From green to red: How ESG controversies drive energy firms toward insolvency

Investigating the link between environmental, social and governance (ESG) controversies and insolvency risk in the energy sector through the lens of stakeholder theory

Master Thesis

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Abstract

This thesis explores how environmental, social, and governance (ESG) controversies influence insolvency risk in the energy sector and whether board-level governance moderates this relationship. Drawing on stakeholder theory, the study proposes that ESG controversies erode stakeholder trust and legitimacy, which are core resources of organizational resilience. By triggering reputational damage, they increase financial vulnerability. A dataset of publicly listed energy firms from 2011 to 2023 is analysed using OLS regression, with insolvency risk measured via the Altman Z"-score.

The findings reveal a statistically significant positive association between ESG controversies and insolvency risk, even when controlling for overall ESG performance. Although strong ESG performance is associated with reduced risk, it does not fully offset the effects of controversies. Board independence shows a small buffering effect, while board gender diversity has no significant moderating influence. Board size is consistently linked to higher insolvency risk.

This study contributes to stakeholder theory by demonstrating how stakeholder misalignment can translate into tangible financial consequences. It also offers the insight that governance mechanisms, while often assumed to reduce ESG risks, may carry more symbolic or regulatory value than practical influence.

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1. Introduction

In 2019, Pacific Gas and Electric Company (PG&E), one of California's largest utility providers, filed for "the first climate change bankruptcy" (Gilson & Abbott, 2020). Investigations linked PG&E's inadequate maintenance and governance practices to catastrophic wildfires, including the devastating 2018 Camp fire. The resulting environmental disaster generated liabilities exceeding $30 billion, forcing the company into bankruptcy. This case demonstrates how environmental, social and governance (ESG) controversies can critically impact financial stability, suggesting that firms may need to consider ESG risks in strategic and financial planning.

Environmental, Social, and Governance (ESG) refers to a firm's obligation to enhance social welfare and generate equitable, sustainable long-term value for stakeholders. ESG performance reflects a firm's overall commitment to these principles. In contrast, ESG controversies are negative incidents such as environmental violations, labour disputes, or governance scandals. Such controversies signal ESG failures and create reputational and financial risks. ESG-compliant firms typically demonstrate stronger governance and a stronger commitment to environmental and sustainable development goals (Wasiuzzaman & Wan Mohammad, 2020). The PG&E case illustrates how ESG failures can translate into severe financial consequences. Against this backdrop, the relationship between ESG controversies and insolvency risk (defined as the likelihood that a firm will be unable to meet its financial obligations) has become an increasingly relevant topic in corporate governance and financial stability discussions. While firms are often assessed based on their overall ESG performance, controversies related to ESG issues may serve as direct signals of mismanagement, ethical lapses, or operational weaknesses (Nirino et al., 2021; Elamer & Boulhaga, 2024; Gidage & Bhide, 2024; Giráldez-Puig et al., 2024).

Using a large U.S. sample, Boubaker et al. (2020) find that firms with poor CSR performance, often correlated with ESG controversies, face higher financial distress and limited credit access. This supports the view that ESG controversies reflect deeper weaknesses in governance and stakeholder alignment. ESG controversies can be seen as a proxy for poor corporate performance (De Franco, 2019; Nirino et al., 2021). This study builds on that insight by examining their direct effect on insolvency risk, while considering overall ESG performance as a control. Drawing on stakeholder theory, ESG controversies are viewed as disruptions to the trust and legitimacy firms hold with key stakeholders. These disruptions can result in reputational damage, provoke stakeholder withdrawal, and impose financial strain, ultimately increasing insolvency risk. In addition, this study explores how board characteristics, board gender diversity and board independence, influence the relationship between ESG controversies and insolvency risk.

As firms are increasingly expected to measure and disclose their ESG performance, research has highlighted the role of governance mechanisms, particularly board gender diversity and board independence, in strengthening ESG oversight and stakeholder engagement. This growing body of empirical evidence shows that gender-diverse boards are associated with more robust ESG disclosure, improved ethical oversight, and stronger stakeholder transparency (Lagasio & Cucari, 2019; Wasiuzzaman and Wan Mohammad 2020; Mehmood et al., 2023). These effects are especially pronounced when boards include at least three female members, suggesting a threshold effect in governance influence (Mehmood et al., 2023).

In parallel, independent boards have been shown to enhance accountability and provide more objective oversight, particularly during periods of reputational risk (Brinette et al., 2023; Elamer & Boulhaga, 2024). Firms with a higher proportion of independent directors are also more likely to engage in corporate social responsibility and respond proactively to ESG concerns (Beji et al., 2021; Harjoto & Jo, 2011). Board gender diversity and board independence function as governance mechanisms that support firms in managing the reputational consequences of ESG controversies by helping restore legitimacy and stakeholder trust. By promoting ethical oversight, accountability and credible stakeholder responses, these board structures are theorized to moderate how reputational damage translates into stakeholder withdrawal and financial strain.

While prior research has extensively examined the role of board characteristics in ESG disclosure (Adams & Ferreira, 2009; Bear et al., 2010; Lagasio & Cucari, 2019; Wasiuzzaman & Wan Mohammad, 2020; Mehmood et al., 2023) and the effect of ESG controversies on firm performance (Krüger, 2015; Aouadi & Marsat, 2018; Nirino et al., 2021; Elamer & Boulhaga, 2024; Giráldez-Puig et al., 2024), the interplay between these factors on insolvency risk remains underexplored. Given that ESG controversies can serve as a proxy for poor performance and therefore could affect insolvency risk, it is relevant to assess whether strong board structures, board gender diversity and board independence, can mitigate these risks to some degree. This requires examining whether such governance mechanisms help uphold legitimacy, ethical oversight, and stakeholder accountability, as understood through the lens of stakeholder theory.

This research addresses this gap by exploring these relationships, offering insights into how board compositions influence resilience against ESG-related financial instability. By doing so, the research provides a stakeholder-oriented perspective on the governance mechanisms that can help firms navigate ESG challenges while safeguarding long-term financial sustainability.

The energy sector, increasingly scrutinized for its ESG practices, serves as this study's empirical context. Accounting for two-thirds of global greenhouse gas emissions, energy firms are directly targeted by environmental regulations (Makridou et al., 2023). This makes the sector particularly vulnerable to ESG-related controversies and regulatory scrutiny, especially compared to less

environmentally exposed industries (Gidage & Bhide, 2024). From a stakeholder theory perspective, the energy sector is characterized by highly salient stakeholders, those with substantial power, legitimacy, and urgency (Mitchell et al., 1997). Regulators, investors and local communities exert considerable influence over firm behaviour. Energy companies are under pressure to uphold a "social license to operate," an implicit agreement in which societal backing is indispensable for the company's activities and its relationship with stakeholders (Moffat et al., 2016). As a result, ESG controversies in the energy sector not only invite regulatory penalties but also trigger investor divestment and consumer backlash, making financial recovery more difficult compared to less regulated industries. Consequently, stricter emission requirements and stakeholder expectations have led to greater financial scrutiny (Shakil, 2021; Song et al., 2024). Such financial strain could heighten insolvency risk, particularly when ESG controversies arise, as firms must simultaneously address regulatory penalties, reputational damage, and investor withdrawals. With research suggesting that firms prioritizing stakeholder engagement are better positioned to navigate ESG challenges and mitigate financial and reputational risks, this sector provides a compelling setting for this study (Eccles, Ioannou & Serafeim, 2014).

Understanding the relationship between ESG controversies and insolvency risk has practical implications for corporate decision-makers and stakeholders. For managers, the findings may underscore the importance of maintaining strong and transparent relationships with diverse stakeholder groups through proactive ESG risk management and thoughtful board compositions. For investors, the results may enhance risk assessment by accounting for how firms navigate ESG controversies and maintain credibility in the eyes of key stakeholders. Finally, for regulators and policymakers, the study offers insights into how governance structures, particularly board diversity and independence, can strengthen corporate accountability and help firms meet rising societal expectations in ESG-sensitive sectors like energy.

While ESG controversies have been studied in relation to firm performance, their direct impact on insolvency risk remains underexplored. Building on this foundation, this research seeks to address the following key questions.

Main Research Question:

How do ESG controversies influence insolvency risk in the energy sector, and to what extent do board gender diversity and board independence moderate this relationship from a stakeholder theory perspective?

Sub-Questions:

- What is the direct effect of ESG controversies on insolvency risk?
- How does overall ESG performance influence the relationship between ESG controversies and insolvency risk?

- How do board gender diversity and board independence moderate the relationship between ESG controversies and insolvency risk?

The sub-questions are implicitly answered in the discussion. To address the main question, this study conducts a quantitative analysis using data from publicly listed energy firms across the world. ESG controversy scores, board characteristics, financial indicators as well as ESG performance (as a control) are examined using regression models.

Outline

The remainder of this proposal is organized as follows. Section 2 presents the literature review, outlining stakeholder theory as the key framework, and reviewing relevant studies on ESG controversies, insolvency risk and corporate governance mechanisms. Section 3 details the methodology, describing sample selection, variable definitions, and the approach to testing the hypotheses. Section 4 presents the results of the statistical analysis, including tests of assumptions, regression outcomes, and robustness checks. Finally, section 5 discusses the main findings in light of stakeholder theory, elaborates on theoretical and managerial implications, addresses study limitations, and provides suggestions for future research.

2. Literature review

This study is grounded in stakeholder theory, which views firms as embedded in a network of relationships with various stakeholders, including investors, employees, customers, regulators, and the broader community. According to this perspective, a firm's long-term viability depends on maintaining legitimacy and sustaining trust-based relationships with these stakeholders (Freeman, 1984; Freeman, Harrison & Wicks, 2007). ESG controversies can damage a firm's reputation and stakeholder trust, leading to capital flight, regulatory penalties, and operational challenges (Goss & Roberts, 2011). As a result, firms facing such controversies may experience increased financial distress and a heightened risk of insolvency.

Stakeholder theory provides a comprehensive framework for understanding how firms interact with various stakeholders and balance competing interests (Elamer & Boulhaga, 2024), particularly in high-risk industries such as the energy sector (Gidage & Bhide, 2024). First introduced by Freeman (1984), the theory challenges the traditional shareholder model by emphasizing that business must create value for all stakeholders. This perspective has become increasingly relevant as firms face growing scrutiny over ESG practices (Shakil, 2021). ESG performance is often viewed as an indicator of sustainable business practices (Eccles et al., 2014). Board characteristics, such as gender diversity and independence, influence how firms manage stakeholder expectations and mitigate the fallout from these controversies. Diverse and independent boards may enhance firms' ability to manage ESG risks and stakeholder expectations (Adams & Ferreira, 2009; Bear et al., 2010). From a stakeholder theory perspective, such boards are better positioned to balance competing stakeholder interests, mitigate governance failures, and improve crisis response (Hillman et al., 2002). They can serve as a buffer against the negative effects of ESG controversies on financial stability by aligning firm behaviour with stakeholder expectations, especially under conditions of reputational risk. This study adopts a stakeholder-oriented lens to explore how governance structures may either amplify or attenuate the impact of ESG controversies on insolvency risk. Understanding how governance structures shape stakeholder expectations and organisational stability begins with clarifying the fundamental concepts of stakeholder theory.

2.1 Stakeholder Theory

Stakeholder theory is based on three premises, the normative, descriptive, and the instrumental view (Donaldson & Preston, 1995). The normative perspective asserts that firms have an ethical obligation to consider stakeholder interests beyond financial returns, emphasizing that stakeholders have intrinsic value and should be considered for their own sake rather than solely for their contribution to shareholder wealth. The descriptive perspective explains how firms interact with stakeholders in practice, recognizing that businesses operate within a complex network of relationships that influence decision-

making. The instrumental perspective links stakeholder management to better corporate performance, arguing that firms that actively engage with stakeholders tend to be more profitable (Donaldson & Preston, 1995; Hillman & Keim, 2001).

