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Original Research Article

Carbon Risk, Democracy, Corruption, Income Inequality, and M&A Performance

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Abstract: Against the backdrop of global energy transition and China's "Dual Carbon" goals, the way in which corporate carbon risk—as a key driver of multinational strategic decision-making—jointly influences post-merger green innovation performance and financial performance through the interactive effects of host-country democracy, corruption, and income inequality remains unresolved. To address this gap, this study draws on data from Chinese cross-border mergers and acquisitions between 2018 and 2022 and employs a multiple linear regression model to empirically analyze the impact of acquirer carbon risk on green innovation performance and financial performance in cross-border M&As. Furthermore, it examines the moderating roles of host-country democracy, corruption, and income inequality. The paper also conducts multiple robustness tests to ensure the reliability of the findings. Research findings indicate that: (1) In terms of green performance, Chinese companies with higher carbon risks exhibit better green innovation performance after mergers and acquisitions. When the level of democracy in the host country is higher, this tendency is significantly enhanced, demonstrating a positive moderating effect. Conversely, when the level of corruption in the host country is higher, this tendency is significantly weakened, demonstrating a negative moderating effect. (2) In terms of financial performance, Chinese companies with higher carbon risks exhibit worse financial performance after mergers and acquisitions. When the level of democracy in the host country is higher, this tendency is significantly enhanced. When the level of corruption in the host country is higher, this tendency is significantly weakened. When the level of income inequality in the host country is higher, this tendency is also significantly weakened. This study aims to construct an integrated analytical framework to explain how emerging market enterprises can achieve "green escape" by adopting international non-market strategies in response to institutional pressures from host countries, thereby deepening the theoretical understanding of the motivations behind global green mergers and acquisitions.

Keywords: Carbon risk; Democracy; Corruption; Income inequality; M&A performance.

1. INTRODUCTION

As global climate governance accelerates and public awareness of environmental protection becomes more widespread, carbon emissions have evolved from a peripheral environmental issue into a core issue concerning global sustainable development (Chen *et al.,* 2025A). In this context, governments around the world are continuously strengthening carbon regulations and promoting the implementation of a series of far-reaching policies. For example, the European Union's "Carbon Border Adjustment Mechanism" (CBAM) imposes tariffs on high-carbon imported products, placing enterprises that have not achieved low-carbon transformation at a competitive disadvantage and under market access pressure (Wang & Chen, 2025). Simultaneously, an increasing number of regions (such as the EU and the U.S. SEC) have introduced mandatory environmental information disclosure requirements, compelling enterprises to invest more resources in compliance, disclosure, and reputation management (Cao *et al.,* 2025). Such institutional pressures not only directly increase the operational costs of enterprises but also potentially constrain their financing capabilities and social image (Jin *et al.,* 2025). It is noteworthy that carbon risk is no longer confined to the traditional scope of

environmental or technological issues; it has evolved into a multi-dimensional institutional factor that significantly constrains corporate strategic decision-making, particularly exerting a profound impact on their internationalization strategies and competitive approaches (Ren *et al.,* 2025).

Cross-border mergers and acquisitions have increasingly become an important means for enterprises to access external green technologies and address environmental risks. Particularly for heavily polluting enterprises, such moves are regarded as a crucial strategic choice for achieving green transformation, reducing compliance costs, and reshaping corporate image (Gu *et al.,* 2025). Therefore, green innovation is not only a core approach for enterprises to overcome resource constraints, respond to climate regulations, and build long-term competitive advantages but also a strategic response to the dual goals of "economic growth" and "carbon emission reduction" (Bai *et al.,* 2025). However, with the growing prevalence of "greenwashing" – where enterprises exaggerate or make false environmental claims to shape an eco-friendly image – markets and investors are gradually shifting their focus toward more substantive green innovation capabilities (Niu *et al.,* 2025). Such capabilities not only reflect the genuine environmental commitment of enterprises but also serve as a key indicator for evaluating their sustainable development potential. Nevertheless, as a channel for acquiring green technologies, the ultimate effectiveness of cross-border mergers and acquisitions is significantly constrained by the institutional environment of the host country (Wang & Chen, 2025). Differences in policy stability, societal expectations, and regulatory systems in the target country profoundly influence the acquiring firm's ability to absorb, integrate, and re-innovate green technologies, determining whether technical knowledge can be successfully translated into substantive green innovation performance.

From the perspective of post-merger financial performance, carbon risk has become a key variable influencing the financial outcomes of acquirers. Specifically, governments worldwide are vigorously advancing "net-zero emission" targets through legislation and regulation. The increasingly stringent environmental regulations and industry access standards have significantly raised the compliance and operational costs for high-carbon enterprises, thereby squeezing their profit margins (Siddique *et al.,* 2021; Cui *et al.,* 2024; Ren, 2025). Meanwhile, during the energy structure transition, certain fixed assets such as high-carbon emission equipment face the risk of accelerated depreciation, potentially leading to substantial asset write-downs for enterprises. Furthermore, as mainstream investment institutions increasingly incorporate environmental, social, and governance (ESG) factors into their decision-making frameworks, financing channels for high-carbon enterprises are gradually narrowing (Nguyen & Phan, 2020). Additionally, the preference of consumers and clients for environmentally friendly brands has further elevated carbon management capabilities into a critical soft power and reputational asset for enterprises. Consequently, cross-border mergers and acquisitions have emerged as a significant strategic pathway for high-carbon enterprises seeking green transformation (Figuerola-Ferretti *et al.,* 2025). However, the institutional environment of the host country plays a pivotal moderating role in this process. While developed countries possess advanced green technologies and well-established regulations that can help enterprises systematically reduce environmental costs, their stringent standards may also increase the difficulty of integration (Zhang *et al.,* 2023). Conversely, developing countries, often regarded as "pollution havens," generally have relatively lax environmental regulations but often lack the technologies and resources necessary to support green transformation (Choi, 2022), thereby limiting the substantive effectiveness of such mergers and acquisitions.

The behaviors and strategies of enterprises are, to a certain extent, influenced by national-level institutions (Jiménez *et al.,* 2025). Taking the Obama administration in the United States as an example, its advocacy for renewable energy and environmental, social, and governance (ESG) issues significantly promoted corporate compliance with environmental regulations (Asiedu & Lien, 2011). Within this framework, the level of democracy in the host country, as a key dimension measuring the relationship between the regime and its citizens (Li & Resnick, 2003), constitutes a core institutional characteristic that influences corporate strategies, particularly the green transformation of high-carbon enterprises. It affects the cross-border mergers and acquisitions of high-carbon risk enterprises through a dual mechanism: On one hand, in countries with robust democratic systems, stringent environmental regulations can compel enterprises to pursue green transformation and build their reputation (Ahmad *et al.,* 2024). However, the openness of the political process may also introduce policy uncertainty, increasing the political risks faced by enterprises (Haq *et al.,* 2025). On the other hand, in autocratic countries, enterprises may leverage monopolistic positions to gain state support (Karolyi and Liao, 2017), but this often suppresses their green innovation capabilities (Ahmad *et al.,* 2024). Therefore, clarifying how the level of democracy in the host country moderates the relationship between carbon risk and merger and acquisition decisions is key to understanding the logic of corporate green strategic choices under institutional environmental constraints.

The establishment of the "dual carbon" goals has elevated corporate green transformation to a strategic height crucial for sustainable competitiveness. In this process, the awakening of public environmental awareness and the practical implementation of green consumption are forming an external "soft constraint," encouraging enterprises to adopt genuine and effective green actions (Du *et al.,* 2025). However, the proliferation of opportunistic behaviors, such as "greenwashing," among some enterprises aiming to cater to environmental images and capital preferences indicates that external pressures, if not guided by a sound institutional environment, may fail to effectively promote substantive

innovation (Stoecker, 2022; Xu & Wang, 2025). Therefore, this study simultaneously focuses on deeper institutional factors that determine the quality of corporate green strategies, namely the level of corruption in the host country. As a major threat to economic development, corruption erodes societal ethical standards, diminishes concern for environmental issues, and may even provide cover for "greenwashing." This encourages enterprises to pursue reputation and resources through political connections rather than substantive innovation, thereby diverting resources to politically connected enterprises rather than those truly capable of green innovation, and profoundly impacting their merger and acquisition performance (Farooq *et al.,* 2023; Quan *et al.,* 2023; Xu & Wang, 2025). Exploring how these two key institutional variables collectively constrain the performance of high-carbon-risk enterprises in cross-border mergers and acquisitions can reveal the fundamental role of institutional quality in guiding corporate green transformation.

At the same time, climate change and income inequality have become two intertwined global challenges. The ecosystem, as the cornerstone of environmental quality, is closely linked to the living conditions of vulnerable populations (Song & Huang, 2025). For many developing countries with high levels of income inequality, their territories often encompass regions crucial to the global ecology. This makes it particularly critical to coordinate the relationships between economic growth, social equity, and ecological protection within the framework of sustainable development goals (Zhu *et al.,* 2025). However, these countries frequently face practical obstacles such as technological bottlenecks, funding shortages, and a singular industrial structure on their path to transformation, leading to sharp conflicts between the demand for economic development and the goals of ecological protection (Jin *et al.,* 2025). The Environmental Kuznets Curve theory predicts their potential development path: in the early stages of economic growth, efforts to narrow the income gap may come at the cost of environmental degradation. Only when the economy advances to a higher development stage and green innovation capabilities are established will carbon emission reduction become a core objective (Kumar *et al.,* 2025). Against this complex macroeconomic backdrop, how the host country's income inequality affects micro-level enterprises, particularly the post-merger performance of high-carbon enterprises, has become an urgent and important question to address.

