

ESG controversies and insolvency risk: evidence from the insurance industry

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Abstract

Purpose – This study investigates the relationships between environmental, social, and governance (ESG) controversies and insolvency risk in the insurance sector. Drawing from legitimacy and stakeholder theories, the authors explore the impact of ESG controversies on insurers' insolvency risk and the moderating effect of ESG practices on this relationship.

Design/methodology/approach – This study utilises a dataset comprising 120 stock insurance firms spanning from 2011 to 2022. The authors employed system-GMM estimations to control for potential endogeneity and conducted several robustness checks.

Findings – ESG controversy positively influences insurers' insolvency risk, with ESG practices mitigating these positive effects. The Governance (G) component of ESG practices plays a key role in counteracting the effects of ESG controversies on insurance companies' insolvency risk.

Originality/value – This is the first study to investigate the direct relationship between ESG controversies and insolvency risk in the insurance industry. It underscores the critical influence of stakeholders' perceptions of the company's legitimacy, which is determined by the number of ESG controversies undertaken by the insurer company, on its insolvency risk. Additionally, by examining the three components of ESG practices individually, the authors offer insights into how managers can gain a competitive edge, particularly by utilising governance practices as safeguards against the adverse effects of ESG controversies on their financial risk.

Keywords ESG controversies, Insolvency risk, Financial risk, Insurance sector, ESG practices, Corporate governance

Paper type Research paper

1. Introduction

The insurance industry—part of the financial system—faces increasing pressure regarding environmental, social, and governance (ESG) responsibilities (McDaniels *et al.*, 2017).

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The United Nations introduced the Principles for Sustainable Insurance (PSI) at the 2012 Rio+20 Summit to integrate ESG issues with insurance firm management. Following this initiative, recently, the insurance industry has increased its commitment to integrating ESG practices (Woods, 2021), and insurers accounting for over 25% of the world premium volume have ratified the PSI (UNEP Finance Initiative, 2022). Although ESG issues are gaining significance in the insurance industry, a history of scandals (Tica and Weißenberger, 2022) may have damaged the sector's image and reputation, thus precipitating negative stakeholder perceptions (Will *et al.*, 2017) and affecting firms' financial stability. One method employed to measure these events is based on ESG controversies, which encompass negative news stories related to a firm's corporate ESG performance (Aouadi and Marsat, 2018; Shakil, 2021). Firms affected by ESG controversies are more likely to raise doubts regarding their prospects among their stakeholders (Shakil, 2021). Thus, these controversies constitute reputational and legitimacy hazards (Bauer and Hann, 2010; Galletta and Mazzù, 2023; Wong, 2014) that can adversely affect insolvency risk. Insolvency risk for insurers is defined as the "risk of loss in the financial situation of a company which results from fluctuations in the credit standing of issuers of securities, counterparties and any debtors to which a Solvency II undertaking is exposed" (Caporale *et al.*, 2017, p. 108).

Additionally, numerous previous studies have reported that negative ESG news significantly impacts market risk, as measured using stock return volatility (Krüger, 2015) or stock price (Klassen and Mclaughlin, 1996; Krüger, 2015). Despite the latter evidence, studies on ESG controversies' impact on insurers' insolvency risk are lacking. Such an omission is serious considering the potential negative financial implications of careless ESG behaviour in this specific industrial context (Fitch ratings, 2023). The main implications are as follows: first, insurance companies may face regulatory and disclosure requirements related to ESG controversies' management (Sustainable Finance Disclosure Regulation -SFDR- 2019; European Taxonomy, 2020—European Parliament and Council, 2020; climate stress test, along with voluntary PSIs). Particularly, the SFDR requires the financial industry to integrate sustainability risks and factors into its investment processes, foster transparency and provide investors with relevant information regarding ESG considerations (Hummel and Jobst, 2024). Notably, this regulation compels insurers to disclose how they incorporate sustainability risks into their investment decisions and insurance coverage, thereby reinforcing transparency and promoting responsible business practices. Non-compliance with these requirements can result in financial sanctions and poor relationships with regulatory bodies. Second, ESG controversies can damage the long-term sustainability of insurers' operations and investments (Fitch ratings, 2023). This includes irresponsible management failing to meet its long-term commitments, such as paying future claims (Moalla and Dammak, 2023). Finally, climate change and natural disasters significantly impact the insurance industry owing to the nature of their activity (Gupta and Venkataraman, 2024). If insurers overlook ESG risks in their growth strategy, their understanding of sustainable risks remains insufficient, and they cannot develop appropriate insurance products and rates to address these risks (Di Tommaso and Mazzuca, 2023). These arguments underscore the fact that ESG controversies may harm a company's reputation among customers, investors, and other stakeholders (Aouadi and Marsat, 2018), which, in turn, potentially increases insurers' insolvency risk. Therefore, it is imperative to investigate this topic to understand how ESG controversies can affect insurers' insolvency risk to develop effective risk management strategies and strengthen resilience in the face of such events. In this study, we extend beyond the recent call for research on ESG compliance's positive role in the insurance sector (Di Tommaso and Mazzuca, 2023) and analyse how such factors' negative aspects affect insurers' insolvency risk.

The literature has addressed the phenomenon whereby companies alleged to have engaged in sustainability misbehaviour continue attaining high ESG ratings (Riera and

Iborra, 2017). Firms can utilise positive scores obtained in ESG practices to mitigate ESG controversies' positive effects on their financial risk (Kang *et al.*, 2016; Kotchen and Moon, 2012). Previous studies (Godfrey, 2005; Godfrey *et al.*, 2009) have suggested that responsible practices provide 'insurance-like' protection and, thereby, mitigate stakeholders' sanctions resulting from negative ESG controversies. Consequently, these positive ESG practices can enhance insurers' financial soundness. In this context, we analyse ESG practice scores' moderating effect on the relationship between ESG controversies and insurers' insolvency risk. We measure this effect using an interaction term between ESG controversies and ESG practice scores (Aouadi and Marsat, 2018; Nirino *et al.*, 2021).

This study—based on a sample of 120 publicly traded insurance firms from 36 countries over 2011–2022—employs an unbalanced panel of 1,428 observations. Employing a System-GMM estimation with an instrumental variable approach addresses the potential endogeneity bias. Robustness checks involved altering the dependent variable and considering the individual effects of the three pillars of the moderating variables of ESG practices. Using propensity score matching (PSM) analysis, we verified whether any sample selection bias existed. Per the results, insurance firms with more ESG controversies exhibited greater insolvency risk. Additionally, ESG practices were found to exert a moderating effect on the relationship between ESG controversies and insurers' insolvency risk, and sustainable governance practices played a pivotal role.

This study makes several contributions to existing literature. First, by analysing ESG controversies' consequences on insurers' insolvency risk, it sheds light on substandard ESG activity's financial implications in the insurance industry. Interestingly, this study addresses the specific relationship between ESG controversies and insolvency risk in the insurance industry, which, to our knowledge has not been studied previously. In contrast to other sectors' findings (Lee and Isa, 2024), the findings of the insurance sector demonstrate a greater impact of ESG controversies on company reputation, which is consistent with those of financial sector (Wang *et al.*, 2003; Ruiz *et al.*, 2014). Second, we provide additional evidence on ESG practices and insolvency risk because we suggest that an insurer's implementation of ESG practices acts as a safeguard against the adverse effects of ESG controversies. However, our study also demonstrates the limited impact of these insurance companies' ESG practices in counteracting the increasing insolvency risk resulting from ESG controversies (Nirino *et al.*, 2021). Finally, this study proposes that corporate governance's particular significance is a key factor in ESG practices to mitigate insurers' insolvency risk. These findings are consistent with those of the banking sector (Agnese *et al.*, 2023; Aevoa *et al.*, 2023; Chiaramonte *et al.*, 2022). We provide a holistic understanding of how ESG controversies and governance mechanisms collectively influence firms' financial stability in the insurance sector.

The remainder of this paper is structured as follows: Section 2 presents a literature review and the research hypotheses. Section 3 elucidates the methodology employed in this study. Section 4 describes the empirical results. Section 5 discusses the findings. Finally, Section 6 outlines the conclusions.

2. Literature review and hypotheses' development

2.1 ESG controversies and insurers' insolvency risk

Per stakeholder theory, the disclosure of sustainable practices information is part of the dialogue between a company and its stakeholders and provides information regarding a company's activities that help legitimise its behaviour (Adams and Larrinaga-González, 2007; Adams and McNicholas, 2007). Per legitimacy theory, reputation takes a long time to build because it comprises a combination of reliability, credibility, responsibility, and trustworthiness (Wong, 2014). Reputation is particularly important for insurer companies (Cummins and Doherty, 2006). Insurance contracts are complex financial products, and stakeholders (in general) and policyholders (in particular) may exhibit difficulty in

understanding them. Furthermore, policyholders submit claims to their insurers following a harmful event; therefore, situations of stress and relative weakness are common for them (Csiszar and Heidrich, 2006). When an insurer has a reputation for fulfilling its commitments, it plays a key role in contracts based on good faith between both parties.

