Business Strategy and the Environment

WILEY | Business Strategy and the Environment

RESEARCH ARTICLE OPEN ACCESS

Complex Firms, Controversial Outcomes: Global Evidence on ESG Failures and Remedies

Abongeh A. Tunyi[1,2] | Ali Uyar[3] | Nejla Ould Daoud Ellili[4] | Abdullah S. Karaman[5]

[1]School of Management, Swansea University, Bay Campus, Swansea, UK | [2]Department of Financial Governance, College of Accounting Sciences, University of South Africa, Pretoria, South Africa | [3]CERIIM, Excelia Business School, La Rochelle, France | [4]College of Business, Abu Dhabi University, Abu Dhabi, UAE | [5]Department of Management and Marketing, Winthrop University, Rock Hill, South Carolina, USA

Correspondence: Abongeh A. Tunyi (tunyi.abongeh@swansea.ac.uk)

Received: 10 June 2025 | **Revised:** 1 February 2026 | **Accepted:** 8 February 2026

Keywords: analyst scrutiny | business complexity | ESG controversies | internal governance mechanisms | Paris Agreement | workforce gender diversity

ABSTRACT

We examine whether business complexity increases firms' exposure to negative environmental, social, and governance (ESG) outcomes, specifically ESG controversies, using a global panel of firms from 37 countries over the period 2002–2021. We further investigate the moderating roles of external monitoring by financial analysts; internal governance mechanisms, including board independence and workforce gender diversity; and international policy frameworks, with particular emphasis on the Paris Agreement as a regulatory tightening mechanism. Our results show that business complexity is strongly and positively associated with ESG controversies worldwide. Analyst scrutiny amplifies, rather than mitigates, this effect, indicating that external capital market monitoring does not effectively discipline ESG risk in complex firms. In contrast, stronger internal governance, reflected in greater board independence and a higher proportion of female employees, significantly attenuates the complexity controversy link. We also find that the positive effect of complexity on ESG controversies weakens in the post-Paris Agreement period, consistent with heightened regulatory pressure and compliance expectations imposed on firms following the Agreement. Overall, the study provides novel cross-country evidence on how organizational structure shapes negative ESG outcomes, integrating insights from complexity and agency theories with important implications for managers, policymakers, and investors.

1 | Introduction

Firms today operate under intensifying scrutiny as stakeholders demand greater environmental, social, and governance (ESG) accountability. This pressure reflects heightened societal expectations, evolving regulatory regimes, and the growing influence of ESG considerations on firm valuation, access to capital, and reputational standing (Chouaibi and Affes 2021). At the same time, firms are becoming increasingly complex. International expansion, fragmented regulatory environments, outsourcing, and extended supply chains have substantially increased the scale, scope, and structural sophistication of modern corporations (Casson and Li 2022; Eriksson et al. 2023). While such complexity may generate strategic advantages, it also complicates coordination, weakens internal controls, and raises exposure to ESG-related risks.

Understanding the ESG implications of business complexity is therefore critical. As firms grow larger, more geographically dispersed, and organizationally layered, agency problems intensify, accountability becomes diffused, and stakeholder engagement becomes uneven. These conditions create fertile ground for ESG controversies, namely, publicly disclosed incidents involving environmental harm, social misconduct, or governance failures. ESG controversies are not only manifestations of corporate irresponsibility (Utz 2019) but also salient

warning signals for investors, regulators, and society at large. Yet despite their economic and reputational consequences, the role of business complexity in shaping ESG controversies remains underexplored.

High-profile ESG failures illustrate the risks inherent in complex organizational structures. Incidents such as the Deepwater Horizon oil spill, the Volkswagen emissions scandal, and multinational bribery cases reveal how decentralized operations, reliance on subcontractors, opaque decision chains, and cross-jurisdictional activity can undermine effective oversight and facilitate large-scale ESG breakdowns. These cases suggest that ESG controversies are often rooted not only in managerial misconduct but also in the structural features of complex firms operating across heterogeneous institutional environments.

While prior research examines business complexity in relation to financial reporting quality (Bertomeu 2023), operational efficiency (Sun et al. 2024), and strategic decision-making (Chatjuthamard et al. 2022), its ESG consequences have received limited attention. This study addresses this gap by asking two core questions. First, does business complexity increase firms' exposure to ESG controversies? Second, under what conditions is this relationship amplified or mitigated. In particular, we examine the role of financial analysts as external monitors, internal governance mechanisms such as board independence and workforce gender diversity, and transnational regulatory frameworks, specifically the Paris Agreement, conceptualized as a global regulatory tightening mechanism.

Drawing on complexity and agency theories, we first hypothesize that ESG controversies are more prevalent in complex firms (Hypothesis 1). Complexity theory predicts that diversified, decentralized, and globally integrated organizations face coordination failures, governance blind spots, and fragmented accountability, thereby increasing their vulnerability to ESG failures (Sargut and McGrath 2011). Small operational lapses can escalate into major controversies once they intersect with regulatory scrutiny, media attention, or stakeholder activism (Christensen et al. 2014; Jamali 2010). Bounded rationality further constrains managers' ability to process dispersed ESG information, leading to reactive rather than preventive risk management (Simon 1991; Gond et al. 2012).

Agency theory reinforces this prediction. As firms expand across organizational layers and jurisdictions, principal–agent chains lengthen and become more opaque, weakening monitoring and increasing the opportunities for ESG-related misconduct (Jensen and Meckling 1976; Daily et al. 2003). ESG oversight becomes more costly and complex, often resulting in symbolic compliance rather than substantive governance (Boiral 2013). These structural characteristics make ESG failures more likely even in firms that publicly espouse strong sustainability commitments.

We next examine whether financial analyst scrutiny mitigates or exacerbates ESG controversies in complex firms (Hypothesis 2). Analysts are commonly viewed as external governance agents who reduce information asymmetry and discipline managerial behavior (Chen et al. 2015). While some studies find that analyst coverage improves ESG performance through enhanced visibility and reputational pressure (Hu et al. 2021; Benlemlih et al. 2024), others show that analyst pressure promotes managerial short-termism by discouraging investments perceived as discretionary (Adhikari 2016; Qian et al. 2019). Importantly, this literature largely focuses on positive ESG performance rather than ESG controversies, which are unexpected events reflecting governance failures rather than strategic ESG choices (Kuzey et al. 2024). In complex firms, analysts may struggle to detect emerging ESG risks and may reinforce managerial focus on short-term financial metrics, thereby amplifying rather than constraining ESG vulnerabilities.

We test our hypotheses using a global panel of 5949 listed firms from 37 countries over the period 2002–2021, yielding 34,782 firm-year observations drawn from LSEG Eikon. Our empirical approach employs fixed-effects regressions and extensive robustness checks to address endogeneity concerns. The results show that business complexity significantly increases the incidence of ESG controversies. Analyst coverage amplifies this relationship, indicating a failure of external market-based monitoring in complex organizational settings. In contrast, internal governance mechanisms, particularly board independence and workforce gender diversity, significantly attenuate complexity-driven ESG risks. We also find that the Paris Agreement weakens the positive association between complexity and ESG controversies, consistent with heightened regulatory pressure and compliance expectations following global climate policy coordination.

This study makes several contributions. First, it shifts the ESG literature's focus from positive ESG performance to ESG controversies, which represent costly and often unanticipated governance failures. Second, it adopts a multidimensional view of business complexity, combining size-based and structural measures, thereby offering a more comprehensive assessment than prior single-proxy approaches (Monem 2013; Loughran and McDonald 2024). Third, it provides the first large-scale cross-country evidence on the role of financial analysts in shaping ESG risk in complex firms, challenging the presumption that analyst scrutiny uniformly disciplines corporate behavior. Finally, by incorporating the Paris Agreement as an institutional moderator, the study demonstrates how transnational regulatory tightening can curb ESG failures in multinational firms.

The remainder of the paper proceeds as follows. Section 2 develops the theoretical framework and hypotheses. Section 3 describes the data and methodology. Section 4 presents the empirical findings, and Section 5 concludes with implications for theory, practice, and policy.

2 | Background, Theory, and Hypotheses

2.1 | ESG Controversies—Background Literature

ESG considerations have become central to corporate strategy as stakeholders demand greater transparency, accountability, and sustainability (Chouaibi and Affes 2021; Giráldez-Puig et al. 2025; Treepongkaruna et al. 2024a; T. Hussain et al. 2024). ESG controversies arise when corporate actions cause environmental harm, social misconduct, or governance failures (Agnese

et al. 2023; Treepongkaruna et al. 2024a). Environmental controversies typically involve pollution, deforestation, resource depletion, and regulatory breaches, exacerbating climate change and biodiversity loss (Brinette et al. 2024; Giráldez-Puig et al. 2025; Treepongkaruna et al. 2024a, 2024b). Social controversies encompass human rights violations, unsafe working conditions, and inequality, undermining employee welfare (Brinette et al. 2024; Elamer and Boulhaga 2024; Iannuzzi et al. 2023). Governance controversies stem from weak oversight, poor board independence, lack of transparency, and shareholder rights violations (Treepongkaruna et al. 2024a, 2024b; Elamer and Boulhaga 2024; Iannuzzi et al. 2023).

The literature consistently links ESG controversies to negative corporate outcomes, including impaired financial performance (Elamer and Boulhaga 2024; Jucá et al. 2024), diminished firm value (Brinette et al. 2024; Rahat and Nguyen 2024), and increased analyst forecast errors due to uncertainty (Schiemann and Tietmeyer 2022). They also raise the cost of equity, reflecting heightened investor risk perceptions (Becchetti et al. 2023; la Rosa and Bernini 2022). Beyond reputational harm, Nicolas et al. (2024) demonstrate that ESG controversies directly damage firms' reputations, particularly when amplified by social media, reducing investor confidence and financial returns.

Understanding the antecedents of ESG controversies is thus crucial. Prior research identifies multiple drivers rooted in firm characteristics, strategic choices, and institutional contexts (Matemane et al. 2026). Industry affiliation plays a key role, with firms in high-impact sectors such as extractives, chemicals, or manufacturing facing greater ESG risks (Delmas and Burbano 2011; M. Khan et al. 2016). Weak governance, marked by low board independence or ineffective oversight, increases susceptibility to controversies (Treepongkaruna et al. 2024a; Tunyi 2025; Simsek et al. 2024). Financial performance influences ESG risk: Financially distressed firms may neglect ESG priorities, while profitable firms invest more in sustainability (Vargas-Santander et al. 2025). Multinational operations introduce complex regulatory and cultural challenges, especially in countries with weak institutions (Marquis et al. 2016; Kolk and Pinkse 2008). Moreover, strong external governance, monitoring, and market competition help enforce discipline and reduce ESG controversies (Cicchiello et al. 2023). We extend this literature by examining business complexity as a critical yet underexplored driver of ESG controversies.

2.2 | Business Complexity

Business complexity describes the multifaceted network of relationships and interactions within an organization, involving components such as technology, data, products, services, and personnel (Casson and Li 2022; Horsch and Kleinow 2022; F. Khan et al. 2026; Vasconcelos and Ramirez 2011). It naturally emerges from factors like organizational growth, innovation, and operational expansion, resulting in an interconnected system of processes and structures (Vasconcelos and Ramirez 2011). While this complexity can foster innovation and drive growth (Casson and Li 2022; Vasconcelos and Ramirez 2011), it also introduces challenges that, if not properly managed, may impede effective communication, collaboration, and decision-making (Casson and Li 2022; Horsch and Kleinow 2022; F. Khan et al. 2026; Vasconcelos and Ramirez 2011).

Characterized by diversified product lines, geographic dispersion, regulatory multiplicity, hierarchical layers, firm size, supply chain integration, and intricate organizational structures, business complexity intensifies managerial demands by requiring sophisticated coordination and control mechanisms to align diverse units and maintain strategic coherence (Brady and Davies 2014; Eriksson et al. 2023; C.-L. Liu and Lai 2012; Qureshi and Kang 2015). This complexity may result in higher operational costs due to increased administrative overhead and inefficiencies in communication and compliance. Moreover, complex firms face greater exposure to risks such as regulatory noncompliance, operational failures, and reputational damage as comprehensive oversight becomes increasingly difficult (Hitt et al. 1997). Transparency and reporting also suffer, as complexity reduces the clarity of corporate disclosures and increases information asymmetry among stakeholders (C.-L. Liu and Lai 2012).

