to prevent hostile M&As and disrupt coercive takeovers (Gaughan, 2010). Poison pills are an important safeguard in a context where ESG commitments are vulnerable to cost-cutting post-acquisition and governance instability. Poison pills can ensure that the firm’s ESG commitments continue in the face of contested control. A particular lack of research is to be found in the ESG literature concerning the effectiveness of these poison pills in achieving long-term sustainable goals under hostile M&A pressure. This research gap motivates the present study.

H1: *Hostile M&A activity has a significant negative impact on firms’ ESG performance*

According to studies, there is a strong correlation between hostile M&As and poorer performance in terms of ESG issues (Bebchuk et al., 2009; Coffee, 2001; Friedman, 2007). These changes in the management of the company are usually associated with a decline in the commitment to ESG issues and weakening of the boards of directors. These changes in the governance of the company often result in a change in management, a change in strategy, and a change in the focus from long-term sustainable development to short-term financial gain (Shleifer & Summers, 1987; Aktas et al., 2013).

H2: *Poison pill strategies positively moderate the adverse impact of hostile M&A on ESG performance.*

Hostile M&As often compel firms to prioritize short-term gains, undermining long-term ESG goals. Poison pill defenses—especially those with strong structural features like low trigger thresholds—deter such takeovers, providing incumbent management with the discretion to continue sustainability initiatives. Empirical evidence suggests that firms equipped with shareholder rights plans tied to ESG frameworks can better fend off aggressive acquisitions (Tsang et al., 2024). In efficiency terms, poison pills increase takeover costs and delay hostile bids, thus moderating ESG degradation. Scholars such as Wang et al. (2025) and Milhaupt & Shishido (2023) argue that this delay helps sustain

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ESG integrity during takeover threats, and we build on this perspective by hypothesizing that poison pill strength positively moderates the negative effect of hostile M&A on ESG performance.

H3: *The ESG-mitigating effect of poison pill strategies exhibits a threshold effect.*

Not all poison pills have equivalent deterrent power: their effectiveness depends critically on design features such as trigger thresholds and acting-in-concert provisions. Recent studies document that lower-threshold poison pills—which activate sooner—are more successful at preventing activist or hostile interventions (Kahan & Rock, 2019). This implies that only sufficiently strong poison pills can neutralize the ESG risks posed by hostile M&As. Therefore, we propose a threshold hypothesis: the moderating impact of poison pill defenses on hostile M&A's negative ESG effects becomes significant only when the structural strength of the pill exceeds a critical level.

It has been found that, although takeover defenses influence governance and value, they have hardly been examined for their effect on ESG performance. Despite the increasing interest in the dynamic between ESG and control transactions, it has hardly been considered whether takeover defenses might, under certain conditions, sustain ESG performance during hostile M&A episodes. To fill this gap, the present paper examines whether and how the ESG fallout from hostile M&As is affected by the presence of poison pills, and whether this effect is heterogeneous across industries. This is particularly relevant given the increasing materiality of ESG issues in the capital markets and the reputational costs associated with the deterioration of these issues. ESG issues into the framework of strategic governance, especially in the context of the control of companies.

3. METHODOLOGY

Model specification

ESG commitments, which are by nature progressive and prospective, are, by the strategic and institutional instability to which they are subjected during coercive takeover processes, weakened. Moreover, agency theory and stakeholder theory argue that companies subject to coercive takeovers are under pressure to refocus on short-term shareholder value at the expense of long-term sustainable development. And studies such as Treepongkaruna et al. (2024) and Chatjuthamard et al. (2023) support this view. The time lag between the immediate need for hostile M&As and the slow realization of ESG benefits creates a substantial risk of a decline in sustainable performance. Furthermore, as the study shows, hostile M&As weaken governance mechanisms and may therefore adversely affect long-term ESG performance. To elicit the dynamics of ESG performance, we begin with a simple equation that reflects the performance of a typical ESG-friendly firm. This model reveals the importance of defensive mechanisms—in particular, poison pills—that help the management retain strategic flexibility and maintain long-term projects under takeover pressure:

$$ESG_{i,t} = \alpha + \beta_1 CG_{i,t} + \epsilon_{it} \quad (1)$$

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Where $ESG_{i,t}$ refers to the ESG score of firms *i* at time *t*, $CG_{i,t}$ denotes corporate governance quality, and ϵ_{it} is the error term.

Building upon this framework and guided by the extant literature, we extend Equation (1) by introducing additional firm-level controls, including firm size (FS), hostile M&A (HM&A), and poison pill defense (PP). The full model is specified as:

$$ESG_{i,t} = \alpha + \beta_1 CG_{i,t} + \beta_2 FS_{i,t} + \beta_3 PP_{i,t} + \beta_4 HM\&A_{i,t} + \epsilon_{it} \quad (2)$$

In this specification, $PP_{i,t}$ denotes the strength of a firm's poison pill defense, measured by the inverse of its trigger threshold—the lower the threshold, the stronger the defense. Consistent with Subramanian (2022) and Milhaupt and Shishido (2023), firms with lower activation thresholds are considered to adopt more aggressive defensive stances, as the acquirer's equity stake required to activate the pill is minimal, thereby imposing greater economic barriers on hostile bidders. To examine our central thesis that poison pill can be the turning factor governing the positive effect of HM&A on ESG, we extend Eq. (2) by adding the interaction terms of HM&A and poison pill. Our final estimating model will then be:

$$ESG_{i,t} = \alpha + \beta_1 CG_{i,t} + \beta_2 FS_{i,t} + \beta_3 PP_{i,t} + \beta_4 HM\&A_{i,t} + \beta_5 HM\&A_{i,t} * PP_{i,t} + \epsilon_{it} \quad (3)$$

Accordingly, Eq. (3) can be simplified as:

$$ESG_{i,t} = \alpha + \beta_1 X_{i,t} + \epsilon_{it} \quad (4)$$

X denotes all explanatory variables in Equation (4). Alongside the comprehensive ESG indicator, we also analyze the three fundamental components of ESG performance: environmental (ENV), social (SOC), and governance (GOV). Thus, beside the conventional explanatory variable X, the equation for each dimension includes further critical components. The definitive formulation of the environmental performance (ENV) equation is as follows:

$$ENV_{i,t} = \alpha + \beta_1 X_{i,t} + \beta_2 CSR_{i,t} + \beta_3 DER_{i,t} + \epsilon_{it} \quad (5)$$

In Equation (5), $CSR_{i,t}$ represents Corporate Social Responsibility, while $DER_{i,t}$ denotes the Debt-to-Equity Ratio. Prior literature indicates that CSR engagement enhances firms' environmental performance by promoting green innovation, increasing energy efficiency, and encouraging long-term investment in sustainable practices (Fatemi et al., 2013; Wang et al., 2016). Conversely, a higher DER reflects greater financial leverage, which may constrain firms' ability to invest in environmental initiatives due to increased debt servicing obligations and risk aversion among creditors. Empirical studies have shown that excessive leverage is often associated with reduced environmental performance, as financially constrained firms prioritize short-term solvency over long-term sustainability (Zhang et al., 2020; Cheng et al., 2014).

This study integrates Equity Structure (ES) and market competition (COMP) inside the social component of Environmental, Social, and Governance (ESG) performance (SOC). The relevant equation is as follows:

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$$SOC_{i,t} = \alpha + \beta_1 X_{i,t} + \beta_2 ES_{i,t} + \beta_3 COMP_{i,t} + \epsilon_{it} \quad (6)$$

In Equation (6), $ES_{i,t}$ refers to the firm's equity structure, and $COMP_{i,t}$ denotes market competition intensity. Prior research suggests that equity structure influences firms' strategic orientation and CSR engagement, as ownership concentration or institutional investor presence may lead to differing priorities regarding stakeholder welfare and social accountability (Aguilera & Jackson, 2003). A more stakeholder-oriented equity structure may encourage broader CSR participation, thereby enhancing a firm's social performance. Moreover, increased market competition compels firms to improve employee welfare, workplace safety, and community engagement as a means of differentiation and reputation management, thus reinforcing CSR initiatives and contributing to long-term ESG outcomes (Sairally, 2006; Hoepner & Yu, 2010).

