Whoever Walks in Integrity Walks Securely: Does Corporate Integrity Culture Mitigate Climate Change Exposure?

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Abstract

This study examines the relationship between corporate integrity culture and firm-level climate change exposure. Using insights from social norm theory and a sample of 31,187 firm-year observations from US firms between 2001 and 2021, we conclude that corporate integrity culture is negatively associated with climate change exposure. Our results remain robust across various robustness tests, including propensity score matching (PSM), an instrumental variable approach, and difference-in-differences (DiD) analysis. Further, our channel analysis suggests that a strong integrity culture mitigates corporate climate change exposure through a stronger internal control environment and higher environmental, social, and governance (ESG) disclosures. Finally, our cross-sectional analysis shows that the negative association between corporate integrity culture and climate change exposure is more pronounced for firms with higher climate policy uncertainty and greater financial distress. Overall, we present novel evidence on how corporate integrity culture mitigates climate risk with important implications for managers and policymakers.

Keywords Climate change exposure, corporate integrity culture, social norm theory, ESG, internal controls, climate policy uncertainty.

Introduction

"*Climate justice is both a moral imperative and a prerequisite for effective global climate action. The climate crisis can only be overcome through cooperation between peoples, cultures, nations, and generations"*—António Guterres, Secretary-General of the United Nations, 29 March 2023.

Environmental scientists have reported a significant increase in greenhouse gas (GHG) emissions and global warming (Ortiz-de-Mandojana et al., 2019), resulting in climate change risks that can affect economic assets directly and indirectly (Feng et al., 2024). In response, regulators, managers, and business leaders have developed various climate-related policies, strategies, and action plans (Orazalin et al., 2024)[2]. In recent decades, Environmental, Social, and Governance (ESG) metrics have been adopted as a commonly accepted framework for evaluating corporate social responsibility and sustainability. The role of institutional asset managers has proven to be instrumental in accelerating ESG adoption (O'Connor, 2022), as seen by the stand taken by Larry Fink of BlackRock, which in turn has shaped a global campaign toward achieving net-zero GHG emissions. However, the net-zero agenda faces increasing challenges from political, economic, environmental, and societal uncertainty. For example, the geopolitical risk from the Russian invasion of Ukraine in 2022 not only adversely impacted the global energy supply chain but also revealed the vulnerability of Europe's reliance on Russia for fossil fuels (IEA, 2025). As a result, many countries are forced to reassess their positions regarding renewable energy frameworks and strategies for achieving Net Zero emissions. In addition to weighing in on geopolitical issues, the transition towards a net-zero

[2]Given the growing importance of climate change in business operations, recent management literature has explored its impact on corporate outcomes. For example, climate risk significantly affects bankruptcy risk (Berkman et al., 2024; Feng et al., 2024), capital structure (Ginglinger and Moreau, 2023), stock market volatility (Bonato et al., 2023), financial stability (Battiston et al., 2021), chief executive officer (CEO) equity incentives (Hossain et al., 2023), and corporate cash holdings (Gounopoulos and Zhang, 2024).

future has been costly for those in agriculture and other sectors due to the economic burden of price hikes in energy and commodities (McKinsey & Company, 2022).

The impact of these economic pressures has been intensified by political and societal disputes over the effectiveness and costs of ESG initiatives, seeding widespread doubt about the very future of net-zero as an overarching goal. For instance, some firms in the US have deviated from their earlier commitments as ESG has become highly politicised recently, partly due to growing concerns from certain powerful societal factions that view progressive initiatives like ESG and DEI (diversity, equity, and inclusion) as being part of a corrupting and imposed agenda, often labelled as 'woke' (Warren, 2022). These multifaceted challenges created by geopolitical, economic, and societal pressures require new paradigms for businesses to effectively address climate change exposure by building stakeholder trust and resilience. Given this backdrop, prior literature (e.g., Freedman and Jaggi, 2011; Haque and Ntim, 2018) examines the determinants of corporate climate change exposure at both the macro- and firm-levels. However, little is known about the likely influence of firms' informal control systems, such as a corporate culture of integrity, on reducing climate change exposure (Koehn, 2005).

This gap in the literature seems surprising, as a recent survey by Graham et al. (2022) of North American executives revealed that 92% believed an improved corporate culture would enhance firm value, while 84% saw a need to improve culture in their organisations. Poor corporate integrity culture is synonymous with harmful and unethical corporate behaviour, which is considered one of the important factors underlying the 2007-2008 global financial crisis. Corporate integrity culture can be instrumental in shaping a firm's strategies and action plans during times of climate policy uncertainty and financial distress (Fang et al., 2023), especially given the complex and unpredictable nature of a firm's climate change exposure. Thus, we argue that firms with a robust integrity culture are better positioned to manage the multifaceted risks associated with ESG controversies, as it enables firms to navigate ethical challenges by implementing strategies rooted in societal values and building transparent and trustworthy relationships with all stakeholders. Accordingly, in this study, we examine the association between corporate integrity culture and climate change exposure.

Bicchieri's (2006) model of social norm activation suggests that organisational factors such as organisational culture can influence social norms, which in turn shape ethical business decision-making, including corporate sustainability initiatives (Blay et al., 2018). According to her model, social norms are activated when individuals recognise that specific behaviours align with shared expectations and perceive that others also endorse and follow these behaviours. In the context of corporate integrity culture, the activation of social norms depends on the alignment of corporate values with broader societal ideals. When societal values emphasise sustainability, inclusivity, and ethical responsibility, these norms are more likely to be internalised by senior management teams and employees, which eventually renders corporate decisions and actions more sustainability-oriented. Thus, Bicchieri's model provides an ideal theoretical framework for our empirical investigation of the influence of corporate integrity culture on firms' climate change exposure. We use insights from her model to build a conceptual framework that supports our prediction that a high corporate integrity culture is associated with a decline in a firm's climate change exposure.

We test our prediction using a large sample of US firms over the period from 2001 to 2021. We employ two novel datasets on corporate integrity culture and climate change exposure that are developed based on textual analysis of earnings calls using advanced machine learning techniques. To capture corporate integrity culture, we utilise the corporate integrity culture index of Li et al. (2021b) that assesses language indicative of an integrity culture during earnings calls. This qualitative depiction of organisational culture in such contexts serves as a valid indicator of workplace ethos, an assumption that rests on the premise that managers are inclined to align their verbal expressions with the values they advocate, particularly in discussions pertinent to business operations and performance. Likewise, we use a comprehensive machine-learning-based measure of a firm's climate change exposure, as developed by Sautner et al. (2023), covering multiple dimensions spanning physical risks, regulatory risks, and climate-related opportunities and their associated uncertainties and costs. The extant literature suggests that measuring the impact of climate change on individual firms is difficult, as it may bring them significant challenges and, in some cases, opportunities due to the complex and multifaceted cause-and-effect relationships (Sautner et al., 2023). Therefore, it is imperative to measure corporate climate change exposure from multiple dimensions; accordingly, we propose that the measure designed by Sautner et al. is an ideal choice for our study.

Our empirical results show that corporate integrity culture has an inverse association with a firm's overall climate change exposure and three specific components of climate shocks: physical exposure, regulatory exposure, and opportunity exposure. These findings support our theoretical argument that, in the face of geopolitical, economic, and societal pressures, organisations with a strong integrity culture are arguably better equipped to manage ESG controversies while aligning their operations with both stakeholder expectations and long-term sustainability goals. Our results remain robust to various identification tests using firm fixed effects, propensity score matching (PSM) analysis, two-stage least squares (2SLS) regression, difference-in-differences (DiD) analysis, and additional control variables. Regarding channel analysis, following our theoretical framework, we examine the potential effects of two possible channels: the strength of a firm's internal controls and climate information asymmetry (e.g., ESG disclosures). Our estimated results suggest that a strong internal control environment and higher ESG disclosures have an inverse association with climate change exposure, and a strong corporate integrity culture reinforces this relationship. Finally, our cross-sectional analysis indicates that the negative association between corporate integrity culture and climate change exposure is more pronounced in firms with high climate-related policy uncertainty and greater financial distress.

We contribute to the literature in several ways. First, we contribute to a limited body of literature that investigates the influence of corporate integrity culture on corporate outcomes such as profitability and productivity (Guiso et al., 2015), operational and regulatory compliance (Altamuro et al., 2022), executive compensation (Graham et al., 2022), and corporate social responsibility (CSR) performance (Wan et al., 2020). However, to the best of our knowledge, no comprehensive study exists on the linkage between corporate integrity culture and climate change exposure. Thus, our study contributes to this stream of literature by showing a negative relationship between the two.

Second, our study contributes to the body of literature investigating the determinants of corporate climate change exposure. Prior studies have shown that factors such as regulations (Freedman and Jaggi, 2011; Haque and Ntim, 2018), board and board committees (Orazalin et al., 2024), and executive compensation (Hossain et al., 2023) have a significant impact on climate change exposure. In a similar vein, Costa and Opare (2024) find that a strong corporate culture is inversely related to the release of toxic chemicals. We offer new evidence suggesting that a firm's ethical dimension of integrity culture not only mitigates its climate change exposure but also specific sub-components such as physical, regulatory, and opportunity shocks. Thus, we extend this literature by providing novel evidence that corporate integrity culture is indeed another crucial determinant of a firm's overarching climate change exposure, which directly relates to its risk management strategies.