Notably, ESG controversies measure a company's exposure to negative ESG events, as reflected in the global media (Agnese *et al.*, 2023). Further, ESG controversies can severely damage a firm's reputation (Riera and Iborra, 2017; Shakil, 2021). Media exposure influences public opinion and contributes to public pressure (Brammer and Pavelin, 2004; Cormier and Magnan, 2003). One reaction to ESG controversies comprises stakeholders' sanctions—caused by the stakeholders' desire to punish firms' sustainable misbehaviour and deter them from adopting such actions (Shakil, 2021).

Per stakeholder theory, ESG controversies may trigger higher stakeholder scepticism and perceptions of corporate hypocrisy (Du *et al.*, 2010; Maignan and Ralston, 2002), thus lowering credibility (Godfrey *et al.*, 2009; Yoon *et al.*, 2006) and negatively impacting firm value. This undesirable reputation created by ESG controversies can, in turn, negatively affect a company's financial results. Thus, legitimacy and stakeholder theories can explain the ESG controversies–insolvency risk nexus (Shakil, 2021). According to Passas *et al.* (2022), a company's participation in illegal practices can damage its reputation and affect its financial performance, thereby increasing its insolvency risk. In this vein, the literature has indicated that ESG negligence can cause reputational damage to firms in financial markets (Shakil, 2021). This results in companies experiencing negative news coverage, thereby precipitating losses such as a reduction in their market share. Other studies have found that negative ESG news significantly impacts stock return volatility (Krüger, 2015) and stock prices (Klassen and Mclaughlin, 1996; Krüger, 2015). Moreover, ESG controversies may diminish a company's ability to attract capital from investors (Barkemeyer *et al.*, 2023) because several of its decisions are conditioned by effective ESG practices.

In sum, stakeholder sanctions can reduce a firm's earnings and increase its insolvency risk (Kölbel *et al.*, 2017). Considering these arguments, we hypothesise that ESG controversies increase stakeholder sanctions' likelihood, thereby increasing insurance companies' insolvency risk. Therefore, we hypothesise as follows:

H1. ESG controversies positively affect an insurance company's insolvency risk.

2.2 ESG practices' moderating effect on ESG controversies and insurers' insolvency risk

Notably, ESG practices constitute legitimate actions implemented by firms directed towards society and broader stakeholders (Shakil, 2021). Per legitimacy theory, firms can strategically utilise their ESG practices to repair reputational damage following an ESG corporate controversy (Li *et al.*, 2019). For example, Marsat *et al.* (2022) found clear evidence that a high environmental practice score significantly helps firms promptly recover from environmental controversy. Accordingly, firms exhibiting high environmental performance should develop environmental skills that foster resilience when facing adverse events.

The ESG agenda has become a key priority and opportunity for insurer companies to drive positive change (KPMG, 2023a). Specifically, ESG's governance dimension is gaining relevance. Therefore, insurance company boards are becoming increasingly aware of the importance of incorporating ESG considerations into business decisions (Bressan, 2023). A positive assessment of a firm's ESG practices affects stakeholder attitudes and loyalty towards the firm; thus, high ESG performance may alleviate stakeholder sanctions against the firm. High ESG practice scores can be associated with low insolvency risk because of the following factors: a low probability of suffering legal prosecutions and fines, relatively stable relations with the government and financial community (Mcguire *et al.*, 1988), customer loyalty, and supportive employees and communities (Oikonomou *et al.*, 2012). In this vein,

previous studies have indicated that high ESG practice scores help reduce a firm's stock price volatility (Harjoto and Jo, 2015; Kim *et al.*, 2014; Shakil, 2022). Per stakeholder theory, higher ESG investment enhances a company's reputation, suggesting that higher ESG scores lower financial risk (Luo and Bhattacharya, 2006). Studies have demonstrated a significant inverse relationship between sustainable practices and firm risk (Chollet and Sandwidi, 2018; Oikonomou *et al.*, 2012; Sassen *et al.*, 2016). Companies with more solid reputations seem more resilient to market volatility than those with weaker reputations (Hristov *et al.*, 2022).

Based on these arguments, regarding high ESG practice scores' effect on stakeholder sanctions following negative ESG events and insolvency risk reduction, we further analyse whether ESG practices can alleviate ESG controversies' positive effect on insurers' insolvency risk. Accordingly, we propose the following hypothesis:

H2. ESG practices negatively moderate the positive relationship between ESG controversies and insurers' insolvency risk.

The above literature review highlights a company's high exposure to its stakeholders and stakeholders' sensitivity to sustainability-related issues. Per stakeholder theory, stakeholders are agents of social control (Aouadi and Marsat, 2018). Thus, sustainable practices can contribute to firm value through positive relationships with stakeholders (Godfrey *et al.*, 2009; Kacperczyk, 2009). Specifically, stakeholder theory can rationalise ESG and firm value as ESG increases shareholder wealth as it motivates other stakeholders to contribute to the firm's success with the resources that they possess (Freeman, 2010). Specifically, stakeholder and legitimacy theories explain the ESG–financial risk nexus (Shakil, 2021). Accordingly, ESG practices earn stakeholders' goodwill, which decreases the impact of stakeholder sanctions in response to negative events and, thus, reduces insolvency risk. By contrast, a common reaction to ESG controversies is stakeholder sanctions—driven by stakeholders' desire to punish firms and deter firms from actions that they perceive as irresponsible—which increase companies' insolvency risk (Kölbel *et al.*, 2017).

We hypothesise that ESG controversies increase the potential for stakeholder sanctions and, thereby, increase insolvency risk. Additionally, we analyse ESG practices' role in the ESG controversies–insolvency risk nexus.

3. Method

3.1 Sample and data

This study's sample comprises 120 publicly traded insurance companies from the United States, Europe, and the Americas (Bermuda and Canada). The data cover the 2011–2022 period. We selected 2011 as the starting point because it represents the 2008 financial crisis' peak in terms of its impact (Galletta and Mazzù, 2023). Additionally, in 2011, the United Nations began promoting the then-upcoming Rio+20 Conference of June 2012, highlighting the need to integrate ESG issues into insurance firm management.

To obtain the firm sample used herein, first, we considered a total population of 194 large insurance firms quoted on the main Stock Exchange Markets of the United States, Europe, and the Americas. Subsequently, to ensure data quality, a data cleaning process was conducted to include only firms that were listed for at least two consecutive years within the study period and whose data were complete and publicly accessible. Specifically, we selected firms that provided at least three years of Z-score information and data on ESG controversies. The latter's availability was limited because the topic is relatively recent (Galletta and Mazzù, 2023; Stern, 2013). Consequently, we obtained an unbalanced panel dataset comprising 120 firms with 1,428 firm-year observations.

This information was derived from the Refinitiv Eikon database, recognised as among the most reliable sources of data on firms' corporate sustainability engagement (Akbas *et al.*, 2018;

Nirino *et al.*, 2021; Stellner *et al.*, 2015 Galletta and Mazzù, 2023); data on the yearly distribution of sample firms by region are illustrated in Appendix 1.

3.2 Variables and measures

Dependent variable: Insolvency risk. Insurers' insolvency risk is measured using the natural Z-score logarithm. The Z-score—increasingly employed as a measure of insurer soundness (Al-Amri *et al.*, 2021; Cummins *et al.*, 2017; Pasiouras and Gaganis, 2013)—is defined as follows:

$$Z - score = \frac{ROA + Capital\ to\ asset\ ratio}{Standard\ deviation\ of\ ROA} \quad (1)$$

where ROA is the return on assets [1]. We utilised a three-year rolling window for the ROA standard deviation (Al-Amri *et al.*, 2021; Cummins *et al.*, 2017); that is, the ROA standard deviation for a specific year (e.g. 2022) was computed as the average of three rolling values (2020-2022). The Z-score is an accounting measure that has been widely used in the banking literature (Baselga-Pascual *et al.*, 2015; Boyd and Graham, 1986; Laeven and Levine, 2009; Schaeck and Cihák, 2014) and insurance literature (Cummins *et al.*, 2017; Gaganis *et al.*, 2019; Kasman *et al.*, 2020; Moreno *et al.*, 2022; Pasiouras and Gaganis, 2013; Rubio-Misas and Fernández-Moreno, 2017; Shim, 2017). The Z-score measures the distance to default (Laeven and Levine, 2009) in terms of the number of ROA standard deviations and is inversely related to default probability. Hence, a higher (lower) Z-score indicates higher (lower) financial stability and lower (higher) insolvency risk, and higher values indicate greater solvency (Shim, 2017).

Main explanatory variable: ESG controversies. We employed Refinitiv's ESG controversies scores, calculated based on 23 topics reflecting recent controversies over the latest complete period (Refinitiv Eikon, 2022, p. 14). They were divided into the following seven categories: "community", "human rights", "management", "product responsibility", "resource use", "shareholders", and "workforce". Refinitiv's ESG controversies scores are widely recognised as a reasonable proxy (Agnese *et al.*, 2023; Dorfleitner *et al.*, 2020). This score gauges a company's exposure to ESG controversies, including negative events, in global media. It compares a company's controversy count to the sector average and assigns an index from 0 to 100, where 0 indicates the most controversy and 100 indicates no controversy. Scores below 50 reflect subpar performance (Refinitiv Eikon, 2022). To increase the ease of interpreting the results, we changed the *ESG controversies* sign by multiplying it by minus one. Therefore, a higher *ESG controversies* value indicated a higher controversy level in the company. To maintain coherence, we applied the same to *Insolvency risk*—following prior studies (Gaganis *et al.*, 2019; Kanagaretnam *et al.*, 2014; Mihet, 2013; Mourouzidou-Damtsa *et al.*, 2019).