Based on the aforementioned theoretical motivations and real-world background, this study takes 648 cross-border merger and acquisition events involving Chinese listed companies from 2018 to 2022 as a sample. It systematically examines the mechanisms through which carbon risk affects the green innovation performance and financial performance of acquiring enterprises, with a particular focus on the moderating roles of the host country's level of democracy, degree of corruption, and extent of income inequality. The research centers on two core questions: First, as a strategic driver, how does carbon risk influence post-merger green innovation and financial performance? Second, how do the three contextual factors—the host country's democracy, corruption, and income inequality—respectively shape the pathways through which carbon risk translates into merger and acquisition performance? Through this research framework, this paper aims to unveil the complex interactions between corporate environmental risks and international non-market strategies, providing new insights for the green globalization of emerging market enterprises.

This study offers several innovations: Theoretically, it constructs an integrated analytical framework that incorporates democracy, corruption, and income inequality, revealing how the institutional environment of host countries systematically moderates the impact of carbon risk on both green innovation performance and financial performance in mergers and acquisitions. It elucidates the synergistic effects and "double-edged sword" dynamics of these institutional factors, thereby deepening the application of institutional theory in the field of environmental strategy. Practically, the research provides actionable insights for enterprises to avoid institutional pitfalls and optimize cross-border investment location decisions, while also highlighting the need to carefully assess hidden risks in supply chains in high-corruption regions. Furthermore, it underscores to governments that advancing institutional and social reforms centered on "high democracy, low corruption, and low inequality" is essential for guiding corporate green transformation and effectively addressing climate change.

2. Theoretical framework and hypotheses

2.1 Carbon risk of acquirers and Green Innovation Performance

2.1.1 The role of acquirer’s carbon risk in Green Innovation Performance

As various countries and regions continue to update environmental regulatory legislation targeting carbon emissions, an increasing number of enterprises are recognizing that high carbon emissions entail significant cost pressures, financing difficulties, and compliance risks. Consequently, carbon risk is gradually shifting from an institutional pressure to an innovation driver, motivating enterprises to reallocate innovation resources and cultivate emerging competitive advantages (Chen *et al.,* 2025A; Wang & Chen, 2025). By developing green technologies and optimizing production processes, enterprises can not only effectively meet environmental regulatory requirements but also enhance production efficiency and optimize cost structures. This enables them to partially or fully offset compliance costs, thereby strengthening their market competitiveness (Jin *et al.,* 2025). Secondly, media oversight and public attention generate sustained external pressure, directly linking a company’s environmental performance to its reputational capital and financing channels (Song & Huang, 2025). These institutional forces reinforce each other, collectively driving enterprises

to elevate carbon risk management from a passive compliance requirement to an active strategic priority. This shift helps enterprises transition from "responding to pressure" to "creating value." Furthermore, consumer preferences for green products and support for environmentally responsible enterprises can generate substantial market returns, enabling companies to more profoundly realize that investments in green innovation are not merely necessary responses to regulatory demands but also strategic investments critical to their long-term survival and development (Gu *et al.,* 2025).

Based on the above analysis, this paper proposes the following hypothesis:
H1: The higher the carbon risk of the acquirer, the better the post-merger green innovation performance.

2.1.2 The moderating role of host country democracy degree in Green Innovation Performance

Corporate strategic behavior is profoundly influenced by the institutional environment (Jiménez *et al.,* 2025). Taking the Obama administration as an example, during its tenure, it placed significant emphasis on renewable energy and environmental, social, and governance issues, actively encouraging enterprises to comply with environmental policies (Asiedu & Lien, 2011). This reflects the important role of political institutions in shaping corporate environmental strategies.

As a key type of political institution, in environments with high levels of democracy, the nature of carbon risk undergoes a fundamental transformation, evolving from a general external pressure into a clear and strategically oriented hard constraint for enterprises. Democratic institutions, through their transparent decision-making processes and active civil society, translate public environmental concerns into stable and predictable policy signals (such as carbon taxes, subsidies, and standards). This greatly reduces the policy uncertainty for enterprises investing in green innovation (Ahmad *et al.,* 2024). Meanwhile, free media and public oversight amplify the reputational and market consequences of a company's environmental performance. In contrast, in authoritarian countries, where opportunities for political participation are limited and ruling leaders may be less responsive to public demands (Asiedu & Lien, 2011), local governments might prioritize economic growth over environmental protection, neglecting the importance of green innovation. Particularly in developing countries, governments are more inclined to accept the development of high-pollution enterprises from other nations within their borders, prioritizing economic growth over environmental protection.

Based on the above analysis, this paper proposes the following hypothesis:
H1a: The level of democracy in the host country plays a positive moderating role in the positive relationship between the acquirer's carbon risk and green innovation performance.

2.1.3 The moderating role of host country corruption degree in Green Innovation Performance

This paper posits that the level of corruption in the host country moderates the relationship between corporate carbon risk and green innovation performance, for the following reasons:

Corruption exerts a suppressive effect on green innovation, primarily through two pathways: distorting corporate resource allocation and undermining fair market competition. First, corruption creates opportunities for "unproductive rent-seeking" for enterprises. This refers to the practice where individuals or firms manipulate political or social conditions to gain profits or benefits, rather than generating new wealth through productive activities. Faced with carbon risks and regulatory pressures, enterprises may be inclined to seek regulatory exemptions or engage in "greenwashing" through bribery, devoting more time, money, and effort to marketing and misleading publicity to gain public trust, rather than pursuing high-investment, high-risk genuine innovation (Stoecker, 2022). Consequently, funds or resources that should have been allocated to research and development are diverted to bribery or marketing activities, fundamentally undermining the capital foundation for green innovation.

Second, corruption triggers a "negative selection effect" in the market. When rent-seekers gain cost advantages through improper means, the legitimate rights and profit margins of compliant and innovative enterprises are squeezed. This "bad money drives out good" mechanism systematically distorts innovation incentives, ultimately suppressing the green innovation vitality of the entire economic system (Quan *et al.,* 2023). Based on the above analysis, this paper proposes the following hypothesis:

H1b: The level of corruption in the host country plays a negative moderating role in the positive relationship between the acquirer's carbon risk and green innovation performance.

2.1.4 The moderating role of host country income inequality degree in Green Innovation Performance

This paper argues that the level of income inequality in the host country moderates the relationship between corporate carbon risk and green innovation performance, for the following reasons: Income inequality suppresses green innovation through two core mechanisms: distorting political agendas and constraining market demand. First, high levels of income inequality are often accompanied by social division, leading public policy agendas and limited political capital

to be prioritized for addressing redistributive conflicts, such as tax reforms and urgent social welfare issues. In contrast, strategic environmental governance goals are likely to be marginalized in public decision-making due to their long political return cycles (Zhu *et al.,* 2025). Consequently, environmental regulations and policies supporting green technology research and development, which aim to incentivize green innovation, may struggle to advance effectively due to insufficient policy support and funding.

Secondly, severe income inequality suppresses purchasing power among the general public, thereby weakening the market competitiveness and economies of scale for green innovation products. Green technology products, such as electric vehicles, often carry high initial costs, making them primarily accessible to high-income groups or large-scale, well-established enterprises. For ordinary consumers, the expensive price positioning of such products renders them "status symbols" rather than mass-market goods (Jin *et al.,* 2025). For enterprises, green technologies—such as wastewater treatment systems or high-efficiency energy systems—involve substantial costs and high investments, making them unaffordable for smaller firms. This market segmentation prevents companies from relying on a broad consumer base to amortize research and development costs and achieve sustainable returns, further eroding their intrinsic economic incentives to engage in green technological innovation. Ultimately, this creates a negative cycle that hinders the widespread diffusion of green technologies. Based on the above analysis, this paper proposes the following hypothesis:
H1c: The level of income inequality in the host country plays a negative moderating role in the positive relationship between the acquirer's carbon risk and green innovation performance.

2.2 Carbon risk of acquirers and post-acquisition performance

2.2.1 The role of acquirer's carbon risk in post-acquisition performance

As the global transition toward clean energy and sustainable development accelerates, carbon-intensive enterprises are facing increasingly severe financial and operational pressures. In the context of mergers and acquisitions, high carbon risk significantly negatively impacts corporate M&A performance by undermining the interest of potential partners, damaging corporate reputation, and restricting access to capital (Cui *et al.,* 2024; Ren, 2025).

From the perspective of institutional theory, the institutional environment in which enterprises operate, including regulatory pressures, industry norms, and stakeholder expectations, profoundly influences their strategic behavior and market performance (Nguyen & Phan, 2020). When enterprises fail to meet institutional expectations regarding environmental responsibility, they may face a series of adverse effects, such as reduced bargaining power in M&A processes, increased transaction resistance, and restricted financing channels (Hussain *et al.,* 2024). High-carbon-risk enterprises are often scrutinized by potential transaction partners, regulatory bodies, and capital markets due to poor environmental performance. This not only makes it difficult to attract high-quality targets but also triggers negative reactions from the public and investors, thereby increasing transaction uncertainty and integration costs (Nguyen & Phan, 2020; Md *et al.,* 2021). At the same time, these enterprises may also be at a disadvantage in accessing green financial resources, which further affects their post-merger integration and reinvestment capabilities, leading to suboptimal long-term performance. Particularly for enterprises in developing countries, which already face multiple challenges in international M&A—such as imperfect institutional environments, weaker corporate governance levels, and insufficient environmental compliance capabilities (Buckley *et al.,* 2015)—high carbon risk exacerbates their perceived institutional compliance risks in the eyes of external stakeholders, reinforcing the negative impression of their environmental responsibility shortcomings. This perception not only amplifies regulatory scrutiny and public resistance but also limits their ability to access high-quality targets and secure favorable transaction terms, ultimately resulting in a systematic decline in M&A performance. Based on the above analysis, this paper proposes the following hypothesis:
H2: The higher the carbon risk of the acquirer, the worse the post-merger financial performance.

