How Does Corporate Carbon Emission Reduction Promote Sustainable Entrepreneurship? —Empirical Evidence from Microdata of Chinese Enterprises

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Abstract: The promotion of low-carbon transformation for sustainable development has become a critical global issue. Exploring the relationship between corporate carbon emission reduction and sustainable entrepreneurship is of significant importance for achieving sustainable development. This paper attempts to construct a logical framework for the impact of corporate carbon emissions on sustainable entrepreneurship based on the "Government-Market-Society" tripartite driving analysis framework and institutional theory. It focuses on formal institutions, including fiscal subsidies and tax incentives (government), market competition (market), and informal institutions such as media supervision (society). Using panel data from listed companies across China from 2010 to 2022, this study conducts empirical research. The findings reveal that: (1) Corporate carbon emission reduction has a positive impact on sustainable entrepreneurship, but with a time-lag effect; (2) In terms of mechanisms, fiscal subsidies exhibit an "inverted U-shaped" moderating effect on the relationship between corporate carbon emissions and sustainable entrepreneurship, while tax incentives show a "positive U-shaped" moderating effect. Market competition weakens the impact of corporate carbon emissions on sustainable entrepreneurship, whereas media supervision strengthens it; (3) Further heterogeneity analysis indicates that the impact of corporate carbon emissions on sustainable entrepreneurship is asymmetric, with more pronounced effects in regions with low-carbon city pilot policies and the Yangtze River Economic Belt. This study provides empirical evidence and practical references for enterprises to implement the "Dual Carbon" strategic goals, establish a green and low-carbon development guarantee system driven by an effective government, efficient market, and robust society, and promote sustainable development.

Key Words: Corporate Carbon Emissions; Sustainable Entrepreneurship; Market Competition; Media Supervision; Policy Incentives

Study on the Impact of Climate Policy Uncertainty on Green Innovation

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Abstract: Green innovation is a key engine driving the high – quality development of enterprises, but its development path is susceptible to the influence of climate policy uncertainties. Although existing studies have preliminarily explored the correlation between climate policy uncertainty and corporate green innovation, no consensus has been reached, and their underlying mechanisms remain inadequately revealed. Based on institutional theory and a dynamic capability perspective, this study uses Chinese A – share listed companies from 2010 to 2022 as a sample to thoroughly analyze the impact of climate policy uncertainty on corporate green innovation and its potential pathways. The findings reveal that increased climate policy uncertainty significantly enhances corporate green innovation, with this mechanism stemming from enterprises ' dual dynamic responses to policy signals. Climate policy uncertainty intensifies environmental regulation pressures and policy dividend expectations, compelling companies to improve their environmental, social, and governance (ESG) performance to secure legitimacy resources. It also triggers digital transformation momentum, optimizing green innovation decision – making efficiency through data – driven empowerment. These effects are particularly pronounced in high – carbon industries, non – technology – intensive sectors, heavily polluting industries, highly competitive industries, and non – manufacturing sectors. This research bridges the theoretical divide between climate policy uncertainty suppression and policy signal incentive perspectives, providing empirical evidence for governments to establish clearly targeted climate policy systems and practical recommendations for enterprises' long – term green innovation strategic planning.

Key words: Climate policy uncertainty; Green innovation; Digital transformation; ESG performance

Summary

This study investigates the mechanisms through which climate policy uncertainty influences corporate green innovation, addressing gaps in existing literature regarding theoretical perspectives and operational pathways. Current research debates whether climate policy uncertainty suppresses or stimulates green innovation, often treating firms as passive entities that merely respond to policy signals while overlooking their strategic agency and internal capability development processes. By bridging this theoretical gap, we clarify policy uncertainty's dual role in green transition, providing actionable insights for governments to optimize climate policy design and enterprises to formulate sustainable strategies.

This study is based on institutional theory and dynamic capability theory, constructingan " pressure – response – empowerment" analytical framework. Using panel data of China A – share listed companies from 2010 to 2022, we conduct empirical research. Specifically, the total number of green patent applications is used to measure corporate green innovation levels, while the China Climate Policy Uncertainty Index constructed by Lee et al. (2023) based on Twitter texts is employed to measure climate policy uncertainty. The study first confirms the use of an individual fixed – effects model for benchmark regression through the Hausman test, controlling for multidimensional variables at both corporate and macroeconomic levels. To ensure result reliability, robustness tests were conducted using multiple methods, including replacing dependent variables, lagging core explanatory varia-

bles, and applying Poisson regression with negative binomial regression. To address potential endogeneity issues, the Heckman two – stage method was employed to correct sample selection bias caused by non – random missing green patent data. In terms of mediation mechanism testing, the three – step stepwise regression method and Bootstrap repeated sampling method were used to verify the mediation effect. Finally, heterogeneity analysis was conducted through industry grouping regression.