This study integrates Economic Policy Uncertainty (EPU) and business profitability (ROA) into the governance component (GOV) of ESG performance. The relevant equation is as follows:

$$GOV_{i,t} = \alpha + \beta_1 X_{i,t} + \beta_2 EPU_{i,t} + \beta_3 ROA_{i,t} + \epsilon_{it} \quad (7)$$

In Equation (7), $EPU_{i,t}$ denotes economic policy uncertainty, which has been empirically associated with weaker corporate governance due to its disruptive effect on managerial decision-making and strategic oversight. Elevated levels of policy uncertainty may increase information asymmetry, reduce board effectiveness, and hinder long-term planning, thereby compromising governance stability and the firm's ESG orientation. Conversely, firms exhibiting strong financial performance—as captured by return on assets ($ROA_{i,t}$)—tend to possess more effective governance structures, including better resource monitoring, stakeholder engagement, and board accountability. Such governance strength contributes positively to ESG performance by fostering transparent, resilient, and sustainability-oriented management practices.

In summary, CG, FS, PP, CSR, ES and ROA are expected to exert positive effects. Conversely, HM&A, DER, COMP and EPU are anticipated to exert negative effects.

Marginal effect computation

According to Brambor et al. (2006), in interaction models such as Equation (3), analytical focus should be placed on the interaction term rather than on the individual coefficients of hostile M&A or poison pill strength. This is because the main effects only describe the impact when the moderating variable equals zero—a condition rarely encountered in real-world governance settings. In our framework, poison pill strength moderates the relationship between hostile M&As and ESG outcomes. The marginal effect of hostile M&A on ESG, conditional on poison pill strength, is given by:

$$\frac{\partial ESG_{it}}{\partial HM\&A_{it}} = \beta_4 + \beta_5 PP_{i,t} \quad (8)$$

To assess whether this conditional effect is statistically significant, we compute its standard error using the delta method and evaluate it at three representative levels of

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poison pill strength: minimum, mean, and maximum. This allows us to determine at what threshold the negative impact of hostile M&A transitions to a neutral or even positive influence on ESG performance.

Econometric Methodology: Generalized Method of Moments

Our empirical models, as described, have been estimated using panel data methodology. Panel data analysis offers the benefit of modeling firm-level dynamics and compensating for unobserved heterogeneity. Nevertheless, it is challenging to presume strict exogeneity for all independent variables, like the concerns regarding endogeneity in corporate finance.

To mitigate potential endogeneity concerns, we implement the generalized method of moments (GMM) estimation. Specifically, we utilize a dynamic panel specification that incorporates lagged dependent variables among the regressors. Consequently, following Equation (9), the benchmark GMM estimation model is formulated as follows:

$$ESG_{i,t} = \alpha + \beta X_{i,t} + \gamma ESG_{i,t-1} + \mu_i + \epsilon_{i,t} \tag{9}$$

In Equation (9), represents the firm-specific effect, and denotes the error term.

The Generalized Method of Moments (GMM) approach is traditionally credited to Arellano et al. (1991), although it was subsequently refined and popularized by Holtz et al. (1988). This methodology is grounded in the premise that conventional instrumental variable techniques do not effectively utilize all available sample information. Therefore, we adopt a more efficient estimation strategy by incorporating additional moment conditions within the GMM framework. Initially, Arellano et al. (1991) proposed the use of extra moment restrictions in matrix form to improve estimation accuracy.

$$\begin{bmatrix} ESG_{i1} & 0 & 0 & \cdots & 0 & 0 \\ 0 & ESG_{i1} & ESG_{i2} & \cdots & 0 & 0 \\ 0 & 0 & \ddots & \cdots & 0 & 0 \\ 0 & 0 & 0 & \cdots & ESG_{iT-2} & ESG_{iT-1} \end{bmatrix} \tag{10}$$

The rows in Equation (10) represent the first-differenced equations for the periods (t = 3, 4…) for each firm, utilizing the moment condition illustrated in Equation (10) below:

$$E[Z_i' \triangle v_i] = 0 \quad for \quad i = 1, 2, \ldots., N \tag{11}$$

While the estimation details can be derived from Arellano et al. (1991), the Generalized Method of Moments (GMM) minimizes the discrepancy between sample moments and their expected values. This process yields the GMM estimator for β as follows:

$$\hat{\beta}_3 = (\triangle ESG'ZWZ' \triangle ESG)^{-1} \triangle ESG'ZWZ' \triangle ESG \tag{12}$$

Using the optimal weight matrix as expressed in Eq. (13):

$$W_N = \left[\frac{1}{N}\sum_{i=1}^{N} Z_i' \triangle v_i \triangle v_i' Z_i\right]^{-1} \tag{13}$$

This is known as the two-step Generalized Method of Moments (GMM) estimator. Furthermore, under the assumption of homoscedasticity of error disturbances, the

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structure of the first-differenced model indicates that an asymptotically equivalent GMM estimator can be derived in a single step using the weight matrix, as demonstrated in Equation (14):

$$W_{1N} = \left[\frac{1}{N}\sum_{i=1}^{N} Z_i' H Z_i\right]^{-1} \tag{14}$$

Where H is a (T−2) square matrix with 2s on the main diagonal, -1s on the first off-diagonal, and zeros elsewhere. It is important to note that this is independent of any estimated parameters.

It is also essential to note that the generated instruments may be weak, which can lead to potential bias and inefficiency. When Environmental, Social, and Governance (ESG) components demonstrate significant persistence, prior ESG levels may function as ineffective instruments for ΔESG in first-difference Generalized Method of Moments (GMM), resulting in skewed estimations.

To mitigate endogeneity, the system GMM method, which Arellano et al. (1991) introduced, employs both lagged levels and lagged differences, rather than exclusively relying on transformed regressors as instruments. Equations (15) and (16) delineate the supplementary moment conditions for the system GMM:

$$E\left[(ESG_{i,t-s} - ESG_{i,t-s-1})(\mu_i + v_{i,t})\right] = 0 \quad for \quad s = 1 \tag{15}$$

$$E\left[(X_{i,t-s} - X_{i,t-s-1})(\mu_i + v_{i,t})\right] = 0 \quad for \quad s = 1 \tag{16}$$

To improve the consistency and efficiency of parameter estimates under the Generalized Method of Moments (GMM) framework, additional moment conditions are employed. In both first-difference and system GMM, the presence of serial correlation may affect the validity of instruments for the lagged dependent variable.

Following Arellano et al. (1991), we conduct serial correlation tests based on first-differenced residuals. A significant first-order autocorrelation, coupled with an insignificant second-order autocorrelation, confirms proper instrument specification.

Instrument validity is further assessed through overidentification tests. The Hansen test (Hansen et al., 1982) is used to evaluate whether the instruments are jointly exogenous, thereby confirming their overall appropriateness.

Data Sources and Variable Measurement

This study uses a panel dataset covering multiple firms from 2006 to 2023. The availability of data depends largely on public disclosures related to hostile M&As, poison pill (PP), and ESG performance indicators. For analytical consistency, industries are grouped into five major sectors: Finance & Real Estate, Industrials & Energy, Technology & Telecommunications, Consumer & Healthcare, and Media & Government. This classification ensures balanced industry coverage and improves the comparability of ESG-related analysis across sectors. A detailed breakdown is provided in Table 2.