While complexity can enrich innovation through diverse capabilities, spanning new technologies, cybersecurity, digital transformation, and new products, it may simultaneously constrain organizational flexibility and slow decision-making, hindering responsiveness to market changes (Stewart 2023; Kajtazi et al. 2023). The overall impact on financial performance is mixed: Some studies highlight benefits from risk diversification and growth opportunities, whereas others emphasize inefficiencies and value erosion (Eriksson et al. 2023; Birkie et al. 2017; Casson and Li 2022; Dean et al. 2022; Helfat and Maritan 2024; Verdenhofa et al. 2022).

However, the costs of complexity are substantial, particularly in transparency, governance, accountability, and risk management (C.-L. Liu and Lai 2012; Correa and Goldberg 2022; Gorton et al. 2017). Complexity can obscure financial disclosures (C.-L. Liu and Lai 2012), weaken boards' ability to monitor executives (Gorton et al. 2017), complicate responsibility structures (Qureshi and Kang 2015), and increase demands on auditors, reducing audit quality (F. Khan et al. 2026). It thus raises systemic risk, notably in financial institutions, and hinders effective risk management due to coordination failures and market uncertainty (Correa and Goldberg 2022; Dean et al. 2022; Eriksson et al. 2023).

Besides structural and operational factors, complexity may arise from institutional, cultural, and leadership aspects. A weak institutional environment and fragmented regulations can increase a firm's opacity in addressing environmental issues, potentially increasing its exposure to ESG risks (Kolk and Pinkse 2008; Marquis et al. 2016). Moreover, cultural variations in stakeholders' sustainability norms and expectations further complicate coordination problems in multinational companies, leading to differences in ESG practices among their subsidiaries (Jamali 2010; Marquis and Qian 2014). Furthermore, leadership plays a vital role due to the influence of top executives on corporate ethical behavior and social outcomes. If top executives do not prioritize ethical standards and accountability, there is an increased risk of corporate social irresponsibility, which can lead to ESG controversies (Christensen et al. 2014).

2.3 | Business Complexity and ESG Controversies: Insights From Complexity and Agency Theories

Complexity theory provides a framework for understanding systems comprised of numerous interconnected and interdependent components whose interactions produce outcomes that are often nonlinear and unpredictable (Anderson 1999). In such systems, emergent behaviors arise that cannot be deduced solely from the properties of individual elements, reflecting the dynamic interplay among agents operating under bounded rationality and limited information (Uhl-Bien and Marion 2009). This perspective is particularly relevant for organizations, which are better conceptualized not as mechanistic entities but as complex adaptive systems characterized by continual adaptation, feedback loops, and evolving structures. Organizations, particularly large multinational firms, can be viewed as complex adaptive systems composed of numerous interdependent agents operating across different levels, geographies, and institutional environments (Anderson 1999; Uhl-Bien and Marion 2009). These systems are characterized by nonlinear dynamics, emergent behavior, and bounded rationality, all of which can create fertile ground for the manifestation of ESG failures.

As firms expand through diversification, outsourcing, digital integration, and global supply chains, they often experience increasing operational and structural complexity (Sargut and McGrath 2011). This complexity can obscure lines of accountability and create governance blind spots. For instance, decentralized decision-making may lead local subsidiaries or contractors to prioritize short-term performance goals over ethical or sustainable practices, especially when incentives are misaligned or when local contexts differ markedly from expectations at the headquarters (Marquis and Qian 2014; Christensen et al. 2014). This misalignment between policy and practice has been observed in several ESG-related scandals, particularly in areas such as labor rights, environmental compliance, and corporate transparency (Jamali 2010). Moreover, complexity increases the nonlinearity of cause–effect relationships within firms. In such systems, seemingly minor infractions or oversights, such as a subcontractor's failure to comply with emission standards, can trigger large-scale ESG controversies through regulatory enforcement, stakeholder activism, or viral social media exposure (Jamali 2010; Marquis and Qian 2014; Christensen et al. 2014; Doh et al. 2010).

Another implication of complexity theory is bounded rationality, the recognition that decision-makers operate with limited cognitive capacity and incomplete information in high-uncertainty environments (Anderson 1999; Simon 1991). In complex firms, ESG-related information is often fragmented, context dependent, and difficult to aggregate across multiple business units or jurisdictions (Läger et al. 2022). This informational asymmetry might impair the firm's ability to effectively monitor ESG risks and respond proactively, increasing the likelihood of reactive crisis management rather than strategic ESG integration (Sundaramurthy and Lewis 2003; Gond et al. 2012).

Agency theory offers another compelling theoretical lens through which to understand how business complexity contributes to the emergence of ESG controversies within firms. At its core, agency theory addresses the conflicts of interest and information asymmetries that arise when one party (the principal) delegates decision-making authority to another (the agent) (Jensen and Meckling 1976). In the context of complex organizations, these agency problems are often magnified, rendering firms more vulnerable to ESG failures.

As firms grow in size, diversify across product lines, expand globally, and adopt multilayered supply chains, they become more organizationally and geographically complex. This expansion often leads to longer and more opaque principal–agent chains, from shareholders to top management, from headquarters to regional subsidiaries, and from firms to third-party suppliers (Daily et al. 2003; Jensen and Meckling 1976). Each link in this chain creates the potential for goal divergence, moral hazard, and information asymmetry, which increase the risk of ESG-related misconduct. In highly complex firms, agents at various levels may exploit information asymmetries to pursue private interests or short-term performance targets at the expense of long-term ESG commitments. For example, managers under pressure to meet financial KPIs may underinvest in safety and environmental compliance, particularly when ESG performance is difficult to monitor or quantify (David et al. 2007; Kim et al. 2012). Similarly, supply chain complexity can reduce corporate visibility into third-party practices, enabling violations to persist undetected until they escalate into controversies (Egels-Zandén and Lindholm 2015).

Both complexity and agency theories provide complementary explanations for ESG controversies in complex firms. On the one hand, complexity theory suggests that dispersed and nonlinear operations can obscure accountability (Anderson 1999; Simon 1991), thereby increasing the risk of governance gaps. On the other hand, agency theory suggests that in such a complex environment, managers may use this opacity to prioritize short-term performance (Jensen and Meckling 1976). Agency dynamics increase the risks associated with complexity by directing managerial incentives toward symbolic compliance rather than substantive oversight (Boiral 2013). This interaction suggests that ESG controversies in complex firms are emergent risks of organizational interdependence and predictable outcomes of managerial opportunistic behavior.

Drawing from the complexity and agency theoretical perspectives discussed above, we hypothesize that business complexity will lead to an increase in ESG controversies. We state our hypothesis as follows:

Hypothesis H1. *Business complexity is positively related to ESG controversies.*

2.4 | Business Complexity and ESG Controversies: the Role of Analyst Scrutiny

Financial analysts play a central role in corporate governance by reducing information asymmetry, enhancing transparency, and exerting external pressure on managers to align corporate actions with investor expectations (Chen et al. 2015). From an agency theory perspective, analysts function as important external monitors, disciplining managerial behavior and potentially curbing opportunistic actions that could expose firms

to governance failures or reputational damage. In this sense, heightened analyst scrutiny may encourage more responsible corporate conduct, including greater attention to ESG risks (N. Hussain et al. 2023).

However, the role of analyst scrutiny becomes less clear in the presence of business complexity. Complex firms are characterized by dispersed operations, opaque organizational structures, and fragmented lines of accountability, all of which complicate external monitoring. In such settings, analyst scrutiny can plausibly operate through two competing channels, one emphasizing effective monitoring and the other highlighting distortive pressures arising from information constraints.

Under the monitoring view, greater analyst following increases a firm's public visibility and raises the expected reputational and market penalties associated with ESG failures. Prior research suggests that analysts can influence corporate social and environmental conduct by intensifying scrutiny, shaping investor expectations, and rewarding firms with stronger ESG profiles (Hu et al. 2021; Lei et al. 2022; Benlemlih et al. 2024; Jing et al. 2024; N. Hussain et al. 2023). Analysts have also been shown to incorporate ESG considerations into valuation and recommendation decisions (Roger 2024). Through these mechanisms, analyst scrutiny may discipline managers to strengthen internal controls, allocate resources to risk prevention, and proactively address ESG vulnerabilities, thereby mitigating the likelihood and severity of ESG controversies.

An alternative perspective emphasizes the limits and potential unintended consequences of analyst scrutiny, particularly in complex firms. Several studies argue that intense analyst pressure can promote managerial short-termism, encouraging managers to prioritize near-term financial performance over long-term investments in sustainability and risk management (Adhikari 2016; Qian et al. 2019). This tendency may be amplified in complex organizations, where analysts face greater difficulty in processing firm-specific information and assessing nonfinancial risks. Prior evidence indicates that analysts are less informative and less accurate when firms operate across multiple business segments or exhibit higher organizational complexity (Frankel et al. 2006). As a result, analysts may rely more heavily on simplified financial metrics, while latent ESG risks embedded within complex operations remain underappreciated.

This distinction is particularly salient for ESG controversies, which differ fundamentally from standard measures of ESG performance. ESG controversies often reflect episodic and unanticipated failures in internal control, governance, or ethical conduct, rather than sustained levels of social or environmental engagement (Kuzey et al. 2024). Such events are inherently difficult to forecast and may originate deep within operational processes that are largely opaque to external observers. Consistent with this view, recent studies show that ESG controversies increase business uncertainty and impair analysts' forecasting accuracy (Schiemann and Tietmeyer 2022; X. Liu et al. 2024). In complex firms, where ESG risks are more diffuse and harder to trace, analyst scrutiny may therefore be less effective at preventing controversies and may even exacerbate underlying vulnerabilities by reinforcing financial performance pressures at the expense of long-term risk mitigation (Fiorillo et al. 2023).

Taken together, these arguments suggest two competing predictions regarding the moderating role of analyst scrutiny in the relationship between business complexity and ESG controversies. On the one hand, analyst scrutiny may serve as an effective external governance mechanism that constrains managerial opportunism and reduces ESG failures. On the other hand, when combined with high levels of business complexity, analyst scrutiny may intensify short-term pressures and weaken attention to latent ESG risks, thereby amplifying firms' exposure to ESG controversies. Accordingly, we propose the following competing hypotheses:

Hypothesis H2a. *Analyst scrutiny exacerbates the impact of business complexity on ESG controversies.*

Hypothesis H2b. *Analyst scrutiny mitigates the impact of business complexity on ESG controversies.*

3 | Methodology

3.1 | Sample

To empirically test our hypotheses, we collect available data on firms listed worldwide from LSEG Eikon. We restrict our sample period to 2002–2021, as ESG controversy data are available only from 2002 onward. The initial dataset covers 10,170 firms (75,272 firm-year observations) drawn from 89 countries. Financial firms (12,023 observations) are excluded due to their distinct regulatory and reporting environments (Tunyi 2021; T. Hussain et al. 2024). This leaves us with 63,249 observations. We exclude firms from countries (such as Iceland, Jordan, Turkey, Chile, Kenya, Oman, Vietnam, and Zimbabwe) with fewer than 10 unique firms. This leaves us with 39,726 observations. We further retain only observations with available data for all variables used in the baseline regression. After excluding observations with missing data on key variables, the final sample comprises 34,782 firm-year observations from 5,949 distinct listed firms across 37 countries. Table 1 shows the coverage of our data.

In terms of distribution, the sample includes firms from North America, Europe, South America, Australia, and Africa (specifically South Africa). As shown in Panel A of Table 1, a high proportion (11,366 observations or 32.68%) of our data comes from the United States, followed by the United Kingdom (3300 observations or 9.49%). As shown in Panel B, much of the data comes from later years (2015–2020) relative to the earlier years (2002–2008).