As business environments become increasingly complex and stakeholder expectations rise, stakeholder theory has gained prominence in ESG-related research. This is especially true in examining how firms navigate ESG pressures to balance stakeholder expectations and financial performance. Frynas & Yamahaki (2016) identified stakeholder theory as the most used theory in corporate social responsibility research. A meta-analysis by Whelan et al. (2021) found that most studies report a positive relationship between ESG and firm performance, although the findings vary across industries and methodologies. Friede, Busch and Bassen (2015) conducted a review analysing over 2,200 studies and concluded that approximately 90% report a non-negative relationship. The majority shows a positive link between ESG and corporate financial performance. They found this positive effect to be stable over time and across regions, asset classes, and methodologies. This reinforces the foundation for the business case of ESG integration. Nonetheless, while strong ESG performance can enhance financial outcomes, ESG controversies such as environmental violations, unethical labour practices and governance failures can trigger stakeholder backlash, capital divestment and regulatory scrutiny (Aouadi & Marsat, 2018; Shakil, 2021).

Stakeholder theory contributes to this research by offering three distinct yet complementary perspectives on ESG in the energy sector. From a normative perspective, firms operating in high-risk industries such as energy have an ethical obligation to proactively address ESG concerns in order to maintain stakeholder confidence (Elamer & Boulhaga, 2024). The descriptive perspective reflects how energy firms engage with regulators, investors, and communities to navigate ESG risk and meet regulatory expectations. Governance mechanisms, including board gender diversity and independence, are part of this engagement structure. Research suggests that female directors contribute to stronger risk oversight and promote ethical governance, potentially enhancing firms' ability to manage ESG-related risks (Brinette et al., 2023). Finally, the instrumental perspective provides a rationale for the view that firms managing ESG controversies through effective stakeholder engagement can improve financial stability and long-term sustainability. Empirical evidence shows that gender-diverse and independent boards can help reduce firm-specific risk and financial volatility, indicating that strong governance contributes to financial resilience (Chen et al., 2016).

2.2 ESG controversies and insolvency risk

ESG controversies, as introduced earlier, refer to critical ESG-related incidents that signal governance and ethical breakdowns. Aouadi and Marsat (2018, p. 1027) describe them as "corporate environmental, social and governance (ESG) news stories, such as suspicious social behaviour and product-harm scandals that place a firm under the media spotlight and, by extension, grab investors' attention". ESG

controversies erode stakeholder trust and legitimacy, triggering reputational damage and scrutiny. This can provoke stakeholder withdrawal through investor divestment, customer loss or regulatory penalties, leading to financial strain that heightens insolvency risk (Gidage & Bhide, 2024; Giráldez-Puig et al., 2024). When companies fail to meet stakeholder expectations, particularly on environmental and social issues, they risk damaging relationships with key stakeholders, including investors, regulators, and the public. This misalignment can foster perceptions of corporate hypocrisy, reduce credibility, and ultimately lead stakeholders to withdraw their support (Aouadi & Marsat, 2018; Shakil, 2021). The compounding effects of reputational damage, stakeholder disengagement, and financial strain place firms at greater risk of long-term instability and potential insolvency. From a stakeholder theory perspective, insolvency can be viewed not just as a financial outcome, but as the ultimate breakdown in stakeholder relationships, when trust, legitimacy, and access to critical resources are no longer sustained.

The body of research suggesting that firms involved in ESG controversies face heightened financial distress and a higher probability of insolvency is growing. For example, Giráldez-Puig et al. (2024) find a significant positive relationship between ESG controversies and insolvency risk in the insurance industry. Drawing on stakeholder theory, they argue that controversies erode stakeholder trust and corporate legitimacy, leading to financial strain and elevated default risk. Their findings underscore that ESG controversies are not just reputational events but material financial risks, especially in highly regulated, stakeholder-intensive industries. “Controversies have the potential to jeopardize a company’s reputation and in turn have a negative impact on company performance” (Nirino et al., 2021, p. 2). Krüger (2015) highlights that ESG controversies negatively impact market volatility because shareholders respond very negatively to negative ESG-related news, reinforcing the argument that ESG controversies contribute to financial instability through stakeholder reactions.

While ESG controversies generally have negative financial consequences (Gidage & Bhide, 2024; Giráldez-Puig et al., 2024; Nirino et al., 2021; Shakil, 2021), the role of ESG performance in this relationship is more nuanced. Strong ESG track records may foster stakeholder goodwill, enhance recovery capacity, and serve as a source of reputational and legitimacy capital (Brammer et al., 2019). In line with stakeholder theory, this reputational capital may buffer the financial consequences of controversies by buffering reputational damage and preventing stakeholder withdrawal. Poor ESG performers, in contrast, lack this protective effect and are more vulnerable to financial instability.

Some studies suggest that ESG performance can buffer reputational damage (Giráldez-Puig et al., 2024), others stress its preventive, not corrective, role (Nirino et al., 2021). Elamer & Boulhaga (2024) take the positive findings of ESG performance a step further. They suggest that ESG controversies can even present strategic opportunities for firms with strong ESG and governance structures. Their study finds that well-implemented ESG practices and governance mechanisms can transform ESG controversies into opportunities for reputational rebuilding and long-term financial stability. This challenges the assumption that ESG controversies only generate financial losses. Instead it highlights the importance

of investigating how actively managing stakeholder perceptions can influence ESG risks. This underscores the importance of examining not only the direct impact of ESG controversies but also how governance practices can activate reputational buffers and transform their effects, providing firms with strategic resilience. To isolate the effects of ESG controversies, ESG performance is included as a control variable.

Despite these insights, direct research linking ESG controversies to insolvency risk remains scarce. Most studies focus on short-term financial consequences such as market reactions (Krüger, 2015), cost of capital (Goss & Roberts, 2011), or firm value (Aouadi & Marsat, 2018). Giráldez-Puig et al. (2024) provide the only known study investigating the direct link within the insurance sector. However, whether this relationship holds across other industries remains unclear. This gap calls for further research into the financial risks of ESG controversies across multiple industries.

Building on stakeholder theory, ESG controversies can be seen as signals of stakeholder misalignment, which erode the trust and legitimacy upon which firm-stakeholder relationships depend (Freeman, 1984; Donaldson & Preston, 1995). When stakeholders perceive a breach of social or environmental expectations, this can result in reputational damage (Nirino et al., 2021), withdrawal of critical stakeholder support (Aouadi & Marsat, 2018), and reduced access to financial capital (Goss & Roberts, 2011). These dynamics increase operational and financial strain, exposing firms to heightened insolvency risk. This is especially true in ESG-sensitive sectors like energy, where stakeholders possess high salience due to their power, legitimacy and urgency (Mitchell et al., 1997; Shakil, 2021). This study addresses this theoretical mechanism by testing whether ESG controversies elevate insolvency risk in the energy sector. This establishes the basis for the first hypothesis:

Hypothesis 1. *ESG controversies are positively associated with insolvency risk in the energy sector, such that firms experiencing ESG controversies are more likely to face financial distress.*

2.3 Governance mechanisms

Effective corporate governance mechanisms play a central role in reducing financial distress by aligning managerial behaviour with the interests of stakeholders and promoting transparency, accountability, and risk oversight (Hunjra et al., 2024, Nguyen et al., 2024). Good governance mechanisms are widely recognized as essential for mitigating agency problems (Fama & Jensen, 1983), enhancing stakeholder trust (Donaldson & Preston, 1995), and improving firm resilience (Eccles et al., 2014). Eccles et al. (2014) find that firms with more robust sustainability governance systems invest more in environmental performance and are more attuned to stakeholder expectations.

Within this broader governance framework, board gender diversity and board independence are examined in this study as specific internal governance mechanisms that may moderate the impact of ESG controversies on insolvency risk. These two mechanisms are widely recognized for enhancing

board oversight, stakeholder alignment, and crisis accountability (Fama & Jensen, 1983; Post & Byron, 2015; Harjoto & Jo, 2011). These qualities are especially relevant in ESG sensitive contexts like the energy sector, where high stakeholder salience demands strong governance.

From a stakeholder theory perspective, firms need to balance the interests of various stakeholders, including investors, employees, regulators, and society, to maintain long-term financial stability and legitimacy (Freeman, 1984; Freeman et al., 2007). Given that ESG controversies undermine stakeholder trust and legitimacy (Aouadi & Marsat, 2018; Shakil, 2021), governance mechanisms become particularly important in shaping how firms manage reputational damage and restore legitimacy. Stakeholder trust is crucial because it influences stakeholder willingness to continue supporting and engaging with firms, thereby impacting long-term viability (Gillespie & Dietz, 2009). When stakeholder trust deteriorates, for example through controversy, it can result in reduced customer loyalty, lower employee morale, and increased scrutiny from regulators. These disruptions can weaken a firm's operational and financial vulnerability, increasing insolvency risk. Board gender diversity may support stakeholder trust by enabling inclusive, ethical decision-making and providing diverse perspectives that align closely with stakeholder expectations during reputational crises (Post & Byron, 2015; Bear et al., 2010). Similarly, legitimacy is essential for maintaining stakeholder support, as it reflects the firm's alignment with societal norms and values (Suchman, 1995). Board independence may help restore legitimacy by ensuring accountability, objective oversight and transparency, thereby demonstrating credibility and responsiveness to stakeholder concerns (Harjoto & Jo, 2011; Brinette et al., 2023). Thus, these governance mechanisms may moderate how ESG controversies translate into stakeholder backlash by reinforcing legitimacy, thereby reducing reputational damage and limiting insolvency risk.

While the importance of governance mechanisms in sustaining legitimacy and long-term stakeholder relationships is clear from a stakeholder perspective, research presents a more complex picture of their effectiveness. Some scholars suggest that governance structures may be adopted symbolically, serving primarily as legitimacy signals rather than tools for substantive change (Martiny et al., 2024; Terjesen et al., 2016). Others emphasize that the efficacy of governance mechanisms is highly contingent on contextual factors such as institutional environments, task complexity, or firm-specific dynamics (Popov & Makeeva, 2022). For example, Midavaine et al. (2016) show that tenure diversity can have a detrimental effect, highlighting that governance outcomes are not universally positive. These insights suggest that board-level governance may not always succeed in resolving ESG-related stakeholder tensions or preventing reputational decline, particularly if it fails to trigger meaningful change in corporate behaviour. This lack of consensus highlights the need to examine when governance can effectively buffer firms from stakeholder backlash and financial fallout.

This section explores how gender diversity and board independence shape firms' responses, particularly in situations where reputational risk and legitimacy are at stake.

2.3.1 Board gender diversity

Board gender diversity refers to the representation of women on a company's board of directors. Gender-diverse boards enhance the quality of boardroom deliberation by introducing a broader range of perspectives and encouraging more inclusive, ethical decision-making (Post & Byron, 2015, Nielsen & Huse, 2010). These qualities support long-term strategic thinking, as diverse boards are more likely to foster openness to innovation and support risk-related investments such as R&D (Midavaine et al., 2016). During periods of crisis, gender-diverse boards appear to improve stakeholder responsiveness. For example, Kara et al. (2022) show that during the COVID-19 pandemic, banks with more women on their boards provided significantly more support to customers and communities. These findings suggest that gender-diverse boards may play a role not only in setting ethical standards but also in shaping how firms interpret stakeholder demands and respond to reputational threats arising from ESG controversies.