Third, we are the first to use Bicchieri's (2006) model of social norm activation, a novel theoretical framework, to explain the impact of corporate integrity culture on climate change exposure. We, therefore, contribute to a growing body of literature on the application of social norm theory in ethical decision-making by explaining how firm-level values arising from an integrity culture can be linked with social norms to enhance ethically grounded long-term decisions that can mitigate a firm's climate-related exposure related to physical, regulatory, and opportunity shocks. In this process, we extend the applicability of the Bicchieri model at the firm-level and develop a theoretical framework that focuses on the interplay between broader societal norms, corporate values, and the dynamics of social norm activation. While we focus on the relationship between corporate integrity culture and climate change exposure, our framework can provide insights into other corporate challenges, such as addressing societal polarisation and backlash against progressive values.

Finally, we utilise a comprehensive dataset comprising 31,187 firm-year observations from US public firms spanning the period from 2001 to 2021. This extensive timeframe allows us to capture the evolving nature of corporate integrity culture and climate change exposure, particularly in response to growing regulatory pressures and societal expectations. The robustness and recency of our data provide a strong foundation for our findings, making our conclusions highly relevant in today's corporate sustainability context.

The remainder of our paper is organised as follows. Section 2 presents the theoretical framework and develops the hypotheses. Section 3 discusses the data sources, sample, and methodology. Section 4 presents and discusses our main results, endogeneity tests, and channel analysis, while Section 5 presents additional analysis. Finally, Section 6 concludes the paper.

Theoretical Framework and Hypothesis Development

Theoretical Framework: Social Norm Activation Theory (Bicchieri, 2006)

A culture of integrity acts as an informal institution that enhances organisational performance by mitigating moral hazard problems, reducing transaction costs, and improving organisational efficiency (Garrett et al., 2014; Shu et al., 2018; Ongsakul et al., 2021). Senior management teams tend to promote the notion of 'keeping your word' to facilitate the social enforcement of an integrity culture among employees, thereby increasing trust and reducing moral hazard problems among them (Guiso et al., 2015). More generally, Li et al. (2021a) argue that a strong corporate culture is likely to enhance employee motivation and help align organisational goals, which eventually enables corporate executives to make consistent decisions geared toward longer-term perspectives, optimising challenging operational environments. More specifically, corporate integrity culture acts as a 'social control' mechanism that addresses the inadequacies of formal control systems and influences choices and behaviours through peer influence or social constructions, which eventually influence organisational effectiveness and firm performance (Fang et al., 2023). This is broadly related to social norm theory, which views individuals as part of a social group expected to follow specific societal values and norms (Wan et al., 2020), which in turn determines whether particular human behaviour is right or wrong (Blay et al., 2019). This underscores the significance of 'shared' societal values and ideals that can inspire employees to 'walk the talk.'

Social norm theory, originating from Adam Smith's seminal work, *The Theory of Moral Sentiments* (1759/1790), has been used to incorporate morality into economic theory (Campbell, 1971; Stevens, 2019). In particular, Smith's work on the source and role of moral judgement in society (such as our natural ability to determine 'right versus wrong' and/or to 'sympathise' with the state and condition of other human beings) supports the link between moral norms and social norms (Blay et al., 2018). Bicchieri (2006) proposes a positive theory of social norm activation to explain phenomena in social psychology and experimental economics, and her theory has been extensively applied in experimental accounting research[3] (Blay et al., 2018; Stevens, 2019; Douthit et al., 2022). While the Bicchieri model does not

[3] For example, several studies use this theory to explain how honesty preferences, distributional fairness, and trustworthiness in behavioural norms shape corporate decisions involving budgetary slack (Rankin et al., 2008) and participative budgeting (Douthit and Stevens, 2015).

directly focus on the firm, it suggests that organisational and individual factors affect social norm activation independently and in combination[4].

We use Bicchieri's (2006) model of social norm activation, as it has been linked to various organisational and individual factors that may impact norm-based behaviour and ethical decision-making in an interdisciplinary setting such as any linkage between integrity culture and climate change exposure (Blay et al., 2018). Societal values and norms such as honesty, integrity, transparency, and doing the right thing (Guiso et al., 2015) are critical considerations in shaping corporate sustainability agendas, especially during periods of environmental uncertainty such as climate change risk. The Bicchieri model provides a foundational lens for understanding how collective expectations and individual perceptions influence behaviour in organisations. The theory outlines three motivations that can drive individuals to comply with a given social norm (Blay et al., 2018. p. 196): (i) fear of potential sanctions or penalties for violating the norm; (ii) desire for potential rewards (e.g., financial rewards, respect, or dignity) from fulfilling the norm; and (iii) acceptance of the social norm as valid. The model further suggests that individuals have conditional preferences for social norms based on their experiences, and that these norms may be activated when situational cues and information make them salient in an economic and social setting (Douthit and Stevens, 2015; Blay et al., 2018; Stevens, 2019). Consequently, social norms shape behavioural expectations and ethical decision-making within an organisation.

We argue that individuals and corporations often face ethical dilemmas when multiple social norms are activated simultaneously. This corroborates the findings of Douthit and Stevens (2015), who use Bicchieri's model (2006) to explain the interactive effects of competing social norms in a participative budgeting setting and suggest that individuals trade-

[4] Stevens (2019) provides a comprehensive account of social norms and the neoclassical theory of the firm by evaluating historical, theoretical, and empirical insights.

off social norms when multiple norms are activated[5]. To exemplify further, global corporations have faced growing political pressure to support the Ukrainian people by closing or scaling back their operations in Russia. However, the decision to leave Russia has wider implications not just in monetary terms but also for ethical values and principles, especially in relation to essential human needs (EHN) and job losses in Russia. This is supported by Huang et al. (2024), who examine the corporate responses to ethical dilemmas and subsequent stock market reactions to those decisions in the context of the Russia-Ukraine war. They find that firms in industries providing EHN are 45% less likely to leave Russia and that investors do not penalise them for staying in Russia, implying that investors understand and support corporate decisions with conflicting moral and ethical values. We contend that corporate integrity culture can be a salient force when multiple social norms are activated, as it enables firms to address ethical dilemmas with transparency, overhaul societal-value-driven strategies, and uphold a transparent and trustworthy relationship with all stakeholders.

Applying the Bicchieri model to the context of our study, namely, climate change, the role of integrity culture becomes even more crucial. Climate change embodies a collective action problem, where aligning individual, organisational, and societal norms is important for effective carbon mitigation efforts (Ostrom, 2010). Firms that prioritise an integrity culture are in a better position to resolve the ethical dilemmas intrinsic to climate action. To elaborate further, a firm may face trade-offs between reducing emissions and sustaining profitability. An integrity-driven approach emphasises that these trade-offs are addressed transparently, with decisions based on ethical values, social welfare, and long-term value maximisation, which ultimately boost stakeholder trust and improve long-term resilience against climate-related

[5] Using Rankin et al.'s manipulation (2008), Douthit and Stevens (2015) investigate the effect of honesty in participative budgetary settings and find that the honesty norm has a strong impact on budgetary slack when the distributional fairness norm is reduced by withholding the relative pay of the superior from the subordinate. They also report that the effect remains robust when the reciprocity norm is increased by allowing the superior to set the subordinate's compensation.

exposure. In addition, activating climate-related norms within firms largely depends on aligning corporate values with broader societal expectations. Firms that emphasise environmental sustainability initiatives as core values may prioritise activating and promoting climate-focused norms among employees if these values resonate with broader societal expectations. However, misalignment between corporate values and societal norms can hamper norm activation, eliminating the effectiveness of environmental initiatives.

Overall, Bicchieri's (2006) model of social norm activation provides a robust theoretical lens for understanding corporate behaviour. When societal norms prioritise ethics, sustainability, and social responsibility, these values are more likely to be integrated into a firm's mission and operational strategies, and accordingly communicated through the 'tone at the top'. In the context of our study, we argue that societal cues (such as stakeholder pressures and climate regulations) drive firms to adopt environmental practices that align with broader societal values, which in turn shape employees' perceptions of corporate integrity. We also argue that ethical decision-making can be multi-dimensional, implying that multiple and competing societal values may drive corporate actions differently depending on various situational cues and stakeholder pressure in a broader context (Huang et al., 2024; Douthit and Stevens, 2015). Consequently, shifts in societal values and multiple/competing social norms, such as the growing political polarisation around ESG metrics and DEI initiatives in some countries, can force organisations to compromise on their sustainability and socially progressive agendas or to make trade-offs among competing priorities.

Hypothesis Development

We use insights from Bicchieri's (2006) model to develop a conceptual framework that links a firm's corporate integrity culture to its climate change exposure. Our conceptual framework, as presented in Figure 1, outlines how broader societal values influence corporate integrity culture, which in turn shapes individual social norms (such as honesty, fairness, responsibility, and accountability) and influences ethically driven corporate sustainability initiatives and action plans, leading to a decline in corporate climate change exposure. These include (i) stakeholder engagement, (ii) ethical decision-making and long-term commitment, (iii) internal control and compliance, and (iv) ESG engagements and disclosures. We describe the intuition behind this conceptual framework to develop our main hypothesis below.

[Insert Figure 1 Here]

First, as we explained earlier, broader societal values play a significant role in shaping stakeholders' influence and act as an important driver for adopting corporate ESG strategies. In line with this, Wang et al. (2021) argue that stakeholders influence corporate decision-making to enhance ethical and professional standards and promote green innovations for sustainable development. This is broadly consistent with Bicchieri's model of social norm activation in that situational cues such as stakeholder pressures tend to influence individuals' social norms, leading to an increase in corporate pro-social behaviour and ESG engagement (Blay et al., 2018; You, 2023). Further, Wan et al. (2020) argue that a corporate integrity culture places greater emphasis on the legitimate interests of stakeholders, which drives firms to strike an optimal balance between shareholder wealth and stakeholder value maximisation objectives. It also lays down the foundations for corporate executives and other employees to undertake business initiatives consistent with high ethical standards, societal norms, environmental considerations, and stakeholders' expectations.