2.2.2 The moderating role of host country democracy degree in post-acquisition performance

Democratic institutions significantly amplify the transmission mechanism between carbon risk and corporate financial performance by establishing a stable and transparent policy environment. First, compared to non-democratic systems, democratic countries typically possess more robust institutional enforcement mechanisms. These ensure that carbon risk is swiftly and predictably translated into actual financial costs or benefits for enterprises through regulatory tools such as carbon taxes and environmental penalties, as well as incentive policies like green subsidies (Jiang, 2023). This predictable cost-internalization mechanism compels enterprises to incorporate carbon risk into their core financial considerations.

Second, the multi-faceted oversight mechanisms and policy continuity under democratic systems substantially increase the financial costs for enterprises that passively respond to carbon risk. Under the combined effects of media scrutiny, civic engagement, and judicial independence, enterprises find it difficult to evade environmental responsibilities through short-term actions (Lu *et al.,* 2022). Such an institutional environment forces corporate management to adopt forward-looking strategies, including proactive divestment of high-carbon assets and accelerated green technological innovation as substantive transformation measures. These strategic actions not only effectively mitigate future regulatory

risks but also help shape green competitive advantages to protect and enhance long-term shareholder value. Additionally, democratic institutions enhance the credibility of policy signals, reducing the uncertainty associated with corporate green transitions. Stable policy expectations empower enterprises to undertake long-term low-carbon investments, while policy support alleviates the financial pressure and costs of green innovation. This enables enterprises to more effectively transition from "compliance costs" to "value creation" when addressing carbon risks. Based on the above analysis, this paper proposes the following hypothesis:

H2a: The level of democracy in the host country significantly strengthens the negative relationship between the acquirer's carbon risk and financial performance.

2.2.3 The moderating role of host country corruption degree in post-acquisition performance

This paper argues that the level of corruption in the host country moderates the relationship between corporate carbon risk and post-merger financial performance, for the following reasons: In institutional systems with high levels of corruption, unproductive rent-seeking activities, such as bribery and transactions involving exemptions from environmental regulations, systematically alter the transmission pathway of carbon risk. In environments with high corruption, regulatory policies may exist in form but lack effective enforcement. Enterprises can achieve substantial returns without relying on costly green technological innovation or production process optimization, fundamentally suppressing their intrinsic motivation for substantive low-carbon transformation. This ultimately weakens the guiding function of carbon risk as a market signal for corporate behavior (Farooq *et al.,* 2023). Corruption enables enterprises to evade the environmental compliance costs they should bear through non-market means, thereby weakening the negative correlation that should exist between carbon risk and financial performance. Institutional loopholes hinder the effective internalization of the negative externalities of carbon emissions, making high carbon emissions potentially more "economically beneficial" in specific contexts. This creates a perverse incentive structure of "high carbon equals high profits" (Xu & Wang, 2025). Based on the above analysis, this paper proposes the following hypothesis:

H2b: The level of corruption in the host country significantly weakens the negative relationship between the acquirer's carbon risk and financial performance.

2.2.4 The moderating role of host country income inequality degree in post-acquisition performance

In countries with high levels of income inequality, the high initial costs of green technology products, such as electric vehicles, largely confine their market to high-income groups, making it difficult to move beyond a "luxury good" positioning and achieve economies of scale. This structural fragmentation on the demand side weakens the transmission mechanism of carbon risk to corporate financial performance. Since traditional high-carbon products continue to maintain stable demand in middle- and low-income markets, enterprises lack sufficient financial incentives to undertake fundamental low-carbon transformation and are more inclined to sustain their existing business models. When income disparity makes it difficult for green innovation to yield effective market returns, the role of carbon risk as an external constraint signal is significantly diminished, ultimately hindering the improvement of corporate financial performance and the enhancement of long-term competitiveness (Jin *et al.,* 2025; Song & Huang, 2025). Based on the above analysis, this paper proposes the following hypothesis:

H2c: The level of income inequality in the host country significantly weakens the negative relationship between the acquirer's carbon risk and financial performance.

3. DATA AND METHODS

3.1 Sample and data

China has consistently been one of the most active emerging economies in global cross-border mergers and acquisitions (M&A), with frequent transnational M&A activities and a substantial accumulation of representative cases (Li *et al.,* 2025A). Additionally, as the global manufacturing hub, Chinese domestic enterprises face significant emission reduction pressures. The government also aims to leverage M&A to acquire external technologies, thereby transitioning from the "world factory" model toward "green transformation." Therefore, selecting China as the research sample not only provides a robust data foundation but also helps elucidate the internationalization strategies of emerging market enterprises against the backdrop of global green transformation.

This study selects M&A events announced by Shanghai and Shenzhen A-share listed companies in China from 2018 to 2022 from the BvD_Zephyr database as the research sample (Xuan & Yan, 2025). The data are filtered according to the following criteria (Guo & Cheng, 2024b): (1) To ensure data availability, samples where the acquirer is an unlisted company are excluded. (2) Based on transaction status, only completed deals are retained, ensuring the announcement date is available. (3) If a company announces two or more M&A transactions within the same year: (a) If the acquirer announces multiple acquisitions of different target companies, only the transaction with the highest value is selected as a sample; (b) If the acquirer announces multiple M&A transactions for the same target company, these amounts are aggregated and treated as a single sample. (4) Acquirers in the financial or insurance industries are excluded. (5) Listed companies labeled as ST or ST* are excluded.

3.2 Variables

3.2.1 Dependent variables

To study the green innovation performance and financial performance of mergers and acquisitions, we established the following variables:

(1) Green Innovation Performance of the Acquirer: This paper adopts the method used by Zhang et al. (2023) to measure corporate green innovation performance using the total number of green patent applications. The data were obtained from the CSMAR database.

(2) Financial Performance of the Acquirer: This paper employs the Tobin's Q value of the acquiring firm X years after the merger (X = 1, 2, 3) to represent M&A performance (Ehsani & Osiyevskyy, 2023; Li *et al.,* 2025). The variable TobinQNextXYear is generated accordingly, with data sourced from the CSMAR database.

3.2.2 Independent variables

The independent variable is the carbon risk of the acquiring firm. This study refers to the method used by Shang et al. (2023) to measure carbon risk, which involves dividing each enterprise's carbon dioxide emissions by its main business revenue. Considering that most Chinese enterprises do not disclose their carbon dioxide emissions, we estimate these emissions based on industry energy consumption (Shang *et al.,* 2023). The specific calculation formula is as follows:

$$Carbon\ Risk=\frac{Carbon\ emission}{Enterprise\ main\ operating\ income\times 1000000}$$

$$Carbon\ emission=\frac{Enterprise\ main\ business\ cost}{Industry\ main\ business\ cost}\times indcost\times CO_2\ conversion\ factor$$

In this formula, Carbon Risk is the core explanatory variable, representing carbon risk. Data on corporate main business costs, corporate main business revenue, and industry main business costs can be obtained from the China Industrial Statistical Yearbook. The total energy consumption data for industries are sourced from the China Energy Statistical Yearbook, while the carbon dioxide conversion coefficients are provided by the Xiamen Energy Conservation Center (Shang *et al.,* 2023).

3.2.3 Moderating variables

(1) Democratic Level of the Destination Country. This study refers to and utilizes the Democracy Index provided by the Varieties of Democracy (V-Dem) database (Ahmad *et al.,* 2024; Reutzel, 2024). V-Dem is an index that ranks each country's level of democracy based on five overarching principles: electoral, deliberative, liberal, participatory, and egalitarian democracy, with each principle itself being an index. For more information on the V-Dem Index, refer to Coppedge *et al.,* (2019).

(2) Corruption Level of the Destination Country. The corruption data used in this study also come from the Varieties of Democracy (V-Dem) database. This database aggregates a large number of expert assessment indicators based on a Bayesian measurement model to generate comparable longitudinal data. This paper selects the Political Corruption Index and the Regime Corruption Index. The operational definition of the Political Corruption Index covers behaviors such as bribery and graft within the executive, legislative, and judicial branches, while the Regime Corruption Index aims to measure the systemic extent to which policymakers use public office for private gain, characterized by patterns consistent with patrimonial rule (Gregori *et al.,* 2024). The Regime Corruption Index is used for robustness testing.

(3) Income Inequality Level of the Destination Country. This study uses the Gini coefficient of resident income in the host country to measure the level of income inequality. To mitigate the impact of outliers, the variable is winsorized at the 1% level. The data are sourced from the World Bank's WDI database (Zhu *et al.,* 2025A).

3.2.4 Control variables

We controlled for the following variables:

(1) Firm Size (Size). Large firms, due to their superior internal production capabilities, often have greater survival opportunities and can pave the way for overcoming obstacles. Controlling for firm size helps avoid the confounding effects of this "scale effect" on the core relationship. Accordingly, this study measures firm size (Size) using the natural logarithm of total assets (Cui, 2025).

(2) Research and Development Investment (RD). Firms with high R&D investments may exhibit distinct objectives and characteristics (Ehsani & Osiyevskyy, 2023), and their performance growth may stem from innovation rather than other factors (e.g., market monopolies). Controlling for R&D expenditure helps exclude the interference of "innovation-driven" effects on the core relationship.

(3) Return on Equity (ROE). This study uses Return on Equity (ROE) to represent corporate profitability. Firms with strong profitability possess greater financial slack to support mergers and acquisitions and subsequent integration. This

serves as the foundation for their ability to address carbon risks and directly influences post-merger innovation outcomes and financial performance (Xuan & Yan, 2025).

(4) Herfindahl-Hirschman Index (HHI_A). The Herfindahl-Hirschman Index (HHI_A) measures industry concentration by calculating the market share of individual firms based on their main business revenue. The level of industry competition directly impacts firms' pricing strategies, innovation incentives, and profit margins (Cenciarelli *et al.,* 2025). Controlling for this variable helps disentangle industry-level from firm-level effects.