3.2 | Empirical Model

Our empirical model for testing the hypothesis is an OLS regression with industry, year, and country fixed effects. In our robustness tests, we explore alternative model specifications (such as panel fixed effects and lagged independent variables). The model is specified in Equation (1) below.

$$ESG\ Controversies_{it} = \beta_0 + \beta_1\ Complexity_{it} + \sum \beta_n\ Controls_{it} + v_j + v_k + v_t + \epsilon_{it} \quad (1)$$

TABLE 1 | Sample distribution.

Country	Frequency	Percent	Country	Frequency	Percent
Panel A: By Country					
Australia	1489	4.28	Luxembourg	126	0.36
Austria	181	0.52	Malaysia	345	0.99
Belgium	207	0.6	Mexico	42	0.12
Bermuda	121	0.35	Netherlands	369	1.06
Canada	1597	4.59	New Zealand	159	0.46
China	2948	8.48	Norway	280	0.81
Cyprus	24	0.07	Philippines	28	0.08
Denmark	294	0.85	Poland	145	0.42
Finland	356	1.02	Portugal	32	0.09
France	934	2.69	Russia	71	0.2
Germany	1080	3.11	Singapore	262	0.75
Greece	49	0.14	South Africa	663	1.91
Hong Kong	1118	3.21	Spain	233	0.67
India	564	1.62	Sweden	606	1.74
Ireland; Republic of	286	0.82	Switzerland	706	2.03
Israel	111	0.32	Thailand	29	0.08
Italy	77	0.22	United Kingdom	3300	9.49
Japan	4208	12.1	United States of America	11366	32.68
Korea; Republic (S. Korea)	376	1.08	Total	34,782	100
Year	**Frequency**	**Percent**	**Year**	**Frequency**	**Percent**
Panel B: By year					
2002	98	0.28	2012	1615	4.64
2003	114	0.33	2013	1778	5.11
2004	220	0.63	2014	1886	5.42
2005	214	0.62	2015	2304	6.62
2006	56	0.16	2016	2572	7.39
2007	528	1.52	2017	3190	9.17
2008	806	2.32	2018	3708	10.66
2009	1035	2.98	2019	4434	12.75
2010	1556	4.47	2020	5010	14.40
2011	1601	4.60	2021	2057	5.91
			Total	34,782	100

Note: The table presents the distribution of the data used in this study by country (Panel A) and by year (Panel B).
Source: Authors' own work.

where $ESG\ Controversies_{it}$ is the level of ESG controversies associated with firm i at time t and $Complexity_{it}$ captures the business complexity of firm i at time t. β are the parameter coefficients to be estimated. We control for factors that, as suggested by prior studies (Agnese et al. 2023; Kuzey et al. 2024; Treepongkaruna et al. 2024a), are associated with ESG controversies. We discuss these in more detail below. In Equation (1), v_j, v_k, and v_t represent industry, country, and year fixed effects, respectively, and ϵ_{it} is the error term. β_1 is our main coefficient of interest. A positive β_1 value would provide evidence in support of our hypothesis that business complexity is associated with ESG controversies.

To test our second hypothesis, which predicts that analyst following exacerbates or mitigates the impact of complexity on ESG controversies, we augment the baseline specification by interacting *Complexity* with *Analyst following*, as shown below.

$$\begin{aligned} ESG\ Controversies_{it} = {} & \beta_0 + \beta_1\ Complexity_{it} + \beta_2\ Analyst\ following_{it} \\ & + \beta_3\ Complexity_{it} \times Analyst\ following_{it} \\ & + \sum_n \beta_n\ Controls_{it} \\ & + \nu_j + \nu_k + \nu_t + \epsilon_{it} \end{aligned} \tag{2}$$

3.3 | Variables

Our measure of ESG controversies is based on Kuzey et al. (2024). The ESG controversies score, drawing on 23 metrics, assesses a firm's exposure to ESG controversies and negative events reflected in global media. While environmental controversies involve incidents in which a firm's operations adversely affect natural resources, the environment, and the local community, such as pollution and resource depletion, social controversies involve incidents including workforce issues, product responsibility, and anticompetition controversies. Governance controversies include accounting and tax controversies, fraud, insider dealings, and shareholder controversies. In the data source, the ESG controversies score ranges between 0 and 100 (firms with no controversies are assigned a score of 100). However, we reverse-score this measure by multiplying by −1, so that higher values indicate more ESG controversies. Scores closer to −100 show fewer governance controversies, whereas scores closer to 0 show more controversies. This facilitates the interpretation of the results.

We follow the literature and, for robustness, employ multiple measures to capture cross-sectional variation in business complexity. Our primary measure is a size-based proxy of complexity, reflecting the idea that larger firms typically operate more diversified activities, manage broader organizational structures, and face greater coordination and monitoring challenges. Prior studies have consistently used firm size–related characteristics, such as full-time employees (Dah and Frye 2017), audit fees (Loughran and McDonald 2024), total assets (Monem 2013), and net sales (Dah and Frye 2017), as proxies for underlying organizational complexity. These variables capture complementary aspects of firm scale, including workforce breadth, operational scope, financial reporting demands, and transaction intensity, all of which contribute to the difficulty of internal control and external monitoring.

Because these proxies are highly correlated and jointly reflect a common latent construct, we follow Florackis and Ozkan (2009) and use principal component analysis to aggregate them into a single composite index, *SBM Complexity*, based on the first principal component. PCA allows us to extract the shared variation across multiple size-related indicators while reducing dimensionality and mitigating multicollinearity concerns. This approach avoids imposing arbitrary weights on individual proxies and yields a parsimonious measure that captures the dominant size-driven component of business complexity. By relying on multiple inputs rather than a single size variable, our measure provides a more comprehensive and robust representation of firm complexity than any individual proxy alone.

SBM Complexity is attractive because it relies on readily available and consistently reported data. However, it may partially reflect firm scale rather than organizational complexity per se. To address this concern and isolate the component of complexity that is not mechanically driven by size or related firm characteristics, we residualize *SBM Complexity*. Specifically, we regress *SBM Complexity* on firm size, profitability, leverage, and the market-to-book ratio, and use the resulting residual, *Residual Complexity*, as an alternative measure of business complexity. This residual captures variation in organizational complexity that cannot be explained by firm scale, performance, capital structure, or growth opportunities and therefore more closely reflects internal coordination demands and informational opacity rather than economic size per se. The consistency of our results using this residualized measure alleviates concerns that our findings are driven solely by firm size rather than underlying complexity.

Further, some studies (Damanpour 1996; Anderson 1999) have criticized size-based measures for failing to capture structural dimensions of complexity, including vertical, functional, occupational, and spatial differentiation. Following Läger et al. (2022), we capture vertical integration as the natural log of the number of employees and functional differentiation as an indicator variable for whether a firm has a CSR committee. We measure occupational differentiation using an indicator for whether a firm has a policy to support employee skills training or career development (Läger et al. 2022). To measure spatial differentiation, following Läger et al. (2022), we first generate two variables—foreign sales to total sales and foreign assets to total assets—and average them.[1] We construct a composite measure of structural complexity, *STR Complexity*, as the first principal component from PCA involving these four indicators.

While the *STR Complexity* measure directly draws from the literature (Läger et al. 2022), it can be biased in our context because it includes two variables (an indicator variable for whether a firm has a CSR committee, and an indicator for whether a firm has a policy to support employee skills training or career development) that are directly related to the outcome variable. To partly mitigate this issue, we develop *STR Complexity (2)*, which excludes these two variables.

Finally, we employ alternative proxies for business complexity that do not rely on PCA to ensure that our findings are not driven by the construction of composite indices. Audit fees provide a widely used, outcome-based measure of organizational complexity, as they reflect the scope of operations, internal control demands, and informational opacity faced by external monitors (Loughran and McDonald 2024). Higher audit fees are typically associated with more complex business structures that require greater audit effort and expertise. In addition, a firm's share of industry sales captures competitive and operational complexity arising from scale, market dominance, and coordination demands within an industry (Markarian and Parbonetti 2007). These measures offer parsimonious yet conceptually distinct perspectives on complexity and avoid potential concerns related to multicollinearity or weighting inherent in PCA-based indices.

The consistency of our results across these alternative proxies reinforces the robustness of our conclusions and mitigates concerns that the observed effects are sensitive to a particular measurement approach.

Our measure of *Analyst following* captures the number of financial analysts reporting on the firm (Luo et al. 2020). Our model controls for several firm characteristics that may affect the likelihood of ESG controversies occurring (Agnese et al. 2023; Kuzey et al. 2024; Treepongkaruna et al. 2024a). Financial characteristics might influence ESG controversies. For example, we control for profitability (return on assets), as loss-making firms may be under greater pressure and thus more prone to controversies, and leverage, because debt providers can act as external monitors, so lower leverage firms may face weaker oversight. We also control for capital expenditures, as financially constrained firms may forgo ESG investments. Additionally, we include liquidity and the market-to-book ratio, since access to liquid assets and growth opportunities can influence ESG behavior in different ways.

We further control for governance-related factors, including board size, board independence, board diversity, and CEO–chairman duality, as the board plays a central role in policy-making and oversight, including ESG-related decisions (Kuzey et al. 2024; Abdelfattah and Aboud 2020; Elbardan et al. 2023). ESG controversies are particularly linked to the board's monitoring function. We also control for ownership structure, particularly free float, as the shareholder base can influence a firm's policies and practices (Kuzey et al. 2024).

Finally, we account for differences in institutional quality and economic development across countries, which shape the regulatory and operational environment in which firms operate (Kuzey et al. 2024). We measure institutional quality using national governance indicators from the Worldwide Governance Indicators and economic development using the natural log of country GDP.[2] All variables are fully defined in Appendix A.

4 | Results and Discussions

4.1 | Descriptive Statistics

Table 2 presents descriptive statistics for the variables used in the empirical analysis. Our ESG controversy measure is generally negatively skewed as many firms (i.e., the bottom 75% of firms) do not report any controversy (i.e., an ESG controversy score of −100). As indicated by the standard deviations, there is considerable variability in complexity (whether measured by the natural log of net sales, total assets, full-time employees, or audit fees) across the firms in our sample. It is, therefore, interesting to explore whether this variability partly explains the differences in ESG controversies involving the firms in our sample.

Appendix B reports correlation diagnostics for our variables. Correlations among individual proxies of business complexity, including full-time employees, audit fees, total assets, and net sales, are high,[3] supporting our use of PCA. We exclude firm size from the control set because it is highly correlated with our complexity measure. In contrast, correlations among the remaining control variables are generally low and below commonly accepted thresholds, suggesting limited multicollinearity. The final column of Appendix B reports variance inflation factors for the baseline model; all are below 2.5, further confirming low multicollinearity.

4.2 | Business Complexity and ESG Controversies: Baseline Results

Table 3 reports the results from our baseline regressions examining the association between SBM Complexity and ESG controversies. Column (1) presents estimates without firm-level controls but includes industry, year, and country fixed effects. Column (2) adds firm-level, governance, and country-level control variables.

Consistent with our first hypothesis, across all models (Columns (1) and (2)), the relationship between business complexity and ESG controversies is positive and significant at 1%. For example, in Column (2), a unit increase in business complexity corresponds to a 5.373 unit increase in ESG controversies. This suggests that, as hypothesized in H1, ESG controversies may arise due to business complexity. Our control variables are generally significant in the expected direction.

We recognize that SBM Complexity may partly capture firm scale rather than complexity per se. To address this concern, we residualize our complexity measure. Column (3) of Table 3 presents the first-stage regression, in which we regress SBM Complexity on firm size, profitability, leverage, and market to book, while controlling for industry, year, and country fixed effects. We document a strong positive association between complexity and firm size, profitability, and leverage, all significant at the 1% level, and a negative association with market to book.

We then use the residual from this model as an alternative measure, labeled *Residual Complexity*, which captures variation in complexity beyond observable scale and financial characteristics. Column (4) reports results using this residualized measure. We continue to find a positive and statistically significant relationship between residual complexity and ESG controversies at the 1% level. The estimated coefficient of 3.303 is smaller than that reported in Column (2), suggesting that part of the baseline effect reflects scale-related components embedded in the original complexity measure.