Second, a corporate integrity culture influences an individual's social norms of honesty and responsibility, shaping the social orientation and ethical decision-making of top executives regarding corporate sustainability initiatives (Blay et al., 2018; You, 2023). These social norms can also help a firm mitigate its moral hazard problems by restricting individuals' opportunistic behaviours and minimising harmful and unethical corporate activities. This is largely aligned with the argument in Bicchieri (2006) that social norms are important in addressing the conflict between selfish and pro-social incentives (Blay et al., 2018). Likewise, Guiso et al. (2015) argue that an integrity culture acts as an informal control mechanism that constrains individuals from maximising short-term profits at the expense of long-term benefits such as customer satisfaction and long-term value creation. As environmental projects involve significant monetary commitment to long-term value creation rather than short-term profit, a strong integrity culture is likely to build greater organisational capacity to prevent myopic behaviours and enhance long-term organisational success (Wang et al., 2021). Therefore, we argue that a high integrity culture influences executives to pursue long-term value-enhancing activities, including environmental-friendly projects.

Third, Altamuro et al. (2022) argue that a weak integrity culture is reflected in an ineffective internal control environment, which in turn is associated with both financial and operational non-compliance. They also observe that a corporate integrity culture promotes greater consistency and closer monitoring of operational and financial reporting processes and outcomes to mitigate non-compliance. Likewise, Graham et al. (2022) argue that integrity culture encompasses several ethical choices, including regulatory compliance and the avoidance of unethical practices. Moreover, Wan et al. (2020) argue that integrity values in corporate culture can intrinsically affect and guide the behaviours of managers and then be internalised into their value systems. This suggests that a high integrity culture influences managers' and employees' behaviour and readiness to comply with regulations and follow ethical and socially responsible business practices such as improved disclosures, environmentally friendly products and services, employee welfare, and more significant community engagement. Fourth and finally, an integrity culture is associated with improved financial reporting quality, lower information asymmetry, and a superior information environment (Graham et al., 2022; Hasan, 2022). Taking insights from these studies, we can infer that a culture of integrity is likely to be associated with improved ESG engagement disclosures, thereby reducing climate information asymmetry and mitigating climate change risks.

The conceptual framework in Figure 1 suggests that corporate integrity culture can shape an individual's social norms as well as a firm's climate-related decision-making by influencing corporate executives' understanding of climate risks and opportunities and their motivation to reduce GHG emissions, leading to reduced climate change exposure. However, one may question whether corporate integrity culture has equal mitigating effects on all types of climate change exposure. Considering the multifaceted nature of climate change exposure, Sautner et al. (2023) classify it into three broad categories focusing on the extent of discussions in earnings conference calls on climate change-related risks and opportunities: (i) physical shock, (ii) regulatory shock, and (iii) opportunity shock.

Physical shock captures a firm's exposure to extreme weather events (such as hurricanes or floods), rising sea levels, and other natural hazards resulting from climate change. Regulatory shock captures firms' exposure to risks from policy or regulatory change related to climate change (such as carbon taxes, cap-and-trade systems, and mandatory reporting standards), as compliance can increase operational costs and regulatory scrutiny. Finally, opportunity shock measures a firm's exposure to climate-related opportunities (such as developing green technologies and renewable energy projects) and the risks associated with pursuing them. These risks stem from uncertainties in market demand, technological feasibility, and regulatory support. Thus, opportunity shocks arise from new business opportunities or the transformation of existing ones due to the structural transition towards a low-carbon economy.

While it is reasonable to argue that corporate integrity culture mitigates physical and regulatory risks exposure, the question then arises as to why it may mitigate a firm's exposure to climate change opportunities. We argue that firms with a strong integrity culture may tend to be more risk-averse, prioritising transparency, compliance, and stability over aggressively pursuing opportunities that involve high uncertainty and risk related to climate change. In other words, these firms may incorporate and implement climate strategies in their core operations but evade aggressive and high-risk climate-related business opportunities that can negatively affect their financial gain and reputation. Moreover, managers in ethical firms are likely to avoid exaggeration and over-promotion, adopting a cautious approach to communicating climate-related opportunities in earnings transcripts to avoid being accused of 'greenwashing'. This may result in a lower measurement of exposure in the Sautner et al. (2023) methodology. In addition, while an integrity culture encourages sustainable and environment-friendly business practices, it may also lead firms to adopt a more conservative stance in their involvement in and communication of climate-related opportunities. Such conservatism could lead to a lower measurement of exposure to climate change opportunities in earnings calls, even if the firms are taking positive sustainability steps.

We also contend that an integrity culture might not lead to substantive climate-related actions if dominant shareholders are concerned about the uncertainty of returns on significant investment in climate-related projects, at least in the short term. In this context, firms may engage in greenwashing and impression management without necessarily undertaking substantive climate-related actions that uphold the values of an integrity culture (Guiso et al., 2015; Wan et al., 2020). Nonetheless, as integrity culture restricts managerial opportunism and mitigates agency problems (Guiso et al., 2015; Graham et al., 2022), we argue that this social control is likely to shape a firm's strategic agenda towards more substantive climate-related policies and action plans, which in turn minimises corporate climate change exposure.

Based on the preceding theoretical arguments and empirical evidence, we test the following hypothesis:

Hypothesis 1 (H1) *A high corporate integrity culture is associated with a decline in a firm's climate change exposure.*

Data and Model

Data

We collect our data from different sources. Our integrity culture data are taken from Li et al. (2021b) for the period 2001-2021. They use machine learning and word embedding techniques to construct a measure of corporate integrity culture from the 209,480 extemporaneous question-and-answer sections of earnings call transcripts. These segments best capture the spontaneous reactions of corporate executives, making them less susceptible to manipulation. This method of Li et al. (2021b) assesses corporate culture by extracting scores for five cultural dimensions, including integrity, which employs an expanded context-specific dictionary of relevant terms, such as honesty, ethics, responsibility, accountability, transparency, trustworthiness, and fairness. Their approach then calculates a corporate integrity score based on the weighted frequency of these terms divided by the total word count in the transcript. A high score indicates a strong integrity culture. We believe this measure is likely to capture a more factual level of corporate integrity culture as they draw on the language used organically in earnings calls to discern the corporate culture; such an approach should best reflect the core values of the senior management team and be less prone to window dressing than the same firm's media releases or website content.

As mentioned, we also use a comprehensive, machine-learning-based measure of a firm's climate change exposure, as developed by Sautner et al. (2023), covering multiple dimensions of such exposure, including physical, regulatory, and opportunity shocks. While the physical shocks of climate change (such as natural hazards and sea level rise) and the enforcement of climate regulations (such as carbon taxes, cap and trade markets, and environmental regulations) bring additional risk and costs for some firms, climate change can provide enormous opportunities for other firms, especially in areas of industry centered on the transition to low carbon (Sautner et al., 2023). Nonetheless, Sautner et al. highlight a range of uncertainties associated with climate-related innovation, green technology, and renewable energy investment (such as solar energy, wind power, and electric vehicles and batteries), their being largely dependent on investors' propensity to hedge against extreme climate risks and/or gamble on climate outcomes.

Exploiting the machine learning algorithm developed by King et al. (2017), Sautner et al. (2023) utilise and deconstruct climate-change-related utterances from conference calls to identify and compile climate change bigrams. Their variable is constructed as the total number of climate bigrams scaled by the total number of all bigrams in the transcript. A high score indicates greater exposure to climate change. Sautner et al. (2023) argue that their measure represents soft information exchanged between management and analysts, which provides management insights beyond those from commonly used hard information, such as natural disasters and carbon emissions. Natural disaster data are often macro-level and fail to capture firm-specific sensitivity, while carbon emissions data are limited to firms that voluntarily disclose them. Conversely, the measure developed by Sautner et al. (2023) is derived from analyst-manager dialogues that reduce missing data issues and self-disclosure bias. Regarding the validity of the measure, Sautner et al. (2023) demonstrate that it passes validity tests and endures a structured human audit; their measure is positively associated with carbon emissions and public attention to climate change.

Regarding other variables, we obtain data on ESG disclosure, analyst following, institutional ownership, and corporate governance measures from the Bloomberg, I/B/E/S, Thompson Reuters 13F, and BoardEx databases, respectively. Data on all the other variables in the study are taken from the Compustat database. We remove financial firms (those with standard industrial classification (SIC) codes 6000-6999) as these are subject to various distinct operating and reporting regulations. We also remove firms with less than USD 1 million in total assets. Finally, we omit observations with missing values. Applying these classification steps results in a final sample of 37,187 firm-year observations for our primary test.

Empirical Model

We estimate the following regression equation to test the association between integrity culture and climate change exposure:

$$CCE_{j,t} = \alpha + \beta_1 INTEG_{j,t-1} + \beta_2 \text{Controls}_{j,t-1} + \tilde{e}_{j,t} \quad (1)$$

where $CCE_{j,t}$ is the climate change exposure of firm j at time t, and $INTEG_{j,t-1}$ is the corporate integrity culture of firm j at time *t-1*. According to our hypothesis *H1*, we expect $\beta_1 < 0$.

