# Signal Transmission and Green Development: Does Transition Climate Risk Drive Green Mergers and Acquisitions?

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**Abstract.** Given the mounting worldwide perils stemming from climatic changes, ecological sustainability has turned into an indispensable condition for enduring corporate operations. In this setting, acquisitions and mergers that are environmentally focused constitute a primary strategic avenue for advancing industrial greening. Drawing on the tenets of signaling theory, our research probes the linkage between transition climate risks and the undertaking of green M&A, while also considering how state subsidies and investor vigilance moderate this relationship. To conduct this investigation, we assemble an unbalanced panel of firms listed on China's A-share markets from 2013 through 2023, and we rely on logistic regression to estimate the specified models. The empirical outcomes demonstrate a robust positive effect of transition climate risk on the probability of engaging in green M&A, and we find that this effect becomes more pronounced when fiscal assistance and market surveillance are stronger. Extending signaling theory into the relatively uncharted territory of climate policy uncertainty associated with green acquisitions, this paper not only advances academic understanding but also offers actionable implications for corporate executives and regulatory bodies.

**Keywords:** Transition climate risk, Green mergers and acquisitions, Government subsidy, Investor attention

## 1 Introduction

Given the rising worldwide unease about climate dynamics, green development has become a central strategy for achieving corporate sustainability (Lu, 2022). In this context, green mergers and acquisitions (M&A) have garnered significant attention as a pivotal mechanism for driving green transformation (Andriuškevičius & Štreimikienė, 2022; Liang et al., 2022). Green M&A involves acquiring green resources, advanced technologies, and management expertise to meet the increasing demand for sustainable practices (Yang & Chi, 2023). This strategy enables firms to rapidly access critical green assets, enhancing their competitive advantage and fostering innovation, thereby

© The Author(s) 2026
B. P. Siba et al. (eds.), *Proceedings of the 2026 5th International Conference on Public Service, Economic Management and Sustainable Development (PESD 2026)*, Advances in Economics, Business and Management Research 411,
https://doi.org/10.2991/978-94-6239-825-2_17

strengthening their position in green markets (Liang et al., 2022). Existing research suggests that green M&A not only accelerates firms' green transformation and market positioning but also contributes to advancing broader sustainability and environmental preservation goals (Lu, 2021; Zhou et al., 2023).

Simultaneously, the mounting hazards stemming from global climatic shifts have made transition climate risk a crucial concern for firms. This risk arises from uncertainties surrounding policy shifts, technological advancements, and evolving market demands as firms adjust to climate-related challenges (Rong et al., 2024). Transition climate risk encompasses both external environmental pressures and the strategic shifts firms must undertake to transition to low-carbon operations (Li & Pan, 2022). These pressures, including compliance costs and carbon taxes, can heighten operational expenses (Reboredo & Ugolini, 2022), prompting firms to explore strategic avenues, such as green M&A, to mitigate these risks. While the importance of green M&A is widely acknowledged, systematic investigations into the primary antecedents of this strategic choice, especially in the context of transition climate risk, remains notably scarce. Despite some empirical evidence suggesting that transition climate risk encourages corporate risk taking and strengthens external legitimacy claims (Xu et al., 2022), the underlying mechanisms and boundary conditions shaping green M&A decisions are underexplored. This study addresses two core research questions: Can transition climate risk drive green M&A? What are the specific mechanisms underlying this relationship?

As essential governmental tools, subsidy programs materially contribute to green technological progress through the mitigation of funding impediments and stimulating firms' green capabilities (Fan et al., 2022). These subsidies not only simply alleviating fiscal pressures arising from green transformation but also guide firms in making strategic investments in sustainability (Shao & Chen, 2022). Government subsidies help firms overcome financial obstacles during acquisitions, mitigate associated risks, and enhance motivation for green M&A (Liang et al., 2022). For instance, subsidies provided to new energy vehicle firms facilitate their acquisition of critical technologies and resources, boosting their competitiveness in the renewable energy sector. Despite the firmly established connection between public subsidies and the advancement of green innovation, the manner in which these fiscal tools moderate the interplay of transition climate risk and green M&A constitutes a notably understudied topic. Prior investigations have largely centered on how subsidies affect green innovation and environmental performance, with limited attention to how subsidies influence M&A decisions under the pressures of transition climate risk. Thus, the second research question this study seeks to address is: In what manner do fiscal subsidies shape the effect of transition climate risk upon green M&A?

Investor attention, as a key external governance mechanism, also plays a crucial role in shaping firms' green M&A strategies. Investor attention influences firm behavior, decision-making, and market performance, with a growing focus on firms that adopt green strategies and demonstrate strong environmental performance (Schuster et al., 2023). This trend encourages firms to prioritize environmental considerations in their M&A decisions to attract investor support. Investor attention acts as a form of market oversight, impacting market valuations and stock performance (Yin et al., 2023), thus

firms are prompted to undertake green M&A to signal their dedication to environmentally responsible operations. Nevertheless, despite extensive prior work examining how investor attention affects corporate transparency and profitability, the moderating influence of such attention on the linkage from transition climate risk to green M&A has been largely neglected. Accordingly, the third research question addressed in this study is: To what degree does investor attention moderate the association from transition climate risk to green M&A?