Taken together, these findings provide consistent support for Hypothesis H1, indicating that business complexity is associated with greater exposure to ESG controversies, even after controlling for firm size and related financial characteristics.

Prior research on business complexity and ESG outcomes is scarce and largely focused on positive ESG performance, with mixed evidence across different dimensions of complexity (Läger et al. 2022; Barros et al. 2024). Our findings extend this literature by shifting attention to ESG controversies, which capture realized ESG failures rather than discretionary ESG engagement. This distinction is important because strong positive ESG performance does not preclude the occurrence of controversies (Kuzey et al. 2024). We argue that this disconnect

TABLE 2 | Descriptive statistics.

Variables	*N* (1)	Mean (2)	SD (3)	P1 (4)	P25 (5)	Median (6)	P75 (7)	P99 (8)
ESG Controversies	34,782	−91.972	21.427	−100.000	−100.000	−100.000	−100.000	−6.522
Ln ESG Controversies	34,782	−4.466	0.479	−4.615	−4.615	−4.615	−4.615	−2.018
SBM Complexity	34,782	0.073	1.705	−4.333	−0.987	0.124	1.175	3.930
Residual Complexity	34,782	0.022	0.779	−2.612	−0.380	0.052	0.489	1.746
Profitability	34,782	0.053	0.132	−0.594	0.020	0.060	0.109	0.376
Leverage	34,782	0.548	0.222	0.083	0.399	0.550	0.692	1.232
Liquidity	34,782	2.143	1.934	0.303	1.125	1.586	2.402	11.765
Capital Expenditure	34,782	0.047	0.044	0.000	0.018	0.035	0.062	0.232
Market to book	34,782	3.657	5.155	−8.354	1.206	2.221	4.185	32.132
Free float	34,782	77.149	24.615	15.142	59.621	88.075	98.113	100.000
Board size	34,782	2.330	0.287	1.609	2.197	2.303	2.485	3.045
Board independence	34,782	6.822	4.030	0.000	3.846	6.667	9.091	17.143
Board diversity	34,782	50.713	27.777	4.356	26.337	49.138	74.850	98.906
CEO–chairman duality	34,782	0.379	0.485	0.000	0.000	0.000	1.000	1.000
National governance	34,782	1.116	0.574	−0.566	1.088	1.249	1.429	1.799
Ln GDP	34,782	29.036	1.496	25.938	28.071	29.229	30.496	30.694
Firm size	34,782	21.918	1.582	18.004	20.939	21.967	22.904	25.738
ln analyst following	33,978	2.329	0.810	0.000	1.792	2.485	2.944	3.664
CSR Governance score	34,782	49.960	22.183	5.716	32.281	50.291	67.774	92.604
CSR Management score	34,782	52.318	28.056	1.923	28.522	52.899	76.446	99.112
CSR Shareholders score	34,782	51.874	28.577	1.449	27.419	52.474	76.718	99.080
CSR Strategy score	34,782	35.343	33.276	0.000	0.000	29.328	64.925	98.006
Earnings volatility	26,587	0.065	1.668	0.002	0.014	0.027	0.054	0.391
Agency cost 1	34,774	2.124	8.984	0.073	0.828	0.913	0.969	63.678
Agency cost 2	34,782	5.247	21.355	0.325	0.930	1.415	2.433	132.969

Note: The table provides summary statistics for the variables in the study. All variables are fully defined in Appendix A.
Source: Authors' own work.

is particularly pronounced in complex firms, where dispersed operations, heterogeneous stakeholder interactions, and fragmented accountability increase the likelihood of control failures and ESG transgressions. Consistent with this view, our baseline results show that greater business complexity is associated with higher exposure to ESG controversies, highlighting complexity as a structural source of ESG risk rather than a driver of voluntary ESG engagement.

4.3 | The Role of Analyst Following

We next examine whether analyst following mitigates or exacerbates the effect of business complexity on ESG controversies. Table 4 reports regressions that interact *Analyst following* with alternative measures of business complexity. Across all specifications, the interaction term is positive and statistically significant, indicating that *Analyst following* amplifies, rather than constrains, the positive association between complexity and ESG controversies. These results support Hypothesis H2a and are inconsistent with Hypothesis H2b. The findings are robust across both SBM Complexity and Residual Complexity, suggesting that the moderating effect of analyst scrutiny is not driven by firm scale alone.

Importantly, these findings do not imply that analyst coverage is inherently detrimental, but rather that its governance role is contingent on organizational structure and financial context. These results point to important limits of analysts' monitoring role in complex firms. While analysts may enhance transparency regarding financial performance, they appear less effective at disciplining ESG-related risks arising from dispersed operations, opaque internal processes, and fragmented accountability. Instead, increased analyst scrutiny

TABLE 3 | Business complexity and ESG controversies: Baseline.

	ESG Controversies		SBM Complexity	ESG Controversies
Variables	**(1)**	**(2)**	**(3)**	**(4)**
SBM Complexity	4.889***	5.373***		
	(0.091)	(0.114)		
Residual Complexity				3.303***
				(0.157)
Firm size			0.821***	
			(0.003)	
Profitability		−15.305***	0.177***	−0.079
		(0.896)	(0.059)	(0.844)
Leverage		−1.897***	2.324***	9.572***
		(0.630)	(0.033)	(0.623)
Liquidity		0.589***		0.192***
		(0.056)		(0.058)
Capital Expenditure		3.712		0.117
		(2.498)		(2.566)
Market to book		0.174***	−0.083***	−0.035
		(0.025)	(0.001)	(0.025)
Free float		0.018***		0.049***
		(0.005)		(0.005)
Board size		1.408***		13.456***
		(0.523)		(0.547)
Board independence		0.080**		0.296***
		(0.035)		(0.036)
Board diversity		0.015***		0.043***
		(0.004)		(0.004)
CEO–chairman duality		0.445*		1.291***
		(0.238)		(0.247)
National governance		3.532**		7.578***
		(1.441)		(1.507)
Ln GDP		−3.939***		−5.045***
		(0.945)		(0.986)
Constant	−92.327***	11.705	−18.905***	0.606
	(0.102)	(27.144)	(0.073)	(28.315)
Observations	34,782	34,782	34,782	34,782
Adj. R^2	0.168	0.179	0.792	0.109
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No
Years	20	20	20	20
Countries	37	37	37	37

Note: The table presents the baseline regression results exploring the relationship between business complexity and ESG controversies. All variables are fully defined in Appendix A. Robust standard errors of coefficient estimates are presented in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Authors' own work.

TABLE 4 | Business complexity and ESG controversies: Analyst following.

	ESG Controversies			
Variables	**(1)**	**(2)**	**(3)**	**(4)**
SBM Complexity	−2.054***		−2.323***	−3.415***
	(0.243)		(0.241)	(0.263)
Analyst following	1.212***	4.476***	1.215***	1.185***
	(0.171)	(0.157)	(0.169)	(0.173)
SBM Complexity∗Analyst following	2.984***		3.093***	3.452***
	(0.096)		(0.097)	(0.108)
Residual Complexity		−2.826***		
		(0.445)		
Residual Complexity∗Analyst following		2.912***		
		(0.201)		
Low Z scores			11.100**	
			(5.083)	
SBM Complexity∗Low *Z* scores			4.997***	
			(1.678)	
Analyst following∗Low *Z* scores			−0.866	
			(2.211)	
SBM Complexity∗Analyst following∗Low *Z* scores			−1.501*	
			(0.794)	
Negative earnings				3.996***
				(1.338)
SBM Complexity∗Negative earnings				3.408***
				(0.578)
Analyst following∗Negative earnings				0.214
				(0.554)
SBM Complexity∗Analyst following∗Negative earnings				−1.071***
				(0.253)
Profitability	−10.379***	−1.741**	−9.459***	−6.752***
	(0.926)	(0.878)	(1.010)	(1.342)
Leverage	−0.417	10.183***	−1.044	−0.479
	(0.641)	(0.639)	(0.648)	(0.637)
Liquidity	0.381***	0.264***	0.356***	0.376***
	(0.058)	(0.060)	(0.057)	(0.058)
Capital Expenditure	2.029	−3.430	2.501	2.367
	(2.531)	(2.614)	(2.530)	(2.529)
Market to book	0.137***	−0.145***	0.143***	0.132***
	(0.025)	(0.025)	(0.025)	(0.025)
Free float	0.020***	0.021***	0.020***	0.019***

(Continues)

TABLE 4 | (Continued)

Variables	ESG Controversies			
	(1)	(2)	(3)	(4)
	(0.005)	(0.005)	(0.005)	(0.005)
Board size	1.375***	8.984***	1.447***	1.689***
	(0.519)	(0.542)	(0.517)	(0.520)
Board independence	0.049	0.187***	0.045	0.056*
	(0.034)	(0.036)	(0.034)	(0.034)
Board diversity	0.014***	0.031***	0.014***	0.014***
	(0.004)	(0.004)	(0.004)	(0.004)
CEO–chairman duality	0.082	1.162***	0.094	0.026
	(0.236)	(0.247)	(0.236)	(0.235)
National governance	3.753***	6.555***	3.610**	4.221***
	(1.454)	(1.523)	(1.451)	(1.450)
Ln GDP	−3.898***	−4.320***	−3.847***	−4.335***
	(0.954)	(0.994)	(0.952)	(0.952)
Constant	5.285	−15.581	3.955	15.925
	(27.450)	(28.576)	(27.391)	(27.397)
Observations	33,978	33,978	33,978	33,978
Adj. R^2	0.214	0.137	0.216	0.219
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Note: The table explores the moderating role of Analyst following on the relationship between business complexity and ESG controversies. All variables are fully defined in Appendix A. Robust standard errors of coefficient estimates are presented in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Authors' own work.

may intensify managerial pressure to meet short-term financial targets, encouraging managers of complex firms to deprioritize ESG oversight. This interpretation is consistent with studies showing that analyst pressure can promote managerial short-termism and discourage investments perceived as discretionary (Adhikari 2016; Qian et al. 2019). It also aligns with evidence that ESG controversies heighten uncertainty and forecasting difficulty, limiting analysts' ability or willingness to incorporate ESG risks into their assessments (Schiemann and Tietmeyer 2022; X. Liu et al. 2024).

To further unpack this mechanism, we examine whether the moderating role of analyst following depends on firms' financial condition. Using a low Altman *Z* score as a proxy for financial distress, we uncover a clear state-dependent pattern. Among financially healthy firms, analyst scrutiny significantly strengthens the positive association between business complexity and ESG controversies, consistent with analysts intensifying earnings pressure and managerial short-termism in complex organizational settings. By contrast, this amplifying effect disappears in financially distressed firms. In these cases, analyst coverage is associated with a weaker or statistically indistinguishable complexity controversy link, suggesting a shift from performance-oriented scrutiny to crisis-oriented discipline. This interpretation is supported by the full sample triple interaction results in Columns (3) and (4), where the coefficient on $Complexity \times Analyst \times Low\ Z$ is negative and statistically significant.

In Column (4), replacing the low Altman *Z* indicator with a negative earnings indicator yields qualitatively similar but statistically stronger results. Specifically, analyst scrutiny no longer amplifies ESG controversies when firms report negative earnings, indicating that immediate performance shortfalls attenuate analysts' pressure effects. Taken together, these findings indicate that analyst scrutiny does not uniformly discipline ESG risk. Instead, its impact depends on firms' financial slack, exacerbating complexity-driven ESG vulnerabilities when performance pressure is high, but dampening such risks when firms face financial distress.

4.4 | Additional Channel Tests

We next examine mechanisms that may attenuate the positive association between business complexity and ESG controversies. Table 5 reports results from a set of additional channel tests

TABLE 5 | Additional channel tests.