Moderating variable: ESG practices. Data on ESG practices rely on the ESG score, which has been highlighted as among the most effective parameters for evaluating these practices and their impact on the environment, society, and businesses (Nollet *et al.*, 2016). This variable initially ranges from 0 to 100, with 100 being the highest. The comprehensive ESG score encompasses the following three categories: environmental, social, and governance.

3.2.1 Variables specific to insurance firms. Following the insurance literature, we included firm-specific control variables that could potentially affect insurance firm insolvency risks.

The reinsurance ratio (*Reinsurance*)—related to higher diversification (Cummins and Nini, 2002)—allows insurers to transfer part of their risk to third parties, thus reducing insolvency risk (Shiu, 2011). We used the ratio of reinsurance premiums paid to total premiums earned to control for reinsurance's effect on insurer risk (de Haan and Kakes, 2010).

Premium growth relates to insurance firms' performance. Nevertheless, rapid premium growth can increase insurance firms' insolvency risk (Chen *et al.*, 2010; Kim *et al.*, 1995).

Equity growth: Insurance companies have regulatory equity requirements to guarantee that they can cope with the risks that they face. This growth rate—though expensive in terms of agency costs (Cummins and Grace, 1994; Cummins and Nini, 2002; Rubio-Misas and Fernández-Moreno, 2017)—reduces the insolvency risk and prevents regulatory costs when capital requirements are violated.

Capital structure (Leverage): For property-liability insurers, capital and risk are inversely related (Cummins and Nini, 2002; Cummins and Sommer, 1996). We measured insurer leverage as the ratio of total liabilities to equity.

Firm size: We employed the natural logarithm of total assets as a proxy for size (Cheng and Weiss, 2013; Cheng, 2008; Cummins *et al.*, 2017; Cummins and Sommer, 1996; Eling and Marek, 2014; Shim, 2017). Larger insurers benefit from a more diversified business than can smaller insurers (Cheng and Weiss, 2013; Cummins and Sommer, 1996). Moreover, regulators are less likely to liquidate large insurers, thereby reducing the insolvency risk (Chen and Wong, 2004).

3.2.2 Industry and macroeconomic variables. Further, the following industry and macroeconomic variables were included in the estimations: inflation rate (*Inflation*), a firm concentration measure based on the Herfindahl-Hirschman index (*HHI*), GDP growth (*GDP growth*), two activity dummies to differentiate between property-casualty and life-and-health insurers, and year and region dummies. We expected the inflation rate to positively impact financial risk as a proxy of monetary stability (Pasiouras and Gaganis, 2013). The expected relation for industry concentration (*HHI*) was undefined. On the one hand, some large firms in a more concentrated industry are likely to earn more profits and, consequently, increase capital ("concentration stability view"). On the other hand, in a concentrated industry, large firms are more exposed to financial fragility because of the "too big to fail" protection mechanism, which may lead managers to make more risky decisions ("concentration fragility view"; Altuntas and Rauch, 2017). Empirical evidence in this regard is mixed. Cummins *et al.* (2017) demonstrated a positive relationship between concentration and insurer soundness among European life insurance firms. By contrast, Altuntas and Rauch (2017) and Shim (2017) found evidence of the opposite. We expected a negative relationship between economic growth and insolvency risk because insurers may find it less challenging to raise capital in a strong economy (Cummins and Sommer, 1996).

Table 1 includes all dependent, independent, and control variables' definitions and notations.

3.3 Model specification

To accurately measure how *ESG controversies* influence insurers' *Insolvency risk*, we needed an empirical model that considers potential endogeneity sources as much as the influence of unobserved heterogeneity and past risk realisations on current risk. Therefore, we employed the System-GMM (Arellano and Bover, 1995; Blundell and Bond, 1998) estimated simultaneously at both levels and the first differences to gain estimation efficiency (Roodman, 2009). The System-GMM has already been widely used in banking studies (Chiaromonte *et al.*, 2022; Galletta *et al.*, 2021; Köhler, 2015; Di Tommaso and Thornton, 2020). We performed second-order autocorrelation tests to detect potential misspecifications. Moreover, because lagged regressors can be used as instrumental variables, we utilised the over-identifying restrictions test (Hansen, 1982) to verify the null hypothesis that all instrumental variables are jointly valid.

We performed the following estimations for Hypothesis (1) in Equation (2):

MD

Explanatory variable	Definition	Data source	
<i>Dependent variables</i>			
<i>Insolvency risk</i>	Neperian logarithm of Z-score multiplied by minus one	Authors' calculation using Thomson Reuters Refinitiv	
<i>Independent variables</i>			
<i>ESG controversies</i>	ESG controversies score: Index ranging from 0 to 100 multiplied by minus one	Thomson Reuters Refinitiv	+
<i>ESG practices</i>	ESG score: Index ranging from 0 to 100, where 1 is the highest punctuation	Thomson Reuters Refinitiv	-
<i>Firm-specific variables</i>			
<i>Reinsurance</i>	Reinsurance premiums paid divided by total premiums earned	Authors' calculation using Thomson Reuters Refinitiv	-
<i>Premium growth</i>	Annual growth of total premiums	Authors' calculation using Thomson Reuters Refinitiv	-
<i>Equity growth</i>	Annual growth of total equity	Authors' calculation using Thomson Reuters Refinitiv	-
<i>Leverage</i>	Debt to Equity ratio	Authors' calculation using Thomson Reuters Refinitiv	+
<i>Firm size</i>	Neperian logarithm of total assets	Thomson Reuters Refinitiv	-
<i>Industry and macroeconomic variables</i>			
<i>Inflation</i>	Annual inflation rate	Thomson Reuters Refinitiv	+
<i>HHI</i>	Herfindahl-Hirschman index calculated as the sum of the squares of all insurance companies' market share in terms of premiums written	Authors' calculation using Thomson Reuters Refinitiv	+/-
<i>GDP growth</i>	Annual real GDP growth	Thomson Reuters Refinitiv	-
<i>Dummy control variables</i>			
<i>Activity dummy</i>	Dummy variables that take the value of 1 for purely life and health/property-casualty insurers	Thomson Reuters Refinitiv	
<i>Year dummy</i>	Year dummies	Thomson Reuters Refinitiv	
<i>Region dummy</i>	Region dummies (the Americas, Europe, and the US)	Thomson Reuters Refinitiv	

Table 1.
Variables

Source(s): Table by authors

$$\begin{aligned}
 Y_{it} = & \beta_1 ESG\ controversies_{i,t-1} + \beta_2 W_{i,t-1} + \beta_3 M_{i,t} + Activity\ dummy + Year\ dummy \\
 & + Region\ dummy + (\eta_i + \delta_t + v_{it})
 \end{aligned} \tag{2}$$

where Y_{it} denotes the insolvency risk of insurer i in year t , $ESG\ controversies_{i,t-1}$ is the explanatory variable, $W_{i,t-1}$ is a vector of firm-specific variables (*Reinsurance*, *Premiums*

growth, Equity growth, Leverage, and Firm size), and M_{it} denotes the industry and macroeconomic variables (*HHI, inflation, and GDP growth*). The model includes activity, year, and region dummies to capture their effects and controls for unobservable heterogeneity through the individual effect, n_i ; d_t is the time variable that controls other macroeconomic factors' effect on firm financial stability, and v_{it} is the random disturbance.

To test ESG practices' moderating effect (**Hypothesis 2**), we introduced the ESG practices variable ($ESG\ practices_{it-1}$) and set the interaction term ($ESG\ controversies_{it-1} \times ESG\ practices_{it-1}$), which resulted in **Equation (3)**, as follows:

$$\begin{aligned}
 Y_{it} = & \beta_1 ESG\ controversies_{it-1} + \beta_2 ESG\ practices_{it-1} \\
 & + \beta_3 ESG\ controversies_{it-1} \times ESG\ practices_{it-1} + \beta_4 W_{i,t-1} + \beta_5 M_{i,t} + Activity\ dummy \\
 & + Year\ dummy + Region\ dummy + (\eta_i + \delta_t + v_{it})
 \end{aligned}
 \tag{3}$$

where all variables were already defined in **Eq. (2)**.