$\text{Controls}_{j,t-1}$ refers to the set of control variables of firm *j* at time *t-1*. Following extant literature (Atif et al., 2021; Alam et al, 2022; Jung et al., 2023), we include *SIZE*, the natural log of total assets; *LEV*, the sum of debt in current liabilities and long-term debt divided by total assets; *ROA*, the ratio of net income to total assets; *RET,* the annual excess return as measured by the difference between company stock return; *VOL*, the annualised stock return volatility; *RD,* a dummy variable with a value of 1 when the ratio of research and development (*R&D*) expenses to sales is available, and 0 otherwise. We include additional control variables, specifically, market-to-book value (*MB)*, the market value of equity divided by the stockholders' equity; *LOSS*, a dummy variable equals 1 for a firm's ROA is negative, and zero otherwise; *INSTOWN,* percentage of dedicated institutional ownership in year; *TANGIBLE*, is the ratio of plant, property, and equipment to total asset; and *ANALYST*, the monthly average number of analysts following the firm over a 12-month period. We provide detailed variable descriptions in the appendix Table 1A.

We measure the dependent variable at year *t* and the regressors at year *t-1*. We winsorise all continuous variables at the 1st and 99th percentiles to account for outliers. We use industry-and year-fixed effects in all our regressions. We correct the standard error using firm and year levels.

Descriptive Statistics

Table 1 reports the descriptive statistics for our sample. The average of *CCE* is 0.5427 and varies between 0.0000 and 1.9269. The 25th percentile and 75th percentile are 0.1096 and 0.7265, respectively, indicating substantial variation in *CCE*. The mean values of carbon exposure sub-measures are 0.0984, 0.0083, and 0.0148 for opportunity shock ($EXPO_{op}$), regulatory shock ($EXPO_{rg}$), and physical shock ($EXPO_{ph}$), respectively. The average value of *INTEG* is 2.3232, with a minimum of 1.1500 and a maximum of 4.1368. Similar to *CCE*, there is sufficient variation in *INTEG* as reported by the corresponding 25th percentile and 75th percentile of 1.5414 and 2.9482. Regarding the control variables, *SIZE*, *LEV, ROA,* and *RET* have an average of 6.8995, 0.2201, 0.0041, and 0.0435, respectively. Also, *VOL* averages 0.4395, *RD* averages 0.6128, MB averages 4.5490, and *LOSS* averages 0.3129. Finally, the mean values of *INSTOWN, TANGIBLE,* and *ANALYST* are 0.6715, 0.4470, and 7.5155, respectively[6].

[Insert Table 1 Here]

Empirical Results

Baseline Results

Our baseline estimation results for the relationship between integrity culture and climate change exposure levels are presented in Table 2, which provides model estimation results for both the composite measure and three sub-measures of climate change exposure. In Column 1, we find that integrity culture (*INTEG*) is negatively related to climate change exposure (*CCE*) at the 1% significance level. Regarding economic significance, the estimated coefficient of

[6] The Pearson correlation matrix in Appendix 2A does not find any extreme correlations in the control variables.

INTEG reported in Column 1 is -0.0213. Therefore, given that the standard deviation of *INTEG* is 0.9356 (as reported in Table 1), a one standard deviation increase in *INTEG* relates to a decrease of 0.0199 (= -0.0213 × 0.9356) in CCE. This is equivalent to a 3.62% (= -0.0199 / 0.5427) reduction in CCE, evaluated at the mean value of CCE in the sample. Our findings on economic significance are consistent with those reported in previous studies. For example, Liu (2016) demonstrates that a one-standard-deviation increase in corruption culture leads to a 2.3% rise in abnormal accruals. Similarly, Chen et al. (2022) report that a one standard deviation increase in collaboration culture is associated with a 2.2% decrease in audit fees.

In Columns 2-4, we estimate the impact of *INTEG* on three sub-measures of climate change exposure and find negative relationships between them, at least at the 5% significance level. Regarding the control variables, we find qualitatively similar results with extant literature (Atif et al., 2021; Alam et al., 2022). In particular, larger firms (*SIZE*), firms with higher growth opportunities (*MB*), greater institutional ownership (*INSTOWN*), and firms spending more on tangible assets (*TANGIBLE*) experience lower climate change exposure, while firms with more loss (*LOSS*) have high climate change exposure.

Our main results suggest that a firm's integrity culture mitigates corporate climate change exposure, a finding that also holds for each of the three components of climate change exposure: physical, regulatory, and opportunity shocks. This evidence is consistent with our theoretical framework, which is based on the insights from Bicchieri's (2006) model of social norm activation that explains how corporate integrity culture acts as a social control mechanism to influence the social and behavioural norms of honesty, integrity, transparency, accountability, responsibility, and fairness (Blay et al., 2018; Guiso et al., 2015; Graham et al., 2022). This eventually shapes ethical business decision-making and long-term (substantive) climate commitments, strengthens internal controls and compliance, facilitates stakeholder engagements, and enhances ESG disclosures, leading to a decline in corporate climate change exposure. Our findings highlight the importance of embedding a high integrity culture into corporate practices to address climate change exposure in dynamic and increasingly polarising environments. Moreover, our evidence is consistent with prior empirical studies that suggest a positive impact of corporate integrity culture on corporate outcomes such as corporate profitability and productivity (Guiso et al., 2015), operational and regulatory compliance (Altamuro et al., 2022), executive compensation (Graham et al., 2022), and CSR performance (Wan et al., 2020).

[Insert Table 2 Here]

Endogeneity Tests

In this section, we address potential endogeneity concerns using the following five approaches: (i) firm fixed effects, (ii) propensity score matching (PSM), (iii) the instrumental variable approach, (iv) difference-in-differences (DiD) analysis, and (v) additional control variables.

Firm Fixed Effects

To rule out the influence of firm-level unobserved heterogeneity on the relationship between integrity culture and climate change exposure, we re-estimate our baseline models in Table 2 by employing firm fixed effects. The results are reported in Table 3. Our results show that the relationship between integrity culture and climate exposure measures is still negative and statistically significant. Moreover, the explanatory power of the models in Table 3 has also increased substantially with the inclusion of the firm fixed effects, as evidenced by improved adjusted R^2 across all models. Overall, our firm fixed effects results suggest a strong association between integrity culture and climate change exposure levels after addressing firm-level unobserved heterogeneity.

[Insert Table 3 Here]

Propensity Score Matching (PSM) Analysis

To address any concerns related to possible sample selection bias, we employ the propensity score matching (PSM) process. Using our control variables, we match our treatment firms to control firms for each fiscal year based on one-to-one nearest neighbour matching without replacement. We define the treatment firms as those with above-median industry-based integrity culture scores and identify control firms as those with below-median integrity culture scores but with similar firm-level characteristics. The outcomes of the PSM process across treatment and control firms are presented in Panel A of Table 4. None of the mean differences of independent variables between the matched treatment and control firms is statistically significant, indicating the comparability of the matched sample firms. We then re-run our baseline estimations based on the matched sample, and present the results in Panel B of Table 4. We find a similar negative and statistically significant association between the integrity culture and climate change exposure level across all specifications of dependent variable. The consistency of these results continues to support *H1* that firms with a higher integrity culture experience lower climate change exposure. These findings confirm that observable variations between firm-year observations of high-integrity culture and low-integrity culture do not drive our main findings.

[Insert Table 4 Here]

Instrumental Variable Approach

Our third approach addresses the endogeneity concern by using an instrumental variable methodology to isolate the exogenous component of the integrity culture variable. This exogenous component is then used to explain climate change exposure. Consistent with Balachandran et al. (2025), we use state-level variation in per capita corruption convictions as an instrumental variable for firm-level integrity culture. This approach is based on the idea that high corruption conviction rates signal a regulatory and legal environment where unethical behaviours, including corporate misconduct, are more likely to be penalised, thereby influencing the prevalence of integrity-oriented corporate cultures. Thus, firms operating in states with higher corruption convictions face more substantial incentives to cultivate a robust integrity culture than those in states with lower corruption convictions (Balachandran et al., 2025); this supports the relevance condition. The exclusion condition is met because corruption conviction rates do not directly affect the physical, regulatory, and opportunity shocks of climate change (e.g., a firm's vulnerability to extreme weather events, regulatory changes, or environmental risks) as the convictions do not directly regulate or mandate sustainability initiatives or firm-level climate risk disclosures. Instead, they affect how firms respond to those risks, particularly by influencing whether they adopt integrity-driven strategies that better prepare them for climate-related challenges. Overall, the state-level per capita corruption conviction rate (*LNCONVICT*) can be used to capture variations in corporate integrity culture.

Table 5 presents our empirical results. We run the first-stage model using the same explanatory variables adopted in the OLS regression reported in Table 2 to obtain the predicted values of integrity culture (*EXPINTEG*). In Column 1, the coefficient of *LNCONVICT* is positive and statistically significant at the 1% level, aligning with our expectation. The F-statistics from the first-stage regression exceed the threshold of 10 recommended by Staiger and Stock (1997), providing strong evidence of the instrument's relevance. Furthermore, the Cragg-Donald Wald F-statistic indicates that the instruments used in the first stage are not weak. The predicted value of integrity culture from the first-stage regression is subsequently used in the second-stage regression. The results of the second stage regressions in Columns 2-5 show statistically significant coefficients, reaffirming the main finding of a negative association between integrity culture and climate change exposure.

[Insert Table 5 Here]

Difference-in-Differences Analysis: The Effect of the CEO Departures

In this sub-section, we employ a DiD analysis, using the CEO's departures, such as those due to sudden death, illness, and other personal issues, as an exogenous shock to influence the relationship. We argue that a CEO's departure may have substantial implications for a firm's integrity culture as the CEO is viewed as the moral compass and driving force behind a firm's ethical standards (Davis, 1984; Schein, 2004). A CEO with strong personal integrity prioritises ethics at the core of their decisions and demonstrates fair and responsible leadership through transmitting, modifying, and maintaining cultural values (Eisenbeiss et al., 2015). Conversely, an unethical CEO, characterised by a lack of transparency, financial misconduct, and regulatory non-compliance, can weaken internal controls and the governance system, making ethical lapses more likely. This can lead to a decline in corporate integrity culture, as employees of the firm may simply follow the CEO's example or feel demotivated in maintaining ethical standards. Thus, the departure of a CEO may result in a shift in ethical priorities, values, and overall corporate strategy, either strengthening or weakening them, which in turn affects the climate-related policies at the time.