	ESG Controversies			
Variables	**(1)**	**(2)**	**(3)**	**(4)**
SBM Complexity∗Board independence	−0.125***			
	(0.018)			
Women employees		0.049***		
		(0.011)		
SBM Complexity∗Women employees		−0.021***		
		(0.007)		
ESG Combined Score			−0.288***	
			(0.007)	
SBM Complexity∗ESG Combined Score			−0.013***	
			(0.003)	
SBM Complexity∗Post-Paris global ESG regulatory regime				−1.692***
				(0.169)
SBM Complexity	6.288***	7.165***	7.496***	6.367***
	(0.175)	(0.298)	(0.212)	(0.153)
Profitability	−14.194***	−14.271***	−15.235***	−13.908***
	(0.904)	(1.770)	(0.916)	(0.899)
Leverage	−2.015***	−1.216	−2.770***	−1.788***
	(0.630)	(1.094)	(0.623)	(0.628)
Liquidity	0.543***	0.766***	0.618***	0.583***
	(0.056)	(0.120)	(0.056)	(0.055)
Capital Expenditure	2.866	7.247*	3.607	4.214*
	(2.492)	(4.334)	(2.500)	(2.492)
Market to book	0.172***	0.176***	0.207***	0.169***
	(0.025)	(0.044)	(0.024)	(0.025)
Free float	0.021***	0.041***	0.040***	0.019***
	(0.005)	(0.008)	(0.005)	(0.005)
Board size	0.406	0.348	3.707***	1.240**
	(0.528)	(0.886)	(0.532)	(0.523)
Board independence	−0.066	−0.009	0.281***	0.066*
	(0.043)	(0.052)	(0.039)	(0.034)
Board diversity	0.017***	0.000	0.048***	0.015***
	(0.004)	(0.006)	(0.004)	(0.004)
CEO–chairman duality	0.440*	−0.166	0.078	0.361
	(0.237)	(0.420)	(0.234)	(0.237)
National governance	4.162***	3.815	3.379**	3.603**
	(1.446)	(2.650)	(1.422)	(1.443)
Ln GDP	−4.304***	−9.129***	−2.693***	−3.797***

(Continues)

TABLE 5 | (Continued)

Variables	ESG Controversies			
	(1)	(2)	(3)	(4)
	(0.947)	(2.166)	(0.933)	(0.946)
Constant	24.469	157.541**	−21.668	7.433
	(27.224)	(61.321)	(26.835)	(27.183)
Observations	34,782	16,319	34,782	34,782
Adj. R^2	0.180	0.219	0.219	0.183
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Note: The table explores the moderating effect of (1) Board independence, (2) Women employees, and (3) the Paris Agreement, on the relationship between business complexity and ESG controversies. All variables are fully defined in Appendix A. Robust standard errors of coefficient estimates are presented in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Authors' own work.

focusing on internal governance, workforce composition, and external regulatory pressure.

We begin by considering internal governance quality. Prior research suggests that ESG controversies are less likely in well-governed firms, where monitoring is stronger and accountability clearer (Agnese et al. 2023). Consistent with agency theory, board independence enhances oversight and constrains managerial opportunism. In Column (1) of Table 5, we test whether board independence moderates the complexity–controversy relationship. The interaction term between SBM Complexity and board independence is negative and statistically significant, indicating that independent boards dampen the propensity of complex firms to experience ESG controversies. This result suggests that stronger internal monitoring partially offsets the governance challenges created by organizational complexity.

We then examine workforce composition as an additional channel. ESG controversies often originate from employee-level actions, making the ethical orientation of the workforce particularly relevant. Prior studies document that women are, on average, more stakeholder-oriented and environmentally and socially conscious (Alkhawaja et al. 2023; Tunyi et al. 2023). They are also associated with lower agency conflict and stronger ethical norms (Al-Hiyari 2024). In Column (2), we interact SBM Complexity with the proportion of women employees. The negative and significant interaction coefficient indicates that the complexity–controversy link is weaker in firms with a higher share of female employees. This finding suggests that gender-balanced workforces can mitigate the ESG vulnerabilities associated with complex organizational structures.

Finally, we examine whether external regulatory pressure alters the complexity–controversy relationship by exploiting the post-2015 period following the Paris Agreement. Rather than interpreting the Agreement as a firm-specific mandate, we treat it as a global regulatory and normative shift that intensified environmental scrutiny, disclosure requirements, and stakeholder expectations. In Column (4), the interaction between SBM Complexity and the post-Paris indicator is negative and highly significant, indicating that the positive association between complexity and ESG controversies weakens in the post-Paris period. This result is consistent with heightened regulatory salience and monitoring reducing the scope for ESG failures in complex firms. Importantly, this effect likely captures a broader post-2015 environment characterized by expanded ESG regulation, increased mandatory disclosure, and stronger enforcement across jurisdictions, rather than the Paris Agreement alone (Kreuzer and Priberny 2022; Ongsakul et al. 2025).

Taken together, these channel tests indicate that both internal governance mechanisms and external institutional pressure can mitigate complexity-driven ESG vulnerabilities. Independent boards, gender-diverse workforces, and stronger regulatory regimes all appear to constrain the tendency of complex firms to experience ESG controversies, reinforcing the view that ESG failures in complex organizations are not inevitable but rather conditional on the strength of monitoring and accountability mechanisms.

4.5 | Additional Analysis and Robustness Checks

Our research design involves several methodological and sampling choices. In this section, we conduct several robustness checks to allay concerns that our methodological choices or sampling configuration drive our results.

4.5.1 | Alternative Measures of Business Complexity

Table 6 reports a set of robustness tests using alternative proxies for business complexity to assess whether our baseline findings depend on the specific construction of SBM Complexity. We begin by considering audit fees as a standalone measure of complexity. Prior research argues that, conditional on firm size and other fundamentals, auditors charge higher fees to firms

TABLE 6 | Business complexity and ESG controversies: Alternative measures of complexity.

	ESG controversies			
	(1)	(2)	(3)	(4)
Audit fees	2.565***			
	(0.161)			
Sales fraction		21.248***		
		(2.258)		
STR Complexity			5.722***	
			(0.132)	
STR Complexity (2)				7.087***
				(0.151)
Firm size	3.406***	4.192***		
	(0.132)	(0.115)		
Profitability	−14.054***	−16.068***	−10.408***	−9.935***
	(0.895)	(0.901)	(0.928)	(0.832)
Leverage	4.031***	6.284***	2.589***	1.860***
	(0.624)	(0.607)	(0.666)	(0.596)
Liquidity	0.118**	−0.027	0.400***	0.381***
	(0.055)	(0.055)	(0.062)	(0.055)
Capital Expenditure	2.190	−2.789	−3.249	−3.290
	(2.507)	(2.530)	(2.747)	(2.458)
Market to book	−0.144***	−0.233***	0.052*	0.076***
	(0.026)	(0.025)	(0.027)	(0.024)
Free float	0.017***	0.027***	0.024***	0.034***
	(0.005)	(0.005)	(0.006)	(0.005)
Board size	2.273***	3.496***	6.242***	4.788***
	(0.530)	(0.530)	(0.585)	(0.494)
Board independence	0.053	0.092***	0.172***	0.086**
	(0.034)	(0.034)	(0.042)	(0.033)
Board diversity	0.014***	0.016***	0.016***	0.025***
	(0.004)	(0.004)	(0.004)	(0.004)
CEO–chairman duality	0.593**	0.783***	0.847***	0.705***
	(0.239)	(0.238)	(0.261)	(0.235)
National governance	4.147***	2.536*	2.807*	4.376***
	(1.459)	(1.450)	(1.625)	(1.433)
Ln GDP	−3.653***	−4.354***	−5.790***	−3.469***
	(0.951)	(0.949)	(1.018)	(0.931)
Constant	−110.596***	−74.483***	51.920*	−14.076
	(27.411)	(27.343)	(29.380)	(26.710)
Observations	34,782	34,782	30,702	34,782

(Continues)

TABLE 6 | (Continued)

	ESG controversies			
	(1)	(2)	(3)	(4)
R^2	0.170	0.169	0.172	0.197
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Note: The table explores the relationship between alternative measures of business complexity and ESG controversies. All variables are fully defined in Appendix A. Robust standard errors of coefficient estimates are presented in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Authors' own work.

with more complex operations due to greater audit effort, higher inherent risk, and more demanding information environments (Loughran and McDonald 2024). Although audit fees enter our composite SBM Complexity index, examining them separately allows direct comparison with this literature. As shown in Column (1), audit fees are positively and statistically significantly associated with ESG controversies at the 1% level, indicating that firms with more complex and opaque operations face a higher incidence of ESG-related controversies.

Next, following Markarian and Parbonetti (2007), we proxy complexity using a firm's share of total industry sales, which captures operational scale and market dominance within an industry. Firms with a larger industry sales fraction are likely to have more diversified activities, broader stakeholder exposure, and more intricate internal coordination. Column (2) shows a strong and positive association between this measure and ESG controversies, reinforcing the view that greater operational breadth and market presence increase firms' exposure to ESG-related risks and incidents.

In Columns (3) and (4), we turn to structural measures of business complexity (STR Complexity) derived from organizational differentiation across vertical, functional, occupational, and spatial dimensions (Läger et al. 2022). Both variants of STR Complexity are highly significant and positively associated with to ESG controversies, suggesting that internally complex organizational structures are systematically associated with a higher likelihood of ESG controversies.[4] Taken together, these results demonstrate that our main conclusion is not sensitive to how business complexity is measured. Whether complexity is captured through audit-based proxies, market-based measures, or detailed structural characteristics, more complex firms consistently experience a greater incidence of ESG controversies.

4.5.2 | Sampling Bias, Variation Definitions, and Model Specification

Table 1 shows that US firms account for 32.68% of the sample. Given potential cross-country differences in institutional and regulatory environments, for example the largely voluntary nature of ESG practices in the United States compared with more prescriptive regimes elsewhere, this concentration could bias our estimates. To address this concern, Columns (1) and (2) of Table 7 re-estimate the baseline model separately for US and non-US firms. The results are qualitatively and quantitatively similar across the two subsamples, indicating that our findings are not driven by US firms and are broadly generalizable across institutional settings.

As shown in Table 2, the distribution of our ESG controversies variable is negatively skewed. In the first instance, we normalize the variable by taking its log and then multiplying it by -1 so that lower values indicate low controversy and higher values indicate high controversy. As shown in Column (3) of Table 7, we find that our results are robust to the redefinition of ESG controversies.

Although ESG controversies is a continuous variable ranging from -100 to 0, Table 2 shows that values from the 1st to the 75th percentile are clustered at -100, indicating that at least 75% of firms in the sample experience no reported ESG controversies. This highly skewed distribution may bias linear estimates. To address this concern, we recode ESG controversies as a binary indicator equal to 1 if a firm reports at least one controversy and 0 otherwise and re-estimate the model using a probit specification. The results, reported in Column (4) of Table 7, are fully consistent with our baseline findings and H1. Business complexity significantly increases the likelihood of an ESG controversy, with the effect statistically significant at the 1% level.

Our results are prone to endogeneity concerns arising from various sources, including reverse causality, omitted variables, and sample selection. We partly address issues relating to reverse causality and omitted variables in Columns (5) and (6) of Table 7. In Column (5), we partly address reverse causality by lagging our independent variables by 1 year so that complexity in 1 year predicts ESG controversies in the next year. In Column (6) of Table 7, we partly address omitted variable bias (i.e., possible missing variables in our model) by estimating a panel fixed-effects model for both of our hypotheses. As shown in Column (5), our results for our first Hypothesis (H1) are robust to using a fixed-effects model.[5]

4.5.3 | Addressing Endogeneity Through Entropy Balancing

Complex firms may differ systematically from less complex firms along dimensions that are imperfectly captured by observable controls, so the observed differences in ESG controversies in Table 3 may not be due to differences in complexity but to

TABLE 7 | Further robustness checks.