4. Empirical results

4.1 Main results

Table 2 summarises the main variables' statistics for the entire period used in the estimations. The average of *Insolvency risk* was measured using the negative sign of the Z-score's natural logarithm: -1.5553 . The negative mean of *ESG controversies* was -66.7119 for the insurers' sample, which was below -50 but far from the lowest value of -100 . Observing the differences on *ESG controversies* by country, notably, Bermuda stood out with the lowest score (-89.64), indicating minimal controversies, while Germany recorded the highest score (-31.88), suggesting a comparatively higher incidence of controversies. Most countries exhibited values below -50 , indicating strong performance in managing ESG controversies. Furthermore, when comparing regional averages and excluding Bermuda from the analysis, the three zones

Variable	Obs	Mean	P50	SD	Min	Max
<i>Insolvency risk</i>	1,428	-1.5553	-1.6108	1.1884	-6.3748	4.0783
<i>ESG controversies</i>	1,428	-66.7119	-60.5634	26.64738	-100	-0.2404
<i>ESG practices</i>	1,428	46.6620	42.8808	17.1145	2.3647	94.93
<i>Reinsurance</i>	1,428	0.1549	0.1371	0.1520	0.0012	1.3963
<i>Premium growth</i>	1,428	0.0802	0.0559	0.2906	-2.0217	1.3838
<i>Equity growth</i>	1,428	0.0577	0.05117	0.2073	-1.8045	1.3838
<i>Leverage</i>	1,428	7.1269	4.0020	8.1163	-41.5122	105.3842
<i>Firm size</i>	1,428	23.7357	23.8436	2.0259	16.5280	27.7615
<i>Inflation</i>	1,412	1.1677	0.9176	1.2553	-0.7	1.75301
<i>HHI</i>	1,414	2.4978	2	1.9290	-0.5300	16.81
<i>GDP growth</i>	1,417	1.2143	0.87	2.1013	-11.2	21.9

Note(s): *Insolvency risk* is the neperian logarithm of Z-score multiplied by minus one; *ESG controversies* is ESG controversies score from Eikon multiplied by minus one; *ESG practices* is the ESG Score from Eikon; *Reinsurance* is the ratio of reinsurance premiums paid to total premiums earned; *Premium growth* is the annual growth of total premiums. *Equity growth* is the annual growth of total equity; *Leverage* is the debt to equity ratio; *Firm size* is the logarithm of total assets; *Inflation* is the annual inflation rate; *HHI* is the Herfindahl–Hirschman index calculated as the sum of the squares of all insurance companies' market share in terms of premiums written, and *GDP growth* is the annual real GDP growth rate

Source(s): Table by authors

Table 2.
Descriptive statistics

exhibited a similar pattern, with scores ranging between -62 and -64 points (Appendix 2 presents a detailed breakdown of *ESG controversy* by country). The average of *ESG practices* was 46.6620, that is, below 50, thus reflecting poor ESG performance on average. The average degree of reinsurance was 0.1549. The *Premiums growth* average was 0.0802, while the *Equity growth* average was 0.0577. The natural logarithm of total assets (*Firm size*) was, on average, 23.7357. Regarding specific country variables, average *Inflation* was 1.1677, the *HHI* average was 2.4978, and the *GDP growth* average was 1.2143.

The correlation matrix revealed several significantly correlated independent variables. Therefore, we employed the variance inflation factor (VIF) to test for multicollinearity.

The VIFs of all independent variables—concerning their relationship with *Insolvency risk*—were below 10 (see Appendixes 3 and 4 for details). Furthermore, the mean value was 1.43, indicating no multicollinearity (Gujarati, 2003).

Table 3 presents the GMM estimation results. Model 1 elucidates the analysis with only the control variables, and Model 2 tests Hypothesis 1. Model 3 examines the effect of *ESG practices*. Model 4 adds the interaction term *ESG controversies* \times *ESG practices* as an explanatory variable to assess the moderating effect of *ESG practices* (Hypothesis 2). The estimates of the *ESG controversies* coefficients in Models 2 ($\beta = 0.0102$; $p < 0.1$), 3

Variables	Model 1	Model 2	Model 3	Model 4
<i>Insolvency risk</i> $t-1$	0.4330***	0.4513***	0.4517***	0.5060***
<i>ESG controversies</i> $t-1$		0.0102*	0.0086*	0.0120**
<i>ESG practices</i> $t-1$			-0.0169***	-0.0192**
<i>ESG controversies</i> $t-1$ \times <i>ESG practices</i> $t-1$				-0.0002*
<i>Reinsurance</i> $t-1$	2.5704***	1.1807	1.2370	-0.5787
<i>Premium growth</i> $t-1$	0.0170	0.0237	0.2335	0.3860
<i>Equity growth</i> $t-1$	-1.3302***	-1.2552**	-0.8163*	0.1262
<i>Leverage</i> $t-1$	-0.0039	-0.0252**	0.0168	0.0101
<i>Firm size</i> $t-1$	-0.039	-0.0993	-0.0053	0.0038
<i>Inflation</i>	0.0133	0.0033	0.0133	-0.0038
<i>HHI</i>	0.0174	0.0632	0.0682*	0.0517*
<i>GDP growth</i>	-0.0538***	-0.0345*	-0.0149	-0.0453**
<i>Activity dummy</i>	Yes	Yes	Yes	Yes
<i>Region dummy</i>	Yes	Yes	Yes	Yes
<i>Year dummy</i>	Yes	Yes	Yes	Yes
m1	-6.38	-6.41	-5.34	-5.17
m2	0.33	0.35	0.18	-0.18
Hansen	86.94(79)	71.58(72)	74.74(82)	87.93(97)
Observations	1,271	1,271	1,271	1,271
Number of firms	120	120	120	120

Note(s): This table presents the determinants of the *Insolvency risk* for 120 North American, Canadian, Bermuda, and European insurance issuers from 2011 to 2022 using the system-GMM estimation. *Insolvency risk* is the neperian logarithm of Z-score multiplied by minus one; *ESG controversies* is ESG controversies score from Eikon multiplied by minus one; *ESG practices* is the ESG Score from Eikon; *Reinsurance* is the ratio of reinsurance premiums paid to total premiums earned; *Premium growth* is the annual growth of total premiums. *Equity growth* is the annual growth of total equity; *Leverage* is the debt to equity ratio; *Firm size* is the logarithm of total assets; *Inflation* is the annual inflation rate; *HHI* is the Herfindahl–Hirschman index calculated as the sum of the squares of all insurance companies' market share in terms of premiums written, and *GDP growth* is the annual real GDP growth rate. Significance levels are indicated as follows ***, **, and *: significant at the 1, 5, and 10 percent level. m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as $N(0,1)$ under the null hypothesis of no serial correlation. Hansen is a test of the overidentifying restrictions, asymptotically distributed as χ^2 under the null hypothesis of no correlation between the instruments and the error term, with degrees of freedom in parentheses

Source(s): Table by authors

Table 3. GMM estimations of the effect of *ESG controversies* on insurers' *insolvency risk* (distance to default in logarithms)

($\beta = 0.0086$; $p < 0.1$), and 4 ($\beta = 0.0120$; $p < 0.01$) highlight ESG controversies' positive and significant influence on insurers' insolvency risk, thus confirming [Hypothesis 1](#). As our dependent variable is log-transformed, the estimated coefficients can be interpreted as the expected proportional change in the response variable per unit change in the explanatory variable. Further, the response variable is $-\ln(\text{Z-score})$, and the explanatory variable (*ESG controversies*) is (-1) times the ESG controversies score—ranging from -100 to 0 units. Hence a one-unit increase in ESG controversies approximately decreases the expected value of the Z-score by 1.02%, 0.86%, and 1.21% in Models 2, 3, and 4, respectively. That is, each additional unit increase in ESG controversies reduces the Z-score by approximately 0.86–1.21%, depending on the estimated model, which increases insolvency risk.

[Hypothesis 2](#) posits that *ESG practices* exhibit a moderating effect on the relationship between *ESG controversies* and *Insolvency*. The negative beta coefficients of *ESG practices* in Models 3 ($\beta = -0.0169$; $p < 0.01$) and 4 ($\beta = -0.0192$; $p < 0.05$) indicate that each additional unit increase in *ESG practices* increased the Z-score by 1.67% (Model 3) and 1.90% (Model 4). Furthermore, the results obtained for the interaction term in Model 4 were negative and significant ($\beta = -0.0002$, $p < 0.1$).

To understand this result better, we calculated the marginal effects for values that were one standard deviation above or below the average sample value of *ESG practices*. We observe that for values one standard deviation below the sample average of *ESG practices* (29.5), a one-unit increase in the -100 to 0 scale of ESG controversies produces a 0.61% decrease in the Z-score. Following the same procedure, for values of one standard deviation above the sample average of ESG practices (63.7), a one-unit increase in *ESG controversies* precipitates a 0.07% decrease in the Z-score. Consequently, we observe a considerable moderating effect of *ESG practices* that reduces the impact of and an increase in *ESG controversies*. That is, *ESG practices* mitigate the detrimental impact of *ESG controversies* on *Insolvency risk*, thus supporting [Hypothesis 2](#).

To illustrate these significant two-way interactions, we used STATA's margins commands ([Williams, 2012](#)) and created a plot. [Figure 1](#) plots the moderating effect of *ESG practices* on the positive relationship between *ESG controversies* and *Insolvency risk*, illustrating how *ESG practices* increase the aforementioned positive association between *ESG controversies* and *Insolvency risk*.

In conclusion, *ESG practices* are instrumental in enhancing reputation, subsequently gaining financial soundness and reducing insolvency risk. The explanatory variables' joint significance test revealed that the variables significantly differed from 0 across all models. We estimated all the models with robust standard errors to account for heteroscedasticity.

4.2 Robustness checks

We performed additional analyses to verify the baseline hypothesis' robustness across different model specifications. First, we changed the dependent variable using the standard deviation (volatility) of ROA, ROE ([Al-Amri et al., 2021](#)), and the beta of the share. We replicated the analyses and found that the results ([Table 4](#)) did not differ from those presented earlier in this paper, thus supporting our analyses' robustness [[2](#)].