A gender-diverse board is further associated with stronger risk oversight, transparency and ethical decision-making, which are key elements of effective governance (Bear et al., 2010; Adams & Ferreira, 2009). Female directors are often linked to greater ESG engagement and stricter monitoring, reinforcing alignment between corporate decisions and stakeholder interests (Hillman et al., 2002; Beji et al., 2021). Research further shows that boards with more women members are better equipped to manage ESG risks and avoid reputational damage when controversies arise (Brinette et al., 2023).

In addition, a growing body of empirical work highlights the positive impact of gender-diverse boards on ESG transparency and reporting. Lagasio and Cucari (2019), in a meta-analysis of 24 empirical studies, find that the presence of women directors enhances voluntary ESG disclosure. Wasiuzzaman and Wan Mohammad (2020) show that female board presence positively affects ESG disclosure in Malaysian listed firms, particularly on environmental and governance components. Similarly, Ellili (2023) finds a consistent positive effect of female board representation on ESG disclosure across financial and non-financial companies in the UAE. Mehmood et al. (2023) further find that gender-diverse boards significantly improve ESG performance, particularly when at least three women serve on the board. Gender-diverse boards also contribute to financial resilience. Chen et al. (2016) find that such boards reduce firm-level risk and earnings volatility, particularly in uncertain environments. Other studies show that firms with higher female board representation face fewer environmental lawsuits and enjoy greater legitimacy, which in turn supports financial stability (Elamer & Boulhaga, 2024). Gender diversity enhances board effectiveness by integrating diverse perspectives into decision-making and reinforcing corporate responsibility toward stakeholders.

In sum, board gender diversity can enhance stakeholder-oriented governance by promoting inclusivity, ethical sensitivity and broader oversight capacity. From a stakeholder theory lens, gender-diverse boards may be more attuned to social legitimacy and therefore better positioned to engage proactively with stakeholder concerns following ESG controversies (Adams & Ferreira. 2009). By fostering stronger transparency and trust, such boards may mitigate reputational damage, thereby reducing the likelihood

that ESG controversies escalate into insolvency risk. This may be especially relevant in ESG-sensitive sectors such as energy, where societal expectations and stakeholder scrutiny are particularly high.

The following hypothesis is developed to assess the extent to which board gender diversity mitigates insolvency risk in firms facing ESG controversies.

Hypothesis 2*. Board gender diversity moderates the relationship between ESG controversies and insolvency risk, such that firms in the energy sector with a higher proportion of female board members experience less negative impact of ESG controversies on insolvency risk.*

2.3.2 Board independence

Board independence serves as a complementary force in moderating the impact of ESG controversies through stronger governance (Elamer & Boulhaga, 2024). Board independence refers to the proportion of board members who are independent, meaning they have no significant personal or financial ties to the company beyond their board service. Independent directors reinforce the separation between decision-control and decision management, ensuring that firms are held accountable not only to shareholders but also to a broader set of stakeholders (Fama & Jensen, 1983).

From a stakeholder theory perspective, board independence strengthens accountability and objectivity, which helps preserve stakeholder trust, especially under conditions of reputational risk. Independent boards serve as guardians of legitimacy, ensuring that organizational decisions align with stakeholder expectations rather than narrow managerial interests. More broadly, governance structures that promote independence have been shown to support firms during periods of uncertainty and change. For example, Aalbers and van Boven (2025) demonstrate that effective governance improves risk management and stakeholder alignment during organizational downsizing. Similarly, Aalbers and Smit (2025) show how board oversight supports the reallocation of internal advice networks, which maintains adaptive capacity. In innovation context, McCarthy, Aalbers and Cearney (2025) highlight how governance mechanisms help firms navigate strategic transitions, such as alliance turning into acquisitions, preserving organizational value and resilience. These insights reinforce the instrumental and descriptive views of stakeholder theory by linking governance to performance, learning and legitimacy.

In the context of ESG controversies, independent boards are not only better positioned to provide objective oversight but also to interpret ESG controversies through a stakeholder lens, identifying which stakeholder relationships are most threatened and what responses are most likely to preserve trust and legitimacy. Numerous studies show that firms with more independent boards are more likely to engage in CSR and demonstrate stronger ESG oversight, helping reduce the financial shocks associated with ESG controversies (Harjoto & Jo, 2011; Beji et al., 2021; Elamer & Boulhaga, 2024). Brinette et al. (2023) find that firms with a higher proportion of independent board members experience significantly smaller value losses following ESG controversies, suggesting that independence plays a key role in

protecting stakeholder trust and restoring legitimacy. Systematic literature reviews reinforce this view: Popov & Makeeva (2022) show that board independence is widely recognized as a driver of ESG performance, while Martiny et al. (2024) emphasize its role in sustainable corporate behaviour. Harjoto & Jo (2011) find that board independence strengthens corporate social responsibility engagement, thereby fostering stakeholder trust and supporting sustainable outcomes.

Empirical evidence links board independence to lower corporate misconduct and reduced bankruptcy, reinforcing its role in effective governance (Neville et al., 2018). However, research suggests that independence alone may not be sufficient, Terjesen et al. (2016) find that its positive effects are amplified when combined with board gender diversity. This highlights the complementary role of both mechanisms, which are explored as joint moderators in this study.

In sum, board independence can enhance stakeholder alignment and crisis governance by reinforcing transparency, oversight and legitimacy. From a stakeholder theory perspective, independent directors can act as neutral guardians of legitimacy, ensuring firms respond objectively to stakeholder expectations when reputational trust is at risk. This may reduce the likelihood that ESG controversies escalate into insolvency risk by encouraging credible, stakeholder-oriented responses that help limit reputational damage. This role is especially important in ESG-sensitive sectors like energy, where firms face heightened scrutiny and elevated stakeholder demands.

The following hypothesis is developed to assess the extent to which board independence mitigates insolvency risk in firms facing ESG controversies.

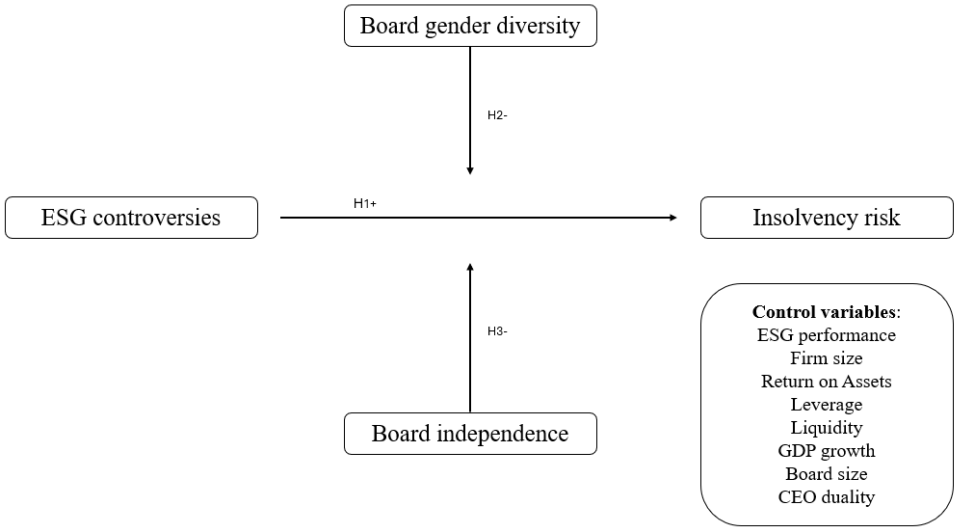
Hypothesis 3. *Board independence moderates the relationship between ESG controversies and insolvency risk, such that firms in the energy sector with a higher proportion of independent board members experience less negative impact of ESG controversies on insolvency risk.*

2.4 Conclusion and conceptual model

The literature review has provided a foundation for examining how ESG controversies impact insolvency risk in the energy sector. Drawing on stakeholder theory, the review outlines how ESG controversies can damage stakeholder trust and legitimacy, leading to reputational harm, stakeholder withdrawal and financial strain. This sequential process may ultimately increase the likelihood of insolvency. While prior research highlights how ESG performance and governance mechanisms act as potential buffers, the role of board gender diversity and independence in moderating this chain remains underexplored. These mechanisms are theorized to influence how firms manage reputational damage and restore legitimacy, thereby reducing the extent to which stakeholder reactions escalate into financial instability. By addressing both the direct effect and moderating role, this study contributes to closing key gaps in the literature and enhances our understanding of how governance structures can help firms remain resilient to ESG-related risk. This leads to the following conceptual model (Figure 1).

Figure 1

Conceptual model



3. Methodology

3.1 Empirical setting

The hypotheses were tested using a sample of firms in the energy sector. There was sufficient secondary data available to test the hypotheses. The energy sector was defined using LSEG's (London Stock Exchange) TRBC (The Reference data Business Classification) sector classification 'Energy' (LSEG, n.d.). The data for TRBC code 'Energy' yielded a larger sample size than SIC code 49 (which is also used for the energy sector) and was therefore deemed more useful. The dataset from LSEG was used to build up a sample of firms in the energy sector covering the 2011-2023 period. The year 2011 was selected as it captures the peak impact of the 2008 financial crisis (Galetta and Mazzù, 2023, as cited in Giráldez-Puig et al., 2024). A total of 847 energy firms were considered. Firms were included if they met the following criteria: first, firms must have complete firm-year observation data, including control variables and data to calculate the Altman Z"-score; second, firms must have total assets of at least 1,000,000 Euro to ensure validity of the Altman Z"-score. After applying these criteria, the final dataset consisted of 4842 firm-year observations.

3.2 Dependent variable

The dependent variable in this study is insolvency risk, measured using the Altman Z"-score. This metric is widely recognized as a reliable indicator of a firm´s financial distress and potential bankruptcy risk. Following the approach of prior studies (e.g. Aalbers & van Boven, 2025), the Z"-score offers a comprehensive assessment of financial stability by capturing the effects of profitability, leverage, liquidity, and retained earnings on a firm's financial health. This enhances the precision of the analysis and allows for a more nuanced understanding of how ESG controversies may contribute to financial vulnerability.

The Z"-score is a revised version of the original Altman Z-score, which was developed for publicly traded manufacturing firms. The model has since been adapted twice (Z-score to Z"-score) to broaden its applicability across both public and private firms in various industries (Altman et al., 2017), including capital-intensive sectors like energy. Given its sectorial neutrality and empirical reliability, the Z"-score is the most appropriate measure for this study.

Firm-level financial data used for calculating the Z"-score were obtained from the LSEG database. All monetary values were converted to euros to ensure consistency across firms and countries. The Z"-score is calculated using the following formula:

$$Z'' = 3.25 + 6.56\,(X_1) + 3.26\,(X_2) + 6.72\,(X_3) + 1.05\,(X_4)$$

Where X_1 represents the ratio of working capital to total assets, X_2 the ratio of retained earnings to total assets, X_3 the ratio of EBIT to total assets, X_4 the ratio of book value of equity to total liabilities. Interpretation thresholds:

- Z"-score < 1.10 = high risk
- $1.10 \leq Z'' \leq 2.60$ = moderate risk
- Z" > 2.60 = low risk

This measurement provides a standardized and replicable way to quantify insolvency risk across a large sample of energy firms, forming the foundation for subsequent hypothesis testing.

3.3 Independent variable

The independent variable is ESG controversies. ESG controversies was measured using the LSEG ESG controversies score, which is calculated based on 23 topics reflecting ESG-related controversies over the latest complete period (LSEG, 2024). These topics are divided into the following seven categories: “community”, “human rights”, “management”, “product responsibility, “resource use, “shareholders”, and “workforce”. ESG controversies are recognised as a reasonable proxy by many studies (Nollet et al., 2016; Giráldez-Puig et al., 2024). If a company is involved in a scandal, it is penalised, which affects its ESG controversies (ESGC) score and grading. This score is compared 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 (LSEG, 2024). Following Giráldez-Puig et al. (2024) the ESG controversies score was multiplied by -1 for ease of interpretation. To maintain coherence, the Z"-score was also multiplied by -1, so that higher values reflect greater insolvency risk.