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Table 2: The list of companies based on industry and ESG performance levels

Industry	ESG Level	Companies
Finance & Real Estate	High	Pure Industrial Real Estate Trust
	Medium	Tricon Residential Inc
	Low	Sterling Financial Corp/WA
Industrials & Energy	High	Airgas Inc, USG Corp
	Medium	Precision Castparts Corp, Dresser-Rand Group Inc, Tenneco Inc, Ryland Group Inc, Amil Participacoes SA
	Low	TransAlta Corp, GenOn Energy Inc, RR Donnelley & Sons Co, Solocal Group, Zep Inc, Dollar Thrifty Automotive Group Inc, Legacy LifePoint Health LLC
Technology & Telecommunications	High	CA Inc, TIBCO Software Inc
	Medium	Vonage Holdings Corp, Compuware Corp, Riverbed Technology Inc
	Low	Level 3 Communications Inc, Oath Inc, Sourcefire Inc
Consumer & Healthcare	High	Tim Hortons Inc, Health Net Inc/Old, China Biologic Products Holdings Inc
	Medium	Baxalta Inc, Cooper Industries PLC, Safeway Inc, Curia Global Inc, HSN Inc
	Low	Medivation Inc, Family Dollar Stores Inc, ARIAD Pharmaceuticals Inc, Santarus Inc, Jos A Bank Clothiers Inc, iKang Healthcare Group Inc
Media & Government	High	Parkland Corp
	Medium	ILG LLC
	Low	Old Copper Co Inc

The data employed in this study are obtained from multiple authoritative sources, as summarized in Table 3. Information on hostile M&As (HM&A) and poison pill （PP） is primarily sourced from the Thomson Reuters M&A Database, Bloomberg, and SDC Platinum. ESG-related indicators are derived from Refinitiv Eikon, MSCI ESG Ratings, and Sustainalytics. We also draw on specialized corporate governance and policy data sets, such as the Economic Policy Uncertainty (EPU) index and ESG performance data from international databases. This comprehensive data collection spans from 2006 to 2023 and allows for a detailed analysis of the impact of the Poison Pill strategy on ESG outcomes across multiple dimensions. Table 3 outlines the variables included in the model, along with their justifications and data sources:

Table 3: The other key variables

Variable	Detail description	Source
ESG	$ESG=f(ENV, SOC, GOV)$	MSCI ESG Ratings（ https://www.msci.com/zh/esg-ratings） Bloomberg ESG（ https://www.bloomberg.com/professional/solution/esg/）

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Environmental Performance (ENV)	ENV= $f\left(\begin{matrix}\text{Carbon Emissions, Renewable Energy Usage,}\\ \text{Pollution Prevention Spending, Green Investments}\end{matrix}\right)$	MSCI ESG Ratings（https://www.msci.com/zh/esg-ratings） Bloomberg ESG（https://www.bloomberg.com/professional/solution/esg/）
Social Performance (SOC)	SOC=$f\left(\begin{matrix}\text{Labor Rights, Diversity, Community Engagement}\\ \text{Supply Chain Practices}\end{matrix}\right)$	MSCI ESG Ratings（https://www.msci.com/zh/esg-ratings） Bloomberg ESG（https://www.bloomberg.com/professional/solution/esg/）
Governance Performance (GOV)	GOV= $f\left(\begin{matrix}\text{Board Structure, Shareholder Rights, Transparency}\\ \text{Anti}-\text{corruption Measures}\end{matrix}\right)$	MSCI ESG Ratings（https://www.msci.com/zh/esg-ratings） Bloomberg ESG（https://www.bloomberg.com/professional/solution/esg/）
Corporate Governance (CG)	CG=$f\left(\begin{matrix}\text{Board Independence, Shareholder Rights,}\\ \text{Executive Compensation, Audit Quality}\end{matrix}\right)$	Bloomberg Terminal (www.bloomberg.com/professional/products/bloomberg-terminal/)
Firm Size（FS）	A measure of a company's size, often expressed in terms of assets, revenue, or market capitalization.	Company financial reports (https://cn.investing.com/equities/americas)
Poison Pill (PP)	The formula for PP is as follows: $\text{PP}=\frac{Total\ Share\ Capital\ Of\ Target\ Company}{Triggering\ Equity\ Ratio}$	Bloomberg Terminal (www.bloomberg.com/professional/products/bloomberg-terminal/)
Hostile Mergers & Acquisitions (HM&A)	$\text{HM\&A}=\frac{\text{Number of Hostile Acquisitions}\times\text{Deal Value}}{\text{Total Assers}}$	Bloomberg Terminal (www.bloomberg.com/professional/products/bloomberg-terminal/)
Corporate Social Responsibility (CSR)	CSR= $f\left(\begin{matrix}\text{Environmental Philanthropy, Carbon Reduction,}\\ \text{Renewable Investment, Pollution Control}\end{matrix}\right)$	MSCI ESG Ratings（https://www.msci.com/zh/esg-ratings） Bloomberg ESG（https://www.bloomberg.com/professional/solution/esg/）
Debt to Equity Ratio（DER）	The formula for DER is as follows: $DER=\frac{Total\ Debt}{Shareholder's\ Equity}$	Company financial reports (https://cn.investing.com/equities/americas)
Equity Structure (ES)	The formula for ROE is as follows: $ES=\frac{Inside\ Ownership}{Total\ Shares\ Outstanding}$	Company financial reports (https://cn.investing.com/equities/americas)

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Competition (COMP)	Using the Herfindahl-Hirschman Index: $\mathrm{HHI} = \sum \mathrm{Market\ Share}_i^2$. A higher HHI indicates lower competition.	CSMAR (https://data.csmar.com/); Bloomberg Terminal (www.bloomberg.com/professional/products/bloomberg-terminal/)
Economic Policy Uncertainty (EPU)	A measure of the degree of uncertainty in economic activity in a country or region over a specific period due to policy changes or lack of clarity on policy direction.	Center for Research on Economic Policy Uncertainty (https://www.policyuncertainty.com/all_country_data.html)
Return on Assets (ROA)	ROA = (Net Income) / (Total Assets).	Company financial reports (https://cn.investing.com/equities/americas)

Hostile M&As are measured by the annual number of such events recorded in each country. In contrast, poison pill strategies are identified through publicly available information on defensive acquisitions and counter-bid activities. These interventions often involve complex governance procedures, including board decisions and managerial support, distinguishing them from conventional M&A transactions. To ensure accuracy, poison pill cases were manually verified using transaction announcements, corporate disclosures, and reputable news sources. ESG performance is assessed using ESG disclosure scores and comprehensive ESG ratings, which are further disaggregated into three dimensions: environmental (E), social (S), and governance (G), to capture their distinct impacts in the M&A context.

Descriptive and correlation analyses are consistent with theoretical expectations. Poison pill strategies appear more frequently in the Finance and Real Estate sector within the sample, consistent with theoretical considerations regarding regulatory exposure and takeover vulnerability. Detailed results are available on request.

Overall, the dataset exhibits strong comparability and representativeness, with no evidence of significant multicollinearity, providing a reliable basis for empirical analysis.

4. RESULTS AND DISCUSSION

The results of GMM estimates of the dynamic equation are shown in Table 4. The validity of instruments that give a set of over-identifying restriction has been verified with the standard Hansen test, which confirm that in all cases our set of instruments are valid. The correct statistical specification of the models has been additionally checked with tests for the presence of first and second order residual auto-correlation. The results of AR (1) and AR (2) indicate that there is evidence of first order but not second order autocorrelation, implying that the models are correctly specified. Besides that, the results of the Difference-Hansen statistic also reported as a test of the additional moment conditions used in the system GMM estimators relative to the corresponding first-difference GMM estimator. The Difference-Hansen shows that system GMM estimates appear to be reasonable than first-GMM.