To assess our proposed conjectures, we exploit a panel dataset of Chinese firms traded on the A-share market over the decade spanning 2013 through 2023. Our empirical evidence indicates that transition climate risk exerts a strong positive influence on the likelihood that corporations undertake green M&A. In addition, government subsidies and investor attention both strengthen this effect, serving as reinforcing forces in the nexus linking transition climate risk to green M&A. The present inquiry enriches prior scholarship along three distinct dimensions. Initially, our analysis broadens the climate risk literature by emphasizing how transition climate risk strategically propels corporate engagement in green M&A, a topic previously underexplored. This offers new insights into how climate risk shapes corporate strategies and provides guidance for responding to climate change. Second, the study identifies transition climate risk as a critical driver of green M&A, broadening the understanding of its role in facilitating firms' green transformations. Finally, drawing on signaling theory, beyond uncovering the condition effects of government subsidies and investor attention on green M&A, this study also broadens the theoretical base for research in this area. These findings offer valuable implications for firms, policymakers, and investors. Beyond establishing a solid underpinning for managerial decision making regarding green M&A, the analysis also points toward uncharted areas that warrant closer examination in the years ahead.

## 2 Theory and Hypothesis Literature Review

### 2.1 Literature Review and Theoretical Basis

As global awareness of climate change intensifies, governments worldwide have introduced stringent policies to steer firms toward low-carbon and green transformations. These regulatory measures, central to transition climate risk, increase external uncertainty through stricter carbon policies, tighter environmental regulations, and growing public demand for sustainability (Reboredo & Ugolini, 2022). In response, firms face heightened legitimacy pressures, requiring them to visibly communicate their green pledges to external partners—governments, investors, and consumers. Serving as a major category of environmental investment, green mergers and acquisitions have developed into a strategic device through which enterprises can broadcast their environmental dedication (Han et al., 2022). By acquiring green technologies, products, or services, firms can rapidly enter green markets, enhance their environmental reputation, and attract policy support, investment, and market recognition (Lu, 2022).

Signaling theory, which has been widely applied in studies of organizational conduct, proposes that corporate actions transmit informational cues to external audienc-

es, thereby influencing their perceptions and subsequent choices (Su et al., 2016). Under conditions of heightened climate related uncertainty, firms are strongly impelled to signal their allegiance to green transformation through visible measures such as green M&A, so as to meet the rising expectations of diverse stakeholders (Han et al., 2022). These external developments are interpreted by management as signals that call for strategic adaptation (BliegeBird & Smith, 2005). For instance, as emissions regulations become more restrictive, companies recognize the dangers associated with continuing high carbon production models, including increased tax burdens and diminishing market shares, and therefore seek to realign their operations with low-carbon practices that resonate with changing market dynamics. From a risk management perspective, transition climate risk gives rise to greater operational unpredictability (Nguyen & Phan, 2020), and green M&A offers a viable means of countering such uncertainties. Not only does green M&A facilitate resource integration and supply chain optimization, but it also reinforces organizational resilience by reducing exposure to climate related shocks (Liang et al., 2022). For example, by acquiring upstream or downstream green enterprises, firms can generate synergies throughout the value chain, thereby mitigating the effects of climate risks such as raw material supply interruptions or demand fluctuations.

In a rapidly evolving business environment, corporate strategic choices serve as potent signals that shape stakeholder perceptions and ensuing actions. In light of ongoing climate change and corresponding shifts in governmental policy, green M&A has become a focal point for policy support, encompassing subsidies and tax incentives (Wang et al., 2024). These government subsidies provide essential financial resources, easing capital constraints and facilitating the implementation of environmentally friendly initiatives (Wu & Hu, 2020). Such incentive programs are especially valuable in sectors characterized by uncertain returns, where they help offset risks related to technological failure and slow market uptake (Bai et al., 2019). By mitigating these obstacles, subsidies enhance firms' readiness to invest in green innovation (Hu et al., 2021a). Moreover, government subsidies not only reduce financial exposure but also bolster corporate legitimacy by signaling congruence with broader policy objectives. This alignment strengthens firms' competitive positioning, particularly within the green M&A domain, as it underscores their adherence to sustainability principles and policy driven goals (Bianchi et al., 2019).

Investor attention, functioning as an influential external governance mechanism, strongly guiding corporate environmental initiatives. Investors increasingly scrutinize firms' environmental performance, thereby encouraging the adoption of sustainable operating practices (He et al., 2022). By monitoring metrics such as carbon emissions and resource efficiency, investors pressure management to prioritize green technologies and emission reduction measures, thereby protecting both reputational standing and market value. As societal concerns over environmental issues intensify, investors weigh firms' green positioning more heavily when making capital allocation decisions. In turn, corporations reassess their strategic directions and step up investments in green industries to attract and maintain investor confidence. Within the theoretical framework of signaling theory, investor attention reinforces the signaling effect of green M&A; high levels of investor focus convey a strong message about a firm's

pledge to social responsibility and green transformation (Wang et al., 2023). Such scrutiny not only enhances corporate reputation but also facilitates the acquisition of supplementary resources dedicated to green M&A activities.