3.4 Moderators

The two moderators, board gender diversity and board independence were measured with LSEG’s variables ‘Board Gender Diversity’ and ‘Board Independence’, which encompass ‘Percentage of females on the board’ and ‘Percentage of independent board members’.

3.5 Control variables

To exclude alternative explanations, a number of control variables were included. ESG performance has been shown to mitigate the negative effects of ESG controversies on insolvency risk, as established in existing research. To account for this potential and ensure that the observed relationship between ESG controversies and insolvency risk was not confounded by a firm’s broader ESG engagement, ESG performance (ESG) was included as a control variable. ESG performance was measured with LSEG’s ESG score.

Following previous studies, more control variables were included. Larger and more profitable firms typically exhibit greater financial resilience (Elamer & Boulhaga, 2024), which may reduce their insolvency risk. The following control variables account for this: firm size (FSIZE), measured as the

natural logarithm of total assets; Return on Assets (ROA), determined by income divided by total assets; leverage (LEV), which helps control risk exposure (Shakil, 2021), measured by the ratio of total debt to total assets; and liquidity (LIQDT), which can influence strategic decisions on sustainable practices (Li et al., 2012), is calculated by the current assets to current liabilities ratio. GDP growth was added as a control variable at the country level to account for the broader macroeconomic conditions that can influence the performance of energy firms (Gidage & Bhide, 2024). Additionally, following Elamer & Boulhaga (2024), the size of the board (BOARD_SIZE) and whether the CEO's role is separate from other executive functions (CEO_DUA) were included as control variables.

3.6 Method of analysis

All variables are listed in table 1. Hypotheses were tested using Ordinary Least Squares (OLS) regression analysis in IBM SPSS V.29. Moderating effects of board gender diversity and board independence were examined using interaction terms. To account for time-fixed effects and capture unobserved heterogeneity across years, year dummy variables were included in all models.

This study follows a deductive, positivist approach, testing theory-driven hypotheses using quantitative data.

ESG controversies may have delayed effects, as reputational damage, regulatory scrutiny and investor reactions often unfold over time. A one-year lag was introduced to capture this temporal dynamic, following Chen et al. (2016).

Lagged variables also help mitigate reverse causality, supporting this study's positivist aim of identifying directional effects. For additional robustness, a two-year lag window was tested to explore potential longer-term effects.

This resulted in the following regression model, in which *i* denotes the firm and *t* denotes the year. The expectation is that ESG controversies will positively influence insolvency risk:

$$
\begin{aligned}
INS\_RISK_{\{it\}} = {} & \beta_0 + \beta_1 ESGC_{\{it-1\}} + \beta_2 BOARD\_GD_{\{it-1\}} + \beta_3 BOARD\_IND_{\{it-1\}} \\
& + \beta_4 \left(ESGC_{\{it-1\}} \times BOARD\_GD_{\{it-1\}}\right) + \beta_5 \left(ESGC_{\{it-1\}} \times BOARD\_IND_{\{it-1\}}\right) \\
& + \beta_6 FSIZE_{\{it-1\}} + \beta_7 ROA_{\{it-1\}} + \beta_8 LEV_{\{it-1\}} + \beta_9 LIQDT_{\{it-1\}} + \beta_{10} ESG_{\{it-1\}} \\
& + \beta_{11} GDP\_G_{\{it-1\}} + \beta_{12} BOARD\_SIZE_{\{it-1\}} + \beta_{13}\, CEO\_DUA_{\{it-1\}} + \epsilon
\end{aligned}
$$

Table 1

Overview variables

Variable	Description	Unit	Category
INS_RISK	Insolvency risk	Z"-score (Altman)	Dependent variable
ESGC	ESG controversies	Score (LSEG)	Independent variable
BOARD_GD	Board Gender Diversity	Percentage (%)	Moderator
BOARD_IND	Board Independence	Percentage (%)	Moderator
ESG	ESG performance	Score (LSEG)	Control variable
FSIZE	Firm size	Log (Total Assets)	Control variable
ROA	Return on Assets	Percentage (%)	Control variable
LEV	Leverage	Debt-to-Assets ratio	Control variable
LIQDT	Liquidity	Current ratio	Control variable
GDP_G	GDP growth rate	Percentage (%)	Control variable
BOARD_SIZE	Board size	Number	Control variable
CEO_DUA	CEO Duality	Binary (Yes / No)	Control variable

3.7 Research ethics

This research adheres to ethical guidelines outlined in APA Ethics code (7th edition), to ensure integrity and quality of the research process. The databases that were used ensured anonymity of the firms. In refining the writing style of this thesis, I utilized ChatGPT*, an AI-based language model (OpenAI, 2025). The AI was solely utilized to receive feedback on clarity, conciseness, and coherence. This was done only for stylistic purposes. This was discussed with my supervisor and permitted in alignment with Radboud University Faculty of Management's guidelines.

*Prompt: Can you check this text for grammar, clarity, and academic writing style? Please suggest improvements and explain major changes.

4. Results

4.1 Data examination & preparation

Prior to conducting the analyses and presenting the results, specific steps were taken with regard to data examination, data preparation, and assumption testing. The steps are described below.

4.1.1 Missing value analysis

Prior to analysis, missing values were assessed (Appendix A). Several variables (particularly ESG, ESGC, BOARD_GD and BOARD_IND) showed around 25 to 26 percent missingness. Little's MCAR test was significant ($X^2 = 1339.636$, df = 285, $p < .001$), indicating the data were not missing completely at random. However, the similarity in missingness percentages across related variables suggests a systematic pattern: firms that do not report ESG or board composition data. This supports the assumption that data were Missing At Random (MAR), as the probability of missingness appears related to observed characteristics. Following Hair et al. (2019), multiple imputation was applied to address missingness, as it is robust under MAR and maintains sample size while reducing bias. In all analyses, pooled results across five imputations were used wherever available. For non-pooled statistics (e.g. standard deviations), the fifth imputation was used.

4.1.2 Outliers & influential observations

To assess the presence of outliers, boxplots were inspected. For the variable INS_RISK, which is based on the Altman Z" score, several extreme values were identified (Appendix B). These extreme Z" values could bias regression results.

To address this, winsorizing was applied to INS_RISK by capping values at the 1st and 99th percentiles. This method reduces the impact of extreme values without removing any observations from the datasets, thereby preserving sample size. Winsorizing is a technique in line with other research, like McCarthy & Aalbers (2016). As Field (2018) argues, altering extremely unrepresentative values can be preferable to interpreting biased model estimates, particularly when such values distort parameter estimates or increase error variance.

4.1.3 Variable computation & data transformations

All variable transformations followed the methodology section. Independent variables were lagged by one year to reduce potential endogeneity. The variables INS_RISK and ESGC were multiplied by -1 to align their interpretation with theoretical expectations. To facilitate interpretation of interaction effects and reduce multicollinearity, ESGC, BOARD_GD and BOARD_IND were mean-centered prior to computing the interaction terms: ESGC × BOARD_GD and ESGC × BOARD_IND.

4.1.4 Descriptive statistics

Table 2 presents the descriptive statistics and coefficients for all variables after imputation and transformation. The dependent variable, INS_RISK, has a mean of -5.86 and a standard deviation of 3.83. The variables ESGC, BOARD_GD and BOARD_IND were mean-centered prior to creating the interaction terms. This transformation results in a mean of zero for these variables.

Regarding the correlations, Hair et al. (2019) consider coefficients above 0.70 to indicate strong relationships, while values exceeding 0.90 may signal multicollinearity concerns. In this study, none of the Pearson correlation coefficients exceeded the 0.70 threshold, suggesting that multicollinearity is unlikely to bias the regression results.

Table 2

Descriptive statistics and correlation matrix

Variables	Descriptives			Correlation matrix										
	N (Valid)	Mean	Std. Deviation	INS_RISK	ESGC	BOARD_GD	BOARD_IND	ESG	ROA	LEV	LIQDT	BOARD_SIZE	CEO_DUA	GDP_G	FSIZE
INS_RISK	4842	-5.8602	3.82591	1											
ESGC	4842	0.0000	23.93015	-0.095	1										
BOARD_GD	4842	0.0000	13.39235	-0.352	0.076	1									
BOARD_IND	4842	0.0000	24.19986	0.450	-0.053	-0.142	1								
ESG	4842	45.6284	20.46907	-0.393	-0.059	0.055	-0.246	1							
ROA	4842	3.4433	11.53368	-0.009	0.341	0.011	-0.093	-0.010	1						
LEV	4842	32.3574	19.14861	0.043	-0.110	-0.050	0.016	-0.042	0.065	1					
LIQDT	4842	1.6036	1.48292	-0.055	-0.064	0.181	-0.050	-0.028	-0.047	0.010	1				
BOARD_SIZE	4842	9.4800	2.95600	-0.029	0.437	0.075	-0.094	-0.124	0.440	0.054	-0.001	1			
CEO_DUA	4842	0.3700	0.48600	-0.003	0.265	0.007	-0.071	-0.023	0.164	0.072	-0.026	0.395	1		
GDP_G	4842	2.6474	2.86254	0.002	0.342	-0.007	0.007	-0.056	-0.042	-0.039	-0.063	0.042	0.104	1	
FSIZE	4842	15.5523	1.28253	0.116	0.078	-0.113	0.041	-0.043	-0.123	0.115	-0.086	-0.017	0.088	0.212	1

4.2 Assumptions

4.2.1 Normality of residuals

To assess whether the residuals of the regression model were normally distributed, a normal probability-probability (P-P) plot was inspected (Appendix C). In this plot, the standardized residuals are plotted against the perfectly normally distributed dataset. While some deviation from the diagonal line is observed, this is common in real-world data. As Field (2018) explains, regression is generally more robust to moderate violations of the normality assumption, particularly when the sample size is large (N > 200). Given the large sample (N = 4842), normality is sufficiently met.

4.2.2 Independence of error terms

The second assumption to be tested was the assumption of independence of error terms (Hair et al., 2019). This assumption implies that residuals should not be correlated across observations, which is particularly relevant in sequential or clustered data structures. Durbin-Watson tests were conducted across all imputed datasets to assess this. Durbin-Watson values (1.432-1.491) fall within the acceptable 1-3 range (Field, 2018), indicating independence (see Appendix D).

4.2.3 Linearity

To assess the assumption of linearity, a scatterplot of standardized residuals versus standardized predicted values was examined (Field, 2018). The plot shows a random scatter of residuals without clear curvature of non-linear patterns, suggesting the assumption of linearity is met (Appendix E). Given the large sample size, minor deviations are unlikely to substantially bias the results.

4.2.4 Homogeneity of variances

The same scatterplot was used to evaluate the assumption of homoscedasticity (Field, 2018). The plot shows no clear funnel or systematic pattern in the dispersion of residuals, indicating that the variance of errors is roughly constant across all levels of predicted values. Therefore, the assumption of homoscedasticity is met (Appendix F).

4.2.5 Multicollinearity

To test for multicollinearity, Variance Inflation Factors (VIF) and tolerance statistics were examined for all predictors. According to Hair et al. (2019), VIF values below 10 and tolerance values above 0.10 indicate no problematic multicollinearity. As show in Appendix F, all predictors fall within these acceptable thresholds. These results indicate that multicollinearity is not a concern in the current model.

4.3 Results of regression analysis

To test the hypotheses, four hierarchical multiple regression models were estimated. The results are presented in table 3. Model 1 includes all control variables and year dummy variables. Model 2 adds the main predictor variable ESG controversies. Model 3 introduces the two moderators, board gender diversity and board independence. Model 4 is the full model and includes the interaction terms between ESG controversies and the moderators.