To execute our empirical analysis, we collect CEO departure-related data from Gentry et al. (2021). We classify firms based on the observed change in integrity culture following a CEO's departure. First, we identify treatment firms as those that experience a CEO's departure and an improvement in integrity culture during the sample period, with available climate change exposure data for two years before and two years after the event. Second, we identify potential control firms as those that experience a CEO's departure but with a decline in integrity culture, with available climate change exposure data over the same four-year period. Third, we rank all firms in both groups based on financial-year data preceding the CEO's departure, using the full set of control variables included in the baseline model. Fourth, we compute the absolute rank differences in control variables between each firm in the treatment group and its counterparts in the control group. Finally, we select the matched control firm as the one with the smallest sum of absolute rank differences. This process yields a final sample of 246 treatment firms (those with a CEO's departure and an improved integrity culture) and an equal number of matched control firms (firms with a CEO's departure and a deteriorated integrity culture), covering a sample of 1,968 observations for both pre- and post-event periods.

Panel A of Table 6 presents descriptive statistics for the baseline controls between the treatment and control firms, and we find no significant differences between them, ensuring the validity of the matching procedure. To formally estimate the effect, we have created a variable '*POST*' which takes a value of 1 for the post-CEO departure years when integrity culture improves, and 0 otherwise. Our key difference-in-differences estimator, *TREAT×POST*, captures the differential impact of an integrity culture improvement in the treatment firms following the CEO departure. Then, we re-estimate our regression based on the matched sample, including *TREAT, POST* and *TREAT×POST* as additional controls to our baseline model, and present the results in Panel B of Table 6. We find that the estimated coefficient for the interaction term (*TREAT×POST*) is negative and significant at least at the 5% level. This suggests that firms experiencing a CEO's departure with a subsequent improvement in integrity culture exhibit lower climate risk exposure compared to those where integrity culture weakens post-event. Overall, these results reinforce our baseline evidence that integrity culture plays a crucial role in mitigating a firm's climate change exposure.

[Insert Table 6 Here]

Additional Control Variables

We control for a range of firm characteristics in Table 2 that could influence climate change exposure. However, prior literature suggests that corporate governance significantly affects firms' environmental performance. Therefore, we examine whether the negative relationships between integrity culture and climate change exposure persist after controlling for governance-level attributes. Our governance measures include CEO duality (*CEODUALITY*), the proportion of independent directors on the board (*BIND*), board size (*BS*), and the proportion of female directors on the board (*FEMALE*) as important characteristics of broad composition. Table 7 presents our findings. We find that our baseline results in Table 2 remain qualitatively similar and are not prone to omitted variable bias problems.

[Insert Table 7 Here]

Channel Analysis

In Section 2, we argue that an integrity culture improves a firm's internal controls and ESG disclosures, which in turn mitigate a firm's exposure to climate change. Therefore, in this section we examine whether internal controls and *ESG* disclosures serve as channels through which a firm's integrity culture influences its climate change exposure. First, we examine the influence of integrity culture on the relationship between internal control weakness and climate change exposure, as a robust integrity culture fosters heightened vigilance over the internal control environment, ensuring adherence to environmental laws and regulations (Altamuro et al., 2022). This is achieved by creating a binary variable (*MW*) identifying firms with an internal control weakness. Additionally, an interaction term, *INTEG×MW*, is incorporated alongside the primary variables, *INTEG* and *MW*, and other control variables. The outcomes of this investigation are presented in Panel A of Table 8. We find that the estimated coefficient of *MW* is positive, suggesting that weak internal control increases climate change exposure. Our variable of interest, the interaction term *INTEG×MW,* demonstrates a significant negative association with *CCE*. This evidence suggests that an effective integrity culture mitigates the adverse impact of weak internal control on corporate climate risk exposure. In other words, a strong integrity culture strengthens internal control processes, thereby mitigating corporate climate change exposure.

Second, we examine the influence of integrity culture on the relationship between ESG disclosure and climate change exposure, as ESG disclosures facilitate the identification and transparent communication of climate-related risks associated with a firm's operations. To test the issue, we use a comprehensive score of ESG measures. We collect *ESG* disclosure data for all S&P 1500 firms in the Bloomberg database, spanning 2005 to 2019, since the coverage for *ESG* disclosures mostly began in 2005. This overall score is based on 120 indicators covering three aspects: environment, social, and governance (Li et al., 2018). We create an interaction term, *INTEG×ESG*, to capture the interaction effect of integrity culture and ESG disclosures and rerun the baseline regression. Our evidence, as shown in Panel B of Table 8, supports our prediction that the negative impact of ESG disclosures on climate change exposure is more pronounced for firms with a strong integrity culture. These findings collectively show that an integrity culture enhances corporate ESG disclosures, thereby mitigating climate information asymmetry and corporate climate change exposure.

[Insert Table 8 Here]

Additional Analysis

The Moderation Effect of Climate Policy Uncertainty

In this sub-section, we examine the moderating role of climate policy uncertainty (*CPU*) in the relationship between integrity culture and climate change exposure. *CPU* refers to the lack of clarity and unpredictability regarding future government actions, regulations, and policies related to climate change, such as environmental requirements, carbon pricing, and sustainability mandates, which create enormous uncertainty for firms in their long-term decisions. We argue that firms with strong integrity cultures are better prepared to manage the complexities of a volatile climate policy environment, as integrity culture promotes transparent communication, ethical practices, and proactive planning, enabling firms to mitigate risks more effectively during uncertain times (Li et al. 2021a). Moreover, an integrity culture may motivate firms to prioritise risk mitigation over exploiting new opportunities due to the ethical considerations and conservatism warranted in uncertain times. Therefore, we argue that the negative association between integrity culture and climate risk exposure will be stronger during times of climate policy uncertainty.

Following recent studies (e.g., Tedeschi et al., 2024; Siddique et al., 2023), we employ the Gavriilidis (2021) CPU index, which is based on searches for articles in eight leading US newspapers containing terms related to uncertainty, climate, and regulation. The analysis spans from January 2000 to March 2021, covering publications like The New York Times, The Wall Street Journal, USA Today, and others. Each newspaper's relevant article count per month is scaled by the total articles published in that month. The standardised series are then averaged and normalised to a mean value of 100 for the entire period. We classify our sample into two subgroups based on the yearly median *CPU* value. *HighCPU* is the subgroup of firm-year observations with *CPU* values greater than its annual median, whereas *LowCPU* is the subgroup of firm-year observations with *CPU* values less than or equal to its annual median. We re-estimate our baseline models based on low and high *CPU* sub-groups, and report the results in Table 9. We find that the relationship between integrity culture and climate change exposure is significantly stronger in *HighCPU*, which is consistent with our argument that the effectiveness of corporate integrity culture is more critical during times of high *CPU*.

[Insert Table 9 Here]

The Moderation Effect of Financial Conditions

In our final cross-sectional test, we investigate the role of financial constraints on the association between integrity culture and climate change exposure. Firms facing financial constraints may struggle to implement robust climate adaptation measures and transition to more sustainable practices. Limited access to capital and resources can impede investments in technologies and infrastructure that enhance resilience against climate-related events such as extreme weather, rising sea levels, or resource scarcity. Therefore, we argue that the role of integrity culture in affecting climate change exposure is likely to be stronger in financially distressed firms due to its mitigating effects on poor financial conditions.

Following Callaghan et al. (2009) and Krishnan and Wang (2015), we define a firm as financially distressed (non-distressed) if it reports both a loss and negative (profit and positive) operating cash flows in the current year. We run our baseline regression for each subgroup and present the results in Table 10. Our results show that the coefficients are negative and significant in both distressed and non-distressed firms, except for $EXPO_{ph}$ in non-distressed firms. However, the coefficients are significantly more negative for the distressed subgroup than the non-distressed subgroup, at least at the 10% level. Overall, we find evidence that the negative relationship between integrity culture and climate change exposure is more pronounced in financially distressed firms.

[Insert Table 10 Here]

Conclusion and Policy Implications

This study investigates whether corporate integrity culture is significantly related to firm-level climate change exposure. Building on social norm theory, we predict a significant negative relationship between integrity culture and climate change exposure. Using a large sample of US public firms, we find robust evidence supporting our hypothesis. Our analysis further suggests that a strong internal control environment and higher ESG disclosures are possible channels through which a strong integrity culture mitigates climate change exposure. Finally, our cross-sectional analysis shows that the negative relationship between integrity culture and climate change exposure is more salient in firms with high CPU and financial distress.

Our results have significant theoretical implications; we are the first to apply Bicchieri's (2006) social norm activation theory to explain how corporate integrity culture can influence social norms to mitigate corporate climate change exposure. Moreover, our theoretical framework has broader implications for understanding corporate culture and its impact on corporate behaviour in dynamic societal contexts. For example, firms that emphasise environmental sustainability and DEI initiatives may experience different levels of support or criticism from various stakeholders depending on the alignment between corporate values and existing societal norms. It is also possible that firms trade off their priorities around ESG and/or DEI due to shifting and competing societal values and ethical norms (Huang et al., 2024; Douthit and Stevens, 2015), as evident in the decision of Larry Fink at Blackrock to cease using the term ESG (Reuters, 2023) and the decision of senior management teams at Meta Platforms and Amazon to abandon their DEI programmes (BBC News, 2025) in the context of the changing political landscape in the US. Consequently, our framework underscores the importance of aligning corporate integrity culture with broader societal values, as well as the need for corporations to make an optimal trade-off in responding to shifting societal values and competing social norms.