In summary, government subsidies and investor attention—two pivotal external forces—have grown increasingly influential in shaping how corporations respond to transition climate risk. As these climate related pressures mount, firms are driven to pursue green M&A in order to harmonise their actions with the expectations of these key stakeholders. Drawing on signaling theory, the principal objective here is to explore how those external moderators condition the nexus from transition climate risk toward green M&A.

## 2.2 Research Hypothesis

To begin with, transition climate risk propels green M&A by augmenting firms' capacity to tolerate uncertainty. The ambiguities inherent in this risk category destabilize normal operating conditions, thereby compelling managers to grapple with heightened volatility in their strategic deliberations (Chen et al., 2024). Although such uncertainty amplifies perceived threats, it simultaneously encourages decision-makers to adopt a more venturesome posture (Xu et al., 2020). In consequence, corporations revise their strategic blueprints, channeling greater financial and human resources toward environmentally friendly projects and enlarging their outlays on sustainable activities. These expanding green investments, in turn, improve their competitive standing within environmentally oriented markets. Nevertheless, depending exclusively on internally generated capabilities proves inadequate for achieving a thorough green transformation, especially in domains such as novel technology development and market penetration. Under these circumstances, green M&A assumes a pivotal function as a vehicle for procuring external assets, thereby quickening the overall tempo of ecological restructuring (Han et al., 2022). With an elevated appetite for risk, enterprises become more disposed to seek out and execute acquisition deals that harmonize with their enduring sustainability ambitions. Through the assimilation of external green technologies, distribution channels, and operational expertise, firms can realize synergistic gains that substantially accelerate their green transformation progress.

Furthermore, transition climate risk intensifies the legitimacy obligations imposed on companies, which further spurs green M&A undertakings. Given the worldwide escalation of environmental consciousness and the tightening of regulatory frameworks, firms encounter mounting pressures from an array of stakeholders, including governmental bodies, institutional investors, and the consuming public (Liu et al., 2024). These external actors now anticipate that organizations will exhibit demonstrable environmental stewardship and actively contribute to broader sustainability outcomes. To satisfy these anticipations and protect their social licence to operate, enterprises are compelled to undertake conspicuous green measures. In this regard, green M&A emerges as an especially effective mechanism. By taking over entities that possess proven green technologies, established product lines, or ready access to green markets, acquiring firms can rapidly expand their environmentally friendly operations and diversify their sustainability portfolios (Shi & Huang, 2024; Yang & Gu, 2024).

Such acquisitions not only address legitimacy imperatives but also consolidate market standing, thereby ensuring the enduring profitability and expansion of their green business segments. Accordingly, we advance the following proposition:

*H1: Transition climate risk exerts a positive influence on green M&A activity.*

Turning to the role of policy instruments, government subsidies operate first by easing the monetary constraints that often impede green investment. As transition climate risk elevates the degree of environmental uncertainty, managers become inclined to adopt more risk-embracing strategies and allocate funds toward sustainability projects. Within this context, subsidy support acts as a critical facilitator for expenditures in green technology research, product innovation, and the optimization of environmentally friendly supply chains (Han et al., 2022). For instance, such financial assistance may enable the procurement of advanced green technologies, the formation of specialized R&D teams, or the upgrading of sustainable infrastructure, all of which contribute to strengthening a firm's relative position in green product markets.

In addition, government subsidies reinforce a firm's competitive edge in green M&A by enhancing its proficiency in absorbing and integrating external green resources (Bai et al., 2019). Backed by fiscal support, companies are better positioned to identify, negotiate, and finalise green acquisitions, thereby expediting their journey toward sustainability. Beyond the direct financial relief, subsidies also convey a clear signal of official endorsement for the firm's environmental initiatives, thereby elevating its legitimacy and public reputation (Han et al., 2024). This signaling effect assists enterprises in satisfying stakeholder calls for environmental accountability while simultaneously cultivating a favourable perception of their green dedication. For example, firms may channel subsidy funds into environmental projects, thereby broadcasting their commitment to sustainability and enhancing their appeal to prospective investors. An improved reputation not only fosters greater consumer allegiance but also attracts additional investment interest and backing for green M&A ventures. Consequently, we posit:

*H2: Government subsidies positively moderate the relationship between transition climate risk and green M&A.*

Concerning external market oversight, investor attention magnifies the beneficial influence of heightened risk tolerance on green M&A under transition climate risk. Acting as a potent external governance mechanism, investor scrutiny incentivises management to address climate related uncertainties with greater resolution (He et al., 2022). When executives perceive that their strategic choices are under close observation by the investment community, they are more prone to embrace risk, aiming to meet investor expectations for prudent risk management and sustained growth. This augmented risk appetite encourages corporations to enlarge their green investments, whether through advancing green technology R&D or entering nascent green market segments. Such actions not only fortify the firm's competitive profile within the green sector but also enlarge its capability to identify and undertake green M&A deals. Moreover, investor attention serves as a valuable conduit for market intelligence and potential collaborative opportunities (Yao et al., 2024), assisting firms in pinpointing acquisition targets that align with their strategic goals, thereby streamlining the green M&A execution process.