Second, to capture ESG effect nuances, that is, where one dimension may offset another ([Brammer et al., 2009](#); [Margolis et al., 2009](#)), we analysed ESG practices across three components—namely, environmental, social, and governance—as illustrated in Models 8–10 in [Table 5](#). In all cases, we observe how each individual subcomponent positively impacted insurers' insolvency risk and exhibited a significant moderating effect on the relationship between *ESG controversies* and *Insolvency risk*. Again, we estimated the marginal effects of the values of the ESG pillars one standard deviation above or below their average. For the environmental pillar, which ranges from 5.88 to 58.18, the moderation effect reduces the negative proportional effect of *ESG controversies* on the Z-score from -1.47% to

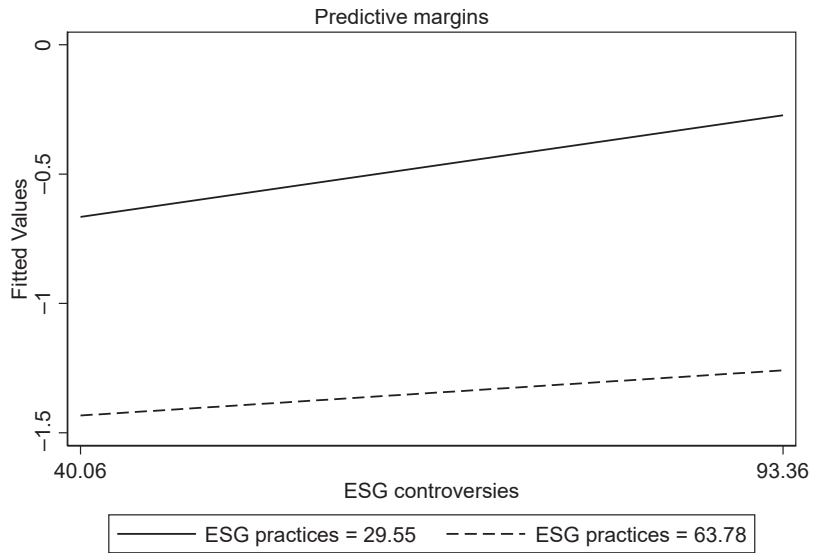


Figure 1.
The moderating effect
of *ESG practices* on
insurer *Insolvency risk*

Source(s): Figure by authors

−0.42%. For the social pillar, which ranges from 22.57 to 60.83, the negative effect decreases from −1.19% to −0.42%. Finally, for the governance pillar, which ranges from 32.68 to 71.08, we noted the strongest effect—specifically, a change from −0.71% to 0.44%.

Again, we plotted these marginal effects with STATA's margins commands for the Z-scores in [Figures 2 \(E\)](#), [3 \(S\)](#), and [4 \(G\)](#). Although environmental and social practices significantly alleviated ESG controversies' harmful effects on Insolvency risk, they did not fully compensate for the overall effect. By contrast, governance practices exerted a stronger effect by changing the relationship sign.

Additionally, we performed supplementary analyses on [Table 5](#), replacing the Z-score with the volatility of ROA (Models 11–13), volatility of ROE (Models 14–16), and equity beta (Models 17–19). Each ESG pillar was found to ameliorate the controversies' effect on insurers' risk.

Subsequently, to address sample selection concerns, we use propensity score matching (PSM; [Rosenbaum and Rubin, 1983](#)) to examine the changes in insolvency risk caused by ESG controversies affecting insurer reputations. We divided our sample into groups with high and low ESG controversy scores using a dummy variable that assumes the value of 1 for companies with a score below 50 and 0 otherwise (subpar performance; [Refinitiv Eikon, 2022](#)), representing insurers with negative media coverage. To create a control group of firms with high ESG controversy scores, we estimated a probit model that predicts the probability of obtaining a low ESG controversy score. The model includes a dummy variable indicator (*DummyESG_C*) for firms with low ESG controversy scores, controlling for other factors that may influence this probability.

$$\begin{aligned} DummyESG_C_{it} &= 1 \text{ if } \sigma + x_{it} - 1\rho + dt + \epsilon_{it} > 0 \\ &= 0 \text{ if } \sigma + x_{it} - 1\rho + dt + \epsilon_{it} \leq 0 \end{aligned} \quad (4)$$

where:

DummyESG_C_{it} – dummy variable that assumes the value of 1 if the firm has an ESG controversy score below the mean value (58.257) and 0 otherwise;

Variables	Model 5: ROA volatility	Model 6: ROE volatility	Model 7: BETA
<i>ROA volatility</i> _{t-1}	0.6470***		
<i>ROE volatility</i> _{t-1}		0.7010***	
<i>BETA</i> _{t-1}			0.8303***
<i>ESG controversies</i> _{t-1}	0.0080**	0.0438**	0.0024***
<i>Reinsurance</i> _{t-1}	-0.3861	-2.3125	-0.0998
<i>Premium growth</i> _{t-1}	-0.2418	-0.8909	0.0616
<i>Equity growth</i> _{t-1}	0.2079	6.3699	0.1476
<i>Leverage</i> _{t-1}	0.0042	-0.0196	-0.0007
<i>Firm size</i> _{t-1}	-0.2595**	0.2130***	0.0151
<i>Inflation</i>	0.1047	-0.6562***	0.0007
<i>HHI</i>	0.0457	0.0964	0.0128
<i>GDP growth</i>	-0.0024	-0.1952	0.0021
<i>Activity dummy</i>	Yes	Yes	Yes
<i>Region dummy</i>	Yes	Yes	Yes
<i>Year dummy</i>	Yes	Yes	Yes
m1	-3.04	-3.04	-5.20
m2	-1.23	-1.24	0.93
Hansen	98.27(91)	85.35(70)	100.94(88)
Observations	1,271	1,271	1,271
Number of firms	120	120	120

Note(s): This table presents the determinants of the Volatility of the ROA, Volatility of the ROE and the Beta of the share for 120 North American, Canadian, Bermuda, and European insurance issuers from 2011 to 2022 using the system-GMM estimation.; *ESG controversies* is ESG controversies score from Eikon multiplied by minus one; *Reinsurance* is the ratio of reinsurance premiums paid to total premiums earned; *Premium growth* is the annual growth of total premiums. *Equity growth* is the annual growth of total equity; *Leverage* is the debt to equity ratio; *Firm size* is the logarithm of total assets; *Inflation* is the annual inflation rate; *HHI* is the Herfindahl-Hirschman index calculated as the sum of the squares of all insurance companies' market share in terms of premiums written, and *GDP growth* is the annual real GDP growth rate. Significance levels are indicated as follows ***, **, and *: significant at the 1, 5, and 10 percent level. m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as $N(0,1)$ under the null hypothesis of no serial correlation. Hansen is a test of the overidentifying restrictions, asymptotically distributed as χ^2 under the null hypothesis of no correlation between the instruments and the error term, with degrees of freedom in parentheses

Source(s): Table by authors

Table 4.
Robustness checks:
change in the
dependent variable

x_{it-1} – vector of firm characteristics;

dt – denotes time dummies; and

ϵ_{it} – error term, which we assume is normally distributed with variance σ_z^2 .

We employed cluster-robust standard errors in all regressions.

The marginal effects analysis (refer to [Appendix 5](#)) revealed that larger firms and those located in more industry-concentrated countries were more likely to present high ESG controversy. Conversely, better-capitalised firms with a higher premiums growth ratio and those in countries with higher GDP growth rates were less likely to face such controversies. In summary, substantial differences were observed between the treatment and control groups, which could have implications for insolvency risk.

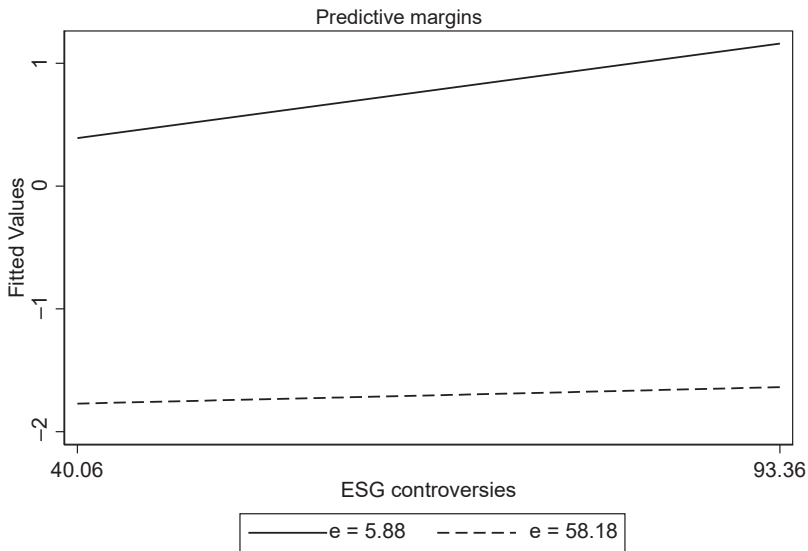
Utilising the `psmatch2` command, we employed caliper matching without replacement using a one percent caliper to construct the counterfactual group ([Leuven and Sianesi, 2003](#)). Subsequently, we compared matched insurers with high and low ESG controversy scores to assess their insolvency risk. We observed no significant mean differences between the matched treatment and control firms, indicating that the treatment and control groups