Our findings also have important implications for policymakers and corporate decision-makers. First, policymakers and regulators should recognise a strong corporate integrity culture and encourage firms to integrate this informal social control mechanism that ultimately helps firms mitigate unpredictable business challenges such as climate change exposure. Second, our evidence strongly implies that integrity culture needs to extend to the 'tone at the top' and that the corporate board and executive management team have crucial roles to play in shaping a corporate integrity culture, not just by strengthening their firm's internal control system, but also by streamlining its strategic agenda to mitigate climate change exposure. Third, policymakers and corporate leaders should consider fostering a strong integrity culture as a critical strategy for enhancing firms' resilience during climate policy uncertainty and financial distress.

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Tables

Table 1 Descriptive statistics

Variables	Sample	Mean	P50	Min	P25	P75	Max	SD
CCE	37,187	0.5427	0.2964	0.0000	0.1096	0.7265	1.9269	0.6114
$EXPO_{op}$	37,187	0.0984	0.0000	0.0000	0.0000	0.1405	0.4594	0.1546
$EXPO_{rg}$	37,187	0.0083	0.0000	0.0000	0.0000	0.0000	0.0726	0.0230
$EXPO_{ph}$	37,187	0.0148	0.0000	0.0000	0.0000	0.0236	0.0317	0.0139
INTEG	37,187	2.3232	2.1358	1.1500	1.5414	2.9482	4.1368	0.9356
SIZE	37,187	6.8995	6.8038	4.4147	5.5143	8.1639	9.9917	1.7040
LEV	37,187	0.2201	0.1980	0.0000	0.0291	0.3607	0.5684	0.1888
ROA	37,187	0.0041	0.0325	-0.2153	-0.0259	0.0735	0.1152	0.1008
RET	37,187	0.0435	-0.0319	-1.2811	-0.2613	0.2117	31.6687	0.6877
VOL	37,187	0.4395	0.3683	0.0201	0.2546	0.5376	13.4539	0.3024
RD	37,187	0.6128	1.0000	0.0000	0.0000	1.0000	1.0000	0.4871
MB	37,187	4.5490	3.6140	1.4179	2.3363	5.7742	11.5345	2.9808
LOSS	37,187	0.3129	0.0000	0.0000	0.0000	1.0000	1.0000	0.4637
INSTOWN	37,187	0.6715	0.7267	0.2248	0.5048	0.8714	0.9506	0.2335
TANGIBLE	37,187	0.4470	0.3453	0.0522	0.1540	0.7014	1.0882	0.3414
ANALYST	37,187	7.5155	6.1667	0.0000	2.9167	11.7500	16.7500	5.4195

Table 2 The impact of integrity culture on climate change exposure

	CCE	$EXPO_{op}$	$EXPO_{rg}$	$EXPO_{ph}$
INTEG	-0.0213	-0.0038	-0.0019	-0.0012
	(-6.89)***	(-3.57)***	(-7.41)***	(-2.18)**
SIZE	-0.0325	-0.009	-0.0014	-0.0015
	(-11.96)***	(-12.21)***	(-11.90)***	(-2.89)***
LEV	0.0277	0.0097	0.0003	0.0056
	(1.64)	(2.15)**	(0.41)	(1.31)
ROA	-0.0305	-0.0157	-0.0013	-0.0169
	(-0.60)	(-1.17)	(-0.63)	(-1.72)*
RET	-0.0038	-0.0018	-0.0008	-0.0007
	(-0.87)	(-1.67)*	(-0.11)	(-1.34)
VOL	0.0224	0.0027	0.0001	0.0067
	(2.22)**	(1.00)	(0.19)	(4.05)***
RD	0.0023	0.0043	0.0008	0.0013
	(0.31)	(2.22)**	(2.66)***	(1.02)
MB	-0.0036	-0.0009	-0.0001	-0.0097
	(-3.97)***	(-3.55)***	(-2.93)***	(-0.19)
LOSS	0.0327	0.0075	0.0003	0.0008
	(3.14)***	(2.67)***	(0.69)	(0.36)
INSTOWN	-0.0425	-0.0105	-0.0013	-0.0008
	(-3.13)***	(-2.90)***	(-2.34)**	(-0.34)
TANGIBLE	-0.2085	-0.0376	-0.0051	-0.0064
	(-7.62)***	(-6.44)***	(-5.60)***	(-3.05)***
ANALYST	-0.0086	-0.0014	-0.0008	-0.0002
	(-9.50)***	(-6.93)***	(-1.06)	(-1.69)*
CONSTANT	Included	Included	Included	Included
Industry & Year effect	Yes	Yes	Yes	Yes
Adj R2	0.3344	0.2524	0.1520	0.1864
Sample	37,187	37,187	37,187	37,187

This table reports the results for the pooled OLS regression of the impact of integrity culture on climate change exposure. The t-statistics shown in parentheses are based on standard errors that are adjusted for heteroscedasticity and are clustered at the firm and year levels. We winsorise continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 3 Firm fixed effects: The impact of integrity culture on climate change exposure

	CCE	$EXPO_{op}$	$EXPO_{rg}$	$EXPO_{ph}$
INTEG	-0.0099	-0.0044	-0.0074	-0.0067
	(-3.32)***	(-2.51)**	(-2.87)***	(-2.77)***
SIZE	-0.0146	-0.0034	-0.0006	-0.0016
	(-2.44)**	(-1.89)*	(-2.01)**	(-1.44)
LEV	0.0516	0.023	0.0011	0.0073
	(2.56)**	(3.77)***	(1.01)	(1.95)*
ROA	-0.0614	-0.0262	-0.0018	-0.0159
	(-1.38)	(-1.94)*	(-0.77)	(-1.57)
RET	-0.0009	-0.0008	-0.0004	-0.0008
	(-0.32)	(-0.92)	(-0.90)	(-1.42)
VOL	0.0113	0.0003	0.0002	0.0006
	(1.47)	(0.12)	(0.58)	(0.45)
RD	0.0113	0.0035	0.0005	0.0178
	(0.74)	(0.71)	(0.61)	(2.59)***
MB	-0.0005	-0.0001	-0.0007	-0.0011
	(-0.59)	(-0.23)	(-0.16)	(-0.52)
LOSS	0.0155	0.0013	0.0009	0.0005
	(1.90)*	(0.53)	(0.46)	(0.28)
INSTOWN	-0.0343	-0.0053	-0.0003	-0.0055
	(-1.75)*	(-0.88)	(-0.32)	(-1.53)
TANGIBLE	-0.079	-0.0191	-0.0015	0.0096
	(-3.93)***	(-3.19)***	(-1.43)	(2.36)**
ANALYST	-0.0021	-0.0009	-0.0003	-0.0006
	(-2.31)**	(-3.21)***	(-4.67)***	(-2.43)**
CONSTANT	Included	Included	Included	Included
Firm & Year effect	Yes	Yes	Yes	Yes
Adj R2	0.7359	0.6045	0.4147	0.5511
Sample	37,187	37,187	37,187	37,187

This table reports the firm fixed effects regression results examining the impact of integrity culture on climate change exposure. The *t*-statistics shown in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm and year levels. We winsorise continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 4 Propensity Score Matching (PSM) analysis

Panel A: Average treatment effects

Variables	Treatment	Control	*t*-test
SIZE	6.7897	6.4271	1.33
LEV	0.2250	0.2267	0.49
ROA	0.0508	0.0329	0.81
RET	0.2491	0.0205	0.72
VOL	0.4279	0.4402	0.81
RD	0.5455	0.6017	0.70
MB	4.6479	4.5683	0.83
LOSS	0.3147	0.3557	0.89
INSTOWN	0.6773	0.5937	0.87
TANGIBLE	0.4289	0.3770	1.09
ANALYST	6.9496	6.5205	1.17

Panel B: PSM regressions

	CCE	$EXPO_{op}$	$EXPO_{rg}$	$EXPO_{ph}$
INTEG	-0.0147	-0.0027	-0.0014	-0.0008
	(-5.06)***	(-2.18)**	(-5.34)***	(-1.98)**
Constant	Included	Included	Included	Included
Control variables	Yes	Yes	Yes	Yes
Industry & Year effect	Yes	Yes	Yes	Yes
Adj R^2	0.2474	0.1860	0.1127	0.1378
Sample	1,420	1,420	1,420	1,420

Panel A shows the average treatment effects obtained from propensity score matching. Firms with high integrity culture are our treatment firms, whereas firms with low integrity are our control firms. Panel B presents the results based on PSM regression. The *t*-statistics shown in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm and year levels. We winsorise continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 5 Instrumental variable approach

	First Stage	2nd Stage			
		CCE	$EXPO_{op}$	$EXPO_{rg}$	$EXPO_{ph}$
LNCONVICT	0.0089				
	(11.46)***				
EXPINTEG		-0.0592	-0.0132	-0.0579	-0.0059
		(-3.47)***	(-3.05)***	(-2.58)**	(-1.99)**
Constant	Included	Included	Included	Included	Included
Control variables	Yes	Yes	Yes	Yes	Yes
Industry & Year effect	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.0875	0.3165	0.2399	0.1431	0.1136
F-stat	123.24				
Sample	1,842	1,842	1,842	1,842	1,842
Weak Identification Test: Cragg–Donald Wald F-statistic					876.93

The table presents results addressing endogeneity in the relationship between integrity culture and climate change exposure. We employ the natural log of the corruption conviction rate (*LNCONVICT*) as the instrumental variable. The t-statistics, shown in parentheses, are computed with standard errors robust to heteroscedasticity and clustered at the firm and year levels. Continuous variables are winsorised at the 1% and 99% levels. Superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6 Difference-in-Differences regression analysis