(5) Total Number of Shareholders (shareholder_num). The total number of shareholders serves as a key proxy for corporate information transparency and equity complexity. A larger shareholder base typically implies broader social oversight and more complex agency problems, systematically influencing decision-making transparency, risk preferences, and long-term investments, such as the willingness to pursue green innovation. Controlling for this variable helps isolate the independent impact of corporate governance factors on M&A strategies and their outcomes (Fallahnejad *et al.,* 2023; Wang & Qiu, 2023).

(6) Year and Industry. Given that unobservable influences may arise from year and industry factors, this study generates dummy variables for the year (Year) and the industry of the acquiring firm (Industry).

Detailed variable definitions and data sources are summarized in Appendix 1.

3.3 MODELS

This study employs an OLS regression model to examine the impact of carbon risk on the green innovation performance of corporate mergers and acquisitions. The following is Model 1:

$$GreenInnovation_{i,t} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 Controls_{i,t-1} + \alpha_3 Year_t + \alpha_4 Industry_i + \varepsilon_{i,t}$$

Model 2 is constructed by incorporating the moderating variable of the host country's level of democracy.

$$GreenInnovation_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times V\_Dem_{it-1} + \alpha_3 V\_Dem_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

Model 3 is developed by adding the moderating variable of the host country's corruption level.

$$GreenInnovation_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times V\_Corr_{it-1} + \alpha_3 V\_Corr_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

Model 4 is formulated by including the moderating variable of the host country's income inequality level.

$$GreenInnovation_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times Gini_{it-1} + \alpha_3 Gini_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

This study also employs an OLS regression model to investigate the impact of carbon risk on the financial performance of corporate mergers and acquisitions. Model 5 is presented as follows:

$$TobinQNextXYear_{i,t} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 Controls_{i,t-1} + \alpha_3 Year_t + \alpha_4 Industry_i + \varepsilon_{i,t}$$

Model 6 is designed to examine the moderating effect of the host country's level of democracy in this relationship.

$$TobinQNextXYear_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times V\_Dem_{it-1} + \alpha_3 V\_Dem_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

Model 7 is established to analyze the moderating effect of the host country's corruption level.

$$TobinQNextXYear_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times V\_Corr_{it-1} + \alpha_3 V\_Corr_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

Model 8 is developed to explore the moderating effect of the host country's income inequality level.

$$TobinQNextXYear_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times Gini_{it-1} + \alpha_3 Gini_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

Among these,$TobinQNextXYear_{it}$represents the Tobin's Q performance of acquiring firm i in the X-th year following the merger, where X = 1, 2, 3.

4. Empirical results and discussion

4.1 Descriptive statistics

Table 1 presents the descriptive statistics for all variables in this study. The mean value of Carbon Risk is 3.606, while the median is 1.151, indicating that most firms in the sample are characterized by high carbon risk. Table 2 displays the correlation matrix for all variables, revealing no severe multicollinearity issues.

Table 1: Descriptive Statistics

Variable	N	Mean	SD	Min	p50	Max
CarbonRisk	648	3.606	5.213	0.713	1.151	19.158
GreenInnovation	648	0.056	0.14	0	0	1
TobinQNext1Year	648	1.918	1.342	0.625	1.509	21.296
TobinQNext2Year	648	1.945	1.428	0.611	1.524	23.399
TobinQNext3Year	561	1.899	1.291	0.655	1.474	14.086
GINI_w	648	34.529	6.554	25.5	34.8	53.5
v2xcorr	648	0.011	1.07	-1.252	-0.069	2.559
v2xdestd	648	0.107	0.99	-1.346	0.322	1.475
shareholder_num	648	93781.927	1.77e+05	3486	38810	1.66e+06
ROE	648	0.061	0.553	-20.737	0.08	3.966
Size	648	23.055	1.889	19.594	22.707	31.155
RD	648	0.04	0.128	0	0.011	1.861
HHI_A	648	0.224	0.223	0.024	0.136	1

Source(s): Authors' own work.

Table 2: Correlation Matrix

Variable	CarbonRisk	GreenInnovation	TobinQ Next1Year	TobinQ Next1Year	TobinQ Next1Year	GINI_w
CarbonRisk	1					
GreenInnovation	0.0528	1				
TobinQNext1Year	-0.0887	-0.0775	1			
TobinQNext1Year	-0.0744	-0.0831	0.7188	1		
TobinQNext1Year	-0.0961	-0.1121	0.5973	0.7952	1	
GINI_w	0.0818	0.0146	0.0206	0.0159	-0.0415	1
v2xcorr	0.0993	0.0334	-0.0463	-0.06	-0.1223	0.203
v2xdestd	-0.041	-0.0016	0.0095	0.0249	0.0826	-0.0507
shareholder_num	0.0183	0.2338	-0.1726	-0.1771	-0.1943	0.1986
ROE	0.0123	0.0219	0.0109	-0.0397	-0.0436	0.0588
Size	-0.013	0.2248	-0.305	-0.3387	-0.364	0.1046
RD	-0.0776	0.0277	-0.03	-0.064	-0.088	-0.0302
HHI_A	0.0363	0.0598	-0.0756	-0.1115	-0.1307	0.0377

Variable	v2xcorr	v2xdestd	*shareholder_num*	ROE	Size	RD	HHI_A
v2xcorr	1						
v2xdestd	-0.8006	1					
shareholder_num	0.0311	0.0641	1				
ROE	-0.0193	-0.0034	0.0227	1			
Size	0.0759	-0.0015	0.7287	0.0597	1		
RD	-0.1003	0.0967	0.3772	0.074	0.4556	1	
HHI_A	0.0706	-0.0731	0.2547	-0.0136	0.2299	-0.0541	1

Source(s): Authors' own work.

4.2 Empirical results and analyses

4.2.1 Carbon risk of acquirers and Green Innovation Performance

Table 3 presents the regression results for Models (1) through (4). Column 1 includes only control variables, while Column 2 tests Hypothesis H1. The results in Table 2 show that the coefficient for CarbonRisk is positive and statistically significant at the p=0.05 level (coef=0.005). This indicates that, holding other variables constant, there is a positive association between the acquirer's carbon risk (CarbonRisk) and the acquirer's green innovation performance, supporting Hypothesis H1.

Column 3 tests Hypothesis H2. The results in Table 2 show that the interaction term between carbon risk (CarbonRisk) and the host country's level of democracy (v2xdestd) is positive and statistically significant at the p=0.1 level (coef=0.001). This suggests that, holding other variables constant, the host country's level of democracy (v2x_delibdem) has a significant positive moderating effect on the relationship between carbon risk and the acquirer's green innovation performance, supporting Hypothesis H2.

Column 4 tests Hypothesis H3. The results in Table 2 show that the interaction term between carbon risk (CarbonRisk) and the host country's level of corruption (v2xcorr) is negative and statistically significant at the p=0.05 level (coef=0.001). This indicates that, holding other variables constant, the host country's level of corruption (v2xcorr) has a significant negative moderating effect on the relationship between carbon risk and the acquirer's green innovation performance, supporting Hypothesis H3.

Column 5 tests Hypothesis H4. The results in Table 2 show that the interaction term between carbon risk (CarbonRisk) and the host country's income inequality level (GINI_w) is positive but not statistically significant, which does not align with Hypothesis H4. This is interpreted as follows:

(1) Host country income inequality may exert conflicting dual effects on green innovation. On the one hand, high income inequality may exacerbate social tensions, prompting governments to prioritize social stability and wealth redistribution in policy agendas, thereby relatively weakening the enforcement and priority of environmental regulations. This diminishes the external pressure for high-carbon-risk firms to engage in substantive green innovation. On the other hand, elite groups and large enterprises in unequal societies, in order to maintain their social legitimacy and gain moral capital, may be more motivated to invest in environmentally friendly initiatives aimed at enhancing their reputation, even if such investments are largely symbolic. This form of "selective incentive" from the top echelons of society could produce a promoting effect in the data. When the aforementioned suppressing and promoting mechanisms coexist in the sample with similar intensity, it may lead to an overall non-significant moderating effect of income inequality. This reveals the complexity of how inequality influences corporate strategies.

(2) The moderating effect of host country income inequality may not exist independently but is profoundly dependent on the overall institutional quality of the host country. In countries with robust democratic systems and high levels of rule of law, even if income inequality is relatively high, the institutional safeguards—such as the independence of environmental legislation, media freedom in oversight, and public participation rights—can effectively buffer the erosion of environmental policy enforcement caused by inequality. Consequently, the driving effect of carbon risk on corporate green innovation is maintained. Conversely, in countries with weak institutional quality, income inequality is more likely to intertwine with rent-seeking behaviors, directly translating into undermined environmental regulations and unfair resource allocation, which are unfavorable for green innovation. This significantly weakens the incentive effect of carbon risk. Therefore, its negative impact may be more pronounced in host countries with weaker institutional quality.

Table 3: OLS regression results for testing H1-H4

Dependent Variable	**(1)** ***GreenInnovation***	**(2)** ***GreenInnovation***	**(3)** ***GreenInnovation***	**(4)** ***GreenInnovation***	**(5)** ***GreenInnovation***
CarbonRisk		0.010** (0.005)	0.009* (0.005)	0.010* (0.005)	0.016* (0.008)
v2xdestd			-0.012** (0.005)		
c.CarbonRisk#c.v2xdestd			0.001* (0.001)		
v2xcorr				0.014* (0.007)	
c.CarbonRisk#c.v2xcorr				-0.002** (0.001)	
GINI_w					0.001 (0.001)
c.CarbonRisk#c.GINI_w					-0.000 (0.000)
shareholder_num	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
ROE	0.001 (0.027)	0.023 (0.026)	0.019 (0.025)	0.018 (0.025)	0.021 (0.026)
Size	0.008 (0.007)	0.007 (0.006)	0.008 (0.006)	0.008 (0.006)	0.007 (0.006)
RD	-0.105 (0.075)	-0.119 (0.075)	-0.110 (0.075)	-0.105 (0.072)	-0.111 (0.076)

HHI_A	-0.002 (0.059)	0.011 (0.061)	0.012 (0.060)	0.014 (0.060)	0.005 (0.062)
_cons	-0.061 (0.174)	-0.107 (0.178)	-0.126 (0.179)	-0.132 (0.181)	-0.124 (0.183)
N	648	648	648	648	648
R^2	0.200	0.211	0.219	0.223	0.214
adj. R^2	0.138	0.150	0.155	0.160	0.150

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

4.2.2 Carbon risk of acquirers and post-acquisition performance

Table 4 presents the regression results for Model (5). Given that performance feedback may exhibit a lag, we examined the Tobin's Q performance for three consecutive years following the merger. Columns 1 to 3 include only control variables, while Columns 4 to 6 test Hypothesis H5. The results in Column 6 show that the coefficient for CarbonRisk is negative and statistically significant at the p=0.1 level (coef=0.078). This indicates that, holding other variables constant, there is a negative association between the acquirer's carbon risk (CarbonRisk) and the acquirer's financial performance, supporting Hypothesis H5.