Table 5.
Robustness checks: E/
S/G moderation effects
on insolvency risk

Dependent variable Variables	Z-Score			Volatility of ROA			Volatility of ROE			BETA		
	Model 8: E	Model 9: S	Model 10: G	Model 11: E	Model 12: S	Model 13: G	Model 14: E	Model 15: S	Model 16: G	Model 17: E	Model 18: S	Model 19: G
<i>Insolvency risk</i> _{<i>t-1</i>}	0.3530**	0.4357***	0.4824***	0.7093***	0.7830***	0.7652***	0.7041***	0.6867***	0.7215***	0.8071***	0.8244***	0.8165***
<i>ESG controversies</i> _{<i>t-1</i>}	0.01584**	0.0164**	0.0169*	0.0172**	0.0250**	0.0104*	0.0438**	0.0678*	0.0823**	0.0035**	0.0062**	0.0095***
<i>E score</i> _{<i>t-1</i>}	-0.0322*			-0.0322**			-0.1138**			-0.0035*		
<i>S score</i> _{<i>t-1</i>}		-0.0278*			-0.0396**			-0.1329**			-0.0056*	
<i>G score</i> _{<i>t-1</i>}			-0.0220**			-0.0099*			-0.2118***			-0.0048*
<i>ESG controversies</i> _{<i>t-1</i>} * <i>E score</i> _{<i>t-1</i>}	-0.0002*			-0.00015*			-0.0006*			-0.0000*		
<i>ESG controversies</i> _{<i>t-1</i>} * <i>S score</i> _{<i>t-1</i>}		-0.0002*			-0.0002*			-0.0011*			-0.0001**	
<i>ESG controversies</i> _{<i>t-1</i>} * <i>G score</i> _{<i>t-1</i>}			-0.0003**			-0.00015*			-0.0017***			-0.0001**
<i>Reinsurance</i> _{<i>t-1</i>}	2.4954**	1.1797	0.8883	-2.2173	-0.3485	-1.6176	-6.5734	-9.0052**	-5.4872	0.1738	-0.0073	-0.0487
<i>Premium growth</i> _{<i>t-1</i>}	0.1503	0.3829	0.0633	0.2710	-0.6212	-0.2561	0.0793	0.7240	-1.1399	0.0695	0.0775	0.0631
<i>Equity growth</i> _{<i>t-1</i>}	-1.0514	-1.3198*	-0.6513	-0.5758	-0.1359	-0.4167	6.7904	6.4085	8.2149	0.1672	0.0624	0.1402
<i>Leverage</i> _{<i>t-1</i>}	0.0261	-0.0007	-0.0109	-0.0139	0.0167	0.0078	0.0291	0.0135	-0.0022	0.0048*	0.0047***	0.0035
<i>Firm size</i> _{<i>t-1</i>}	-0.1132	0.0318	0.0211	-0.0776	-0.2216*	-0.1629**	0.7238	0.4241***	0.6556***	0.0144**	0.0106	0.0307***
<i>Inflation</i>	0.0261	0.0212	0.0202	0.1025	0.0614	0.0654	-0.6084***	-0.6120***	-0.7505***	0.0230*	0.0014	0.0053
<i>HHI</i>	0.0371	0.0377	0.0210	0.0082	0.1086*	0.0194	0.0824	-0.0203	-0.2346	-0.0041	0.0246*	0.0335**
<i>GDP growth</i>	-0.0384**	-0.0659***	-0.0662***	-0.0156	0.0712	-0.0182*	-0.1846***	-0.5430	-0.6126	0.0084***	0.0285***	0.0428**
<i>Sector dummy</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Region dummy</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year dummy</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m1	-3.48	-4.58	-6.81	-3.24	-3.45	-3.18	-3.09	-3.06	-3.17	-5.15	-5.54	-5.67
m2	-0.03	0.37	-0.02	-1.28	-1.12	-1.16	-1.25	-1.27	-1.21	0.69	0.77	0.51
Hansen	35.60(47)	50.15(60)	86.43(84)	73.55(75)	95.22(89)	97.23(128)	98.90(97)	106.97(104)	94.98(98)	104.31(93)	93.12(83)	65.13(60)
Observations	1,271	1,271	1,271	1,271	1,271	1,271	1,271	1,271	1,271	1,271	1,271	1,271
Firms	120	120	120	120	120	120	120	120	120	120	120	120

Note(s): This table presents the determinants of *Insolvency risk* with four different measures (z-score, volatility of ROA, volatility of ROE and BETA) for 120 North American, Canadian, Bermuda, and European insurance issuers from 2011 to 2022 using the system-GMM estimation. *Insolvency risk* is the neperian logarithm of Z-score multiplied by minus one; *ESG controversies* is ESG controversies score from Eikon multiplied by minus one; *E Score* is the Environmental Pillar Score from Eikon; *S Score* is the Social Pillar Score from Eikon; *G Score* is the Governance Pillar Score from Eikon; *Reinsurance* is the ratio of reinsurance premiums paid to total premiums earned; *Premium growth* is the annual growth of total premiums. *Equity growth* is the annual growth of total equity; *Leverage* is the debt to equity ratio; *Firm size* is the logarithm of total assets; *Inflation* is the annual inflation rate; *HHI* is the Herfindahl–Hirschman index calculated as the sum of the squares of all insurance companies' market share in terms of premiums written, and *GDP growth* is the annual real GDP growth rate. Significance levels are indicated as follows ***, **, and *: significant at the 1, 5, and 10 percent level. m_i is a serial correlation test of order *i* using residuals in first differences, asymptotically distributed as N(0,1) under the null hypothesis of no serial correlation. Hansen is a test of the overidentifying restrictions, asymptotically distributed as χ^2 under the null hypothesis of no correlation between the instruments and the error term, with degrees of freedom in parentheses

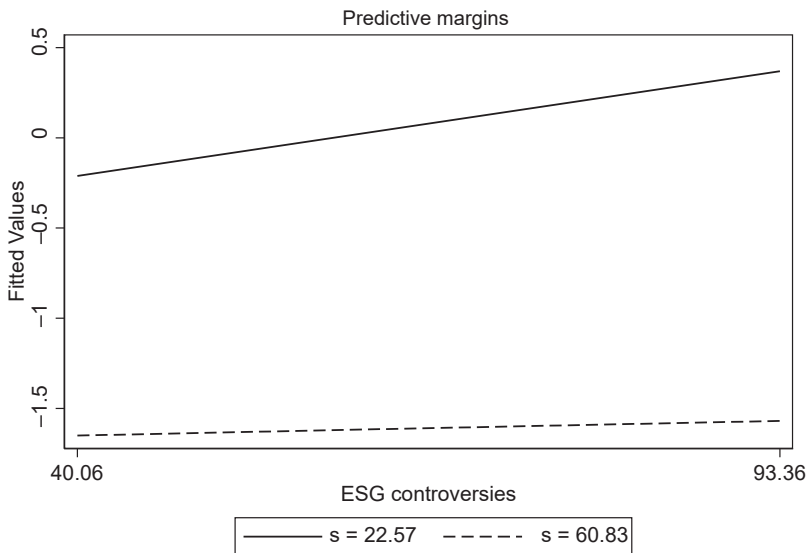
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Management
Decision

Figure 2.
The moderating effect
of *E score* on insurer
Insolvency risk



Source(s): Figure by authors

Figure 3.
The moderating effect
of *S score* on insurer
Insolvency risk

exhibited comparable observable characteristics. [Appendix 6](#) presents the test results of the balancing hypothesis for the treated and control groups. Moreover, we observed a significant average treatment effect for the treated group (ATT) of 0.413 ($p < 0.01$), implying that insurance companies experiencing negative global media news or events experience a significant adverse effect on their insolvency risk. These consistent findings strongly

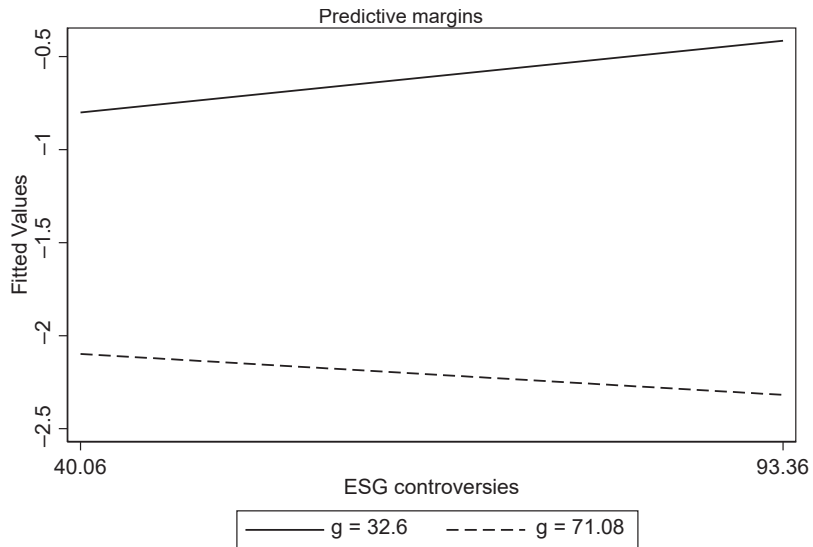


Figure 4.
The moderating effect
of *G score* on insurer
Insolvency risk

Source(s): Figure by authors

support [Hypothesis 1](#), which states that ESG controversies detrimentally impact insurers' insolvency risk.