Variables	Treatment	Control	*t*-test
SIZE	6.0878	5.9669	1.17
LEV	0.1941	0.1898	0.39
ROA	0.0436	0.0357	0.74
RET	0.2158	0.1913	1.09
VOL	0.3706	0.3819	0.63
RD	0.4722	0.4756	0.59
MB	4.0247	3.9085	0.68
LOSS	0.2729	0.2803	0.74
INSTOWN	0.5864	0.5687	0.84
TANGIBLE	0.3712	0.3488	1.18
ANALYST	6.0175	5.1505	0.89

Panel B: PSM estimations

	CCE	$EXPO_{op}$	$EXPO_{rg}$	$EXPO_{ph}$
TREAT	-0.0374	-0.0318	-0.0263	-0.0103
	(-0.99)	(-0.63)	(-1.09)	(-0.27)
POST	-0.0596	-0.0178	-0.0306	-0.0128
	(-1.27)	(-1.07)	(-0.95)	(-0.71)
TREAT×POST	-0.0216	-0.0204	-0.0171	-0.0136
	(-2.67)***	(-2.48)**	(-3.24)***	(-2.04)**
Constant	Included	Included	Included	Included
Control variables	Yes	Yes	Yes	Yes
Industry & Year effect	Yes	Yes	Yes	Yes
Adj R^2	0.2481	0.1856	0.1132	0.1375
Sample	1,968	1,968	1,968	1,968

Panel A presents descriptive statistics for two groups: (i) treatment firms experiencing a CEO's departure where their integrity culture improves during the sample period, and (ii) control firms experiencing a CEO's departure where their integrity culture deteriorates. Panel B reports the regression results analysing the impact of integrity culture on climate change exposure using a difference-in-difference approach. The variable *TREAT* equals 1 for firms with a CEO departure and an improvement in integrity culture during the sample period, and 0 for firms with a CEO's departure and a decline in integrity culture. The variable *POST* takes a value of 1 for the post-CEO departure years when integrity culture improves. The t-statistics, shown in parentheses, are computed with standard errors robust to heteroscedasticity and clustered at the firm and year levels. Continuous variables are winsorised at the 1% and 99% levels. Superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7 Integrity culture and climate change exposure controlling for governance measures

	CCE	$EXPO_{op}$	$EXPO_{rg}$	$EXPO_{ph}$
INTEG	-0.0140	-0.0036	-0.0018	-0.0012
	(-3.71)***	(-3.25)***	(-3.69)***	(-2.50)**
SIZE	-0.0328	-0.0107	-0.0013	-0.006
	(-4.06)***	(-4.91)***	(-3.19)***	(-2.47)
LEV	0.1341	0.0357	0.0032	0.0023
	(2.42)**	(2.32)**	(1.26)	(0.35)
ROA	-0.1149	-0.0019	-0.0279	-0.0062
	(-0.60)	(-0.04)	(-3.48)***	(-0.21)
RET	-0.0474	-0.0061	-0.0015	-0.0023
	(-2.14)**	(-1.03)	(-1.73)*	(-0.86)
VOL	0.0577	0.007	0.0016	0.0125
	(1.18)	(0.54)	(0.68)	(1.60)
RD	0.0276	0.0064	0.0035	0.0008
	(1.32)	(1.16)	(3.59)***	(0.23)
MB	-0.0135	-0.0023	-0.0001	-0.0001
	(-4.72)***	(-3.05)***	(-0.99)	(-0.16)
LOSS	0.0487	0.022	0.0028	0.0071
	(1.40)	(2.36)**	(1.78)*	(1.19)
INSTOWN	-0.0101	-0.0175	-0.001	-0.0241
	(-0.16)	(-1.04)	(-0.34)	(-2.26)**
TANGIBLE	-0.4775	-0.0717	-0.0122	-0.0249
	(-12.81)***	(-7.53)***	(-7.28)***	(-4.77)***
ANALYST	-0.0085	-0.0023	-0.0008	-0.0008
	(-4.00)***	(-4.15)***	(-0.11)	(-2.22)**
CEODUALITY	0.1135	0.0326	0.0047	0.0147
	(2.18)**	(2.33)**	(1.91)*	(1.95)*
BIND	-0.1462	-0.0485	-0.0060	-0.0730
	(-2.99)***	(-3.67)***	(-2.57)**	(-4.22)***
BS	-0.1994	-0.0574	-0.0047	-0.0038
	(-4.28)***	(-4.48)***	(-2.20)**	(-0.63)
FEMALE	-0.1706	-0.0552	-0.0052	-0.0053
	(-3.70)***	(-4.41)***	(-2.40)**	9-1.02)
CONSTANT	Included	Included	Included	Included
Industry & Year effect	Yes	Yes	Yes	Yes
Adj R2	0.4438	0.3577	0.2437	0.1667
Sample	18,005	18,005	18,005	18,005

This table presents the regression results examining the impact of integrity culture on climate change exposure, incorporating a range of additional control variables related to governance measures.. The t-statistics shown in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm and year levels. We winsorise continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 8 Channel analysis

	CCE	$EXPO_{op}$	$EXPO_{rg}$	$EXPO_{ph}$
Panel A: The effect of internal control weakness				
INTEG	-0.0133	-0.0027	-0.0012	-0.0007
	(-4.36)***	(-2.29)**	(-4.23)***	(-2.13)**
MW	0.0086	0.0057	0.0069	0.0034
	(2.11)**	(1.98)**	(2.04)**	(1.74)*
INTEG × MW	-0.0198	-0.0083	-0.0062	-0.0034
	(-3.29)***	(-2.21)**	(-3.89)***	(-1.99)**
Constant	Included	Included	Included	Included
Control variables	Yes	Yes	Yes	Yes
Industry & Year effect	Yes	Yes	Yes	Yes
Adj R^2	0.3286	0.2439	0.1493	0.1684
Sample	24,874	24,874	24,874	24,874
Panel B: The effect of ESG disclosure				
INTEG	-0.0113	-0.0020	-0.0009	-0.0006
	(-3.43)***	(-2.07)**	(-4.15)***	(-2.07)**
ESG	-0.0056	-0.0034	-0.0042	-0.0026
	(-2.27)**	(-1.98)**	(-2.25)**	(-1.73)*
INTEG × ESG	-0.0181	-0.0069	-0.0056	-0.0041
	(-3.07)***	(-2.16)***	(-3.76)***	(-2.12)**
Constant	Included	Included	Included	Included
Control variables	Yes	Yes	Yes	Yes
Industry & Year effect	Yes	Yes	Yes	Yes
Adj R^2	0.3032	0.2217	0.1294	0.1432
Sample	11,987	11,987	11,987	11,987

This table examines the influence of integrity culture on climate change exposure through (1) mitigating the adverse effect of internal control weakness and (2) enhancing ESG disclosures. The t-statistics shown in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm and year levels. We winsorise continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 9 Moderating effect of climate policy uncertainty (CPU) on the integrity culture – climate change exposure relationship

Variables	*CCE*			*EXPO_opp*			*EXPO_reg*		
	HighCPU (1)	LowCPU (2)	Diff in coeff. & χ2 (1) vs (2) (3)	HighCPU (4)	LowCPU (5)	Diff in coeff. & χ2 (4) vs (5) (6)	HighCPU (7)	LowCPU (8)	Diff in coeff. & χ^2 (7) vs (8) (9)
INTEG	-0.0268	-0.0127	0.0141	-0.0156	-0.0045	0.0111	-0.0089	-0.0034	0.0055
	(-3.75)***	(-2.13)**	[15.64]***	(-2.98)***	(-1.87)**	[13.56]***	(-2.94)***	(-2.03)**	[7.64]**
Constant	Included	Included		Included	Included		Included	Included	
Control variables	Yes	Yes		Yes	Yes		Yes	Yes	
Fixed effects	Yes	Yes		Yes	Yes		Yes	Yes	
Adj R^2	0.2682	0.1816		0.1984	0.1374		0.1189	0.0992	
Sample	16,362	16,364		16,362	16,364		16,362	16,364	

	EXPO_phy		
	HighCPU (10)	LowCPU (11)	Diff in coeff. & χ2 (10) vs (11) (12)
INTEG	-0.0041	-0.0011	0.0030
	(-2.12)**	(-1.34)	[5.23]*
Constant	Included	Included	
Control variables	Yes	Yes	
Fixed effects	Yes	Yes	
Adj R^2	0.0962	0.0716	
Sample	16,362	16,364	

This table examines the moderating influence of climate policy uncertainty on the relationship between integrity culture and climate change exposure. The t-statistics shown in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm and year levels. We winsorise continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