Table 4: OLS regression results for testing H5

Dependent Variable	**(1) TobinQ Next1Year**	**(2) TobinQ Next2Year**	**(3) TobinQ Next3Year**	**(4) TobinQ Next1Year**	**(5) TobinQ Next2Year**	**(6) TobinQ Next3Year**
CarbonRisk				-0.063 (0.045)	-0.062 (0.051)	-0.134* (0.078)
shareholder_num	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ROE	2.126*** (0.713)	1.412 (0.886)	0.649 (0.749)	1.984*** (0.744)	1.271 (0.940)	0.451 (0.765)
Size	-0.254*** (0.076)	-0.324*** (0.081)	-0.308*** (0.073)	-0.244*** (0.078)	-0.313*** (0.084)	-0.286*** (0.075)
RD	0.631 (0.893)	0.177 (0.702)	0.071 (0.750)	0.722 (0.935)	0.268 (0.739)	0.004 (0.745)
_cons	6.519*** (1.871)	7.616*** (1.853)	8.079*** (1.647)	6.812*** (1.833)	7.906*** (1.813)	8.703*** (1.665)
N	648	648	561	648	648	561
R^2	0.233	0.175	0.193	0.235	0.178	0.206
adj. R^2	0.174	0.112	0.123	0.175	0.113	0.135

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

Tables 5-7 present the regression results for Models (6)-(8), with Column 1 of each table testing Hypothesis H6, Column 2 testing Hypothesis H7, and Column 3 testing Hypothesis H8. Given the potential lag in performance feedback, we examined Tobin's Q performance over three consecutive years post-merger. Ultimately, none of the moderating variables in Tables 5-7 were statistically significant, except for Table 7, where the data results differed.

In Table 7, the coefficient of the interaction term between carbon risk (CarbonRisk) and the host country's level of democracy (v2xdestd) is negative and significant at the p=0.1 level (coef=0.011). This indicates that, holding other variables constant, the host country's level of democracy (v2xdestd) significantly strengthens the negative relationship between carbon risk and M&A financial performance, supporting Hypothesis H6.

In Table 7, the coefficient of the interaction term between carbon risk (CarbonRisk) and the host country's corruption level (v2xcorr) is positive and significant at the p=0.1 level (coef=0.009). This indicates that, holding other variables constant, the host country's corruption level (v2xcorr) significantly weakens the negative relationship between carbon risk and M&A financial performance, supporting Hypothesis H7.

In Table 7, the coefficient of the interaction term between carbon risk (CarbonRisk) and the host country's income inequality level (GINI_w) is positive and significant at the p=0.05 level (coef=0.004). This indicates that, holding other variables constant, the host country's income inequality level (GINI_w) significantly weakens the negative relationship between carbon risk and M&A financial performance, supporting Hypothesis H8.

Table 5: OLS regression results for testing H6-H8

Dependent Variable	(1) TobinQNext1Year	(2) TobinQNext1Year	(3) TobinQNext1Year
CarbonRisk	-0.068 (0.044)	-0.064 (0.046)	-0.053 (0.052)
v2xdestd	0.023 (0.102)		
c.CarbonRisk#c.v2xdestd	-0.009 (0.012)		
v2xcorr		-0.051 (0.086)	
c.CarbonRisk#c.v2xcorr		0.008 (0.009)	
GINI_w			0.012 (0.014)
c.CarbonRisk#c.GINI_w			-0.000 (0.001)
shareholder_num	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ROE	1.972*** (0.741)	1.998*** (0.747)	1.946*** (0.748)
Size	-0.246*** (0.080)	-0.248*** (0.080)	-0.239*** (0.080)
RD	0.732 (0.935)	0.678 (0.943)	0.799 (0.927)
HHI_A	0.275 (0.752)	0.261 (0.755)	0.277 (0.741)
_cons	6.852*** (1.872)	6.917*** (1.855)	6.386*** (1.986)
N	648	648	648
R^2	0.236	0.236	0.236
adj. R^2	0.173	0.173	0.174

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

Table 6: OLS regression results for testing H6-H8

Dependent Variable	(1) TobinQNext2Year	(2) TobinQNext2Year	(3) TobinQNext2Year
CarbonRisk	-0.067 (0.052)	-0.063 (0.052)	-0.101 (0.072)
v2xdestd	0.047 (0.106)		
c.CarbonRisk#c.v2xdestd	-0.012 (0.013)		
v2xcorr		-0.059 (0.094)	
c.CarbonRisk#c.v2xcorr		0.009 (0.011)	
GINI_w			0.004 (0.015)
c.CarbonRisk#c.GINI_w			0.001 (0.002)
shareholder_num	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ROE	1.265 (0.942)	1.287 (0.943)	1.249 (0.957)
Size	-0.317*** (0.086)	-0.318*** (0.085)	-0.309*** (0.086)

RD	0.263 (0.762)	0.215 (0.777)	0.278 (0.751)
HHI_A	0.728 (0.706)	0.716 (0.709)	0.775 (0.699)
_cons	7.984*** (1.846)	8.021*** (1.818)	7.644*** (2.016)
N	648	648	648
R^2	0.180	0.179	0.179
adj. R^2	0.112	0.112	0.112

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

Table 7: OLS regression results for testing H6-H8

Dependent Variable	**(1)** **TobinQNext3Year**	**(2)** **TobinQNext3Year**	**(3)** **TobinQNext3Year**
CarbonRisk	-0.140* (0.074)	-0.141* (0.075)	-0.264*** (0.090)
v2xdestd	0.125 (0.102)		
c.CarbonRisk#c.v2xdestd	-0.020* (0.011)		
v2xcorr		-0.121 (0.087)	
c.CarbonRisk#c.v2xcorr		0.017* (0.009)	
GINI_w			-0.004 (0.015)
c.CarbonRisk#c.GINI_w			0.004** (0.002)
shareholder_num	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ROE	0.467 (0.748)	0.489 (0.755)	0.423 (0.780)
Size	-0.299*** (0.078)	-0.299*** (0.076)	-0.284*** (0.075)
RD	-0.115 (0.788)	-0.181 (0.796)	0.068 (0.747)
HHI_A	-0.429 (0.645)	-0.462 (0.647)	-0.316 (0.630)
_cons	8.960*** (1.698)	9.034*** (1.657)	8.580*** (1.797)
N	561	561	561
R^2	0.214	0.214	0.218
adj. R^2	0.141	0.140	0.145

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

4.3 Robustness tests

Regarding the relationship between carbon risk and post-merger green innovation performance, this study tested the robustness of H1 by replacing control variables. New control variables include earnings per share (EPS), firm age (firm_age), CEO duality (Dual_Board), whether the host country is part of the Belt and Road Initiative (IsBRCountry), and industry relatedness of the merging firms (Industryrelated). The test results are shown in Column 1 of Table 8. The significance of the relevant variables largely remains unchanged, indicating the robustness of the findings in this study.

Regarding the relationship between carbon risk and post-merger financial performance, this study used return on assets (ROA) to represent post-merger performance. The test results are shown in Columns 2 to 4 of Table 8. The significance of the relevant variables largely remains unchanged, and the performance in the second and third years post-merger is more significant than in the first year, reflecting the lagged effect of performance impact and further confirming the robustness of the findings.

Regarding the democracy index, this study used the standardized democracy index as the moderating variable. The robustness test results for H2 and H6 are presented in Columns 1 and 3 of Table 9, respectively, with the significance of the relevant variables largely unchanged.

Regarding corruption, this study used the regime corruption index as the moderating variable. The test results for H3 and H7 are shown in Columns 2 and 4 of Table 9, respectively, with the significance of the relevant variables largely unchanged.

Regarding income inequality, this study continued to use the Gini coefficient to represent the host country's income inequality level but applied a 5% winsorization to this variable. The test result for H8 is shown in Column 5 of Table 9, with the significance of the relevant variables largely unchanged, indicating the robustness of the findings in this study.