Variables	ESG controversies						
	US	Non-US	Log trans.	Probit	Lagged (IVs)	Fixed effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SBM Complexity	6.578***	4.817***	0.113***	0.494***	5.728***	2.981***	0.870
	(0.236)	(0.130)	(0.003)	(0.010)	(0.128)	(0.419)	(0.610)
Analyst following							−0.545
							(0.345)
SBM Complexity * Analyst following							0.974***
							(0.213)
Profitability	−21.520***	−13.019***	−0.326***	−0.861***	−15.331***	−7.381***	−6.807***
	(1.425)	(1.242)	(0.021)	(0.115)	(1.005)	(1.570)	(1.651)
Leverage	−2.321**	−1.673**	−0.058***	−0.066	−2.219***	0.972	1.076
	(1.051)	(0.770)	(0.015)	(0.063)	(0.712)	(1.337)	(1.412)
Liquidity	0.895***	0.419***	0.013***	0.042***	0.616***	0.032	0.018
	(0.100)	(0.061)	(0.001)	(0.008)	(0.066)	(0.094)	(0.099)
Capital Expenditure	17.479***	0.297	0.088	0.653**	3.439	−14.570***	−16.403***
	(5.267)	(2.786)	(0.056)	(0.259)	(2.748)	(4.219)	(4.346)
Market to book	0.174***	0.163***	0.004***	0.013***	0.199***	0.004	0.005
	(0.037)	(0.032)	(0.001)	(0.002)	(0.028)	(0.037)	(0.038)
Free float	−0.064***	0.038***	0.000***	0.001*	0.015**	−0.011	−0.003
	(0.013)	(0.005)	(0.000)	(0.001)	(0.006)	(0.014)	(0.015)
Board size	2.202	1.714***	0.018	0.215***	1.288**	0.267	0.279
	(1.773)	(0.539)	(0.012)	(0.058)	(0.608)	(0.995)	(1.013)
Board independence	0.356***	0.068*	0.001*	0.015***	0.086**	0.094	0.088
	(0.132)	(0.037)	(0.001)	(0.004)	(0.043)	(0.069)	(0.071)
Board diversity	0.020***	0.011***	0.000***	0.001**	0.018***	−0.001	−0.002
	(0.007)	(0.004)	(0.000)	(0.000)	(0.004)	(0.007)	(0.007)
CEO–chairman duality	0.365	0.415	0.006	0.029	0.298	0.343	0.279
	(0.418)	(0.284)	(0.005)	(0.022)	(0.266)	(0.414)	(0.420)
National governance		2.316	0.072**	0.021	7.069***	0.845	0.606
		(1.705)	(0.032)	(0.139)	(1.696)	(1.607)	(1.645)
Ln GDP		−0.520	−0.075***	−0.422***	−4.171***	−3.049***	−3.652***
		(0.972)	(0.021)	(0.087)	(1.068)	(1.111)	(1.154)
Constant	−95.908***	−88.577***	−2.473***	10.137***	15.144	−4.692	13.250
	(4.886)	(27.011)	(0.607)	(2.390)	(30.775)	(32.840)	(34.103)
Observations	11,366	23,416	34,782	34,780	30,077	33,976	33,187
R^2	0.199	0.172	0.151		0.182	0.370	0.372
Industry FE	Yes	Yes	Yes	Yes	Yes	No	No

(Continues)

TABLE 7 | (Continued)

Variables	ESG controversies						
	US	Non-US	Log trans.	Probit	Lagged (IVs)	Fixed effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country FE	Yes	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No	Yes	Yes

Note: The table presents robustness checks for our analysis of the relationship between business complexity and ESG controversies. All variables are fully defined in Appendix A. Robust standard errors of coefficient estimates are presented in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Authors' own work.

other unobserved characteristics we do not control for. To address this source of endogeneity, we deploy the entropy balancing technique to reweight our sample so that the distribution of our variables is the same (in terms of the mean) across firms with different levels of business complexity.

We begin by constructing an indicator for high business complexity, defining high complexity firms as those with SBM Complexity values above the year country median. Consistent with our baseline results, high complexity is positively associated with ESG controversies in untabulated analyses. We use this indicator as the treatment variable in the entropy balancing procedure. Table 8 reports the results. Panel A shows pronounced differences in firm characteristics between high- and low-complexity firms prior to reweighting. After entropy balancing, these differences are effectively eliminated, with mean differences close to zero as reported in Panel B. Panel C presents regression estimates based on the entropy-balanced sample. In Column (1), consistent with H1, business complexity remains positively and statistically significantly associated with ESG controversies at the 1% level. In Column (2), consistent with H2a, analyst following continues to exacerbate this positive relationship.

5 | Concluding Remarks

This study examines whether business complexity increases firms' exposure to negative ESG outcomes, measured by ESG controversies, using a large cross-country panel of firms from 2002 to 2021. While prior research has focused predominantly on positive ESG performance, ESG controversies capture a distinct and economically consequential dimension of corporate behavior. They reflect ESG failures that attract media attention, trigger regulatory scrutiny, and impose substantial reputational and financial costs. Understanding the organizational drivers of such failures is therefore critical for managers, investors, and policymakers.

Consistent with our first hypothesis, we document a robust positive relationship between business complexity and ESG controversies. This finding aligns with complexity theory, which emphasizes that fragmented structures, layered decision-making, and geographically dispersed operations weaken coordination, dilute accountability, and create informational blind spots. In such environments, ESG risks are harder to detect and control, increasing the likelihood that localized failures escalate into publicly visible controversies. Our results extend prior work linking complexity to positive ESG outcomes (Läger et al. 2022; Barros et al. 2024) by showing that complexity is also a key determinant of negative ESG events. Importantly, strong ESG ratings do not preclude controversies, particularly in complex firms, a point emphasized by Kuzey et al. (2024). Positive ESG engagement and effective control of ESG failures are therefore distinct governance challenges.

We further show that analyst following exacerbates, rather than mitigates, the effect of complexity on ESG controversies, supporting our second hypothesis. While analyst coverage is often viewed as an external governance mechanism, our findings align with studies suggesting that analysts may prioritize short-term financial performance over long-term ESG risk management (Adhikari 2016; Qian et al. 2019). In complex firms, where operations are opaque and difficult to monitor, analysts are more likely to focus on observable financial metrics, reinforcing managerial short-termism and weakening attention to ESG risk. This helps reconcile mixed evidence in the literature on analyst following and ESG outcomes (Hu et al. 2021; N. Hussain et al. 2023) and is consistent with arguments that ESG controversies heighten uncertainty and complicate analysts' forecasting tasks (Schiemann and Tietmeyer 2022; X. Liu et al. 2024).

In contrast, our additional analyses highlight the stabilizing role of internal and institutional governance mechanisms. Independent boards and a higher share of female employees significantly weaken the complexity ESG controversy link, consistent with agency theory predictions that stronger monitoring, ethical orientation, and stakeholder sensitivity constrain managerial opportunism in complex organizations (Srinidhi et al. 2011; Palvia et al. 2015; Elamer and Boulhaga 2024). We also find that the Paris Agreement dampens the positive effect of complexity on ESG controversies, suggesting that transnational regulatory pressure can discipline complex multinational firms and reduce their ability to exploit cross-jurisdictional regulatory gaps (Kreuzer and Priberny 2022).

Taken together, our findings present a coherent picture of how organizational structure, market pressure, governance, and institutions jointly shape ESG risk. Business complexity is a fundamental driver of ESG controversies; analyst scrutiny tends to amplify this risk, while strong internal governance and international regulation help contain it. These results imply that ESG failures are not merely the product of isolated

TABLE 8 | Entropy balancing.

	Treatment group (17,236)			Control group (17,546)		
	Mean	Variance	Skewness	Mean	Variance	Skewness
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Variable distributions before entropy balancing						
Profitability	0.062	0.007	−0.804	0.043	0.028	−1.710
Leverage	0.620	0.035	0.141	0.479	0.054	0.657
Liquidity	1.611	1.056	3.693	2.666	5.827	2.608
Capital Expenditure	0.046	0.001	1.901	0.048	0.002	1.992
Market to book	3.260	21.560	3.380	4.047	31.200	2.751
Free float	79.550	613.700	−1.094	74.790	587.000	−0.802
Board size	2.427	0.066	0.122	2.235	0.080	0.031
Board independence	6.277	10.980	0.447	7.358	20.820	1.690
Board diversity	55.540	710.200	−0.112	45.970	786.600	0.313
CEO–chairman duality	0.401	0.240	0.403	0.356	0.229	0.600
National governance	1.117	0.328	−1.682	1.115	0.332	−1.662
Ln GDP	29.050	2.205	−0.731	29.020	2.269	−0.734
Panel B: Variable distributions after entropy balancing						
Profitability	0.062	0.007	−0.804	0.062	0.017	−1.681
Leverage	0.620	0.035	0.141	0.620	0.061	0.729
Liquidity	1.611	1.056	3.693	1.611	0.998	2.331
Capital Expenditure	0.046	0.001	1.901	0.046	0.002	2.025
Market to book	3.260	21.560	3.380	3.260	34.720	2.291
Free float	79.550	613.700	−1.094	79.550	505.000	−1.092
Board size	2.427	0.066	0.122	2.427	0.092	0.325
Board independence	6.277	10.980	0.447	6.277	19.280	4.977
Board diversity	55.540	710.200	−0.112	55.540	752.900	−0.089
CEO–chairman duality	0.401	0.240	0.403	0.401	0.240	0.403
National governance	1.117	0.328	−1.682	1.117	0.287	−1.811
Ln GDP	29.050	2.205	−0.731	29.050	2.132	−0.786
Panel C: Business complexity and ESG controversy after entropy balancing						

	ESG controversies	
Variables	(1)	(2)
SBM Complexity	5.863***	−3.483***
	(0.143)	(0.344)
Analyst following		0.818***
		(0.217)
SBM Complexity*Analyst following		3.575***
		(0.129)
Profitability	−10.886***	−6.846***

(Continues)

TABLE 8 | (Continued)

Variables	ESG controversies (1)	(2)
	(2.205)	(2.253)
Leverage	2.020*	3.273***
	(1.108)	(1.149)
Liquidity	0.439***	0.477***
	(0.149)	(0.149)
Capital Expenditure	5.870	5.156
	(3.697)	(3.684)
Market to book	0.066	0.044
	(0.043)	(0.044)
Free float	0.027***	0.023***
	(0.007)	(0.007)
Board size	1.413*	1.499*
	(0.805)	(0.791)
Board independence	0.089*	0.051
	(0.052)	(0.044)
Board diversity	0.021***	0.018***
	(0.005)	(0.005)
CEO–chairman duality	0.135	−0.052
	(0.335)	(0.331)
National governance	1.512	1.798
	(2.207)	(2.213)
Ln GDP	−3.635***	−4.168***
	(1.173)	(1.184)
Constant	0.952	13.237
	(31.363)	(31.742)
Observations	34,782	33,978
Adj. R^2	0.173	0.205
Industry FE	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes

Note: The table explores the relationship between business complexity and ESG controversies using an entropy-balanced sample. Panel A (B) shows variable distributions before (after) entropy balancing. Panel C presents regression results. All variables are fully defined in Appendix Robust standard errors of coefficient estimates are presented in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Authors' own work.

misconduct but are deeply rooted in the structural features of modern corporations.

This study contributes to the ESG and governance literatures by providing the first large-scale cross-country evidence linking business complexity to ESG controversies. It advances theory by integrating complexity and agency perspectives, and it challenges the presumption that market-based monitoring uniformly improves ESG outcomes. For practice and policy, the results underscore that managing ESG risk in complex firms requires more than external visibility. It demands robust internal governance, inclusive organizational cultures, and coordinated international regulatory frameworks capable of constraining corporate behavior in a globalized economy.

Author Contributions

Abongeh Tunyi: conceptualization; project administration; methodology; software; formal analysis; investigation; data curation; visualization; writing – original draft; writing – review and editing. **Ali Uyar:** conceptualization; supervision; project administration; investigation; data curation; writing – original draft; writing – review and editing. **Nejla Ould Daoud Ellili:** conceptualization; writing – original draft; writing – review and editing. **Abdullah S. Karaman:** conceptualization; writing – original draft; writing – review and editing.

Endnotes

[1] Although the number of geographic segments could measure spatial differentiation, we cannot use it in our context due to the unavailability of global geographic segments data (covering our sample). However, the proxy we use (i.e., foreign assets to total assets) for spatial differentiation is also frequently used to measure the complexity of the firms arising from international operations (Aggarwal et al. 2011).

[2] The data were retrieved from the Worldwide Governance Indicators and the World Development Indicators.

[3] Not reported for brevity.