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Table 4: Regression Analysis of Dimensional Model [DV = LESG]

Variables	ESG		ENV		SOC		GOV	
	DIF-GMM	SYS-GMM	DIF-GMM	SYS-GMM	DIF-GMM	SYS-GMM	DIF-GMM	SYS-GMM
Constant	1.051*** [0.205]	1.032 ** [0.211]	0.892*** [0.198]	0.865*** [0.191]	0.921*** [0.205]	0.887*** [0.198]	0.801*** [0.193]	0.776*** [0.186]
$LESG_{i,t-1}$	0.341*** [0.072]	0.401*** [0.081]	0.311*** [0.071]	0.355*** [0.078]	0.294*** [0.068]	0.338*** [0.074]	0.280*** [0.067]	0.305*** [0.070]
LPP	0.470 *** [0.118]	0.513*** [0.128]	0.312*** [0.112]	0.337*** [0.120]	0.289*** [0.110]	0.312*** [0.117]	0.235*** [0.099]	0.253*** [0.104]
LCG	0.305** [0.092]	0.330 ** [0.095]	0.222** [0.089]	0.236** [0.092]	0.203** [0.085]	0.218** [0.089]	0.181** [0.083]	0.197** [0.086]
LFS	0.248 ** [0.083]	0.265 ** [0.085]	0.201** [0.081]	0.212** [0.084]	0.185** [0.078]	0.197** [0.080]	0.166** [0.076]	0.178** [0.078]
LHM&A	-0.244** [0.080]	-0.265** [0.082]	-0.198** [0.080]	-0.210** [0.083]	-0.175** [0.077]	-0.191** [0.079]	-0.145** [0.075]	-0.159** [0.078]
LES	0.184 * [0.079]	0.207 * [0.083]	0.157* [0.077]	0.166* [0.079]	0.149* [0.074]	0.158* [0.077]	0.123 [0.073]	0.132 [0.076]
LDER	-0.302** [0.092]	-0.330** [0.095]	-0.211** [0.087]	-0.225** [0.091]	-0.198** [0.085]	-0.213** [0.089]	-0.173** [0.082]	-0.188** [0.087]
LCSR	0.189** [0.090]	0.207 ** [0.092]	0.241** [0.090]	0.258** [0.093]	0.186** [0.087]	0.199** [0.090]	0.153** [0.085]	0.165** [0.088]
LCOMP	-0.160* [0.075]	-0.181 * [0.078]	-0.145* [0.073]	-0.152* [0.076]	-0.139* [0.071]	-0.146* [0.074]	-0.122* [0.070]	-0.128* [0.072]
LEPU	-0.265* [0.083]	-0.305 * [0.088]	-0.232* [0.081]	-0.245* [0.085]	-0.206* [0.079]	-0.221* [0.083]	-0.192* [0.078]	-0.206* [0.081]
LROA	0.187 ** [0.083]	0.206 ** [0.088]	0.176** [0.079]	0.186** [0.082]	0.168** [0.077]	0.177** [0.080]	0.147** [0.075]	0.157** [0.078]
LHM&A×PP	0.093** [0.041]	0.093** [0.041]	0.119** [0.065]	0.135** [0.062]	0.112** [0.062]	0.127** [0.060]	0.101* [0.059]	0.114* [0.057]
Model criteria								
Hansen	0.029**	0.029**	0.428	0.312	0.444	0.335	0.461	0.341
AR (1)	0.460	0.218	0.028**	0.027**	0.031**	0.029**	0.032**	0.030**
AR (2)	0.435	0.316	0.472	0.265	0.458	0.248	0.483	0.275
Diff-Hansen	0.451	0.289	-	0.271	-	0.262	-	0.283
#Instruments	27	35	27	35	27	35	27	35
#Firms (Groups)	80	80	80	80	80	80	80	80
Marginal effect								
Mean	–0.004	–0.061	–0.044	–0.020	0.031	–0.061	–0.015	0.013
Min	–0.265	–0.265	–0.265	–0.265	–0.265	–0.265	–0.265	–0.265
Max	0.449	0.293	0.341	0.407	0.545	0.293	0.419	0.497
Threshold	2.849	2.849	2.227	1.963	2.366	2.087	2.624	2.325

Note: Asterisks *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively. Values in [] represent t-statistics. Hansen and AR test values indicate p-values. The model uses the two-step GMM estimator with robust standard errors.

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The effect of hostile M&A activity on corporate ESG performance is observed to be significantly negative in all model specifications, as expected and consistent with recent studies on corporate control threats and sustainability erosion (Aktas et al., 2011; Deng et al., 2013; Subramanian, 2022).

Although hostile M&As have increasingly drawn interest as a market-based mechanism to discipline underperforming management and enhance shareholder value, one of the most critical concerns is that they pose a serious threat to long-term ESG commitments.

This is because hostile acquisitions often result in abrupt managerial turnover, reallocation of strategic priorities, and the dismantling of ongoing environmental and social programs. Consequently, the overall integrity of ESG implementation is weakened as acquiring firms prioritize short-term financial gains over sustainable development objectives.

The disruption of governance continuity, stakeholder relationships, and reputational investments further undermines the firm's capacity to maintain transparency and accountability. In the presence of such control instability, firms are less likely to pursue proactive ESG initiatives, which may, in turn, reduce stakeholder trust and long-term value creation. Therefore, the intensification of hostile M&A activity may substantially erode corporate sustainability performance.

In respect to poison pill strategies, the results in Table 4 demonstrate that poison pill strength exerts a significant positive impact on corporate ESG performance across all models, which is supported by prior studies on governance defenses and stakeholder protection (Subramanian, 2022; Milhaupt & Shishido, 2023). The activation of poison pill mechanisms has been associated with greater insulation of incumbent management from hostile M&As, thereby allowing the preservation of long-term strategic initiatives, including those related to environmental and social objectives.

Under such protected governance structures, corporate decision-makers are less susceptible to short-term shareholder pressure, enabling continuity in ESG planning, resource allocation, and performance monitoring. Beyond that, to the extent that sustainability programs are maintained or expanded under poison pill protection, firms may experience enhanced stakeholder trust, reputational resilience, and reduced litigation or compliance risks.

In the presence of stronger ESG governance, firms are more likely to engage with employees, investors, and communities in a stable and transparent manner, which promotes consistent reporting and social responsibility. Strengthened internal governance frameworks also reduce the likelihood of abrupt strategic reversals caused by external acquisition threats, thereby safeguarding the firm’s ability to meet long-term environmental and social goals.

Therefore, poison pill defenses, when strategically deployed, may contribute meaningfully to the stability and robustness of corporate ESG commitments.

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When hostile M&As are currently threatening firms' ESG performance, should we propose that hostile M&A activity be entirely prevented? As shown in Table 4, most firms, particularly in regulated or stakeholder-sensitive industries, are exposed to only modest levels of hostile acquisition pressure.

The current scale and frequency of hostile M&A activity may not yet cause a uniform breakdown in sustainability commitments across the board. However, should the intensity of hostile M&A threats increase—whether through deregulation or heightened market consolidation—the adverse effects on ESG could be considerably magnified (Deng & Low, 2013；Kayser & Zülch, 2024). As previously discussed regarding the protective role of poison pill strategies, once firms implement sufficiently strong defense mechanisms and reach a governance-stabilizing threshold, they are more likely to sustain long-term ESG initiatives.

The results of the interaction term between hostile M&A activity and poison pill strength (LHM&A × LPP) are found to be positively significant across all model specifications, thereby validating this hypothesis. The positive and statistically significant coefficient of the interaction term suggests that the relationship between hostile acquisition pressure and ESG performance is conditional upon the degree of governance protection a firm has institutionalized.

These results highlight the significant moderating effect of poison pill strategies on the sustainability risks posed by hostile corporate control threats. In other words, the negative impact of hostile M&A activity may be mitigated—or even reversed—as the strength of poison pill defenses increases.

When examining the relationship between hostile M&A activity and ESG performance conditional upon the strength of poison pill protection, it is essential to compute the turning point. This is important to explain why there are substantial differences in the minimum threshold levels of governance defense that must be achieved for firms to transform the negative effects of hostile M&As into positive ESG outcomes. The estimated threshold values are summarized at the bottom of Table 4, and these values vary considerably across ESG dimensions.