Additionally, investor attention plays an instrumental part in assisting firms to meet legitimacy requirements and construct a robust green image in response to transition climate risk, further stimulating green M&A activities. As public concern over environmental degradation deepens, investors increasingly emphasize how companies manage their environmental obligations amid climate related transitions. This heightened surveillance pushes enterprises to engage more vigorously with regulatory and societal expectations, thereby reinforcing their legitimacy (He et al., 2022). Consequently, firms show a greater inclination to ramp up investments in green business operations, pursue innovation, and improve the transparency of their environmental reporting (Hu et al., 2021b). By aligning their conduct with these legitimacy demands, companies secure stronger investor confidence, which in turn facilitates smoother and more successful green M&A transactions. We therefore propose:

*H3: Investor attention strengthens the positive relationship between transition climate risk and green M&A.*

# 3 Samples and Variables

## 3.1 Sample

This study uses a sample of listed companies from the Shanghai and Shenzhen A-share markets in China from 2013 to 2023. We chose the 2013 as the starting year due to the increased global attention to climate change and the growing pressures on companies to undergo transformation suring this period. The study examines four core variables, with data on these variables sourced from publicly available databases. First, data on green M&A are drawn from the merger event data in the CSMAR database, which includes basic information on the acquiring and target companies, as well as their financial data. Additional information, such as merger announcements, annual reports, social responsibility reports, and sustainability reports, were collected from company websites and subjected to content analysis and keyword extraction. Second, data on transition climate risk are derived from the text in the corporate annual reports of listed companies, which can be accessed via the CNINFO website (http://www.cninfo.com.cn/new/index). Third, government subsidy data are obtained from the financial statement notes in the CSMAR database. Finally, investor attention data are sourced from the internet search index of listed companies disclosed in the CNRDS database. The control variables for this study are also drawn from the CSMAR and CNRDS databases. In total, the study includes a sample of 31,040 observations from 4,649 companies.

## 3.2 Variables

### 3.2.1 Dependent Variable: Green Mergers and Acquisitions.

Green M&A is defined as corporate acquisition activities that integrate environmental considerations into the transaction process, with the objective of obtaining green resources, advanced technologies, and production equipment, while simultaneously contributing to energy conservation, emission abatement, ecological protection,

and long-term sustainability (Lu, 2022; Sun et al., 2023). Following the methodological approaches adopted by Han et al. (2022), Yang et al. (2023b), and Zou and Ma (2024), we manually compiled M&A announcements, annual reports, and other pertinent corporate documents from publicly listed firms. Through the application of textual analysis techniques, we screened for green related terminology, including phrases such as "environmental protection," "energy saving and emission reduction," "green technology," and "clean energy," in order to determine whether a given acquisition event qualifies as a green M&A. Specifically, if the disclosed M&A information contains any of these keywords and, upon comprehensive review, the transaction is judged to advance the firm's environmentally friendly production or development objectives, it is classified as a green M&A and coded as 1; otherwise, it is treated as a non-green acquisition and assigned a value of 0. Table 1 reports the measurement of variables employed in this study.

### 3.2.2 Independent Variable: Transition Climate Risk.

Transition climate risk denotes the uncertainty and prospective financial consequences that corporations encounter during the shift toward a low carbon economy, arising from modifications in regulatory frameworks, technological progress, market dynamics, and societal expectations (Lee et al., 2023; Arfaoui et al., 2024). This form of risk primarily originates from government policy reforms intended to combat climate change, industrial restructuring propelled by technological breakthroughs, and difficulties stemming from evolving consumer preferences and public attitudes. Building upon the work of Yang et al. (2024) and Fang (2024), we initially examined corporate annual reports, government work reports, and other relevant textual materials to extract seed terms associated with transition climate risk. The frequency with which these terms appear was subsequently employed as a proxy for the magnitude of such risk. We then utilized an open source Chinese word vector corpus to train these seed words, identifying semantically similar expressions and thereby enlarging our keyword lexicon. Finally, using computational tools such as Python, we counted the occurrences of these keywords within the annual reports of listed enterprises or government work documents, and computed their share relative to the total word count of each report, which served as our indicator of transition climate risk.

### 3.2.3 Moderator Variables.

*3.2.3.1 Government Subsidies.*

Government subsidies refer to the fiscal assistance provided by public authorities to firms or other entities in order to attain designated economic, social, and environmental goals (Yan & Li, 2018; Shao & Wang, 2023). Such support may take various forms, including but not restricted to direct cash grants, tax abatements, interest rate reductions, and in-kind contributions. A widely adopted approach for quantifying government subsidies is to take the natural logarithm of the aggregate subsidy amount received by a given firm (Liu et al., 2019). Drawing on the practices of Wang et al. (2021), Liu et al. (2022), and Shao and Wang (2023), we aggregated the figures re-

ported under the “government subsidies” line item in the notes to the financial statements, and then applied the natural logarithm transformation to derive a measure of the level of governmental support.