[4] In untabulated analysis, we find that business complexity stemming from vertical, functional, and occupational differentiation (components of STR Complexity) is significantly positively associated with ESG controversies. However, our results for spatial differentiation are negative, albeit statistically insignificant at the 10% level. This may suggest that spatial differentiation may not necessarily lead to better ESG performance as firms operating in foreign markets may benefit from local regulatory loopholes (Läger et al. 2022).

[5] Similarly, in untabulated results, we find that the results for Hypotheses H2a and H2b are similarly robust to using a fixed-effects model.

References

Abdelfattah, T., and A. Aboud. 2020. "Tax Avoidance, Corporate Governance, and Corporate Social Responsibility: The Case of the Egyptian Capital Market." *Journal of International Accounting, Auditing and Taxation* 38: 100304.

Adhikari, B. K. 2016. "Causal Effect of Analyst Following on Corporate Social Responsibility." *Journal of Corporate Finance* 41: 201–216.

Aggarwal, R., J. Berrill, E. Hutson, and C. Kearney. 2011. "What Is a Multinational Corporation? Classifying the Degree of Firm-Level Multinationality." *International Business Review* 20, no. 5: 557–577.

Agnese, P., F. Battaglia, F. Busato, and S. Taddeo. 2023. "ESG Controversies and Governance: Evidence From the Banking Industry." *Finance Research Letters* 53: 103397.

Al-Hiyari, A. 2024. "Does Top Executive Gender Diversity Matter for the Value Relevance of ESG Controversies? Empirical Evidence From European Tech Firms." *Journal of Accounting & Organizational Change*, ahead of print, June 2024. https://doi.org/10.1108/JAOC-01-2024-0009.

Alkhawaja, A., F. Hu, S. Johl, and S. Nadarajah. 2023. "Board Gender Diversity, Quotas, and ESG Disclosure: Global Evidence." *International Review of Financial Analysis* 90: 102823.

Anderson, P. 1999. "Complexity Theory and Organization Science." *Organization Science* 10, no. 3: 216–232.

Barros, V., P. Verga Matos, J. Miranda Sarmento, and P. Rino Vieira. 2024. "ESG Performance and Firms' Business and Geographical Diversification: An Empirical Approach." *Journal of Business Research* 172: 114392.

Becchetti, L., D. Cucinelli, F. Ielasi, and M. Rossolini. 2023. "Corporate Social Irresponsibility: The Relationship Between ESG Misconduct and the Cost of Equity." *International Review of Financial Analysis* 89: 102833.

Benlemlih, M., M. Bitar, I. E. Ouadghiri, and J. Peillex. 2024. "Financial Analyst Coverage and Corporate Environmental Disclosure." *British Journal of Management* 35, no. 3: 1609–1631.

Bertomeu, J. 2023. "Managers' Choice of Disclosure Complexity." *Journal of Accounting and Economics* 76: 101637.

Birkie, S. E., P. Trucco, and P. Fernandez Campos. 2017. "Effectiveness of Resilience Capabilities in Mitigating Disruptions: Leveraging on Supply Chain Structural Complexity." *Supply Chain Management* 22, no. 6: 506–521.

Boiral, O. 2013. "Sustainability Reports as Simulacra? A Counter-Account of A and A+ GRI Reports." *Accounting, Auditing & Accountability Journal* 26, no. 7: 1036–1071.

Brady, T., and A. Davies. 2014. "Managing Structural and Dynamic Complexity: A Tale of Two Projects." *Project Management Journal* 45, no. 4: 21–38.

Brinette, S., F. D. Sonmez, and P. S. Tournus. 2024. "ESG Controversies and Firm Value: Moderating Role of Board Gender Diversity and Board Independence." *IEEE Transactions on Engineering Management* 71: 4298–4307.

Casson, M., and Y. Li. 2022. "Complexity in International Business: The Implications for Theory." *Journal of International Business Studies* 53, no. 9: 2037–2049.

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, T., J. Harford, and C. Lin. 2015. "Do Analysts Matter for Governance? Evidence From Natural Experiments." *Journal of Financial Economics* 115, no. 2: 383–410.

Chouaibi, S., and H. Affes. 2021. "The Effect of Social and Ethical Practices on Environmental Disclosure: Evidence From an International ESG Data." *Corporate Governance (Bingley)* 21, no. 7: 1293–1317.

Christensen, L. J., A. Mackey, and D. Whetten. 2014. "Taking Responsibility for Corporate Social Responsibility: The Role of Leaders in Creating, Implementing, Sustaining, or Avoiding Socially Responsible Firm Behaviors." *Academy of Management Perspectives* 28, no. 2: 164–178.

Cicchiello, A. F., M. Cotugno, and C. Foroni. 2023. "Does Competition Affect ESG Controversies? Evidence From the Banking Industry." *Finance Research Letters* 55: 103972.

Correa, R., and L. S. Goldberg. 2022. "Bank Complexity, Governance, and Risk." *Journal of Banking and Finance* 134: 106013.

Dah, M. A., and M. B. Frye. 2017. "Is Board Compensation Excessive?" *Journal of Corporate Finance* 45: 566–585.

Daily, C. M., D. R. Dalton, and A. A. Cannella. 2003. "Corporate Governance: Decades of Dialogue and Data." *Academy of Management Review* 28, no. 3: 371–382.

Damanpour, F. 1996. "Organizational Complexity and Innovation: Developing and Testing Multiple Contingency Models." *Management Science* 42, no. 5: 693–716.

David, P., M. Bloom, and A. J. Hillman. 2007. "Investor Activism, Managerial Responsiveness, and Corporate Social Performance." *Strategic Management Journal* 28, no. 1: 91–100.

Dean, T., H. Zhang, and Y. Xiao. 2022. "The Role of Complexity in the Valley of Death and Radical Innovation Performance." *Technovation* 109: 102160.

Delmas, M. A., and V. C. Burbano. 2011. "The Drivers of Greenwashing." *California Management Review* 54, no. 1: 64–87.

Doh, J. P., S. D. Howton, S. W. Howton, and D. S. Siegel. 2010. "Does the Market Respond to an Endorsement of Social Responsibility? The Role of Institutions, Information, and Legitimacy." *Journal of Management* 36, no. 6: 1461–1485.

Egels-Zandén, N., and H. Lindholm. 2015. "Do Codes of Conduct Improve Worker Rights in Supply Chains? A Study of Fair Wear Foundation." *Journal of Cleaner Production* 107: 31–40.

Elamer, A. A., and M. Boulhaga. 2024. "ESG Controversies and Corporate Performance: The Moderating Effect of Governance Mechanisms and ESG Practices." *Corporate Social Responsibility and Environmental Management* 31, no. 4: 3312–3327.

Elbardan, H., A. Uyar, C. Kuzey, and A. S. Karaman. 2023. "CSR Reporting, Assurance, and Firm Value and Risk: The Moderating Effects of CSR Committees and Executive Compensation." *Journal of International Accounting, Auditing and Taxation* 53: 100579.

Eriksson, P. E., O. Pesämaa, and J. Larsson. 2023. "Governing Technical and Organizational Complexity Through Supply Chain Integration: A Dyadic Perspective on Performance in Infrastructure Projects." *International Journal of Project Management* 41, no. 4: 102479.

Fiorillo, P., F. Gangi, A. Meles, M. Mustilli, and D. Salerno. 2023. "The Impact of Equity Analysts on ESG Performance: Evidence From an Exogenous Shock." *Global Business Review*. https://doi.org/10.1177/09721509231168252.

Florackis, C., and A. Ozkan. 2009. "The Impact of Managerial Entrenchment on Agency Costs: An Empirical Investigation Using UK Panel Data." *European Financial Management* 15, no. 3: 497–528.

Frankel, R., S. Kothari, and J. Weber. 2006. "Determinants of the Informativeness of Analyst Research." *Journal of Accounting and Economics* 41, no. 1–2: 29–54.

Giráldez-Puig, P., I. Moreno, L. Perez-Calero, and J. Guerrero Villegas. 2025. "ESG Controversies and Insolvency Risk: Evidence From the Insurance Industry." *Management Decision* 63, no. 2: 610–639.

Gond, J.-P., S. Grubnic, C. Herzig, and J. Moon. 2012. "Configuring Management Control Systems: Theorizing the Integration of Strategy and Sustainability." *Management Accounting Research* 23, no. 3: 205–223.

Gorton, G. B., L. Huang, and Q. Kang. 2017. "The Limitations of Stock Market Efficiency: Price Informativeness and CEO Turnover." *Review of Finance* 21, no. 1: 153–200.

Helfat, C. E., and C. A. Maritan. 2024. "Resource Allocation Capability and Routines in Multibusiness Firms." *Organization Science* 35, no. 3: 1110–1130.

Hitt, M. A., R. E. Hoskisson, and H. Kim. 1997. "International Diversification: Effects on Innovation and Firm Performance in Product-Diversified Firms." *Academy of Management Journal* 40, no. 4: 767–798.

Horsch, A., and J. Kleinow. 2022. "The Challenge of Regulatory Complexity." *European Business Law Review* 33, no. 3: 421–442.

Hu, M., W. Xiong, and C. Xu. 2021. "Analyst Coverage, Corporate Social Responsibility, and Firm Value: Evidence From China." *Global Finance Journal* 50: 100671.

Hussain, N., I.-M. García-Sánchez, S. A. Khan, Z. Khan, and J. Martínez-Ferrero. 2023. "Connecting the Dots: Do Financial Analysts Help Corporate Boards Improve Corporate Social Responsibility?" *British Journal of Management* 34, no. 1: 363–389.

Hussain, T., A. A. Tunyi, and G. Areneke. 2024. "Environmental Innovation and Takeover Performance." *Business Strategy and the Environment* 33, no. 7: 6586–6615.

Iannuzzi, A. P., S. Dell'Atti, E. D'Apolito, and S. Galletta. 2023. "Nomination Committee Characteristics and Exposure to Environmental, Social and Governance (ESG) Controversies: Evidence From European Global Systemically Important Banks." *Corporate Governance (Bingley)* 23, no. 6: 1314–1338.

Jamali, D. 2010. "The CSR of MNC Subsidiaries in Developing Countries: Global, Local, Substantive or Diluted?" *Journal of Business Ethics* 93, no. 2: 181–200.

Jensen, M., 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.

Jing, C., K. Keasey, I. Lim, and B. Xu. 2024. "Analyst Coverage and Corporate Environmental Policies." *Journal of Financial and Quantitative Analysis* 59, no. 4: 1586–1619.

Jucá, M. N., P. D. Muren, A. Valentinčič, and R. Ichev. 2024. "The Impact of ESG Controversies on the Financial Performance of Firms: An Analysis of Industry and Country Clusters." *Borsa Istanbul Review* 24, no. 6: 1305–1315.

Kajtazi, K., G. Rexhepi, A. Sharif, and I. Ozturk. 2023. "Business Model Innovation and Its Impact on Corporate Sustainability." *Journal of Business Research* 166: 114082.

Khan, F., M. A. B. Abdul-Hamid, S. Fauzi Saidin, and S. Hussain. 2026. "Organizational Complexity and Audit Report Lag in GCC Economies: The Moderating Role of Audit Quality." *Journal of Financial Reporting and Accounting* 24, no. 1: 23–45.

Khan, M., G. Serafeim, and A. Yoon. 2016. "Corporate Sustainability: First Evidence on Materiality." *Accounting Review* 91, no. 6: 1697–1724.

Kim, Y., M.-S. Park, and B. Wier. 2012. "Is Earnings Quality Associated With Corporate Social Responsibility?" *Accounting Review* 87, no. 3: 761–796.

Kolk, A., and J. Pinkse. 2008. "A Perspective on Multinational Enterprises and Climate Change: Learning From an Inconvenient Truth?" *Journal of International Business Studies* 39, no. 8: 1359–1378.

Kreuzer, C., and C. Priberny. 2022. "To Green or Not to Green: The Influence of Board Characteristics on Carbon Emissions." *Finance Research Letters* 49: 103077.