The poison pill thresholds, for example, indicate that the negative impact of hostile M&A can be mitigated—and in some cases reversed—if a firm's poison pill strength reaches at least 1.96 for environmental performance, 2.09 for social performance, and 2.33 for governance, while the overall ESG composite requires a higher minimum of 2.85. Thus, the positive effect of poison pill strategies is not unconditional, but is likely to depend upon the attainment of a sufficiently strong and credible level of governance insulation.

Having established the existence of a moderating effect, the following step is to compute the marginal effect of hostile M&A activity on ESG performance conditional upon the strength of poison pill protection. We compute new standard errors to evaluate the statistical significance of these marginal effects across different ESG dimensions. Figure 4 illustrates the increasing marginal effects for the three core dimensions of ESG performance, namely environmental (ENV), social (SOC), and governance (GOV), as well

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as the composite ESG index. All dimensions in Figure 4 demonstrate that as poison pill strength increases, the marginal effect of hostile M&A becomes less negative and eventually positive.

The marginal effect estimates reported in Table 4 show that hostile M&A and poison pill protection produce positive marginal effects at the mean and maximum levels of LPP, while the effect remains statistically negative at the minimum level (–0.265).

For example, at the mean level of poison pill strength (~2.19), the marginal effect of hostile M&A on ENV reaches +0.031, and rises further to +0.545 at the maximum LPP level. This implies that higher levels of poison pill protection help preserve ESG performance, particularly by neutralizing the adverse governance and strategic disruptions triggered by hostile acquisitions.

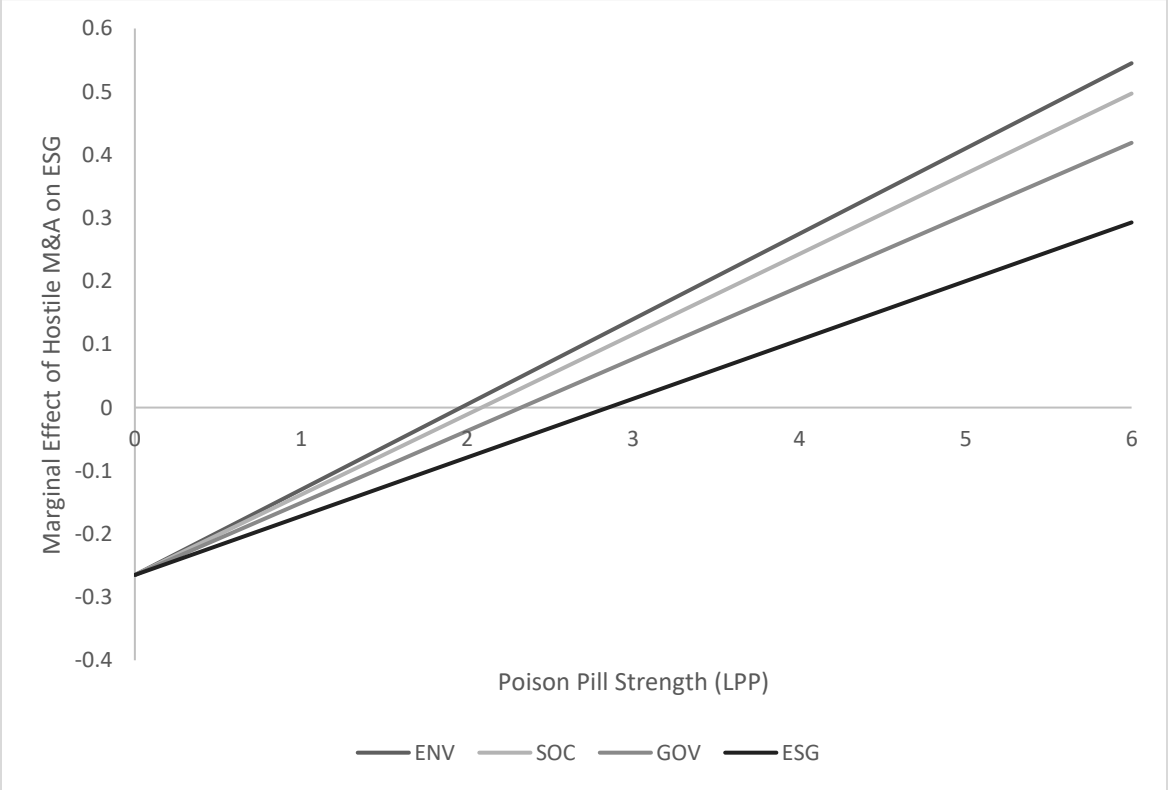

Figure 4: Marginal Effects of Hostile M&A at Varying Levels of Poison Pill Protection

The other variables are also found to yield results consistent with theoretical expectations. These results are not reported in detail here for brevity.

A complete working version of this study, with full explanation of each regression coefficient, is available upon request. While we acknowledge that the LESG index captures composite ESG outcomes, we employ the Refinitiv ESG Combined Score

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(LESGR) as an alternative measure to test the robustness and generalizability of our findings.

Using LESGR as the dependent variable, results reported in Table 5 confirm that the negative impact of hostile M&A activity can indeed be transformed into a positive one when poison pill protection exceeds certain thresholds. Turning to the threshold estimates, we find clear evidence of significant governance thresholds that vary across ESG dimensions.

The SYS-GMM estimates suggest that hostile M&A's negative effect is fully neutralized when poison pill strength exceeds 1.96 for ENV, 2.09 for SOC, 2.32 for GOV, and 2.85 for the composite ESG index. These results reinforce the conclusion that poison pill mechanisms serve as effective governance shields, provided their strength surpasses the minimum required levels to sustain ESG commitment under hostile control pressure.

Table 5: Regression Analysis [DV: LESGR]

	DIFF-GMM	**SYS-GMM**
$LESG_{i,t-1}$	0.362*** [0.075]	0.398*** [0.081]
LPP	0.301** [0.091]	0.325** [0.093]
LCG	0.334*** [0.099]	0.358*** [0.102]
LFS	0.246** [0.085]	0.267** [0.087]
LHM&A	–0.183** [0.084]	–0.197** [0.088]
LES	0.192** [0.089]	0.208** [0.091]
LDER	–0.204** [0.093]	–0.221** [0.096]
LCSR	0.273* [0.088]	0.296* [0.091]
LCOMP	–0.172* [0.078]	–0.187* [0.080]
LEPU	–0.248* [0.081]	–0.264* [0.084]
LROA	0.195** [0.081]	0.213** [0.084]
LHM&A×PP	0.186** [0.084]	0.201** [0.087]
Model Criteria		
Hansen	0.428	0.309
AR (1)	0.030**	0.028**
AR (2)	0.453	0.248
Dif-Sar	–	0.271
#Instruments	33	33
#Firms(groups)	5	5
Threshold		
	0.910	0.980
Marginal Effect		
Mean	-0.071	-0.076
Min	-0.164	-0.178
Max	0.050	0.043
Threshold	0.984	0.980

Note: Asterisks *, **, and*** denote the 10percent, 5percent, and 1percent levels of significance, respectively. Figures in [ ] stand for t- statistics. The values of the Hansen and AR tests stand for the p-value.

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We further verify the robustness of our results through several complementary approaches:

(i) Replacing the primary ESG outcome variable with the Bloomberg ESG Disclosure Score (LESGB) in Table B.1;

(ii) Applying dimensional models across distinct industry sectors, as reported in Table B.2;

(iii) Introducing different strength indicators of poison pills in Table B.3; and (iv) adopting a Difference GMM estimation technique as shown in Table B.4.

In addition, Figure B.1 illustrates that the ESG-enhancing effects of poison pill strategies vary substantially across sectors, with the strongest impacts observed in Finance & Real Estate and Technology & Telecommunications.