Table 8: Robustness test of alternative variables for testing H1、H5

Dependent Variable	**(1) GreenInnovation**	**(2) ROANext1Year**	**(3) ROANext2Year**	**(4) ROANext3Year**
CarbonRisk	0.000 (0.003)	-0.008* (0.004)	-0.007** (0.003)	-0.007** (0.003)
shareholder_num	0.000 (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)
ROE	0.002 (0.002)	0.179*** (0.063)	0.122** (0.051)	0.042 (0.059)
EPS	0.004 (0.003)			
firm_age	0.001 (0.001)			
Dual_Board	0.008 (0.008)			
IsBRCountry	0.009 (0.014)			
Industryrelated	0.011 (0.009)			
Size		0.004 (0.005)	0.006 (0.006)	0.010* (0.005)
RD		0.047 (0.046)	0.062 (0.053)	0.005 (0.044)
HHI_A		0.001 (0.038)	-0.057 (0.040)	0.015 (0.033)
_cons	-0.084 (0.092)	0.009 (0.103)	-0.587** (0.257)	-0.082 (0.125)
N	1104	648	648	561
R^2	0.184	0.217	0.388	0.197
adj. R^2	0.132	0.156	0.340	0.125

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

Table 9: Robustness test of alternative variables for testing H2-H3、H5-H8

Dependent Variable	**(1) GreenInnovation**	**(2) GreenInnovation**	**(3) ROANext3Year**	**(4) ROANext3Year**	**(5) ROANext3Year**
CarbonRisk	0.009* (0.005)	0.010* (0.005)	-0.007** (0.003)	-0.007** (0.003)	-0.015*** (0.004)
v2xdestd2	-0.013** (0.005)		-0.002 (0.005)		
c.CarbonRisk#c.v2xdestd2	0.002* (0.001)		0.000 (0.001)		
v2xcorrreg		0.014** (0.007)		0.006 (0.005)	
c.CarbonRisk#c.v2xcorrreg		-0.002** (0.001)		-0.001 (0.000)	

GINI_w5					-0.000 (0.001)
c.CarbonRisk#c.GINI_w5					0.000** (0.000)
shareholder_num	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)
ROE	0.019 (0.025)	0.019 (0.025)	0.042 (0.059)	0.040 (0.060)	0.041 (0.060)
Size	0.008 (0.006)	0.008 (0.006)	0.010** (0.005)	0.010** (0.005)	0.010** (0.005)
RD	-0.111 (0.075)	-0.106 (0.073)	0.007 (0.046)	0.014 (0.045)	0.009 (0.045)
HHI_A	0.012 (0.060)	0.012 (0.060)	0.015 (0.033)	0.015 (0.033)	0.023 (0.034)
_cons	-0.127 (0.179)	-0.126 (0.180)	-0.086 (0.124)	-0.090 (0.124)	-0.092 (0.124)
N	648	648	561	561	561
R^2	0.220	0.223	0.197	0.200	0.206
adj. R^2	0.156	0.159	0.122	0.125	0.131

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

5 Additional Tests

5.1 Subsample Analysis

A corrupt institutional environment systematically distorts the relationship between carbon risk and corporate green innovation, but the underlying mechanisms differ significantly between developed and developing countries. In developed countries with relatively sound institutions, corruption typically manifests as isolated instances of "regulatory failure" or informal government-business relationships. However, the mature rule of law and public oversight in developed countries can still, to a considerable extent, maintain the market transmission mechanism of carbon risk. Consequently, while corporate green innovation may be suppressed, it is not completely stifled.

In contrast, within the institutional contexts of developing countries, corruption tends to be more pervasive and systemic. Enterprises can routinely obtain regulatory exemptions through means such as bribery, preventing carbon risk from being effectively translated into financial costs and innovation pressures. This leads to a large-scale diversion of resources from research and development to rent-seeking activities, which may inhibit green innovation. Moreover, the perverse incentive structure of "high carbon equals high profits" becomes entrenched, placing compliant and innovative firms at a systematic disadvantage in the distorted competitive environment. Therefore, this study introduces the variable "Developed" to conduct a subsample analysis of the main effects, with the results of the subsample tests presented in Table 9.

Column 1 demonstrates how the corruption level of the host country affects the relationship between carbon risk and corporate innovation performance when the target country is a developing country. The results show that the coefficient for CarbonRisk is positive and significant at the p=0.1 level (coef=0.007). This indicates that, holding other variables constant, there is a positive association between the acquirer's carbon risk (CarbonRisk) and the acquirer's post-merger green innovation performance when the host country is a developing country.

Column 2 examines how carbon risk affects corporate innovation performance when the target country is a developed country. The results show that the coefficient for CarbonRisk is positive but not statistically significant.

Column 3 investigates how the corruption level of the host country moderates the relationship between carbon risk and corporate innovation performance when the target country is a developing country. The results show that the coefficient of the interaction term is negative and significant at the p=0.05 level (coef=0.002). This indicates that, holding other variables constant, the host country's corruption level (v2xcorr) has a significant negative moderating effect on the relationship between carbon risk and the acquirer's green innovation performance in developing countries.

Column 4 explores how the corruption level of the host country moderates the relationship between carbon risk and corporate innovation performance when the target country is a developed country. The results show that the coefficient of the interaction term is negative and significant at the p=0.1 level (coef=0.007). This indicates that, holding other variables constant, the host country's corruption level (v2xcorr) also has a significant negative moderating effect on the relationship between carbon risk and the acquirer's green innovation performance in developed countries. The results align with the

initial expectations of this study, demonstrating that the impact of corruption on the relationship between carbon risk and the acquirer's green innovation performance is more pronounced in developing countries.

Table 9: Additional Test 1

Dependent Variable	(1) GreenInnovation	(2) GreenInnovation	(3) GreenInnovation	(4) GreenInnovation
CarbonRisk	0.014**	0.012	0.018**	0.002
	(0.007)	(0.007)	(0.008)	(0.008)
v2xcorr			0.029**	0.113**
			(0.014)	(0.045)
c.CarbonRisk#c.v2xcorr			-0.004**	-0.012*
			(0.002)	(0.007)
shareholder_num	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
ROE	0.001	0.021	-0.003	0.009
	(0.037)	(0.030)	(0.037)	(0.032)
Size	-0.001	0.017*	-0.003	0.018**
	(0.010)	(0.009)	(0.009)	(0.009)
RD	-0.107	-0.101	-0.057	-0.061
	(0.100)	(0.125)	(0.085)	(0.129)
HHI_A	-0.028	0.039	-0.019	0.035
	(0.113)	(0.070)	(0.105)	(0.070)
_cons	0.081	-0.646**	0.123	-0.581**
	(0.252)	(0.281)	(0.244)	(0.268)
N	358	290	358	290
R^2	0.226	0.304	0.251	0.349
adj. R^2	0.115	0.195	0.137	0.241

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

5.2 Firm Life Cycle Test

In addition to considering the influence of national institutions, this study also examines the impact of firm-level factors on merger and acquisition performance. Similar to biological organisms, enterprises undergo various stages such as youth, maturity, and decline. Particularly when facing risks, managers adopt strategies appropriate to their company's life cycle stage in an effort to effectively navigate challenges. Life cycle theory further posits that companies should maximize revenue growth in their early stages to establish enduring demand or cost advantages over competitors.

Following the approach of DeAngelo et al. (2006), this study employs a continuous proxy measure for corporate life cycle—specifically, the ratio of retained earnings to total assets (RE/TA) (Amin *et al.,* 2023). The following model is used to test the heterogeneous effects of corporate life cycle on the primary relationships:

$$GreenInnovation_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times young\_co_{it-1} + \alpha_3 young\_co_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

$$GreenInnovation_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times mature\_co_{it-1} + \alpha_3 mature\_co_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

$$GreenInnovation_{it} = \alpha_0 + \alpha_1 CarbonRisk_{it-1} + \alpha_2 CarbonRisk_{it-1} \times old\_co_{it-1} + \alpha_3 old\_co_{it-1} + \alpha_4 Controls_{i,t-1} + \alpha_5 Year_t + \alpha_6 Industry_i + \varepsilon_{i,t}$$

Table 10 presents the results of the heterogeneity test based on corporate life cycle. In Columns 1 and 3, the interaction terms between carbon risk and the firm's young and old stages are not statistically significant. However, in Column 2, the interaction term between carbon risk (CarbonRisk) and the firm's mature stage (mature_co) shows a positive coefficient, significant at the p=0.1 level (coef=0.002). This indicates that, holding other variables constant, the firm's mature stage (mature_co) significantly weakens the relationship between carbon risk and post-merger green innovation performance.

This paper offers the following interpretation: It is not that mature-stage firms fail to perceive carbon risks, but rather that their inherent organizational inertia and structural resistance are excessively strong. The green transformation

of mature enterprises still faces internal challenges. First, the highly successful business models and resource allocation patterns developed over the long term are difficult to change. For mature-stage firms, past successes are often built on traditional high-carbon operations, with extensive fixed assets, established supply chains, and stable customer relationships deeply intertwined with these operations, making short-term shifts challenging. Second, mature-stage firms tend to overly rely on and optimize their existing core competencies (such as large-scale production of fossil fuel-based products), thereby neglecting the exploration and investment in new, disruptive capabilities like green technological innovation. Consequently, while high carbon risk should serve as a powerful external force for change, mature-stage firms possess an exceptionally robust "inertial system" that counteracts this external pressure, resulting in a slower pace of transformation.

Table 10: Additional Test 2

Dependent Variable	**(1) GreenInnovation**	**(2) GreenInnovation**	**(3) GreenInnovation**
CarbonRisk	0.007*	0.011**	0.009**
	(0.004)	(0.005)	(0.005)
young_co	-0.005		
	(0.016)		
c.CarbonRisk#c.young_comature_co	0.003	0.012	
		(0.012)	
c.CarbonRisk#c.mature_co		-0.004*	
		(0.002)	
old_co			-0.015
			(0.016)
c.CarbonRisk#c.old_co	(0.002)		0.002
			(0.004)
shareholder_num	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
ROE	0.021	0.019	0.024
	(0.026)	(0.026)	(0.026)
Size	0.005	0.006	0.005
	(0.006)	(0.006)	(0.006)
RD	-0.107	-0.107	-0.115
	(0.073)	(0.073)	(0.075)
HHI_A	0.015	0.012	0.011
	(0.063)	(0.062)	(0.062)
_cons	-0.063	-0.092	-0.077
	(0.177)	(0.181)	(0.180)
N	645	645	645
R^2	0.220	0.222	0.213
adj. R^2	0.156	0.158	0.149

Note(s): Robust standard errors clustered by firm id in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source(s): Authors' own work.