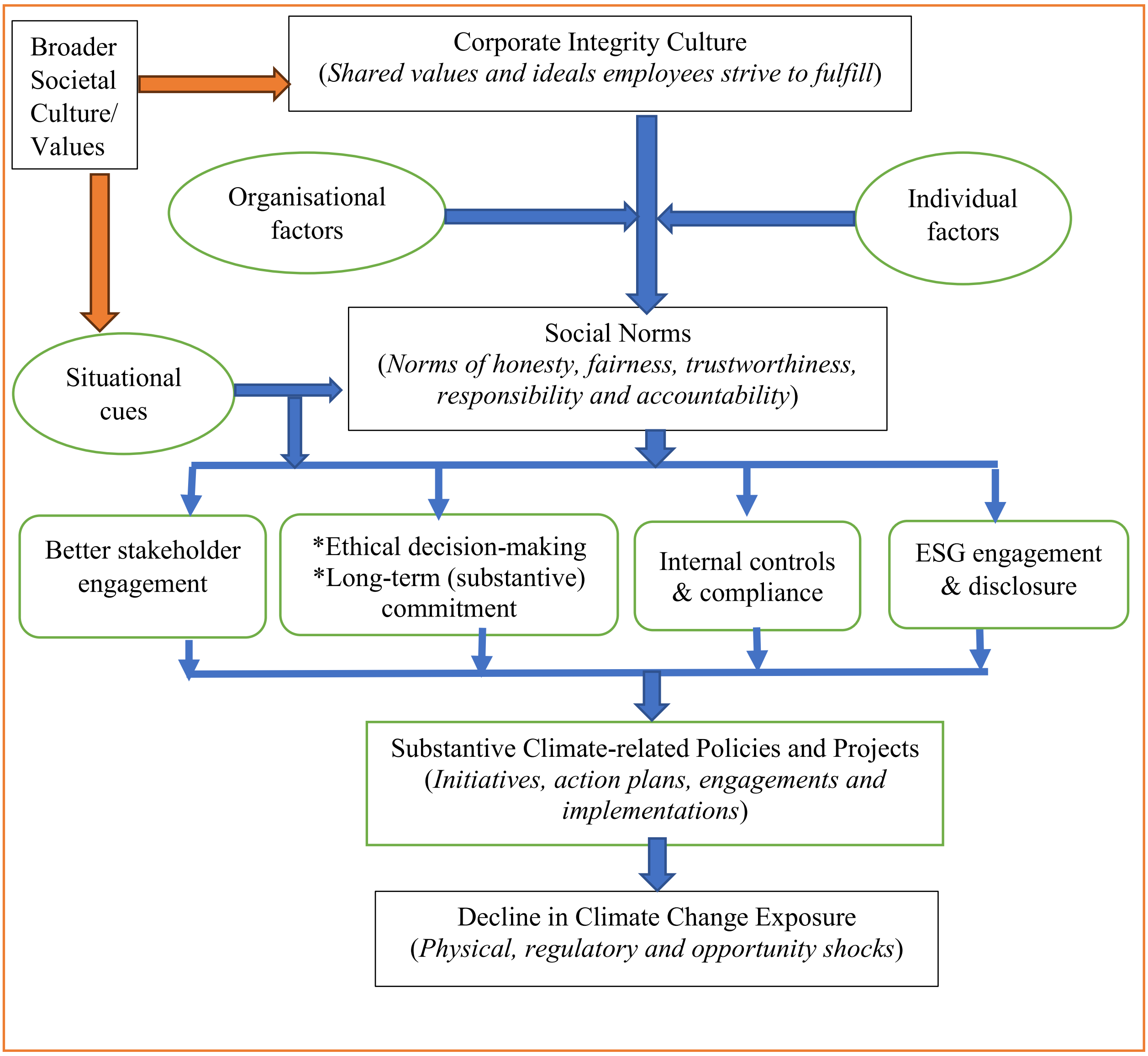
Table 10 Moderating effect of financial distress on the integrity culture – climate change exposure relationship

Variables	*CCE*			*EXPO_{opp}*			*EXPO_{reg}*		
	DISTRESS (1)	NONDISTRESS (2)	Diff in coeff. & χ2 (1) vs (2) (3)	DISTRESS (4)	NONDISTRESS (5)	Diff in coeff. & χ2 (4) vs (5) (6)	DISTRESS (7)	NONDISTRESS (8)	Diff in coeff. & χ^2 (7) vs (8) (9)
INTEG	-0.0409	-0.0160	0.0249	-0.0102	-0.0032	0.0070	-0.0043	-0.0007	0.0036
	(-7.15)***	(-2.91)***	[19.64]***	(-6.70)***	(-2.27)**	[8.43]**	(-5.49)***	(-2.32)**	[5.74]*
Constant	Included	Included		Included	Included		Included	Included	
Control variables	Yes	Yes		Yes	Yes		Yes	Yes	
Fixed effects	Yes	Yes		Yes	Yes		Yes	Yes	
Adj R^2	0.2778	0.2134		0.1950	0.1408		0.1685	0.0812	
Sample	6,543	27,549		6,543	27,549		6,543	27,549	

	EXPO_{phy}		
	DISTRESS (10)	NONDISTRESS (11)	Diff in coeff. & χ2 (10) vs (11) (12)
INTEG	-0.0028	-0.0005	0.0023
	(-1.73)*	(-0.73)	[4.17]*
Constant	Included	Included	
Control variables	Yes	Yes	
Fixed effects	Yes	Yes	
Adj R^2	0.1301	0.0760	
Sample	6,543	27,549	

This table examines the moderating influence of financial distress on the relationship between integrity culture and climate change exposure. The t-statistics shown in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm and year levels. We winsorise continuous variables at the 1% and 99% levels. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Figure 1 Conceptual framework: Integrity culture, social norms and climate change exposure



Source: Developed by authors based on a review of the literature.

Appendix

Appendix 1A Variable descriptions

CCE	Overall firm-level climate risk exposure developed by Sautner et al. (2023).
$EXPO_{op}$	Firm-level climate risk exposure that captures opportunities related to climate change.
$EXPO_{rg}$	Firm-level climate risk exposure that captures regulatory shocks related to climate change.
$EXPO_{ph}$	Firm-level climate risk exposure that captures physical shocks related to climate change.
INTEG	Weighted-frequency count of words and phrases associated with integrity in the earnings call transcripts. This measure is constructed using the machine learning approach used in Li et al. (2021b).
SIZE	Logarithm of total assets
LEV	The ratio of total debt to total assets. Total debt = Long term debt + Debt in current liabilities
ROA	The ratio of net income before extraordinary items to total assets (IB/AT)
VOL	Volatility of earnings defined as the standard deviation of last 5 years operating earnings.
RD	Dummy variable which equals 1 for a for R&D expense to sales is measured as R&D / sales and is set equal to zero when R&D is missing
MB	Market value of equity (CSHO * PRCC_F) divided by the stockholders' equity
LOSS	Dummy variable, which equals 1 for a firm's ROA is negative, and zero otherwise.
INSTOWN	Percentage of dedicated institutional ownership in year. We calculate the yearly percentages of shares outstanding held by dedicated institutional investors, taking the average over the four quarters of the firm's financial year using data from the Thomson Reuters Institutional Holdings (13F) database. Our classification of dedicated institutions is based on Bushee (1998).
TANGIBLE	Ratio of Plant Property and Equipment (PPE) to total asset (AT).
ANALYST	Monthly average number of analysts following a firm over a 12-month period
CPU	Gavriilidis's (2021) CPU index is based on searches for articles in eight leading US newspapers containing terms related to uncertainty, climate, and regulation. The analysis spans from January 2000 to March 2021, covering publications like The New York Times, The Wall Street Journal, USA Today, and others. Each newspaper's relevant article count per month is scaled by the total articles published in that month. The standardized series are then averaged and normalized to a mean value of 100 for the entire period.
RET	Annual excess return as measured by the difference between company stock return.
BS	The natural logarithm of number of directors on a corporate board.
BIND	The percentage of outside directors on the board
FEMALE	Dummy variable which equals 1 for a firm if there is a female director in the board, and 0 otherwise
CEODUALITY	A dummy variable which equals 1 for a firm if a firm's CEO is also chairman of the board
MW	Dummy variable which equals 1 for a firm if the auditor's SOX Section 404(b) internal control opinion discloses a material weakness, and 0 otherwise
ESG	Environmental, Social, and Governance disclosure of a firm, ranging from 0.1 to 100.
DISTRESS	Dummy variable which equals 1 for a firm if the firm reports both a loss and negative operating cash flows and 0 otherwise

Appendix 2A Correlation matrix

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CCE	**1**	1.00															
$EXPO_{op}$	**2**	0.22	1.00														
$EXPO_{rg}$	**3**	0.26	0.19	1.00													
$EXPO_{ph}$	**4**	0.17	0.13	0.14	1.00												
INTEG	**5**	-0.14	-0.12	-0.08	-0.19	1.00											
SIZE	**6**	-0.12	-0.09	-0.11	-0.08	0.15	1.00										
LEV	**7**	0.16	0.16	0.13	0.10	0.17	0.16	1.00									
ROA	**8**	-0.17	-0.13	-0.16	-0.14	0.15	0.08	0.01	1.00								
RET	**9**	-0.06	-0.08	-0.05	-0.06	0.08	0.05	0.01	0.15	1.00							
VOL	**10**	0.04	0.05	-0.06	-0.03	0.13	0.04	0.10	-0.06	-0.12	1.00						
RD	**11**	0.13	0.14	0.12	0.09	-0.03	-0.12	0.17	0.10	-0.02	0.21	1.00					
MB	**12**	-0.10	-0.09	-0.11	-0.08	0.09	0.10	0.14	0.08	0.18	-0.04	0.11	1.00				
LOSS	**13**	0.07	0.09	0.09	0.11	0.07	-0.07	0.09	-0.12	-0.12	0.02	0.05	0.01	1.00			
INSTOWN	**14**	-0.18	-0.10	-0.09	-0.15	0.17	0.08	0.16	0.14	0.04	0.02	-0.13	-0.05	-0.07	1.00		
TANGIBLE	**15**	-0.11	-0.11	-0.12	-0.11	0.12	0.02	0.10	0.05	0.06	-0.03	0.03	0.36	0.08	0.16	1.00	
ANALYST	**16**	-0.01	-0.04	-0.04	-0.02	0.08	0.02	0.13	0.09	0.07	-0.13	0.04	0.01	0.17	0.08	0.05	1.00