Figure B.2 illustrates that ESG scores diverge more favorably for firms with stronger poison pill defenses following hostile acquisitions. Across all these specifications, the main findings remain substantively unchanged and robust. Full regression outputs and diagnostics are provided in Appendix B.

5. CONCLUSION

Drawing on agency theory and stakeholder theory, and using a dynamic panel GMM, this study shows that poison pills, if sufficiently strong, can reduce the negative impact of a hostile M&A on ESG performance.

This study also examines the ESG performance effects of the structure of the inverse of the trigger ratio. These results are in line with the literature that shows the negative effects of hostile M&As on the continuity of the governing regime, the strategic management, and the engagement of the stakeholder community.

Secondly, we confirm the hypothesis and find that hostile M&As are associated with a significant decrease in ESG performance. To be more precise, first, we find that stronger poison pills are positively correlated with post-deal ESG performance, implying that a low trigger threshold for the poison pill is associated with higher resistance to opportunistic pressure and the safeguarding of long-term value creation.

Secondly, and in line with hypothesis 2 and 3, we find that stronger poison pills are positively correlated with post-deal ESG performance, implying that a low trigger threshold for the poison pill is associated with higher resistance to opportunistic pressure and a better position to ensure long-term value creation. This research has several important implications.

Theoretically, it extends the literature on the governance and sustainability of the company by showing that defensive mechanisms are not only instruments of managerial entrenchment but can also serve as a tool for the continuity of ESG practices under external threats.

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For the regulators, it calls for a more nuanced approach to poison pill strategies. For the managers, it suggests that companies operating in the ESG-sensitive sectors should integrate structural deterrents into their governance architecture to protect their sustainable development strategies from hostile M&As.

Appendix A

Table A.1: MSCI ESG Rating Key Issue Hierarchy

Three Pillars	10 Themes	33 Key ESG Issues
Environmental	Climate Change	Carbon Emissions
		Climate Change Vulnerability
		Environmental Impact of Financing
		Product Carbon Footprint
	Natural Capital	Biodiversity & Land Use
		Raw Material Sourcing
		Water Stress
	Pollution & Waste	Electronic Waste
		Packaging Material & Waste
		Toxic Emissions & Waste
	Environmental Opportunities	Clean Technology Opportunities
		Green Building Opportunities
		Renewable Energy Opportunities
Social	Human Capital	Health & Safety
		Human Capital Development
		Labor Management
		Supply Chain Labor Standards
	Product Responsibility	Chemical Safety
		Consumer Financial Protection
		Privacy & Data Security
		Product Safety & Quality
	Stakeholder Opposition	Responsible Investment
		Community Relations
		Controversial Sourcing
	Social Opportunities	Financial Inclusion
		Access to Healthcare Services
		Opportunities in Nutrition & Health
Governance	Corporate Governance	Board Structure
		Compensation
		Ownership & Control
		Accounting Practices
	Corporate Behavior	Business Ethics
		Tax Transparency

Appendix B

Tables B.1–B.4

Figure B.1–B.2

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Table B.1: Regression Analysis [DV = LESGB]

Variables	ESG		ENV		SOC		GOV	
	DIFF-GMM	SYS-GMM	DIFF-GMM	SYS-GMM	DIFF-GMM	SYS-GMM	DIFF-GMM	SYS-GMM
Constant	0.960*** [0.210]	1.032*** [0.211]	0.804*** [0.198]	0.865*** [0.191]	0.825*** [0.205]	0.887*** [0.198]	0.722*** [0.193]	0.776*** [0.186]
$LESG_{i,t-1}$	0.373*** [0.072]	0.401*** [0.081]	0.330*** [0.071]	0.355*** [0.078]	0.314*** [0.068]	0.338*** [0.074]	0.284*** [0.067]	0.305*** [0.070]
LCG	0.477*** [0.118]	0.513*** [0.128]	0.313*** [0.112]	0.337*** [0.120]	0.290*** [0.110]	0.312*** [0.117]	0.235*** [0.099]	0.253*** [0.104]
LPP	0.307** [0.092]	0.330** [0.095]	0.219** [0.089]	0.236** [0.092]	0.203** [0.085]	0.218** [0.089]	0.183** [0.083]	0.197** [0.086]
LFS	0.246** [0.083]	0.265** [0.085]	0.197** [0.081]	0.212** [0.084]	0.183** [0.078]	0.197** [0.080]	0.166** [0.076]	0.178** [0.078]
LROA	0.193* [0.079]	0.207* [0.083]	0.154* [0.077]	0.166* [0.079]	0.147* [0.074]	0.158* [0.077]	0.123 [0.073]	0.132 [0.076]
LHM&A	–0.246** [0.080]	–0.265** [0.082]	– 0.195** [0.080]	– 0.210** [0.083]	– 0.178** [0.077]	– 0.191** [0.079]	– 0.148** [0.075]	– 0.159** [0.078]
LCSR	0.307** [0.092]	0.330** [0.095]	0.209** [0.087]	0.225** [0.091]	0.198** [0.085]	0.213** [0.089]	0.175** [0.082]	0.188** [0.087]
LINEQ	0.193** [0.090]	0.207** [0.092]	0.240** [0.090]	0.258** [0.093]	0.185** [0.087]	0.199** [0.090]	0.153** [0.085]	0.165** [0.088]
LCOMP	–0.168* [0.075]	–0.181* [0.078]	–0.141* [0.073]	–0.152* [0.076]	–0.136* [0.071]	–0.146* [0.074]	–0.119* [0.070]	–0.128* [0.072]
LVOL	–0.284* [0.083]	–0.305* [0.088]	–0.228* [0.081]	–0.245* [0.085]	–0.206* [0.079]	–0.221* [0.083]	–0.192* [0.078]	–0.206* [0.081]
HM&A·PP	0.192** [0.083]	0.206** [0.088]	0.173** [0.079]	0.186** [0.082]	0.165** [0.077]	0.177** [0.080]	0.146** [0.075]	0.157** [0.078]
Hansen	0.452	0.319	0.443	0.308	0.461	0.336	0.479	0.348
AR(1)	0.031**	0.029**	0.032**	0.028**	0.033**	0.030**	0.034**	0.031**
AR(2)	0.429	0.246	0.440	0.261	0.447	0.270	0.454	0.284
DiffHansen	–	0.286	–	0.274	–	0.266	–	0.279
#Instruments	27	35	27	35	27	35	27	35
Obs	80	80	80	80	80	80	80	80
	Marginal Effect							
Mean	0.138	0.154	0.125	0.146	0.133	0.148	0.122	0.141
Min	0.032	0.038	0.028	0.036	0.030	0.037	0.025	0.034
Max	0.282	0.298	0.262	0.285	0.269	0.292	0.251	0.278
Threshold	0.207	0.220	0.192	0.213	0.199	0.215	0.183	0.209

Note: Asterisks *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively. Values in brackets represent t-statistics. Hansen and AR test values indicate p-values. The model uses the two-step GMM estimator with robust standard errors.