*3.2.3.2 Investor Attention.*

Investor attention captures the degree of interest that investors exhibit toward specific events concerning the firms in which they invest, or toward companies operating within the relevant market (Gu, 2024). A substantial body of research employs a firm's internet search volume index as a primary metric for assessing both the level and temporal fluctuations of investor attention (Hao & Xiong, 2021; Chen & Chen, 2024). In line with the methodologies proposed by He et al. (2022) and Zhang and Zhang (2024), we adopted the online search index as a proxy for investor attention in the Chinese market, measured as the natural logarithm of total search counts. Specifically, we computed search frequencies based on keywords including stock ticker symbols, company abbreviations, and full corporate names, and then took the natural logarithm of the sum of these frequencies.

### 3.2.4 Control Variables.

In accordance with prior studies on green M&A conducted by Sun and Liu (2022) and Zou and Ma (2024), we incorporated a set of control variables into our empirical models. Firm level characteristics include firm size, years since listing, financial leverage, and cash flow ratio. Governance related attributes encompass board size, CEO duality, the proportion of independent directors on the board, and ownership concentration.

**Table 1.** Variable definitions

| Variable | Name | Measure |
|---|---|---|
| Green Mergers and Acquisition | GMA | If a firm implements green M&A, it is assigned a value of 1; otherwise, it is assigned a value of 0. |
| Transition climate risk | TCR | (Total keyword frequency of "Transition Climate Risk" /Total word frequency of Annual Report)*100 |
| Government subsidy | GS | ln(Total government subsidy + 1) |
| Investor attention | IA | ln(Number of searches with stock code as keyword + 1) |
| Firm size | Size | ln(Total annual assets + 1) |
| List age | ListAge | ln(Current year - Listing year + 1) |
| Financial leverage | Lev | Total liabilities / Total assets |
| Cash flow ratio | Cash | Net cash flow/Total assets |
| Board size | Board | ln(Number of board members + 1) |
| CEO duality | Dual | The board and CEO are the same as 1, otherwise 0 |
| Independent director ratio | Indep | Independent directors divided by the number of directors |
| Share concentration | Top1 | ratio of the largest shareholder |

### 3.3 Empirical Model

Based on the results of the Hausman test, we applied a fixed effects logistic regression model (FE_Logit) to test the hypotheses proposed in this study using the collected panel data. To examine the relationship between transition climate risk and green M&A, we specified Model 1as follows:

$$\text{logit}(\text{GMA}_{i,t+1}) = \alpha_0 + \alpha_1 \text{TCR}_{i,t} + \alpha_2 \text{Controls}_{i,t} + \alpha_i \sum \text{Ind}_i + \alpha_j \sum \text{Year}_j + \varepsilon_{i,t} \quad (1)$$

In equation (1), $\text{GMA}_{i,t+1}$ represents the green M&A activity of the firm in year $t+1$, $\text{TCR}_{i,t}$denotes transition climate risk, and $\text{Controls}_{i,t}$ includes all control variables. Year effects are captured by $\text{Year}_j$, and industry effects are represented by $\text{Ind}_i$. $\varepsilon_{i,t}$ represents the random error term. The explanatory variables are lagged to mitigate potential endogeneity issues arising from reverse causality.

To test the moderating effects of government subsidies and investor attention on the relationship between transition climate risk and green M&A, we constructed Models 2 and 3 as follows:

$$\text{logit}(\text{GMA}_{i,t+1}) = \alpha_0 + \alpha_1 \text{TCR}_{i,t} + \alpha_2 \text{GS}_{i,t} + \alpha_3 \text{TCR}_{i,t} * \text{GS}_{i,t} + \sum \alpha_4 \text{Controls}_{i,t} + \alpha_i \sum \text{Ind}_i + \alpha_j \sum \text{Year}_j + \varepsilon_{i,t} \quad (2)$$

$$\text{logit}(\text{GMA}_{i,t+1}) = \alpha_0 + \alpha_1 \text{TCR}_{i,t} + \alpha_2 \text{IA}_{i,t} + \alpha_3 \text{TCR}_{i,t} * \text{IA}_{i,t} + \sum \alpha_4 \text{Controls}_{i,t} + \alpha_i \sum \text{Ind}_i + \alpha_j \sum \text{Year}_j + \varepsilon_{i,t} \quad (3)$$

In equation (2), $\text{GS}_{i,t}$ represents government subsidies, and the interaction term $\text{TCR}_{i,t} * \text{GS}_{i,t}$ captures the moderating effect of government subsidies. In equation (3), $\text{IA}_{i,t}$ represents investor attention, and the interaction term, $\text{TCR}_{i,t} * \text{IA}_{i,t}$ captures the moderating effect of investor attention.

## 4 Results

### 4.1 Descriptive statistics and correlation analysis

Table 2 presents the descriptive statistics, including the mean, standard deviation, maximum, minimum, and correlation analysis. The mean value of TCR is 0.189, indicating that firms are facing a relatively high level of transition climate risk. The mean value of GMA is 0.261, suggesting that approximately 26.1% of firms have engaged in green M&A activities. The mean values of GS and IA are 16.078 and 12.229, respectively. Furthermore, the correlation coefficients between most variables are relatively low, suggesting that severe multicollinearity is unlikely to be a concern.