6. CONCLUSIONS AND IMPLICATIONS

6.1 Conclusions

Based on 648 cross-border M&A transactions completed by Chinese enterprises between 2018 and 2022, this study finds that carbon risk has a significant impact on both post-merger green performance and post-merger financial performance, with the host country's institutional environment playing a critical moderating role. (1) Specifically, regarding green performance: Chinese enterprises with higher carbon risks demonstrate better green innovation performance after mergers and acquisitions. This tendency is significantly enhanced when the host country has a higher level of democracy, indicating a positive moderating effect, while it is significantly weakened when the host country has a higher level of corruption, demonstrating a negative moderating effect. (2) In terms of financial performance: Chinese enterprises with higher carbon risks exhibit poorer financial performance after mergers and acquisitions. This tendency is significantly enhanced when the host country has a higher level of democracy, significantly weakened when the host country has a higher level of corruption, and also significantly weakened when the host country has a higher level of income inequality.

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6.2 Implications

6.2.1 Theoretical implications

This study provides the following theoretical contributions:

(1) It constructs an integrated analytical framework combining institutions and environmental strategy. Moving beyond a single institutional perspective, this study integrates three core dimensions—democracy, corruption, and income inequality—to develop a comprehensive framework for assessing the macro-institutional environment of host countries. It reveals that institutional factors do not operate in isolation but interact in a synergistic and systemic manner to collectively shape the boundaries within which firms can translate carbon risk into drivers of green innovation.

(2) It uncovers the dual-edged role of institutional environments in moderating the effect of carbon risk. The findings demonstrate that institutional contexts can either amplify or suppress the impact of carbon risk on corporate behavior. In the most favorable institutional setting—characterized by high democracy, low corruption, and low-income inequality—carbon risk effectively triggers substantive green innovation. Conversely, in the least favorable setting—marked by low democracy, high corruption, and high-income inequality—carbon risk becomes distorted, leading firms toward rent-seeking and avoidance behaviors instead. This deepens our understanding of how institutional environments modulate the transmission mechanisms of external pressures.

(3) It broadens the performance dimensions of corporate green transformation. By simultaneously examining both financial performance and green innovation performance, this study clarifies the potential "performance paradox" that firms may face under different institutional environments when responding to carbon risk. For example, in corrupt settings, firms may maintain short-term financial performance through rent-seeking while sacrificing long-term green innovation capabilities. This highlights the necessity of incorporating non-financial indicators, such as green innovation, into strategic evaluation systems and provides a new theoretical basis for comprehensively assessing corporate sustainable competitiveness.

6.2.2 Practical implications

This study provides practical implications for policymakers and corporate managers:

For Corporate Managers:

This paper offers a clear "institutional map" for cross-border investment decisions by high carbon-risk enterprises. Firms should deeply integrate the institutional and social quality of host countries into their financial models and risk assessment systems to avoid institutional pitfalls. In particular, it is essential to reassess supply chain partners in highly corrupt countries. The apparent "financial advantages" these partners gain by evading environmental costs actually conceal significant compliance and legal risks, which could disrupt the entire supply chain. Furthermore, investors should move beyond traditional financial analysis and incorporate firms' geographic footprints and the institutional risks they face into valuation models.

For Policymakers:

This study argues that promoting green innovation cannot rely solely on corporate self-discipline or market-based tools such as carbon pricing. Instead, it requires fundamental improvements in the macro-level institutional and social environment. Governments should commit to advancing political, economic, and social reforms centered on "high democratic quality, robust corruption control, and enhanced social equity," thereby creating a stable, fair, and strongly incentivized policy stage for corporate green transformation. Additionally, regulatory authorities must remain vigilant about variations in corporate motivations for "greenwashing" across different institutional environments. They should guide capital toward firms engaged in substantive green innovation within sound institutional settings, thereby achieving efficient resource allocation.

6.3 Limitations and future research

This study has certain limitations. First, the measurement of democracy and corruption is relatively singular, relying solely on data from the V-Dem database, which presents certain constraints. Second, the research sample is limited to Chinese enterprises, which may affect the external validity of the findings. Future research could incorporate additional institutional variables, such as the intensity of environmental regulations in the home country, and expand the scope to other emerging economies to enhance the generalizability and comparative significance of the conclusions.

REFERENCES

- Ahmad, M. F., Lambert, T., Martín-Flores, J. M., & Romec, A. (2024). Does democracy shape international merger activity? Journal of International Economics, 152, 103995.
- https://doi.org/10.1016/j.jinteco.2024.103995
- Amin, A., Bowler, B., Hasan, M. M., Lobo, G. J., & Tresl, J. (2023). Firm life cycle and cost of debt. Journal of Banking & Finance, 154, 106971. https://doi.org/10.1016/j.jbankfin.2023.106971
- Asiedu, E., & Lien, D. (2011). Democracy, foreign direct investment and natural resources. Journal of International Economics, 84(1), 99-111. https://doi.org/10.1016/j.jbankfin.2023.106971
- Bai, H., Yu, M., & Park, J.-M. (2025). Can digital transformation cure “greenwashing”? Finance Research Letters, https://doi.org/10.1016/j.frl.2025.108747

- Cao, Z., Chen, S. X., Dong, T., & Lee, E. (2025). Climate change uncertainty and supply chain financing. The British Accounting Review, 57(5), 101423. https://doi.org/10.1016/j.bar.2024.101423
- Cenciarelli, V. G., Greco, G., & Mattei, M. M. (2025). Product market competition and financial default: Evidence from Italian private firms. Research in International Business and Finance, 78, 103009.
- https://doi.org/10.1016/j.ribaf.2025.103009
- Chen, J., Fan, Y., Yang, Y., & Tang, Y. (2025). Carbon risk and technological mergers and acquisitions (M&A): The perspective of institutional pressures. Energy Economics, 143, 108213. https://doi.org/10.1016/j.eneco.2025.108213
- Choi, G. (2022). Determinants of target location selection for acquirers in the manufacturing sector: Pollution intensity, policy enforcement, and civic environmentalism. Journal of Business Research, 146, 308-324. https://doi.org/10.1016/j.jbusres.2022.03.074
- Coppedge, M., Gerring, J., Knutsen, C. H., Krusell, J., Medzihorsky, J., Pernes, J., Skaaning, S.-E., Stepanova, N., Teorell, J., Tzelgov, E., et al. (2019). The methodology of "varieties of democracy" (V-Dem). BMS-Bulletin of Sociological Methodology-Bulletin de Methodologie Sociologique, 143(1), 107-133. https://doi.org/10.1177/0759106319854989
- Cui, D., Ding, M., Han, Y., & Suardi, S. (2024). Greening the future: How mergers and acquisitions in China tackle carbon challenges. Energy Economics, 136, 107725.
- https://doi.org/10.1016/j.eneco.2024.107725
- Cui, W. (2025). Green management innovation, supply chain finance capabilities, and corporate green innovation performance. Finance Research Letters, 85(Part D), 108157. https://doi.org/10.1016/j.frl.2025.108157
- DeAngelo, H., DeAngelo, L., & Stulz, R. M. (2006). Dividend policy and the earned/contributed capital mix: A test of the life-cycle theory. Journal of Financial Economics, 81(2), 227–254. https://doi.org/10.1016/j.jfineco.2005.07.005
- Du, Y., Li, Z., & He, Y. (2025). Can the level of green consumption restrain listed companies' "greenwashing" behavior? An analysis of the moderating effect of green credit. Finance Research Letters, https://doi.org/10.1016/j.frl.2025.108419
- Ehsani, M., & Osiyevskyy, O. (2023). Firm failure and the exploration/exploitation dilemma: The role of firm life cycle. Long Range Planning, 56(3), 102307. https://doi.org/10.1016/j.lrp.2023.102307
- Fallahnejad, A., Nazari, R., & Fard, M. M. (2023). Analysis of the relationship between the development of performance criteria and job performance of employees with respect to the mediating role of employee participation. Studia Universitatis Vasile Goldis Arad Seria Stiinte Economice, 33(2), 1–26. https://doi.org/10.2478/sues-2023-0006
- Farooq, U., Tabash, M. I., Hamouri, B., & Daniel, L. N. (2023). Does control of corruption play its role in enhancing the innovation? Empirical evidence from Asian region. International Journal of Innovation Science, 17(1), 202–217. https://doi.org/10.1108/IJIS-05-2023-0110
- Figuerola-Ferretti, I., Sanz, F. J., & Tang, T. (2025). Measuring the impact of carbon transition risk on the equity performance of energy corporations. Energy Strategy Reviews, 62, 101914. https://doi.org/10.1016/j.esr.2025.101914
- Guo, J., & Cheng, H. (2024b). Acquirer's carbon risk, host country environmental regulations, cross-border M&A and carbon emissions: Evidence from China. International Journal of Environmental Research, 18(2), 30. https://doi.org/10.1007/s41742-024-00580-y
- Gu, Y., Xie, W., Qian, X., & Lv, J. (2025). Peer effect in mergers and acquisitions for green innovation. Journal of Innovation & Knowledge, 10(3), 100734. https://doi.org/10.1016/j.jik.2025.100734
- Gregori, T., Giansoldati, M., & Zotti, J. (2025). Institutional corruption and environmental degradation. Journal of Cleaner Production, 521, 146191. https://doi.org/10.1016/j.jclepro.2025.146191
- Haq, H. u., & Kuiken, A. (2025). Economic or Political Outcomes: Corporate Political Activity in a Populist Setting. Journal of Business Research, 190, 115234.
- https://doi.org/10.1016/j.jbusres.2025.115234
- Karolyi, G. A., & Liao, R. C. (2017). State capitalism's global reach: Evidence from foreign acquisitions by state-owned companies. Journal of Corporate Finance, 42, 367–391. https://doi.org/10.1016/j.jcorpfin.2016.02.007
- Kumar, M., Mohapatra, G., & Giri, A. K. (2025). Unveiling green trade-led EKC framework: A comprehensive analysis using carbon, material, and ecological footprints across G20 nations. Journal of Environmental Management, 394, 127528. https://doi.org/10.1016/j.jenvman.2025.127528
- Li, Q., & Resnick, A. (2003). Reversal of fortunes: Democratic institutions and foreign direct investment inflows to developing countries. International Organization, 57(1), 175-211.
- https://doi.org/10.1017/S0020818303571077
- Li, Y., Xiao, Z., Shen, F., Zou, H., & Li, W. (2025). Financing the firm or fueling risk? How share-pledged loans for corporate use shape corporate performance. The North American Journal of Economics and Finance, 78, 102421. https://doi.org/10.1016/j.najef.2025.102421
- Lu, Z., Mahalik, M. K., Mallick, H., & Zhao, R. (2022). The moderating effects of democracy and technology adoption on the relationship between trade liberalization and carbon emissions. Technological Forecasting and Social Change, 180, 121712.