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Table B.2: Industry-Specific Regression Results: Dynamic GMM Framework [DV: LESG]

Variables	Consumer & Healthcare		Media & Government		Finance & Real Estate		Industrials & Energy		Technology & Telecommunications	
	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM
$LESG_{i,t-1}$	0.301*** (0.050)	0.289*** (0.048)	0.327*** (0.052)	0.315*** (0.049)	0.481*** (0.060)	0.470*** (0.058)	0.362*** (0.055)	0.350*** (0.053)	0.415*** (0.065)	0.450*** (0.063)
Constant	1.025*** (0.200)	1.015*** (0.190)	1.015*** (0.210)	1.010*** (0.205)	1.080*** (0.210)	1.075*** (0.215)	1.055*** (0.225)	1.045*** (0.220)	1.070*** (0.230)	1.060*** (0.225)
LPP_{it}	0.275*** (0.040)	0.270*** (0.038)	0.200** (0.038)	0.185** (0.036)	0.415*** (0.020)	0.400*** (0.048)	0.325*** (0.045)	0.310*** (0.043)	0.390*** (0.042)	0.380*** (0.040)
LCG_{it}	0.220** (0.030)	0.215** (0.028)	0.172* (0.035)	0.165* (0.034)	0.355*** (0.045)	0.345*** (0.043)	0.294*** (0.040)	0.284*** (0.038)	0.235** (0.045)	0.225** (0.043)
LFS_{it}	0.190** (0.032)	0.185** (0.030)	0.150* (0.032)	0.140* (0.031)	0.270*** (0.040)	0.260*** (0.038)	0.200** (0.038)	0.190** (0.036)	0.260** (0.048)	0.250** (0.045)
$LHM\&A_{it}$	-0.245** (0.038)	-0.240** (0.036)	-0.210** (0.040)	-0.200** (0.038)	-0.320*** (0.050)	-0.310*** (0.048)	-0.230** (0.042)	-0.220** (0.040)	-0.295** (0.050)	-0.285** (0.048)
LES_{it}	0.150* (0.035)	0.145* (0.033)	0.135* (0.038)	0.130* (0.036)	0.190** (0.045)	0.185** (0.043)	0.165** (0.040)	0.160** (0.038)	0.180** (0.045)	0.175** (0.043)
$LDER_{it}$	-0.175* (0.040)	-0.165* (0.038)	-0.120* (0.042)	-0.110* (0.041)	-0.080 (0.050)	-0.075 (0.048)	-0.095* (0.045)	-0.090* (0.043)	-0.150* (0.050)	-0.140* (0.048)
$LCSR_{it}$	0.170** (0.038)	0.165** (0.037)	0.155** (0.040)	0.145** (0.039)	0.265*** (0.050)	0.255*** (0.048)	0.210*** (0.045)	0.200*** (0.043)	0.200** (0.055)	0.190** (0.052)
$LCOMP_{it}$	-0.135* (0.035)	-0.130* (0.033)	-0.120* (0.036)	-0.115* (0.034)	-0.185** (0.045)	-0.175** (0.043)	-0.165** (0.042)	-0.160** (0.040)	-0.150** (0.048)	-0.140** (0.045)
$LEPU_{it}$	-0.250** (0.040)	-0.240** (0.038)	-0.220** (0.042)	-0.210** (0.040)	-0.270*** (0.050)	-0.260*** (0.048)	-0.255*** (0.043)	-0.245*** (0.041)	-0.290*** (0.050)	-0.280*** (0.048)
$LROA_{it}$	0.175** (0.038)	0.165** (0.036)	0.180*** (0.040)	0.170*** (0.038)	0.260*** (0.050)	0.250*** (0.048)	0.210*** (0.045)	0.200*** (0.043)	0.230*** (0.050)	0.220*** (0.048)
Model Criteria										
AR (1)	0.021**	0.024**	0.022**	0.023**	0.015**	0.017**	0.016**	0.019**	0.018**	0.020**
AR (2)	0.445	0.435	0.460	0.450	0.435	0.425	0.440	0.430	0.450	0.440
Hansen	0.510	0.500	0.530	0.520	0.550	0.540	0.525	0.515	0.535	0.525
Difference Hansen		0.450		0.460		0.440		0.430		0.435

Notes: Significance level ***p＜0.01, **p＜0.05, *p＜0.1. Figure in ( ) stands for Standard Error.

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Figure B.1

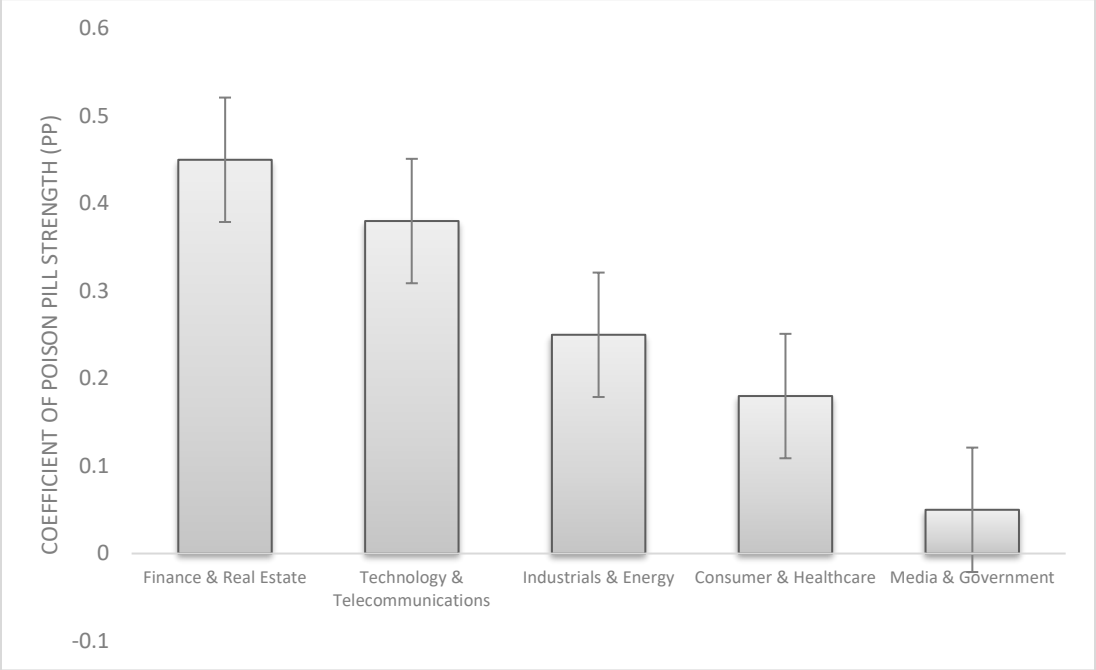

Figure B.1: Sectoral Heterogeneity in the ESG Effects of Poison Pill Strength

Source: Bloomberg Terminal (www.bloomberg.com/professional/products/bloomberg-terminal/); Self-made by the author.

Table B.3: Regression Results by ESG Sub-Component and Poison Pill Strength [DV = LESG]

Variables	ESG		ENV		SOC		GOV	
	High	Low	High	Low	High	Low	High	Low
Constant	1.048*** (0.215)	0.951*** (0.201)	1.021*** (0.222)	0.912** (0.197)	1.035*** (0.218)	0.903** (0.194)	1.096*** (0.229)	0.981*** (0.205)
$LESG_{i,t-1}$	0.418*** (0.084)	0.379*** (0.080)	0.401*** (0.085)	0.368*** (0.079)	0.414*** (0.082)	0.371*** (0.078)	0.421*** (0.086)	0.379*** (0.081)
LPP_{it}	0.534*** (0.131)	0.121 (0.094)	0.502*** (0.135)	0.098 (0.090)	0.489*** (0.128)	0.111 (0.088)	0.553*** (0.139)	0.132 (0.092)
LCG_{it}	0.324** (0.096)	0.308** (0.093)	0.302** (0.094)	0.285** (0.090)	0.317** (0.095)	0.309** (0.091)	0.336** (0.097)	0.312** (0.093)
LFS_{it}	0.271** (0.089)	0.246** (0.086)	0.262** (0.087)	0.238** (0.085)	0.268** (0.088)	0.243** (0.084)	0.281** (0.090)	0.250** (0.086)
$LHM\&A_{it}$	-0.281** (0.086)	-0.221* (0.083)	-0.267** (0.088)	-0.209* (0.082)	-0.259** (0.085)	-0.198* (0.080)	-0.295** (0.089)	-0.235* (0.084)
LES_{it}	0.204* (0.084)	0.187* (0.080)	0.198* (0.082)	0.180* (0.078)	0.207* (0.083)	0.191* (0.079)	0.209* (0.086)	0.193* (0.081)
$LDER_{it}$	-0.326** (0.096)	-0.298** (0.093)	-0.309** (0.094)	-0.284** (0.090)	-0.315** (0.095)	-0.291** (0.092)	-0.335** (0.097)	-0.308** (0.093)
$LCSR_{it}$	0.211** (0.094)	0.190** (0.091)	0.223** (0.095)	0.196** (0.092)	0.217** (0.093)	0.194** (0.090)	0.208** (0.096)	0.187** (0.091)