Kuzey, C., H. Al-Shaer, A. Uyar, and A. S. Karaman. 2024. "Do Board Monitoring and Audit Committee Quality Help Risky Firms Reduce CSR Controversies?" *Review of Quantitative Finance and Accounting* 2024: 1–39.

la Rosa, F., and F. Bernini. 2022. "ESG Controversies and the Cost of Equity Capital of European Listed Companies: The Moderating Effects of ESG Performance and Market Securities Regulation." *International Journal of Accounting and Information Management* 30, no. 5: 641–663.

Läger, F., Y. D. Bouzzine, and R. Lueg. 2022. "The Relationship Between Firm Complexity and Corporate Social Responsibility: International Evidence From 2010-2019." *Corporate Social Responsibility and Environmental Management* 29, no. 3: 549–560.

Lei, Z., G. Xuemeng, and F. Xiangfei. 2022. "How Does Analyst Coverage Affect Corporate Social Responsibility? Evidence From China." *Emerging Markets Finance and Trade* 58, no. 7: 2036–2049.

Liu, C.-L., and S.-M. Lai. 2012. "Organizational Complexity and Auditor Quality." *Corporate Governance: An International Review* 20, no. 4: 352–368.

Liu, X., J. Dai, X. Dong, and J. Liu. 2024. "ESG Rating Disagreement and Analyst Forecast Quality." *International Review of Financial Analysis* 95: 103446.

Loughran, T., and B. McDonald. 2024. "Measuring Firm Complexity." *Journal of Financial and Quantitative Analysis* 59, no. 6: 2487–2514.

Luo, J., H. Yin, and H. Zhang. 2020. "The Disincentive Effect of Stars: Evidence From Analyst Coverage." *Journal of Accounting, Auditing & Finance* 35, no. 4: 803–828.

Markarian, G., and A. Parbonetti. 2007. "Firm Complexity and Board of Director Composition." *Corporate Governance: An International Review* 15, no. 6: 1224–1243.

Marquis, C., and C. Qian. 2014. "Corporate Social Responsibility Reporting in China: Symbol or Substance?" *Organization Science* 25, no. 1: 127–148.

Marquis, C., M. W. Toffel, and Y. Zhou. 2016. "Scrutiny, Norms, and Selective Disclosure: A Global Study of Greenwashing." *Organization Science* 27, no. 2: 483–504.

Matemane, R., T. A. Ojeyinka, A. A. Tunyi, and T. Lemma. 2026. "Do Women on Corporate Boards Enhance Biodiversity Disclosure? Evidence From South Africa." *Journal of Accounting in Emerging Economies* 16, no. 1: 51–85.

Monem, R. M. 2013. "Determinants of Board Structure: Evidence From Australia." *Journal of Contemporary Accounting & Economics* 9, no. 1: 33–49.

Nicolas, M. L. D., A. Desroziers, F. Caccioli, and T. Aste. 2024. "ESG Reputation Risk Matters: An Event Study Based on Social Media Data." *Finance Research Letters* 59: 104712.

Ongsakul, V., P. Chatjuthamard, P. Jiraporn, and S. M. Lee. 2025. "Climate Change, Ethical Accounting, and the Paris Agreement: Does Financial Statement Divergence Influence Shareholder Value?" *Journal of Sustainable Finance & Investment* 15, no. 4: 836–868.

Palvia, A., E. Vähämaa, and S. Vähämaa. 2015. "Are Female CEOs and Chairwomen More Conservative and Risk Averse? Evidence From the Banking Industry During the Financial Crisis." *Journal of Business Ethics* 131, no. 3: 577–594.

Qian, C., L. Y. Lu, and Y. Yu. 2019. "Financial Analyst Coverage and Corporate Social Performance: Evidence From Natural Experiments." *Strategic Management Journal* 40, no. 13: 2271–2286.

Qureshi, S. M., and C. Kang. 2015. "Analysing the Organizational Factors of Project Complexity Using Structural Equation Modelling." *International Journal of Project Management* 33, no. 1: 165–176.

Rahat, B., and P. Nguyen. 2024. "The Impact of ESG Profile on Firm's Valuation in Emerging Markets." *International Review of Financial Analysis* 95: 103361.

Roger, T. 2024. "Do Financial Analysts Care About ESG?" *Finance Research Letters* 63: 105289.

Sargut, G., and R. G. McGrath. 2011. "Learning to Live With Complexity." *Harvard Business Review* 89, no. 9: 68–76.

Schiemann, F., and R. Tietmeyer. 2022. "ESG Controversies, ESG Disclosure and Analyst Forecast Accuracy." *International Review of Financial Analysis* 84: 102373.

Simon, H. A. 1991. "Bounded Rationality and Organizational Learning." *Organization Science* 2, no. 1: 125–134.

Simsek, R., S. Mollah, and A. Tunyi. 2024. "Corporate Governance Structure and Climate-Related Financial Disclosure: Conventional Banks Versus Islamic Banks." *Business Strategy and the Environment* 33, no. 6: 5503–5528.

Srinidhi, B., F. A. Gul, and J. Tsui. 2011. "Female Directors and Earnings Quality." *Contemporary Accounting Research* 28, no. 5: 1610–1644.

Stewart, H. 2023. "Digital Transformation Security Challenges." *Journal of Computer Information Systems* 63, no. 4: 919–936.

Sun, Z., Z. Tian, X. Xie, Z. Sun, X. Zhang, and G. Gong. 2024. "An Meta-Cognitive Based Logistics Human Resource Modeling and Optimal Scheduling." *Engineering Applications of Artificial Intelligence* 130: 107760.

Sundaramurthy, C., and M. Lewis. 2003. "Control and Collaboration: Paradoxes of Governance." *Academy of Management Review* 28, no. 3: 397–415.

Treepongkaruna, S., K. Kyaw, and P. Jiraporn. 2024a. "ESG Controversies and Corporate Governance: Evidence From Board Size." *Business Strategy and the Environment* 33, no. 5: 4218–4232.

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

Tunyi, A. A. 2021. "Revisiting Acquirer Returns: Evidence From Unanticipated Deals." *Journal of Corporate Finance* 66: 101789.

Tunyi, A. A. 2025. "Silver-Haired, Carbon-Heavy? Director Age and Corporate Environmental Outcomes." *Sustainability* 17, no. 18: 8476.

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.

Uhl-Bien, M., and R. Marion. 2009. "Complexity Leadership in Bureaucratic Forms of Organizing: A Meso Model." *Leadership Quarterly* 20, no. 4: 631–650.

Utz, S. 2019. "Corporate Scandals and the Reliability of ESG Assessments: Evidence From an International Sample." *Review of Managerial Science* 13, no. 2: 483–511.

Vargas-Santander, K. G., S. Álvarez-Diez, S. Baixauli-Soler, and M. Belda-Ruiz. 2025. "Do Financial Constraints Lead to Environmental, Social and Governance Controversies? The Role of Country Context." *Business Strategy and the Environment* 34, no. 1: 965–981.

Vasconcelos, F. C., and R. Ramirez. 2011. "Complexity in Business Environments." *Journal of Business Research* 64, no. 3: 236–241.

Verdenhofa, O., J. Dehtjare, O. Dzenis, R. Djakons, and J. Mironova. 2022. "Organizational and Communication Support of the Process of Decision-Making in the Educational Sphere." *Public Policy and Administration* 21, no. 4: 379–394.

Appendix A:

Variable descriptions.

Variable	Description
Panel A: Dependent and independent variables	
ESG Controversies	An index measuring a firm's exposure to environmental, social, and governance (ESG) controversies and negative events reflected in the global media. In the data source, the ESG controversies score range between 0 and 100 (firm with no controversy gets a score of 100). However, we reverse-scored by multiplying this measure by (− 1) to indicate that greater score indicates more ESG controversies which will facilitate interpreting the results.
SBM Complexity	First component from principal component analysis of four variables: Ln Net sales, Ln Total assets reported, Ln full-time employees, and Ln audit fees (defined below).
Residual Complexity	The residual obtained by regressing SBM Complexity on firm size, leverage, and market to book while accounting for country, industry, and year fixed effects.
Ln Net sales	Natural log of 1 plus net sales.
Ln Total assets reported	Natural log of 1 plus total assets reported.
Ln full-time employees	Natural log of 1 plus number of full-time employees.
Ln audit fees	Natural log of 1 plus audit fees.
Audit fees	The natural log of audit fees paid by the firm to its principal auditor for audit-related services.
Sales fraction	Market share (by sales) of the firm within its industry.
STR Complexity	First component from principal component analysis of four variables: Vertical, functional, occupational, and spatial (defined below).
STR Complexity (2)	First component from principal component analysis of two variables: Vertical and spatial (defined below).
Vertical differentiation	Natural log of the number of full-time employees.
Functional differentiation	Dummy indicator for the presence of a CSR-Sustainability Committee.
Occupational differentiation	An indicator variable for the presence of a policy to support the skills training or career development of employee.
Spatial differentiation	The average of FSTS and FATA, where FSTS is the ratio of international (foreign) sales to total sales and FATA is the ratio of international (foreign) assets to total assets.
Panel B: Moderating variables	
Analyst following	Natural log of the number of analysts following a firm.
Women employees	The proportion of female employees in the firm.
ESG Combined Score	LSEG ESG index which captures a firm's performance across different ESG dimensions.
Post-Paris global ESG regulatory regime	Dummy indicator for an event that took place in 2016.
Panel C: Control variables	
Firm size	Natural log of total assets.
Profitability	Ratio of net income before taxes to total assets.
Leverage	Total debt to total assets.
Liquidity	Current ratio; current assets to current liabilities.
Capital expenditures	Capital expenditure reported as a ratio of a firm's total assets.
Market to book	Company market capitalization to total equity.
Free float	Percentage of shares in free float.
Board size	Natural log of number of directors on a firm's board.
Board independence	Proportion of directors that are nonexecutives.
Board diversity	The proportion of female directors on the board.
CEO–chairman duality	Dummy that captures whether the CEO and chairperson are the same individual.
National governance	Average score of World Governance Indicators.
Ln GDP	Natural log of one plus the country's GDP.

Appendix B:

Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	VIF
(1) ESG Controversies	1.00														
(2) SBM Complexity	0.34*	1.00													2.48
(3) Residual Complexity	0.14*	0.43*	1.00												1.43
(4) Profitability	0.01	0.24*	0.00	1.00											1.29
(5) Leverage	0.12*	0.35*	−0.04*	−0.13*	1.00										1.77
(6) Liquidity	−0.09*	−0.37*	−0.17*	−0.11*	−0.52*	1.00									1.63
(7) Capital Expenditure	0.03*	−0.01	−0.04*	0.08*	−0.03*	−0.11*	1.00								1.03
(8) Market to book	0.01	−0.13*	−0.01*	0.12*	0.02*	0.06*	0.01	1.00							1.10
(9) Free float	0.11*	0.12*	0.05*	−0.04*	0.03*	0.05*	−0.04*	0.03*	1.00						1.45
(10) Board size	0.17*	0.54*	0.14*	0.10*	0.17*	−0.19*	−0.01	−0.09*	0.00	1.00					2.18
(11) Board independence	−0.02*	−0.30*	−0.06*	−0.11*	−0.06*	0.15*	0.02*	0.12*	0.28*	−0.62*	1.00				1.93
(12) Board diversity	0.10*	0.19*	0.04*	0.09*	0.08*	−0.09*	−0.02*	0.06*	0.12*	0.13*	0.01	1.00			1.07
(13) CEO–chairman duality	0.05*	0.14*	0.02*	0.04*	0.03*	0.02*	−0.01	0.04*	0.10*	0.06*	0.02*	0.01	1.00		1.10
(14) National governance	0.04*	0.01	0.00	−0.04*	0.00	0.03*	−0.02*	−0.04*	0.37*	−0.09*	0.20*	0.01	−0.02*	1.00	1.37
(15) Ln GDP	0.03*	0.06*	−0.01	−0.07*	0.03*	0.12*	−0.05*	0.09*	0.22*	0.02*	0.10*	0.01	0.27*	−0.24*	1.35

Note: The table presents pairwise correlations of the variables involved in the study. All variables are fully defined in Appendix A. * denotes statistical significance at the 10% level.
Source: Author's own work.