**Table 2.** Descriptive statistics and correlation analysis

| | Mean | Std | Min | Max | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| 1.GMA | 0.261 | 0.439 | 0.000 | 1.000 | 1 | | | |
| 2.TCR | 0.189 | 0.157 | 0.000 | 1.757 | 0.226*** | 1 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3.GS | 16.078 | 2.557 | 0.000 | 20.234 | 0.030*** | 0.143*** | 1 | |
| 4.IA | 12.229 | 2.841 | 0.000 | 14.915 | 0.043*** | 0.010* | 0.047*** | 1 |
| 5.Size | 22.266 | 1.295 | 19.966 | 26.314 | 0.089*** | 0.246*** | 0.373*** | 0.285*** |
| 6.ListAge | 2.085 | 0.941 | 0.000 | 3.497 | 0.063*** | 0.070*** | 0.016*** | 0.453*** |
| 7.Lev | 0.417 | 0.208 | 0.008 | 1.957 | 0.156*** | 0.158*** | 0.101*** | 0.199*** |
| 8.Cash | 0.047 | 0.075 | -0.888 | 0.876 | -0.072*** | 0.038*** | 0.121*** | 0.006 |
| 9.Board | 2.112 | 0.199 | 1.099 | 2.890 | 0.016*** | 0.105*** | 0.099*** | 0.102*** |
| 10.Indep | 0.378 | 0.056 | 0.143 | 0.800 | -0.011* | -0.052*** | -0.005 | -0.001 |
| 11.Dual | 0.298 | 0.457 | 0.000 | 1.000 | -0.035*** | -0.068*** | -0.022*** | -0.148*** |
| 12.Top1 | 0.338 | 0.149 | 0.003 | 0.900 | -0.045*** | 0.076*** | 0.074*** | -0.009 |

| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|
| 5.Size | 1 | | | | | | | |
| 6.ListAge | 0.438*** | 1 | | | | | | |
| 7.Lev | 0.495*** | 0.380*** | 1 | | | | | |
| 8.Cash | 0.079*** | -0.023*** | -0.162*** | 1 | | | | |
| 9.Board | 0.270*** | 0.160*** | 0.140*** | 0.039*** | 1 | | | |
| 10.Indep | -0.010* | -0.017*** | -0.006 | -0.002 | -0.559*** | 1 | | |
| 11.Dual | -0.190*** | -0.262*** | -0.139*** | -0.010* | -0.174*** | 0.100*** | 1 | |
| 12.Top1 | 0.187*** | -0.077*** | 0.034*** | 0.104*** | 0.018*** | 0.039*** | -0.053*** | 1 |

*Note: ***p < 0.01, **p < 0.05, *p < 0.1.*

### 4.2 Main Regression

Table 3 reports the findings from our fixed effects logistic regression estimations, which were employed to examine the hypothesized relationships. As a preliminary step, Model 1 was estimated with only the control variables included, serving as a benchmark specification. Moving to Model 2, the coefficient for transition climate risk (TCR) is positive and statistically significant ($\beta = 2.275$, $p < 0.01$), implying that higher levels of TCR are associated with a greater propensity for firms to undertake green mergers and acquisitions (GMA). This result provides empirical support for Hypothesis 1. Turning next to the moderating role of fiscal policy, Model 3 reveals that government subsidies (GS) exert a positive and significant direct effect on GMA ($\beta = 0.022$, $p < 0.01$), and more importantly, the interaction term between TCR and GS (TCR×GS) also carries a positive coefficient that is significant at the 1% level ($\beta = 0.110$). This pattern indicates that government subsidies amplify the favorable influence of TCR on GMA, thereby corroborating Hypothesis 2. In a similar vein, Model 4 shows that investor attention (IA) has a significant positive association with GMA ($\beta = 0.019$, $p < 0.01$), and its interaction with TCR (TCR×IA) is likewise positive and significant ($\beta = 0.118$, $p < 0.01$), suggesting that IA reinforces the effect of TCR on GMA, which supports Hypothesis 3. Finally, Model 5 incorporates all independent and moderating variables simultaneously; the estimated coefficients for the key predictors retain their signs and levels of significance, consistent with the results from the preceding models, thus confirming the robustness of our findings.