As US insurance firms constitute over 50% of the entire dataset, another robustness test excluding US insurers was conducted to mitigate potential statistical biases and enable a more accurate assessment of specific dynamics outside the USA. In the initial sample, the number of observations fell to 516 from 2011 to 2022, of which 21 were from the Americas and 22 were from Europe. Again, the results supported the initial conclusions (see [Appendix 7](#)). The estimation generated positive ESG controversy signs and negative ones for ESG practices, whereas the moderation was also negative and significant.

Finally, another noteworthy issue was the ratification of the Paris Agreement, whereby 193 countries agreed to combat climate change by capping the rise in global temperature to "well below 2 °C", with a concerted push to limit the increase to 1.5 °C above pre-industrial levels. Against this backdrop, financial institutions play a crucial role in reducing funding for environmentally hazardous projects ([Galletta and Mazzù, 2023](#)). The insurance sector plays a significant role in responsible portfolio investments and meticulous risk-coverage underwriting. Nevertheless, regulations are unevenly developed worldwide, and Europe is the leader in terms of political implementation. The main issue in this evolution was the USA's disengagement between 2017 and January 2021, after which Joe Biden assumed the presidency. To measure this regulation's effectiveness, our approach follows standard practice and combines matching with difference-in-differences (DID; [García-Vega et al., 2019](#); [García-Vega and Vicente-Chirivella, 2020](#); [Redding and Sturm, 2008](#)). The DID method enables us to follow changes in ESG controversy levels between the pre- and post-Paris Agreement periods, comparing insurers in Europe and the Americas (Paris Agreement zone or treatment group) with US insurers (control group). Owing to the risk of non-random sample selection in such a comparison between the treatment and control groups, we used matching to select pairs of firms with similar observable characteristics and pretreatment trends before the Paris Agreement. To consider the inference of causal effects as valid, assuming that the potential outcomes of interest for treated and non-treated firms are

independent is essential, considering the observable characteristics relevant to ESG controversies' presence. We limited the sample period to 2020 to better adjust the Paris Agreement's implication and avoid the shocks of both the COVID-19 Pandemic and Russia's invasion of Ukraine (which predominantly affected Europe). Moreover, we employed heteroskedasticity-robust standard errors and adjusted for clustering based on region. Our results (refer to [Appendixes 8 and 9](#)) revealed a lower amount of *ESG controversies* after the Paris Agreement's ratification in the treatment group, generating significant effects for non-US insurers after applying the DID method ($\beta = 10.104$; 0 p -value<0.05).

5. Discussion

Previous studies have analysed ESG controversies' effects on performance in general ([Aouadi and Marsat, 2018](#); [Li et al., 2019](#)) and on financial risk in other sectors, such as oil and gas firms ([Shakil, 2021](#)) or banking ([Galletta and Mazzù, 2023](#)). Drawing on legitimacy ([Suchman, 1995](#)) and stakeholder theories ([Freeman, 1999](#); [Freeman et al., 2004](#)), we analyse the effects of ESG controversies on insurers' insolvency risk using an international sample of insurance companies. Our analysis supported our main hypothesis that ESG controversies positively impact insurers' insolvency risk. Furthermore, the results corroborated the main hypothesis for standard ROE and ROA deviations and share beta as alternative risk measures. These findings are consistent with those of previous research that found that banks' reputational risk are significantly affected by irresponsible behaviours or controversies (see [Galletta and Mazzù, 2023](#); [Iannuzzi et al., 2023](#); [Agnese et al., 2023](#); [Ruiz et al., 2014](#)). Drawing upon legitimacy and stakeholder theories, our findings support those of [Shakil \(2021\)](#) that states ESG controversies can result in negative stakeholder perceptions, ultimately diminishing credibility ([Godfrey et al., 2009](#)) and increasing insolvency risk ([Galletta and Mazzù, 2023](#); [Kölbel et al., 2017](#)). However, this result contrasts with that of [Lee and Isa \(2024\)](#), who excluded financial companies from their sample. They discovered that medium to low levels of ESG controversies have no effect on firm performance. These findings suggest that the financial sector is particularly sensitive to the ESG controversy.

Second, we analysed ESG practices' moderating effect on the relationship between ESG controversies and insurers' insolvency risk, and found that when a company invests in ESG practices, insolvency risk is less affected by ESG controversies. Our study extends the notion that ESG practices directly benefit financial performance ([Brogi and Lagasio, 2019](#); [Chen and Xie, 2022](#); [Fatemi et al., 2018](#); [Gangi et al., 2020](#); [Simpson and Kohers, 2002](#)) by proposing a moderating effect between ESG controversies and insolvency risk. This indicates that stakeholders closely monitor insurance companies' adherence to ESG commitments and perceive negative ESG news differently based on a company's ESG practices. These results are consistent with the ongoing debate on the significant impact of ESG practices on company value and risk, as discussed by [Di Tommaso and Thornton \(2020\)](#) and [Shanaev and Ghimire \(2022\)](#). Additionally, in line with those of [Kang et al. \(2016\)](#), [Kotchen and Moon \(2012\)](#), and [Nirino et al. \(2021\)](#), our findings support the notion that firms can leverage positive ESG scores to mitigate the adverse effects of ESG controversies on financial risk. Furthermore, in the financial sector, our results corroborate prior studies highlighting banks' adoption of ESG practices to enhance their reputation and financial stability ([Carè et al., 2024](#); [Mango et al., 2023](#); [Murè et al., 2021](#)). These assertions align with the stakeholder and legitimacy theories. Essentially, integrating ESG practices may bolster insurers' financial stability by fostering positive stakeholder relationships, leading to increased support for these companies.

We further analyse the ESG effect nuances. We observe that while the E (environmental) and S (social) factors maintain their consistent moderating effect (i.e. attenuate the positive relationship between ESG controversies and insolvency risk), the G (government) factor simultaneously moderates and reverses this relationship. Furthermore, it exerts the

strongest moderating effect on this relationship. This implies that robust corporate governance mechanisms are associated with greater mitigation of insurers' insolvency risk. This aligns with [Elamer and Boulhaga's \(2024\)](#) results, which highlight the moderating and transformative potential of robust corporate governance structures in addressing ESG controversies. These structures can mitigate adverse impacts and leverage them as opportunities for growth and reputation enhancement. Within the banking sector, we align with [Agnese *et al.*'s \(2023\)](#) study that highlight the key role of sustainable corporate governance; the governance score reduces exposure to ESG controversies and disputes in global media. Similarly, [Kiesel and Lücke \(2019\)](#) observe a significant impact of ESG performance on credit default swap spreads around the rating announcement date, with corporate governance playing a pivotal role. Our results align with [Aevoae *et al.* \(2023\)](#), indicating a positive correlation between the governance pillar and bank soundness. [Chiaromonte *et al.* \(2022\)](#) demonstrate that enhanced corporate governance bolsters the stability of European banks during financial distress. However, [Chiaromonte *et al.* \(2020\)](#) find no such correlation in their study on American insurers, attributing this to heightened regulatory scrutiny during their analysis period (2006–2018). Overall, the literature suggests that within the financial sector, ESG-oriented governance is a reliable indicator of sustained dedication to ESG principles, which, in turn, amplify the positive demand effects stemming from socially conscious policyholders, thereby mitigating firms' insolvency risk ([Becchetti *et al.*, 2014](#); [Kopel and Brand, 2012](#); [Lambertini and Tampieri, 2015](#); [Manasakis *et al.*, 2014](#)).

6. Conclusions

Insurance companies, a part of the financial system, are becoming increasingly vulnerable to ESG. They play a key role in the society's transition to a low-carbon economy through investment and underwriting activities ([Fitch ratings, 2023](#)). Moreover, these companies incur significant solvency risk as they determine their capacity to meet future claims or income for their clients ([Moalla and Dammak, 2023](#)). Despite their growing significance, few studies have analysed the effects of ESG controversies on solvency. This study fills this gap by answering the following research questions: do ESG controversies affect insurance companies' insolvency risk? How do ESG practices affect the relationship between ESG controversies and insurers' insolvency risk?

We employed a sample of 120 publicly traded insurance companies from the US, Europe, and the Americas, compiled an unbalanced panel of 1,428 firm-year observations, and applied the system GMM to answer these questions. Per this study's findings, ESG controversies positively influence insurers' insolvency risk, although ESG practices exert a mitigating effect, and governance (G) practices play a key role in counteracting ESG controversies' effects on insurance companies' insolvency risks.

6.1 Implications for theory

This study's theoretical contributions are as follows: first, it contributes to legitimacy theory by shedding light on ESG controversies' negative impact on corporate reputational damage and insolvency risk in the insurance sector. Contrary to findings in other sectors ([Lee and Isa, 2024](#)), recent research highlights the financial industry's unique sensitivity to ESG issues ([Chaudhry *et al.*, 2023](#)) and reputational risks ([Wang *et al.*, 2003](#)). [Carè *et al.* \(2024\)](#) underscore a growing trend linking reputation and sustainability-related risks. The findings strongly posit that recognising this sensitivity is crucial for insurance companies to devise effective control mechanisms against such risks.