Model 1 shows an Adjusted R^2 of .401 and a significant F-statistic ($F = 171.830$, $p < .001$), indicating that the control variables explain a substantial portion of the variance in insolvency risk. Following Hair et al. (2019), an Adjusted R^2 of this magnitude can be considered as moderately strong. This is particularly notable given the complexity of the phenomenon in this study.

In all models, the ESG score is significantly negatively associated with insolvency risk (e.g. $\beta = -.017$, $p < .001$ in model 1), confirming that ESG performance plays an important role in enhancing financial resilience. ROA, leverage and liquidity consistently show strong and significant effects across models. This is likely due to the fact that insolvency risk is measured using the Altman Z"-score, which itself is constructed based on financial ratios. As a result, these indicators are inherently linked to the dependent variable and are expected to play a key explanatory role. Another control variable that consistently shows a significant effect is board size (e.g. $\beta = .080$, $p < .001$ in model 4). Larger boards may enhance oversight but also cause coordination delays, increasing risk.

Model 2 adds ESG controversies, which show a significant positive association with insolvency risk ($\beta = .005$, $p < .05$), supporting Hypothesis 1. This finding is consistent across models and suggests that firms involved in more ESG-related controversies are at greater risk of financial distress. In model 3, the separate effect of board gender diversity does not have a significant main effect, while board independence is positively significant ($\beta = .011$, $p < .001$). This is a counterintuitive finding that indicates that more independent boards are associated with greater insolvency risk in this context. Although the standardized beta indicates a small effect size, this finding may suggest over-monitoring or misalignment with firm strategy.

Model 4 introduces the interaction terms to test Hypotheses 2 and 3. The interaction between ESG controversies and board gender diversity is not significant ($\beta = .000$, $p > .05$), leading to a rejection of Hypothesis 2. However, the interaction between ESG controversies and board independence is significant ($\beta = -.0002$, $p < .05$) supporting Hypothesis 3. This finding indicates that board independence moderates the effect of ESG controversies on insolvency risk, such that higher board independence mitigates the impact of ESG controversies. It should be noted, however, that the effect size is small, which may limit the practical relevance of this relationship despite its statistical significance.

Across all models, year dummy variables (2012-2023) were included to control for year-fixed effects, with 2016 omitted as the reference category. This year was selected as the reference point because it did not coincide with any major economic disruptions and represents a relatively stable baseline. Several dummies are significant (Appendix G): 2015, 2018, 2019, 2020 and 2023. This pattern suggests meaningful variation in insolvency risk across years.

Overall, the models show stable and significant results across specifications. The stepwise increase in Adjusted R^2 from .401 to .409 suggests that while these variables contribute to explaining insolvency risk, their additional explanatory value is modest relative to the baseline model with control variables. Although they may be theoretically relevant, the practical relevance of these results is questionable.

Table 3

Linear regression results

Variable	Model 1	Model 2	Model 3	Model 4
ESG controversies		.005 (.002)*	.004 (.002)*	.005 (.002)*
Board gender diversity			.001 (.004)	.002 (.004)
Board independence			.011 (.002)***	.011 (.002)***
ESGC × Board gender diversity				.000 (.000)
ESGC × Board independence				-.0002 (.000)*
ESG score	-.017 (.003)***	-.017 (.003)***	-.020 (.003)***	-.020 (.003)***
Firm size	.019 (.043)	-.017 (.045)	-.008 (.045)	-.004 (.044)
ROA	-.100 (.004)***	-.099 (.004)***	-.097 (.004)***	-.097 (.004)***
Leverage	.068 (.002)***	.068 (.002)***	.068 (.002)***	.068 (.002)***
Liquidity	-.767 (.031)***	-.768 (.031)***	-.762 (.031)***	-.762 (.031)***
Board size	.062 (.019)**	.064 (.019)***	.081 (.019)***	.080 (.019)***
CEO duality	-.035 (.137)	-.053 (.134)	-.125 (.131)	-.123 (.130)
GDP growth	-.068 (.021)**	-.066 (.021)**	-.054 (.021)**	-.054 (.021)**
Constant	-6.766 (.660)***	-6.191 (.713)***	-6.402 (.712)***	-6.466 (.694)***
Adjusted R^2	.401	.402	.407	.409
Year dummies	Included	Included	Included	Included
F-statistic	171.830***	163.902***	152.233***	140.401***
Observations	4842	4842	4842	4842

*Significance: *p < .05; **p < .01; ***p < .001*

4.4 Robustness checks

Several robustness checks were conducted to verify the reliability of the results. First, the full analysis was repeated using variables with a two-year lag (presented in appendix H). Results remained similar, though model fit (Adjusted R^2) was lower and the main effect became insignificant. Second, to test for potential non-linear effects, the ESGC variable was squared and log transformed. Neither transformation yielded meaningful differences. Third, the moderating variables were converted into median-split dummies to examine whether their original scaling was too weak. This produced similar results to the main model.

In addition, a robustness check was conducted to explore whether board independence exhibits an ambidextrous relationship, potentially increasing risk at low controversy levels while reducing it at high levels. A median split on ESG controversies was used to estimate separate models for low- and high controversy subsamples. However, no meaningful change in the direction or strength of the effect of board independence was found. Therefore, this exploratory check did not support further theorizing and, while it is discussed in chapter 5, it will not be emphasized in the main analyses.

Lastly, separate linear regressions were conducted on the lower and upper quartiles of the sample to explore whether the effect of ESG controversies differs across levels of insolvency risk. The results showed only minor differences between the two groups, suggesting that the relationship between ESG controversies and insolvency risk is relatively stable across different levels of risk.

5. Discussion and conclusions

5.1 Findings

This study examined how ESG controversies influence insolvency risk in the energy sector. It was expected that firms involved in ESG controversies would face greater financial vulnerability due to a loss of stakeholder trust and legitimacy. The analysis tested whether such controversies are linked to higher insolvency risk and whether board characteristics affect this relationship. This chapter interprets the main findings of the analysis and connects them to the theoretical expectations and prior research. The results table can be found in table 3 or appendix G.

5.1.1 ESG controversies and Insolvency risk

The analysis confirms a positive association between ESG controversies and insolvency risk, supporting Hypothesis 1 and aligning with stakeholder theory. Stakeholder theory holds that firms rely on legitimacy and ongoing stakeholder support to remain financially viable (Freeman, 1984). ESG failure reduces trust, trigger scrutiny, and restrict resources, increasing distress (Aouadi & Marsat, 2018). This holds even when controlling for overall ESG performance. The ESG score is consistently associated with lower insolvency risk ($\beta = -.020$, $p < .001$), indicating that ESG engagement helps protect firms from financial distress.

The result is also consistent with prior research that identifies ESG controversies as events that signal deeper organizational weaknesses (De Franco, 2019; Nirino et al., 2021). It affirms the instrumental view of stakeholder theory by showing that failing to meet stakeholder expectations can translate into higher insolvency risk. At the same time, this finding adds nuance to the theory. It suggests that once stakeholder trust is broken through controversy, strong ESG performance may have limited mitigating power, supporting the view that ESG efforts are more effective at preventing controversies than absorbing their financial consequences (Nirino et al., 2021).

In practical terms, the effect size is relatively small ($\beta = .005$), indicating a modest impact on insolvency risk at the firm level. However, the finding is robust across specifications and model variations, and the consistent direction of the effect reinforces its importance as a signal of elevated risk. Controversies thus serve not just as reputational events, but as concrete predictors of financial instability, especially in ESG-sensitive industries like energy. This is an industry where stakeholder expectations are high and regulatory pressure is intense (Makridou et al., 2023).

While the main effect of ESG controversies was stable across years, several year dummies were also statistically significant. Insolvency risk was higher in 2015, 2019, and 2020. Possible explanations could be oil market volatility, growing ESG scrutiny, and the onset of the COVID-19 pandemic. A notable drop in 2021 ($\beta = -1.166$) could be linked to temporary relief from government support

programs. These temporal shifts suggest that while ESG controversies increase risk, macroeconomic and institutional dynamics continue to shape the broader financial landscape. Additionally, GDP growth emerged as a significant control variable, reinforcing the importance of broader economic conditions in explaining insolvency risk.

Robustness checks using two-year lagged variables yielded similar results, further supporting the main findings, though with slightly lower effect sizes and model fit (Appendix H).

5.1.2 ESG controversies × Board gender diversity & Insolvency risk

The interaction between ESG controversies and board gender diversity was statistically insignificant, suggesting that gender-diverse boards do not systematically influence the strength of the relationship between ESG controversies and insolvency risk. Therefore, the second hypothesis is not supported.

The lack of a significant interaction challenges the assumption that the presence of women on board automatically translates into meaningful influence over ESG-related decisions. From a stakeholder theory perspective, it was expected that a more gender-diverse board would be better equipped to anticipate stakeholder concerns and act in ways that protect legitimacy. Previous studies have suggested that diverse boards may prioritize ethical behaviour, sustainability, and stakeholder engagement more strongly than less diverse boards (Bear et al., 2010; Adams & Ferreira, 2009; Chen et al., 2016). However, the results indicate that board gender diversity does not reduce the financial vulnerability caused by ESG controversies. In ESG-intensive sectors, stakeholder expectations are shaped by industry norms and regulatory pressures, which may dilute the influence of board-level diversity on perceptions of legitimacy.

One possible explanation is that stakeholders respond more to how a board acts in response to controversy than to its demographic composition. While gender diversity may improve overall decision-making quality, it does not guarantee effective risk management in critical situations. In the energy sector, where controversies often trigger immediate reputational damage and regulatory scrutiny, stakeholders may look for other governance mechanisms that provide stronger assurance of accountability.

Another reason for the lack of significance may lie in how board gender diversity is measured. Measuring gender diversity as a proportion may mask whether women hold influential roles or shape ESG strategy. Apparent diversity may not translate into meaningful influence if minority voices are not empowered. Symbolic diversity may lack influence when legitimacy is threatened. Consequently, in times of controversy, stakeholders may focus less on symbolic representation and more on whether governance structures drive substantive ESG actions.

Overall, the findings imply that board gender diversity alone does not act as a buffer against the financial consequences of ESG controversies. While diversity remains important from a governance and ethical standpoint, it may not be enough to alter stakeholder perceptions or reduce insolvency risk

when trust has been damaged. These results suggest that gender diversity, as a structural feature or ethical imperative, is insufficient unless it translates into meaningful action and engagement with stakeholder concerns. However, since this study does not measure the nature or intensity of such engagement, it remains uncertain whether even active involvement by gender-diverse boards would change outcomes.

In contrast, one board characteristic that does show a consistent and statistically significant relationship with insolvency risk is board size. The results indicate that larger boards are associated with higher insolvency risk ($\beta = .080$, $p < .001$), which may reflect coordination difficulties, slower decision-making, or reduced accountability within more complex governance structures. Although not central to this study's focus, this finding suggests that certain aspects of board composition can contribute to financial vulnerability.

5.1.3 ESG controversies × Board Independence & Insolvency risk

The interaction between ESG controversies and board independence is negative and significant ($\beta = -.0002$, $p < .05$), indicating that more independent boards weaken the relationship between ESG controversies and insolvency risk. In other words, board independence appears to reduce the financial vulnerability caused by ESG controversies.

From a stakeholder theory view, independent directors help maintain legitimacy by aligning decisions with the interest of a broad set of stakeholders. They are expected to provide objective oversight and ensure that firms remain accountable in the face of reputational threats. The findings of this study support this role and show that independent boards may help preserve stakeholder trust when firms are involved in ESG controversies. Interestingly, the separate effect of board independence shows a significant positive effect on insolvency risk ($\beta = .011$, $p < .001$), while the interaction effect is negative and significant ($\beta = -.0002$, $p < .05$). This tension may reflect a contextual duality in how board independence functions under different conditions.