**Table 3.** The Results of TCR on GMA

| Variable | GMA | | | | |
|---|---|---|---|---|---|
| | Model1 | Model2 | Model3 | Model4 | Model5 |
| Size | 0.075*** | 0.017 | -0.007 | 0.008 | -0.014 |
| | (0.014) | (0.015) | (0.016) | (0.015) | (0.017) |
| ListAge | 0.064*** | 0.079*** | 0.082*** | 0.054*** | 0.058*** |
| | (0.018) | (0.019) | (0.019) | (0.020) | (0.020) |
| Lev | 1.057*** | 0.999*** | 1.003*** | 1.010*** | 1.013*** |
| | (0.083) | (0.084) | (0.084) | (0.084) | (0.084) |
| Cash | -1.381*** | -1.357*** | -1.380*** | -1.379*** | -1.401*** |
| | (0.195) | (0.197) | (0.197) | (0.197) | (0.197) |
| Board | -0.172* | -0.178** | -0.180** | -0.177* | -0.179** |
| | (0.089) | (0.090) | (0.090) | (0.090) | (0.091) |
| Indep | -0.459 | -0.239 | -0.241 | -0.237 | -0.238 |
| | (0.304) | (0.307) | (0.307) | (0.307) | (0.307) |
| Dual | -0.033 | -0.025 | -0.023 | -0.023 | -0.021 |
| | (0.032) | (0.032) | (0.032) | (0.032) | (0.032) |
| Top1 | -0.979*** | -1.055*** | -1.061*** | -1.051*** | -1.058*** |
| | (0.101) | (0.103) | (0.103) | (0.103) | (0.103) |
| TCR | | 2.275*** | 2.233*** | 2.261*** | 2.227*** |
| | | (0.103) | (0.104) | (0.104) | (0.105) |
| GS | | | 0.022*** | | 0.021*** |
| | | | (0.007) | | (0.007) |
| IA | | | | 0.019*** | 0.018*** |
| | | | | (0.006) | (0.006) |
| TCR*GS | | | 0.110*** | | 0.091** |
| | | | (0.042) | | (0.042) |
| TCR*IA | | | | 0.118*** | 0.109*** |
| | | | | (0.035) | (0.035) |
| Constants | -2.931*** | -1.956*** | -1.773*** | -1.953*** | -1.788*** |
| | (0.408) | (0.414) | (0.418) | (0.415) | (0.419) |
| N | 31040 | 31040 | 31040 | 31040 | 31040 |
| Industry | Yes | Yes | Yes | Yes | Yes |
| Year | Yes | Yes | Yes | Yes | Yes |
| Pseudo $R^2$ | 0.087 | 0.101 | 0.102 | 0.102 | 0.102 |

*Note: Standard errors in parentheses*

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

## 5 Discussion and Conclusion

With the accelerating pace of global climate change, transition climate risk has become a pressing concern for corporations, pushing them toward adopting green development strategies as they navigate the shift to a low carbon economy. Within this array of strategic options, green mergers and acquisitions (M&A) have emerged as a particularly important vehicle through which firms can pursue sustainable growth while simultaneously coping with climate related hazards. Although a considerable body of

research has examined the economic returns and ecological advantages associated with green M&A, the antecedents that drive these activities have received relatively scant attention. Accordingly, the present study sets out to explore the linkage between transition climate risk and green M&A, placing special emphasis on the role of external contextual factors.

Grounding our theoretical framework in signaling theory, we investigate whether transition climate risk encourages corporate engagement in green M&A, and we further probe the mediating pathways and conditioning factors that shape this relationship. Using an empirical sample drawn from Chinese A share listed enterprises, we apply logistic regression techniques to evaluate our proposed hypotheses. The estimation outcomes reveal several noteworthy patterns. First, transition climate risk exerts a significant accelerative effect on green M&A activity, operating through two channels: an elevated propensity for risk taking among managers and an intensified need for organizational legitimacy. Second, both government subsidies and investor attention serve as positive moderators in this relationship. Specifically, subsidies furnish crucial monetary resources and reinforce corporate legitimacy, while investor attention, acting as an external governance force, propels firms to take preemptive actions in response to transition climate risk.

In addition, our heterogeneity tests indicate that the effect of transition climate risk on green M&A is stronger for non state owned enterprises and for firms operating in heavily polluting industries. By doing so, this research broadens the applicability of signaling theory to the domain of climate transition and green acquisition behavior, yielding both theoretical novelty and practical takeaways. The results offer actionable insights for corporate decision makers regarding green M&A, for policy makers in designing subsidy programs, and for investors in shaping their engagement strategies, thereby contributing to the overarching goals of sustainable business conduct and green development.

### 5.1 Theoretical Implications

The current investigation enhances our comprehension of how transition climate risk shapes corporate decision making at the firm level, especially in relation to green strategic choices. Although earlier scholarship has largely concentrated on the macroeconomic consequences of transition climate risk or its repercussions for corporate financial performance and capital structure (Chen et al., 2024; Deng et al., 2024), its bearing on specific organizational behaviors, notably those pertaining to green strategy formulation, has remained comparatively underexplored. By redirecting analytical attention toward the micro level, this study scrutinizes the mechanisms through which transition climate risk propels green M&A decisions. Our evidence indicates that such risk bolsters firms' capacity for risk taking and raises their legitimacy requirements, which together stimulate green M&A pursuits. In so doing, this work enriches the theoretical landscape of transition climate risk by offering a micro level framework that connects climate related uncertainties to strategic actions, thus deepening scholarly insight into corporate adaptation to environmental shifts and contributing to the broader literature on management under climate transition.