Second, this study's findings support stakeholder theory by demonstrating the significant impact of ESG practices on reducing insolvency risk. Our results confirm the risk-mitigation view derived from stakeholder theory, suggesting that ESG practices exert

insurance-like protection towards stakeholders (Godfrey, 2005; Godfrey *et al.*, 2009). Additionally, we suggest that sustainable practices that fulfil stakeholders' expectations can enhance corporate reputation (Sen and Bhattacharya, 2001; De Quevedo-Puente *et al.*, 2007; Hur *et al.*, 2014).

Third, our study contributes to the literature by focusing on the association between ESG and corporate governance (Agnese *et al.*, 2023; Iannuzzi *et al.*, 2023; Wu *et al.*, 2023). Therefore, ESG practice scores are divided into subcomponents to examine their effects on insolvency risk (Lee and Isa, 2024; Chiaramonte *et al.*, 2020, 2022). We find that environmental and social scores moderate the positive ESG controversy-insolvency risk interaction, while the governance score counters this pre-existing relationship. Few previous works have corroborated that corporate governance scores have a stronger effect on financial risk (MSCI Inc, 2022; Switzer *et al.*, 2018) and market risk (Komath *et al.*, 2023; Wu *et al.*, 2023), but evidence in this regard—specifically for the insurance sector—is limited. One possible interpretation of this result is that corporate governance, which promotes sustainability (i.e. transparency, CSR strategy, diversity, and independence), may outweigh ESG controversies' negative effects on companies' reputations and insolvency risk. On the one hand, sustainable corporate governance signals to stakeholders that the insurance company is aware of current ESG-related regulations and effectively complies with them. Additionally, sustainable corporate governance plays a key role in monitoring ESG reports' preparation and disclosure. This ensures that reports are accurate, complete, and understandable to maintain the confidence of investors and other stakeholders. Finally, while ESG controversies significantly impact the insurance industry because of the nature of their activities (risks such as natural disasters, climate change, and claims related to social responsibility), an effective board of directors—whose role is to guide the company's strategy—would develop specific policies and guidelines related to these ESG issues. These policies may address issues such as responsible investments, environmental and social risk management, and ethical business practices.

6.2 Implications for practice

The findings of this study have significant practical implications and provide actionable insights that can effectively bridge theoretical knowledge with real-world applications. First, insurer managers should be aware of the sensitivity these firms exhibit to controversy and its negative implications for financial stability. Underwriting and investment activities result to insurer returns.

When performing underwriting activities, insurers are prone to controversies related to policyholders' concerns regarding risk coverage and claim management. Mitigating such controversies requires managers to adopt transparent communication policies. Given the complex nature of insurance contracts, managers should pay special attention to ensuring that policy wording is clear and understandable to average policyholders. Therefore, insurers should “ensure that product and service coverage and benefits and costs are relevant and clearly explained and understood” (UNEP Finance Initiative, 2012, p. 4). Regarding claims management, insurers should “quickly, fairly, sensitively, and transparently respond to clients at all times and make sure claims processes are clearly explained and understood” (UNEP Finance Initiative, 2012, p. 4). This would help to avoid misunderstandings that erode the relationship between the insurer and policyholder. Insurers also face a significant challenge in maintaining a balance between protecting policyholders from fraudulent claims and ensuring fair and timely compensation for legitimate claimants. Thus, artificial intelligence (AI) and generative AI can be useful for effectively identifying false claims.

Another important concern is policyholders' private data processing. Recent results from a survey of 128 insurance CEOs conducted by KPMG (2023b) reveal that cybercrime and

cyber insecurity are among the topmost concerns. Considering this, insurance managers should prioritise strict cybersecurity protocols throughout the organisation and implement measures to prevent employees' data processing misbehaviour (e.g. training programs on data protection). Insurers can also use newly available ESG data to enhance their pricing algorithms and risk assessments.

Insurers play an important role as investors in financial markets. Thus, insurer managers could design methodologies to adequately assess ESG risks and opportunities in their investments, such as creating their own ESG rating scorecard for investment selection, along with ESG training and dedicated subject-matter experts. Additionally, as suggested by the PSI ([UNEP Finance Initiative, 2012](#)), managers should also consider joining the Principles for Responsible Investment ([United Nations, 2006](#)).

Our findings also imply the key role played by insurance companies in corporate governance, in which the main body of governance is the board of directors. Boards are responsible both for manager monitoring and ensuring the sustainability of a firm's strategy. Recent regulations (such as the SFDR in Europe and the SEC's climate disclosure rule in the United States) require companies to disclose the adverse sustainable impacts of their strategic decisions. The key focus is positioning ESG as a driver for value creation and insolvency risk mitigation. The quality and effectiveness of a board and its good risk management are fundamental to the stability of an organisation. Thus, the board must have an appropriate configuration to effectively perform its functions. Directors with specialised knowledge of the insurance sector and finance and expertise in sustainable management are also essential. In addition, having robust frameworks, reporting, and controls in place is necessary. As suggested by [Lee and Isa \(2024\)](#) and [Sanchez-Planelles *et al.* \(2022\)](#), companies should establish risk and compliance committees to mitigate ESG risks. Companies should also clearly define their responsibilities and the process and frequency of informing the board about ESG issues.

In summary, insurance managers should implement ESG practices and integrate ESG risks into their operations and investment decisions to mitigate risks and seize opportunities for long-term growth and financial stability.

6.3 Limitations and future research

This study has some limitations. Our sample was restricted to insurers with available ESG and ESG controversy scores. Therefore, only listed stock insurers were included, which limited the number of observations. Importantly, although mutual insurers constitute a significant part of the insurance industry, they were excluded due to restrictions on data availability. Specifically, in 2021, mutual insurance accounted for 26.2% of the global insurance industry's market share ([International Cooperative and Mutual Insurance Federation, 2023](#)). Unlike stock insurers, ensuring a mutual firm makes the policyholder the company owner. Additionally, unlike stock insurers, whose primary purpose is to create value for their shareholders, the main goal of mutuals is to satisfy policyholders' needs. Thus, the particularities of mutual firms offer an interesting insight into how ESG controversies affect their financial stability and how ESG practices impact them in comparison to listed stock insurers. The second limitation is the use of data from only one source (Refinitiv Eikon). Future research should diversify data sources (e.g. Vigeo-Eiris or Sustainalytics) to increase the robustness of the results. Furthermore, considering the rapidly evolving nature of ESG criteria and corporate governance practices, future studies should consider regulatory changes and emerging new data and frameworks. Additionally, this study explicitly focuses on Western insurance companies. Cultural differences between Western and Eastern countries may limit the generalisability of our findings to insurers worldwide.

This study paves the way for future research in several areas. Considering the insurance sector's susceptibility to ESG controversies, future studies could delve into the specific types

of sustainability controversies pertinent to this industry. Examining whether they are environmental, social, or governance controversies and exploring their consequences would provide a more comprehensive understanding of the legitimacy mechanisms relevant to stakeholders in the insurance industry. Moreover, given that the ESG controversy score comprises 23 individual indicators, a factor analysis to build three different indicators (environmental, social, and governance controversies) is a viable approach. Our findings suggest the need for an in-depth exploration of specific governance practices that can enhance stakeholder satisfaction and bolster a company's reputation. Future research could delve into specific corporate governance mechanisms relevant to insurance companies, which could potentially clarify the governance dynamics shaping the correlation between ESG controversies and an insurer's reputation, ultimately impacting insolvency risk. Finally, although our results underscore the significance of the G-score in managing the impact of ESG controversies on insolvency risk, the reasons for its heightened relevance to insurance companies remain unclear. Conducting a qualitative analysis to explore insurance managers' opinions and concerns would provide more accurate insights into these reasons and contribute to our understanding of this relationship.

Notes

1. We used profit before taxes to correct the effect of different tax rates across countries (Cummins *et al.*, 2017).
2. Regarding the different approaches to Z-score calculation, specifically when estimating the ROA standard deviation window, including the Z-score measure with the standard deviation or ROA over a three-year window allows for variations in the Z-score's denominator and prevents it from being driven exclusively by ROA changes and the equity to assets ratio (Pasiouras and Gaganis, 2013; Schaeck *et al.*, 2012). This approach is consistent with that followed in previous studies in the insurance sector (Al-Amri *et al.*, 2021; Cummins *et al.*, 2017; Gaganis and Pasiouras, 2013). Furthermore, Chiaramonte *et al.* (2016) provide evidence of the significant capacity of Z-score with the standard ROA deviation calculated over a three-year window as an effective predictor of bank failure. Nevertheless, to verify robustness, the models were estimated using Z-scores over two- and five-year rolling windows. Highly similar results were obtained, which are available from the authors upon request. Additionally, a sample of Spanish insurers (Moreno *et al.*, 2022) supports the adequacy of computing the standard ROA deviation over the full sample period. However, the results obtained using this measure was inconclusive for our sample.

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Appendix

The supplementary material for this article can be found online.

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