In routine, non-crisis settings, highly independent boards may create strategic distance or lead to slower, less adaptive decision-making, which can increase vulnerability (Terjesen et al., 2016; Popov & Makeeva, 2022). This interpretation is consistent with the finding that larger boards are associated with higher insolvency risk, highlighting how certain board structures may hinder agility during periods of uncertainty. However, in ESG crisis contexts, this same independence may become an asset: it enables boards to enforce transparency, maintain stakeholder alignment, and buffer reputational damage (Fama & Jensen, 1983, Elamer & Boulhaga, 2024). It should be noted that a robustness check using a median split on ESG controversies showed no further support for this ambidextrous interpretation, and the small effects sizes limit the case for such dual explanation.

The interaction effect of ESG controversies and insolvency risk is in line with prior research that highlights how board independence strengthens ESG oversight and limits firm-level risk (Popov &

Makeeva, 2022), In the energy sector, where firms operate under heightened ESG scrutiny, board independence may signal stronger stakeholder alignment and more reliable governance practices.

Despite its statistical significance, the interaction effect is small. The adjusted R^2 increases only slightly in the extended model, which makes the practical relevance of the effect appear limited. Board independence does seem to have a buffering effect, but the size of the impact raises questions about how useful this mechanism is in real-world settings. The result is theoretically sound and consistent with stakeholder theory, but in practice, board independence alone is unlikely to substantially alter stakeholder reactions once trust has been damaged by controversy.

5.2 Theoretical contributions

The results contribute meaningful insights to the existing body of research on stakeholder theory, ESG practices, corporate governance, and financial distress. Although the practical impact of the effects observed in this study appears limited, particularly in terms of effect size and explanatory power, the findings nonetheless offer several theoretical contributions that refine and extend current understanding.

First, this study extends stakeholder theory by linking stakeholder misalignment through ESG controversies to insolvency risk. While stakeholder theory is typically applied to firm value, legitimacy, or ESG disclosure, this research shows that failing to meet stakeholder expectations can also have implications for financial survival. The results reinforce the instrumental view of stakeholder theory by demonstrating that reputational damage and erosion of stakeholder trust can translate into increased insolvency risk.

Second, the findings refine ESG literature by distinguishing ESG performance from ESG controversies. The consistently negative effect of ESG performance on insolvency risk supports the idea that ongoing stakeholder management contributes to financial resilience. However, the continued significance of ESG controversies even when accounting for ESG performance suggests that controversies are a separate and material source of risk. This supports the argument by Nirino et al. (2021) that ESG efforts are more effective at preventing controversy than mitigating its consequences.

Third, the findings provide a more nuanced view of governance mechanisms in shaping stakeholder responses to ESG controversies. While it is often assumed in governance literature that structures such as board independence and board gender diversity promote better stakeholder alignment, the findings of this study offer limited support for that assumption in the context of ESG-related financial risk. The positive main effect of board independence runs counter to theoretical expectations, although the effect is weak. These results suggest that governance mechanisms may hold symbolical value but offer limited protection in buffering firms against ESG-related fallout.

Fourth, this study adds to the still limited body of research examining the direct relationship between ESG controversies and insolvency risk. Besides the work by Giráldez-Puig et al. (2024), which

focused on the insurance sector, this is the first known study to explore this link in the energy sector. By highlighting the financial risks tied to ESG controversies in a particularly exposed industry, this study contributes sector-specific insight to the growing ESG literature.

Finally, the study connects ESG and financial distress literature by showing how ESG-related stakeholder failures are not just reputational concerns but can have direct implications for firm viability. While the observed effects may be small in practice, their statistical significance and theoretical alignment suggest that future research should continue to explore how ESG governance relates to long-term financial outcomes, particularly in industries under intense stakeholder pressure.

5.3 Managerial implications

While this study offers theoretically relevant contributions, its practical implications for managers are limited. The effects observed, particularly those related to ESG controversies and board governance, are too small to warrant major strategic adjustments in practice. Managers may regard ESG controversies as stakeholder risk signals, but not as major financial threats.

The overall explanatory power of the model remains largely unchanged after the inclusion of board-level governance and ESG interaction terms. The base model explains a substantial portion of the variance in insolvency risk, subsequent models show only marginal increases. This suggests that the additional variables, though sometimes statistically significant, offer limited practical value for decision-making.

The governance mechanisms board gender diversity and board independence showed no meaningful practical effect in this study. Although they may serve a symbolic purpose or act as early indicators of governance scrutiny, there is no practical evidence here that they help firms navigate the financial consequences of ESG controversies.

Results show that strong ESG performance is significantly associated with lower insolvency risk, indicating that sustained stakeholder engagement may contribute to financial resilience. The effect of ESG controversies, while statistically significant, is small. However, in ESG-sensitive sectors like energy, even modest legitimacy signals may serve as early warnings that trigger investor scrutiny or regulatory attention (Makridou et al., 2023). Governance structures like board independence and gender diversity show limited impact. However, board size is positively associated with insolvency risk, which may reflect coordination challenges or inefficiencies in larger boards. Managers in the energy sector should therefore prioritise long-term ESG performance and financial stability, while remaining cautious about overestimating the financial value of structural governance features.

5.4 Limitations & future research

The most important limitation of this study is the limited practical relevance of the findings. Although some effects are statistically significant, their real-world impact appears limited. The focus on the

energy sector enhances the relevance of the findings within a high-stakes ESG context but reduces generalizability to other industries with different stakeholder dynamics. Another limitation concerns the use of the Altman Z"-score to measure insolvency risk. Although widely used, this metric was originally developed for U.S. manufacturing firms and may not fully reflect insolvency risk in a global, energy-sector sample. The ESG score and ESG controversy score are based on LSEG, which aggregates and classifies events according to its own methodology. While also widely used and accepted, it may not fully capture the construct. In addition, governance variables may not have been captured in sufficient depth. For example, board gender diversity was measured only as a proportion of women, without accounting for their roles or influence. At the same time, board size showed a consistently significant positive relationship with insolvency risk, suggesting that board composition matters, but may require more refined measurement. Finally, while multiple imputation was used to address missing data, some uncertainty remains for variables with higher proportions of missing data.

Future research could address these limitations in several ways. First, applying a similar model in other sectors could test whether ESG controversies and governance structures operate differently under varying levels of stakeholder scrutiny. Second, alternative measures of financial distress may offer a more nuanced understanding of insolvency risk beyond accounting-based models like the Altman Z"-score. Third, incorporating more detailed governance indicators could offer a deeper understanding of how board characteristics influence financial outcomes. Additionally, disaggregating ESG controversies into environmental, social and governance components, or by severity, could help identify which types of incidents are most financially damaging. Future studies could investigate how these relationships evolve under crisis conditions or during periods of heightened regulatory change, when stakeholder expectations are likely to be intensified. Finally, qualitative case studies could provide richer insights into how ESG controversies are managed within firms, how board dynamics influence stakeholder communication, and how different governance responses are perceived in practice. This could include examining whether and how gender-diverse and independent boards actively engage with ESG issues, beyond their structural presence.

5.5 Conclusions

This study examined how ESG controversies affect insolvency risk in the energy sector and whether this relationship is moderated by board gender diversity and board independence. Drawing on stakeholder theory, it was hypothesised that ESG controversies would increase insolvency risk and that governance mechanisms could mitigate this effect.

The results showed that ESG controversies are statistically associated with higher insolvency risk, supporting the first hypothesis. However, the effect size is small, which limits its practical relevance. Board independence was found to have a statistically significant moderating effect, but again the size of this effect was minimal. Board gender diversity showed no significant influence. Among the

governance variables, only board size consistently predicted insolvency risk, with larger boards being associated with higher financial vulnerability.

Overall, the findings suggest that while ESG controversies and board characteristics may play a role in shaping stakeholder perceptions and legitimacy, their impact on financial outcomes such as insolvency risk is limited. Financial control variables remain the dominant predictors of insolvency risk in this context. However, this may partly reflect the way insolvency risk is measured in this study, as the Altman Z"-score is constructed using financial ratios.

Managers and researchers should therefore be cautious in interpreting the practical value of ESG controversies or board structures when assessing financial vulnerability, particularly in complex sectors like energy. still, even modest governance signals or early signs of stakeholder misalignment may carry symbolic weight in these settings, potentially influencing investor sentiment, regulatory response, or reputational stability.

References

Adams, R. B., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, *94*(2), 291–309. https://doi.org/10.1016/j.jfineco.2008.10.007

Aalbers, R., & van Boven, J. (2025). Navigating the digital shift: Downsizing magnitude and its timing under corporate digitalization. In R. DeWitt & S. House (Eds.), *Concise Guide to Corporate Downsizing* (pp. xx-xx).

Aalbers, R., & Smit, S. (2025). Advice tie reallocation under organizational downsizing: A longitudinal network study. *European Management Journal. https://doi.org/10.1016/j.emj.2025.01.009*

Altman, E. I., Iwanicz-Drozdowska, M., Laitinen, E. K., & Suvas, A. (2017). Financial distress prediction in an international context: A review and empirical analysis of Altman's Z-score model. *Journal of International Financial Management & Accounting, 28*(2), 131-171. https://doi.org/10.1111/jifm.12053

Aouadi, A., & Marsat, S. (2018). Do ESG controversies matter for firm value? Evidence from International Data. *Journal of Business Ethics*, *151*(4), 1027–1047. https://doi.org/10.1007/s10551-016-3213-8

Bear, S., Rahman, N., & Post, C. (2010). The impact of board diversity and gender composition on corporate social responsibility and firm reputation. *Journal of Business Ethics*, *97*(2), 207–221. http://www.jstor.org/stable/40929405

Beji, R., Yousfi, O., Loukil, N., & Abdelwahed, O. (2021). Board diversity and corporate social responsibility: Empirical evidence from France. *Journal of Business Ethics, 173*, 1–23. https://doi.org/10.1007/s10551-020-04522-4

Boubaker, S., Cellier, A., Manita, R., & Saeed, A. (2020). Does corporate social responsibility reduce financial distress risk? *Economic Modelling, 91*, 835–851. https://doi.org/10.1016/j.econmod.2020.05.012

Brammer, S., Branicki, L., Linnenluecke, M., & Smith, T. (2019). Grand challenges in management research: Attributes, achievements, and advancement. *Australian Journal of Management, 44*,. https://doi.org/10.1177/0312896219871337

Brinette, S., Sonmez, F., & Tournus, P. S. (2023). ESG Controversies and Firm Value: Moderating Role of Board Gender Diversity and Board Independence. *IEEE Transactions on Engineering Management*, 1–10. https://doi.org/10.1109/tem.2023.3236667

Chen, S., Ni, X. & Tong, J.Y. (2016). Gender diversity in the boardroom and risk management: A Case of R&D Investment. *Journal of Business Ethics,* **136**, 599–621. https://doi.org/10.1007/s10551-014-2528-6

Dadanlar, H., & Abebe, M. (2020). Female CEO leadership and the likelihood of corporate diversity misconduct: Evidence from S&P 500 firms. *Journal of Business Research*, *118*, 398–405. https://doi.org/10.1016/j.jbusres.2020.07.011

De Franco, C. (2019). ESG controversies and their impact on performance. *The Journal of Investing*, *29*(1). https://doi.org/10.3905/joi.2019.1.106

Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *The Academy of Management Review*, *20*(1), 65–91. https://doi.org/10.2307/258887

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*(11), 2835–2857. http://www.jstor.org/stable/24550546

Elamer, A. A., & Boulhaga, M. (2024). ESG controversies and corporate performance: The moderating effect of governance mechanisms and ESG practices. *Corporate Social Responsibility and Environmental Management*, *31*(4), 3312-3327. https://doi.org/10.1002/csr.2749

Fama, E.F. & Jensen, M.C. (1983). Separation of ownership and control. *Journal of Law and Economics*, 26, 301- 325. http://dx.doi.org/10.1086/467037

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics*. 5th Edition, SAGE Publications, United States: California.