Furthermore, this study uncovers novel antecedents of green M&A. Extant work has chiefly emphasized the economic payoffs, environmental gains, and policy inducements linked to green M&A (Lu, 2022; Sun et al., 2024; Xu et al., 2024), while paying relatively little attention to what actually prompts these transactions. In particular, the influence of external environmental forces, such as transition climate risk, on motivating green M&A has received scant empirical scrutiny. Our research is among the first to explicitly identify transition climate risk as a significant precursor of green M&A, providing robust evidence that this risk factor positively affects corporate decisions to engage in such acquisitions. Consequently, we extend the existing theoretical framework concerning the determinants of green M&A and offer novel perspectives on the processes that drive corporate green transformation in the face of worldwide climate change. These results carry important theoretical implications for enterprises as they formulate green development strategies, and for policy makers in designing appropriate regulatory measures.

In addition, we draw on signaling theory to explore how government subsidies and investor attention moderate the green M&A decision process. While signaling theory has been extensively employed to explain how organizations convey information to stakeholders via their strategic choices, its use in the climate risk context has been rather limited. By incorporating signaling logic, our study reveals the contingent conditions under which transition climate risk exerts its influence on green M&A behavior. More concretely, we find that both government subsidies and investor attention reinforce the effect of transition climate risk, with subsidies acting as a signal of official endorsement for green endeavors and investor attention serving as a market based oversight mechanism. These two forces jointly strengthen the positive relationship between transition climate risk and green M&A, thereby offering a more nuanced understanding of the external determinants that shape corporate environmental strategies. Our work thus extends the reach of signaling theory into the green management domain, providing a novel theoretical perspective on how stakeholder actions condition organizational responses to environmental pressures.

### 5.2 Management Implications

For corporate practitioners, it is essential to recognize the external environmental transformations brought about by transition climate risk and their far reaching consequences for operational activities. To adeptly manage these shifts, firms ought to keep a close watch on policy and regulatory updates, market sentiment, and technological progress, treating these elements as key informational cues. In response, organizations should bolster their capacity for risk taking, refine their strategic orientation, and redirect capital and efforts toward green initiatives, including research and development in green technologies and the adoption of sustainable manufacturing methods. Such proactive moves will improve their standing in the green M&A arena. Instead of regarding green M&A merely as a reactive measure to climate risk, companies should deploy it as a proactive strategic instrument to expedite their green transformation. Operationally, this approach involves identifying acquisition candidates that offer

complementary green technologies, products, or services, and then effectively integrating those assets to realize synergies and accelerate sustainable growth.

From a policy standpoint, governments should strengthen fiscal support for enterprises that pursue green development, with particular attention to those actively using green M&A as a response to transition climate risk. The design of subsidy schemes should aim to lower the financial hurdles associated with green innovation and acquisition activities, thereby relaxing capital constraints and stimulating additional investments in green transformation. Furthermore, subsidy programs ought to be customized to reflect the distinct characteristics of various industries and firm categories, so as to achieve more efficient distribution of resources. When subsidies are aligned with strategic green priorities, they can steer corporations toward critical areas such as green M&A, thereby facilitating broader systemic transitions. Additionally, policy makers should underscore the signaling value of these subsidies, articulating clear policy directions that guide market expectations. Such transparency will not only foster green development but also burnish firms' reputations and competitiveness within the green sector, drawing further resources into the industry, nurturing the expansion of the green M&A market, and hastening the ecological upgrading of industrial sectors.

Investor attention constitutes an important external signal that warrants careful managerial consideration. Firms should place a premium on transparency in their environmental reporting, offering comprehensive and detailed accounts of their efforts to address transition climate risk, their progress in green M&A, and the returns generated from green investment activities. Such openness will enable investors to more accurately evaluate a firm's dedication to green development and its prospects for sustained long term growth, thereby reinforcing investor confidence. It is advisable for companies to view investor attention as a pivotal factor in their green M&A decision processes. Specifically, they should integrate investor expectations and feedback into strategic deliberations, adjusting resource deployment in line with evolving investor preferences toward green sectors. By harmonizing their strategies with market trends, firms can seize opportunities in emerging green industries, venture into new green markets, and satisfy investor demands for sustainability, ultimately boosting their market valuation and competitive advantage.

### 5.3 Limitations and Future Research

First, the operationalization of transition climate risk and green M&A could be prone to certain biases. Our measure of transition climate risk relies on text based frequency counts of keywords, which might not fully reflect the multifaceted nature of the actual risks confronting enterprises. Likewise, some green M&A deals that do not explicitly contain the preselected keywords may be excluded from our identification, even though they are substantively relevant. Subsequent investigations could improve upon these measurement approaches by adopting more precise and holistic methodologies.

Second, the scope of our empirical inquiry is confined to external determinants of green M&A choices. Nevertheless, corporate decisions at the firm level are also molded by a variety of internal elements, including organizational culture, managerial cognitive frames, and individual executive attitudes. Future work could integrate these

internal drivers into the analytical framework, thereby constructing a more comprehensive model of green M&A decision making.

Finally, although our study draws upon a wide cross section of listed enterprises, subsequent research might narrow the focus to particular industrial sectors, for instance, energy or manufacturing, in order to investigate how climate risk affects green M&A behavior within those domains. Such targeted examinations would permit a more nuanced appreciation of industry specific adaptive responses to climate related challenges.

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