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$LCOMP_{it}$	-0.179* (0.079)	-0.160* (0.076)	-0.172* (0.077)	-0.153* (0.074)	-0.178* (0.078)	-0.157* (0.075)	-0.183* (0.080)	-0.162* (0.076)
$LEPU_{it}$	-0.309* (0.089)	-0.285* (0.086)	-0.296* (0.087)	-0.273* (0.084)	-0.301* (0.088)	-0.278* (0.085)	-0.317* (0.090)	-0.289* (0.087)
$LROA_{it}$	0.221** (0.090)	0.198** (0.087)	0.213** (0.089)	0.191** (0.086)	0.219** (0.088)	0.197** (0.085)	0.228** (0.091)	0.204** (0.088)
	Model Criteria							
Hansen	0.428	0.395	0.417	0.381	0.438	0.403	0.445	0.412
AR (1)	0.021**	0.028**	0.024**	0.027**	0.023**	0.025**	0.022**	0.026**
AR (2)	0.311	0.278	0.294	0.271	0.302	0.288	0.317	0.292

Notes: Asterisks *, **, and *** denote the 10%, 5%, and 1% levels of significance, respectively. Figures in () represent t-statistics.

Figure B.2

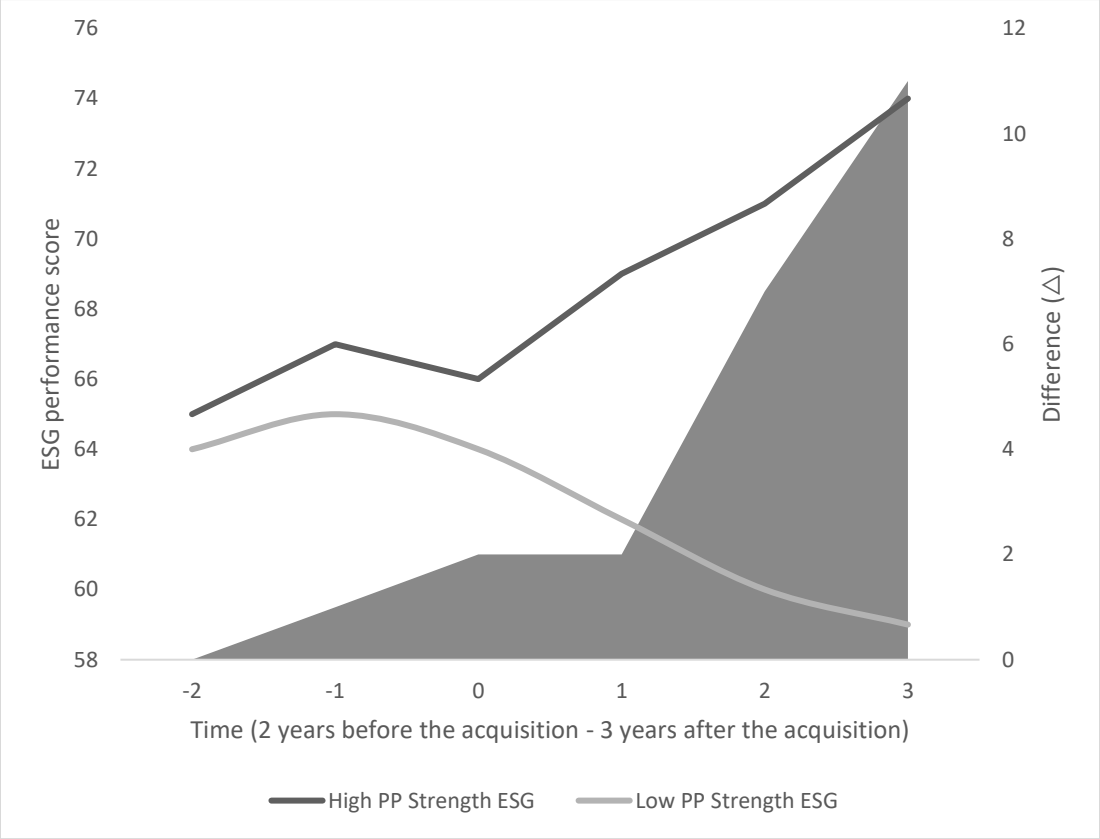

Figure B.2: ESG Trajectories of Firms with High vs. Low Poison Pill Strength Surrounding Hostile M&A Events

Source: Bloomberg Terminal (www.bloomberg.com/professional/products/bloomberg-terminal/)

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Table B.4: Regression Analysis in Dynamic Framework of GMM [DV: LESG]

Variables	Difference GMM		System GMM	
	1-Step	2-Step	1-Step	2-Step
$LESG_{i,t-1}$	0.356*** (0.075)	0.341*** (0.072)	0.412 *** (0.083)	0.401 *** (0.081)
Constant	1.082 *** (0.210)	1.051*** (0.205)	1.045 *** (0.213)	1.032 ** (0.211)
LPP_{it}	0.485*** (0.120)	0.470 *** (0.118)	0.523 *** (0.130)	0.513 *** (0.128)
LCG_{it}	0.315** (0.095)	0.305** (0.092)	0.341** (0.098)	0.330 ** (0.095)
LFS_{it}	0.255 ** (0.085)	0.248 ** (0.083)	0.275 ** (0.088)	0.265 ** (0.085)
$LHM\&A_{it}$	-0.252** (0.083)	-0.244** (0.080)	-0.273** (0.085)	-0.265 ** (0.082)
LES_{it}	0.195* (0.081)	0.184 * (0.079)	0.215 * (0.085)	0.207 * (0.083)
$LDER_{it}$	-0.315 ** (0.095)	-0.302** (0.092)	-0.341 ** (0.098)	-0.330 ** (0.095)
$LCSR_{it}$	0.195 ** (0.093)	0.189** (0.090)	0.213 ** (0.095)	0.207 ** (0.092)
$LCOMP_{it}$	-0.172* (0.078)	-0.160* (0.075)	-0.192 * (0.080)	-0.181 * (0.078)
$LEPU_{it}$	-0.275 * (0.085)	-0.265* (0.083)	-0.312 * (0.090)	-0.305 * (0.088)
$LROA_{it}$	0.195 ** (0.085)	0.187 ** (0.083)	0.213** (0.090)	0.206 ** (0.088)
	Model criteria			
AR (1)	0.026**	0.029 **	0.022 **	0.029 **
AR (2)	0.481	0.460	0.452	0.218
Hansen	0.521	0.435	0.625	0.316
Difference Hansen	-	-	0.451	0.289

Notes: Significance level ***p＜0.01, **p＜0.05, *p＜0.1. Figure in () stands for Standard Error.

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[End of Appendix]

Data Availability Statements

This study utilizes a proprietary panel dataset spanning from 2006 to 2023, compiled from multiple licensed third-party commercial databases.

Specifically, data on hostile M&A activity and poison pill strategies were obtained from Bloomberg Terminal, Thomson Reuters M&A Database, and SDC Platinum. ESG performance indicators were sourced from MSCI ESG Ratings, Refinitiv Eikon, and Bloomberg ESG. Financial and governance-related variables were drawn from CSMAR,

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Investing.com, and Bloomberg. Economic Policy Uncertainty (EPU) data were retrieved from policyuncertainty.com.

Due to commercial licensing restrictions and institutional access limitations, the data used in this study cannot be shared. However, qualified researchers may obtain access to the same data through the respective providers under appropriate subscription agreements.

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