Freeman, R. E. (1984). *Strategic management*: *A stakeholder approach*. Pitman

Freeman, R. E., Harrison, J. S., & Wicks, A. C. (2007). *Managing for Stakeholders: Survival, Reputation, and Success*. Yale University Press. http://www.jstor.org/stable/j.ctt1npxrg

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917.

Frynas, J. G., & Yamahaki, C. (2016). Corporate social responsibility: Review and roadmap of theoretical perspectives. *Business ethics: A European Review*, *25*(3), 258-285.https://doi.org/10.1111/beer.12115

Gidage, M., & Bhide, S. (2024). Impact of ESG performance on financial risk in energy firms: Evidence from developing countries. *International Journal of Energy Sector Management*, (ahead-of-print). https://doi.org/10.1108/IJESM-05-2024-0021

Gillespie, N., & Dietz, G. (2009). Trust repair after an organization-level failure. *The Academy of Management Review*, *34*(1), 127–145. https://doi.org/10.5465/AMR.2009.35713319

Gilson, S. C., & Abbott, S. L. (2020). *"PG&E and the First Climate Change Bankruptcy."* (HBS Case No. 221-057. Harvard Business School Publishing.

Giráldez-Puig, P., Moreno, I., Perez-Calero, L., & Villegas, J. G. (2024). ESG controversies and insolvency risk: Evidence from the insurance industry. *Management Decision*, *63*(2), 610–639. https://doi.org/10.1108/MD-10-2023-2002

Goss, A., & Roberts, G. S. (2011). The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance*, *35*(7), 1794–1810. https://doi.org/10.1016/j.jbankfin.2010.12.002

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Boston: Cengage.

Harjoto, M. A., & Jo, H. (2011). Corporate governance and CSR nexus. *Journal of business ethics*, *100*, 45-67. https://doi.org/10.1007/s10551-011-0772-6

Hillman, A. J., Cannella, A. A., & Harris, I. C. (2002). Women and racial minorities in the boardroom: How do directors differ? *Journal of Management*, *28*(6), 747–763. https://doi.org/10.1016/S0149-2063(02)00192-7

Hillman, A. J., & Keim, G. D. (2001). Shareholder value, stakeholder management, and social issues: What's the bottom line? *Strategic Management Journal*, *22*(2), 125–139. http://www.jstor.org/stable/3094310

Hunjra, A. I., Jebabli, I., Thrikawala, S. S., Alawi, S. M., & Mehmood, R. (2024). How do corporate governance and corporate social responsibility affect credit risk?. *Research in International Business and Finance*, *67*, 102139. https://doi.org/10.1016/j.ribaf.2023.102139

Kara, A., Nanteza, A., Ozkan, A., & Yildiz, Y. (2022). Board gender diversity and responsible banking during the COVID-19 pandemic. *Journal of Corporate Finance*, *74*, 102213. https://doi.org/10.1016/j.jcorpfin.2022.102213

Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics*, *115*(2), 304–329. https://doi.org/10.1016/j.jfineco.2014.09.008

Lagasio, V., & Cucari, N. (2019). Corporate governance and environmental social governance disclosure: A meta-analytical review. *Corporate Social Responsibility and Environmental Management*, *26*. https://doi.org/10.1002/csr.1716

Li, W. X., Chen, C. C. S., & French, J. J. (2012). The relationship between liquidity, corporate governance, and firm valuation: Evidence from Russia. *Emerging Markets Review*, *13*(4), 465-477. https://doi.org/10.1016/j.ememar.2012.07.004

Liu, C. (2018). Are women greener? Corporate gender diversity and environmental violations. *Journal of Corporate Finance*, *52*, 118–142. https://doi.org/10.1016/j.jcorpfin.2018.08.004

LSEG. (n.d.). *TRBC Sector Classification*. https://www.lseg.com/en/data-analytics/financial-data/indices/trbc-business-classification

LSEG. (2024). Environmental, social and governance scores from LSEG. In *CORPORATE* (pp. 3–6).

Makridou, G., Doumpos, M., & Lemonakis, C. (2023). Relationship between ESG and corporate financial performance in the energy sector: Empirical evidence from European companies. *International Journal of Energy Sector Management*, *18*(4), 873–895. https://doi.org/10.1108/IJESM-01-2023-0012

Martiny, A., Taglialatela, J., Testa, F., & Iraldo, F. (2024). Determinants of environmental social and governance (ESG) performance: A systematic literature review. *Journal of Cleaner Production*, *456*, 142213. https://doi.org/10.1016/j.jclepro.2024.142213

McCarthy, K., Aalbers, R., & Cearney, K. (2025). Organising for innovation: Alliance-to-acquisition transitions and patent production. *Journal of Technology Transfer*. *http://dx.doi.org/10.1007/s10961-025-10199-6*

McCarthy, K. J., & Aalbers, H. L. (2016). Technological acquisitions: The impact of geography on post-acquisition innovative performance. *Research Policy*, 45(9), 1818-1832. https://doi.org/10.1016/j.respol.2016.05.012

Midavaine, J., Dolfsma, W., & Aalbers, R. (2016). Board diversity and R&D investment. *Management Decision*, *54*(3), 558-569. https://doi.org/10.1108/MD-09-2014-0574

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *The Academy of Management Review*, *22*(4), 853–886. https://doi.org/10.2307/259247

Nguyen, Q., Kim, M. H., & Ali, S. (2024). Corporate governance and earnings management: Evidence from Vietnamese listed firms. *International Review of Economics & Finance*, *89*, 775-801. https://doi.org/10.1016/j.iref.2023.07.084

Nollet, J., Filis, G., & Mitrokostas, E. (2016). Corporate social responsibility and financial performance: A non-linear and disaggregated approach. *Economic Modelling*, *52*, 400–407. https://doi.org/10.1016/j.econmod.2015.09.019

Neville, F., Byron, K., Post, C., & Ward, A. (2019). Board independence and corporate misconduct: A cross-national meta-analysis. *Journal of Management*, *45*(6), 2538-2569. https://doi.org/10.1177/0149206318801999

Nielsen, S., & Huse, M. (2010). The contribution of women on boards of directors: Going beyond the surface. *Corporate governance: An international review*, *18*(2), 136-148. https://doi.org/10.1111/j.1467-8683.2010.00784.x

Mehmood, A., De Luca, F., & Quach, H. (2023). Investigating how board gender diversity affects environmental, social and governance performance: Evidence from the utilities sector. *Utilities Policy*, *83*, 101588. https://doi.org/10.1016/j.jup.2023.101588

Moffat, K., Lacey, J., Zhang, A. and Leipold, S. (2016).“The social licence to operate: a critical review”, *Forestry*, Vol. 89 No. 5, pp. 477-488, https://doi.org/10.1093/forestry/cpv044

Nirino, N., Santoro, G., Miglietta, N., & Quaglia, R. (2021). Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices. *Technological Forecasting and Social Change*, *162*, 120341. https://doi.org/10.1016/j.techfore.2020.120341

Popov, K., & Makeeva, E. (2022). Relationship between board characteristics, ESG and corporate performance: A systematic review. *Journal of Corporate Finance Research*, 16(4), 119–134. https://doi.org/10.17323/j.jcfr.2073-0438.16.4.2022.119-134

Post, C., & Byron, K. (2015). Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal*, *58*(5), 1546–1571. https://doi.org/10.5465/amj.2013.0319

Shakil, M. H. (2021). Environmental, social and governance performance and financial risk: Moderating role of ESG controversies and board gender diversity. *Resources Policy*, *72*, 102144. https://doi.org/10.1016/j.resourpol.2021.102144

Song, Y., Li, R., Zhang, Z., & Sahut, J.-M. (2024). ESG performance and financial distress prediction of energy enterprises. *Finance Research Letters*, *65*, 105546. https://doi.org/10.1016/j.frl.2024.105546

Suchman, M. C. (1995). Managing Legitimacy: Strategic and Institutional Approaches. *The Academy of Management Review*, *20*(3), 571–610. https://doi.org/10.2307/258788

Terjesen, S., Couto, E. B., & Francisco, P. M. (2016). Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity. *Journal of Management & Governance*, *20*, 447-483. https://doi.org/10.1007/s10997-014-9307-8

Wang, Z., & Sarkis, J. (2017). Corporate social responsibility governance, outcomes, and financial performance. *Journal of Cleaner Production*, *162*, 1607–1616. https://doi.org/10.1016/j.jclepro.2017.06.142

Wasiuzzaman, S., & Wan Mohammad, W. M. (2020). Board gender diversity and transparency of environmental, social and governance disclosure: Evidence from Malaysia. *Managerial and Decision Economics*, *41*, 145–156. https://doi.org/10.1002/mde.3099

Whelan, T., Atz, U., Van Holt, T., & Clark, C. (2021). ESG and Financial Performance: *Uncovering the Relationship by Aggregating Evidence from 1,000 Plus Studies Published between 2015-2020.* NYU Stern Center for Sustainable Business and Rockefeller Asset Management.

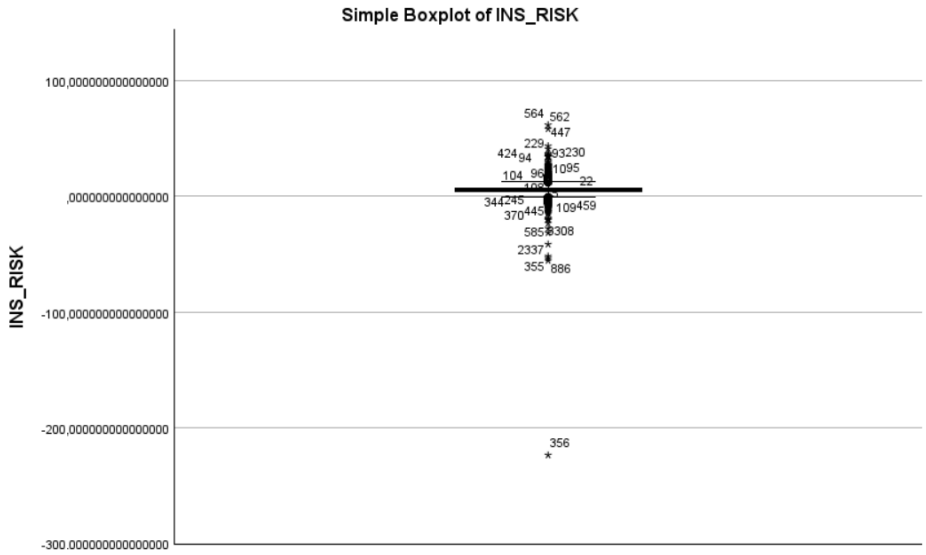
Appendix

Appendix A: Missing value analysis

Variable	N	Missing Count	Percent
ESG_lag1	3606	1236	25.5
ESGC_lag1	3599	1243	25.7
BOARD_GD_lag1	3601	1241	25.6
BOARD_IND_lag1	3600	1242	25.7
ROA_lag1	4781	61	1.3
LEV_lag1	4064	778	16.1
LIQDT_lag1	4827	15	0.3
BOARD_SIZE_lag1	3604	1238	25.6
GDP_G_lag1	4771	71	1.5
FSIZE_lag1	4842	0	0.0
INS_RISK	4216	626	12.9
CEO_DUA_lag1	3611	1231	25.4