- https://doi.org/10.1016/j.techfore.2022.121712
- Jiang, J., & Zhang, J. (2023). Does political ideology matter in Chinese cross-border acquisitions? Journal of Business Research, 161, 113829. https://doi.org/10.1016/j.jbusres.2023.113829
- Jiménez, A., Bayraktar, S., Choi, S.-J., & Pattnaik, C. (2025). Democracy's political ideology and corporate political activities: The role of state capacity, firm size, and capital location. Journal of Business Research, 194, 115371. https://doi.org/10.1016/j.jbusres.2025.115371
- Jin, H., Chen, D., & Xu, S. (2025). Climate change and rural income inequality: Evidence from China. Energy Economics, *149*, 108722. https://doi.org/10.1016/j.eneco.2025.108722
- Jin, Y., Deng, S., Pu, X., & Zhu, Z. (2025). Carbon emissions and bank risk around the world. The British Accounting Review, https://doi.org/10.1016/j.bar.2025.101750
- Li, C., Wang, H., & Zhang, C. (2025). Digital transformation and corporate mergers and acquisitions: Evidence and mechanism in China. Pacific-Basin Finance Journal, 102968. https://doi.org/10.1016/j.pacfin.2025.102968
- Nguyen, J. H., & Phan, H. V. (2020). Carbon risk and corporate capital structure. Journal of Corporate Finance, 64, 101713. https://doi.org/10.1016/j.jcorpfin.2020.101713
- Niu, F., Luo, Z., & Mu, Y. (2025). How do enterprises deal with environmental protection "fee-to-tax" reform? Evidence from ESG information greenwashing in China. International Review of Economics & Finance, 104, 104657. https://doi.org/10.1016/j.iref.2025.104657
- Quan, X., Zhang, K., Zhong, R., & Zhu, Y. (2023). Political corruption and green innovation. Pacific-Basin Finance Journal, *82*, 102169. https://doi.org/10.1016/j.pacfin.2023.102169
- Ren, X., Li, W., Duan, K., & Urquhart, A. (2025). Carbon risk and debt financing: An international perspective. Journal of International Money and Finance, 153, 103294.
- https://doi.org/10.1016/j.jimonfin.2025.103294
- Reutzel, F. (2024). The grass is always greener on the other side: (Unfair) inequality and support for democracy. European Journal of Political Economy, 85, 102600.
- https://doi.org/10.1016/j.ejpoleco.2024.102600
- Shang, Y., Raza, S. A., Huo, Z., Shahzad, U., & Zhao, X. (2023). Does enterprise digital transformation contribute to the carbon emission reduction? Micro-level evidence from China. International Review of Economics & Finance, 86, 1-13. https://doi.org/10.1016/j.iref.2023.02.019
- Siddique, M. A., Akhtaruzzaman, M., Rashid, A., & Hammami, H. (2021). Carbon disclosure, carbon performance and financial performance: International evidence. International Review of Financial Analysis, 75, 101734. https://doi.org/10.1016/j.irfa.2021.101734
- Stoecker, A. (2022). Partisan alignment and political corruption: Evidence from a new democracy. World Development, 152, 105805. https://doi.org/10.1016/j.worlddev.2021.105805
- Song, Z., & Huang, G. (2025). The impact of reducing income inequality on household carbon emissions in China. Sustainable Cities and Society, 131, 106699. https://doi.org/10.1016/j.scs.2025.106699
- Wang, J., & Chen, Y. (2025). Does carbon risk promote green innovation in manufacturing companies? International Review of Financial Analysis, 108(Part A), 104684. https://doi.org/10.1016/j.irfa.2025.104684
- Wang, Q., & Qiu, M. (2023). Strength in numbers: Minority shareholders' participation and executives' pay-performance sensitivity. Pacific-Basin Finance Journal, 79, 102015. https://doi.org/10.1016/j.pacfin.2023.102015
- Xuan, Z., & Yan, Q. (2025). Digital transformation of enterprises, degree of internationalization, and performance in cross-border mergers and acquisitions. Finance Research Letters, 86(Part B), 108445. https://doi.org/10.1016/j.frl.2025.108445
- Xu, M., & Wang, Y. (2025). Beyond the green facade: Evidence of a nonlinear link between greenwashing and financing efficiency. Global Finance Journal, 68, 101183. https://doi.org/10.1016/j.gfj.2025.101183
- Zhang, Y., Sun, Z., & Zhou, Y. (2023). Green merger and acquisition and green technology innovation: Stimulating quantity or quality? Environmental Impact Assessment Review, 103, 107265.
- https://doi.org/10.1016/j.eiar.2023.107265
- Zhu, Y., Chen, M., Pan, M., & Ren, Z. (2025). Beyond funding: How income inequality shapes international clean energy finance's influence on ecological carrying capacity in 114 developing countries. Journal of Environmental Management, *393*, 127045. https://doi.org/10.1016/j.jenvman.2025.127045

Appendix

Appendix 1. Variables' Definitions and Sources

Table A1.1 Variables Definitions and Sources

Variable	Section	Definition	Source
Dependent Variables			
GreenInnovation	Main Analysis	the natural logarithm of (1 + the number of green patents independently applied for in that year)	CSMAR
TobinQNext1Year	Main Analysis	Market value of equity/total assets in the next year before the M&A	CSMAR
TobinQNext2Year	Main Analysis	Market value of equity/total assets in the next two year before the M&A	CSMAR
TobinQNext3Year	Main Analysis	Market value of equity/total assets in the next three year before the M&A	CSMAR
ROANext1Year	Robustness Test	Net income/total assets balance in the next year before the M&A	CSMAR
ROANext2Year	Robustness Test	Net income/total assets balance in the next two year before the M&A	CSMAR
ROANext3Year	Robustness Test	Net income/total assets balance in the next three year before the M&A	CSMAR
Independent Variable			
CarbonRisk	Main Analysis	Carbon emission /（Enterprise main operating revenue× 100,000）	CSMAR
Moderating Variables			
intro	Main Analysis	Using the pattern of cash flow from operating (CFO), investing (CFI), and financing (CFF) from the cash flow statement. A firm-year is in the stage if CFO < 0, CFI < 0, and CFF > 0.	CSMAR
grow	Main Analysis	Growth stage if CFO > 0, CFI < 0, and CFF > 0.	CSMAR
mature	Main Analysis	Mature stage for remaining firm-years	CSMAR
decline	Main Analysis	Decline stage if CFO < 0, CFI > 0 regardless the sign of CFF.	CSMAR
IntroPeriod	Robustness Test	Using the pattern of cash flow from operating (CFO), investing (CFI), and financing (CFF) from the cash flow statement. A firm-year is in the stage if CFF < 0, CFI < 0, and CFF > 0.	CSMAR
GrowthPeriod	Robustness Test	Growth stage if CFO > 0,CFI < 0, and CFF > 0.	CSMAR
MaturePeriod	Robustness Test	Mature stage if CFO > 0, CFI < 0, and CFF < 0.	CSMAR
Shakeout	Robustness Test	Shake-out stage for remaining firm-years	CSMAR
DeclinePeriod	Robustness Test	Decline stage if CFO < 0, CFI > 0 regardless the sign of CFF.	CSMAR
v2xdestd	Main Analysis	A deliberative process is one in which public reasoning focused on the common good motivates political decisions-as contrasted with emotional appeals, solidary attachments, parochial interests, or coercion. To make it a measure of not only the deliberative principle but also of democracy, the index also takes the level of electoral democracy into account.	V-democracy
v2xcorr	Main Analysis	This version has the suffixes: "codelow" and "codehigh". These two kinds of variables ["code low" and "code high"] demarcate the interval in which the measurement model places 68 percent of the probability mass for each	V-democracy

		country-year score, which is approximately equivalent to one standard deviation upper and lower bounds. If the underlying posterior distribution is skewed, the HPDs reflect this with unequal distances between the point estimate and the high and low estimates.	
Control Variables			
Size	Main Analysis	The logarithm of total assets at the end of the year	CSMAR
ROE	Main Analysis	Return on Equity (ROE), calculated as Net Profit divided by Average Shareholders' Equity	CSMAR
RD	Main Analysis	R&D expenses refer to the expenditure on research and development costs. It has been in use since 2018.	CSMAR
shareholder_num	Main Analysis	Total Number of Shareholders	CSMAR
HHI_A	Main Analysis	Calculate the industry market share of a single company based on its main business income.	CSMAR
EPS	Robustness Test	Earnings Per Share (EPS), calculated as Net Profit divided by Total Number of Shares Outstanding	CSMAR
firm_age	Robustness Test	Firm Age, measured in days since incorporation to the end of the fiscal year	CSMAR
Dual_Board	Robustness Test	The Duality of Chairman and CEO	CSMAR
IsBRCountry	Robustness Test	Whether it is a "Belt and Road" country，If yes, then “1”，otherwise “0”.	CSMAR
Industryrelated	Robustness Test	A dummy variable that equals 1 if the acquirer and the target share the same two-digit primary Standard Industry Classification code, and 0 otherwise.	CSMAR

Source(s): Authors’ own work.