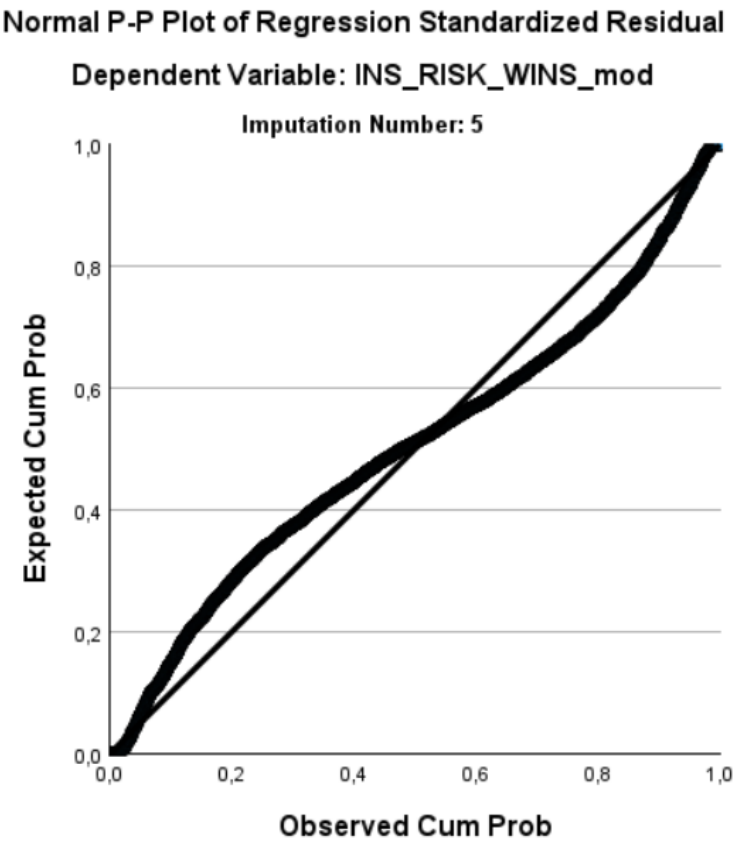
Little's MCAR test: Chi-Square = 1339,636, DF = 285, Sig. = ,000

Appendix B: Box Plot INS_RISK



Note: Asterisk indicates an extreme outlier (more than 3× the interquartile range)

Appendix C: P-P plot

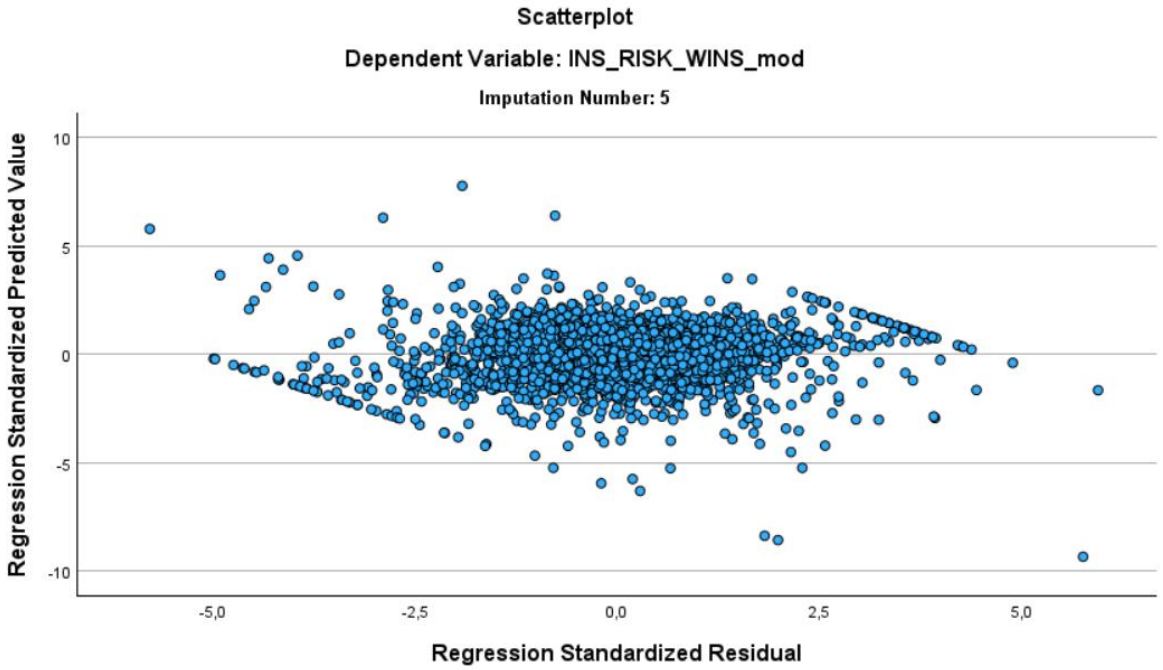


Appendix D: Durbin-Watson tests

Model Summary[e]

Imputation_ Imputation Number	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
						R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
0 Original data	1	,635[a]	,403	,399	2,86196	,403	103,427	19	2912	<.001	
	2	,635[b]	,404	,400	2,86029	,001	4,395	1	2911	,036	
	3	,638[c]	,407	,402	2,85389	,003	7,543	2	2909	<.001	
	4	,639[d]	,408	,403	2,85229	,001	2,632	2	2907	,072	1,434
1	1	,636[f]	,405	,402	2,96407	,405	172,451	19	4822	<.001	
	2	,637[g]	,406	,403	2,96145	,001	9,565	1	4821	,002	
	3	,641[h]	,411	,408	2,94977	,005	20,123	2	4819	<.001	
	4	,642[i]	,412	,409	2,94791	,001	4,041	2	4817	,018	1,472
2	1	,636[j]	,404	,402	2,97868	,404	172,013	19	4822	<.001	
	2	,636[k]	,405	,403	2,97648	,001	8,130	1	4821	,004	
	3	,640[l]	,410	,407	2,96509	,005	19,558	2	4819	<.001	
	4	,641[m]	,411	,408	2,96292	,001	4,534	2	4817	,011	1,491
3	1	,637[n]	,405	,403	2,96202	,405	173,000	19	4822	<.001	
	2	,637[o]	,406	,403	2,96101	,001	4,303	1	4821	,038	
	3	,640[p]	,409	,407	2,95322	,003	13,736	2	4819	<.001	
	4	,640[q]	,409	,407	2,95324	,000	,956	2	4817	,385	1,461
4	1	,634[r]	,402	,400	2,98002	,402	170,944	19	4822	<.001	
	2	,635[s]	,403	,401	2,97820	,001	6,916	1	4821	,009	
	3	,638[t]	,407	,404	2,97039	,003	13,689	2	4819	<.001	
	4	,638[u]	,407	,404	2,96962	,001	2,253	2	4817	,105	1,483
5	1	,635[v]	,404	,401	2,96016	,404	171,830	19	4822	<.001	
	2	,636[w]	,405	,402	2,95791	,001	8,322	1	4821	,004	
	3	,640[x]	,410	,407	2,94538	,005	21,559	2	4819	<.001	
	4	,642[y]	,412	,409	2,94205	,002	6,456	2	4817	,002	1,432

Appendix E: Scatterplot



Appendix F: VIF

Variable	Tolerance	VIF
ESG score	0.628	1.594
ROA	0.854	1.170
Leverage	0.893	1.118
Liquidity	0.900	1.111
Board size	0.731	1.368
CEO duality	0.941	1.062
GDP_	0.549	1.821
FSIZE	0.616	1.624
ESGC	0.790	1.266
BOARD_GD	0.777	1.288
BOARD_IND	0.889	1.124
INT_ESGC_BOARDGD	0.852	1.173
INT_ESGC_BOARDIND	0.872	1.147

Note: Values are based on Model 4 from Imputation 5. Year dummies were excluded from this table, as they are primarily included for time-fixed effects.

Appendix G: Results regression analysis

Variable	Model 1	Model 2	Model 3	Model 4
ESG controversies		.005 (.002)*	.004 (.002)*	.005 (.002)*
Board gender diversity			.001 (.004)	.002 (.004)
Board independence			.011 (.002)***	.011 (.002)***
ESGC × Board gender diversity				.000 (.000)
ESGC × Board independence				-.0002 (.000)*
ESG score	-.017 (.003)***	-.017 (.003)***	-.020 (.003)***	-.020 (.003)***
Firm size	.019 (.043)	-.017 (.045)	-.008 (.045)	-.004 (.044)
ROA	-.100 (.004)***	-.099 (.004)***	-.097 (.004)***	-.097 (.004)***
Leverage	.068 (.002)***	.068 (.002)***	.068 (.002)***	.068 (.002)***
Liquidity	-.767 (.031)***	-.768 (.031)***	-.762 (.031)***	-.762 (.031)***
Board size	.062 (.019)**	.064 (.019)***	.081 (.019)***	.080 (.019)***
CEO duality	-.035 (.137)	-.053 (.134)	-.125 (.131)	-.123 (.130)
GDP growth	-.068 (.021)**	-.066 (.021)**	-.054 (.021)**	-.054 (.021)**
Constant	-6.766 (.660)***	-6.191 (.713)***	-6.402 (.712)***	-6.466 (.694)***
Adjusted R^2	.401	.402	.407	.409
Year dummies	Included	Included	Included	Included
F-statistic	171.830***	163.902***	152.233***	140.401***
Observations	4842	4842	4842	4842

*Significance: *p < .05; **p < .01; ***p < .001*

Variable	B	Std. Error	t	Sig.
year2012	0.294	0.254	1.160	0.251
year2013	0.232	0.225	1.035	0.301
year2014	0.409	0.227	1.802	0.073
year2015	1.348	0.226	5.967	<.001
year2017	-0.265	0.232	-1.142	0.253
year2018	0.481	0.216	2.222	0.027
year2019	0.802	0.218	3.673	<.001
year2020	1.350	0.212	6.360	<.001
year2021	-1.166	0.246	-4.738	<.001
year2022	-0.145	0.239	-0.608	0.544
year2023	0.648	0.218	2.975	0.003

Note: no observations from the year 2011 were retained in the final dataset after filtering. As a result, 2011 is not included in the year dummies.

Appendix H: regression results with a two-year lag

Variable	Model 1	Model 2	Model 3	Model 4
ESG controversies		.003 (.003)	.002 (.003)	.002 (.003)
Board gender diversity			-.002 (.007)	-.002 (.007)
Board independence			.016 (.003)***	.016 (.003)***
ESGC × Board gender diversity				-0,00018 (.000)
ESGC × Board independence				-0,0000076 (.000)*
ESG score	-.022 (.004)***	-.022 (.004)***	-.024 (.005)***	-.024 (.005)***
Firm size	.154 (.051)**	.134 (.058)*	.139 (.058)*	.140 (.056)*
ROA	-.072 (.006)***	-.072 (.006)***	-.068 (.006)***	-.068 (.006)***
Leverage	.067 (.003)***	.067 (.003)***	.067 (.003)***	.067 (.003)***
Liquidity	.124 (.021)***	.124 (.021)***	.124 (.021)***	.123 (.024)***
Board size	.074 (.020)***	.075 (.020)***	.100 (.020)***	.099 (.020)***
CEO duality	.176 (.112)	.165 (.113)	.053 (.115)	.055 (.116)
GDP growth	.071 (.018)***	.072 (.018)***	.080 (.018)***	.079 (.018)***
Constant	-10.385 (.696)***	-10.075 (.780)***	-10.280 (.764)***	-10.281 (.749)***
Adjusted R^2	0.182	0.182	0.195	0.196
F-statistic	134.137***	119.554***	106.286***	90.523***
Observations	4842	4842	4842	4842

* p < .05; ** p < .01;*** p < .001