Research reveals that rising climate policy uncertainty significantly drives corporate green innovation. This effect operates through two pathways: First, companies proactively enhance ESG performance to secure legitimacy resources in response to regulatory pressures; second, they accelerate digital transformation to optimize innovation decisions and resource allocation efficiency through data – driven approaches. Heterogeneity analysis demonstrates that this stimulating effect is more pronounced in high – carbon industries, non – technology – intensive sectors, heavily polluting industries, highly competitive industries, and non – manufacturing sectors, reflecting differences in resource endowments and strategic flexibility across industries.

The novelty of this study is demonstrated through three key aspects: First, by integrating institutional theory with a dynamic capability perspective, it reveals how enterprises transform external policy pressures into endogenous innovation capabilities, moving beyond simplistic explanations of signaling incentives or risk suppression. Second, it demonstrates that ESG performance and digital transformation are not merely compliance tools or technical measures, but strategic capability vehicles for building competitive advantages in uncertain environments. Third, it systematically identifies the boundary conditions under which climate policy uncertainties affect green innovation, thereby expanding the applicability of relevant theoretical frameworks.

Based on the research findings, it is recommended that the government maintain clear long – term policy orientation while appropriately utilizing policy iterations to signal industrial transformation. This can be achieved through improving ESG disclosure systems, supporting corporate digital transformation, and strengthening market incentive mechanisms. Enterprises should shift from viewing policy uncertainties as negative factors to actively embracing them as strategic opportunities, integrating ESG and digitalization into core strategies. The study's limitations include a sample limited to A – share listed companies and reliance on social media data for climate policy uncertainty index. Future research could expand to small and medium – sized enterprises (SMEs) and multinational comparisons, combined with micro – level matching data between policy texts and corporate behaviors, to further reveal the dynamic process of climate policy signal decoding and organizational responses.

Common Institutional Ownership and Corporate Green Innovation

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Abstract:

Purpose: With the deepening of capital market development, common institutional ownership—where multiple institutional investors hold significant equity in the same firm—has become an increasingly prevalent feature of corporate ownership structures. This form of cross-holding creates channels for information sharing, coordination, and joint monitoring, potentially influencing strategic decision-making. While prior studies in developed markets have explored its implications for governance, competition, and firm performance, little is known about its role in fostering corporate green innovation, particularly in emerging markets such as China. Green innovation—characterized by the creation and adoption of environmentally friendly technologies and processes—has dual attributes of environmental and knowledge externalization. It plays a crucial role in promoting ecological civilization and high-quality economic growth but often faces significant barriers due to its capital intensity, long investment horizon, and uncertain payoffs. Against this backdrop, this study investigates whether and how common institutional ownership promotes green innovation in Chinese listed firms, elucidates the underlying mechanisms, and assesses whether the effects vary across different types of enterprises.

Research Design: The study employs a panel dataset of A-share listed firms in Shanghai and Shenzhen from 2007 to 2023, integrating financial data from CSMAR and green patent data from the State Intellectual Property Office. Common institutional ownership is measured as the proportion of shares jointly held by institutional investors with overlapping holdings. Green innovation is proxied by the number of granted green patents, with alternative measures adopted for robustness. Empirical analyses proceed in several steps. First, the Heckman two-stage regression addresses potential sample selection bias. Second, an instrumental variable approach mitigates endogeneity concerns from reverse causality and omitted variables. Third, a series of robustness checks—including alternative variable definitions, expanded control variables, and different model specifications—confirm result stability. Mechanism tests assess four potential channels: enhancement of managerial environmental awareness, realization of institutional synergy, alleviation of financing constraints, and increase in exit threat. Finally, heterogeneity analysis compares effects between heavily polluting and non-heavily polluting industries, and between state-owned and non-state-owned enterprises.

Findings: The results indicate that common institutional ownership significantly improves corporate green innovation performance. This positive effect is robust across all empirical specifications and robustness tests. Mechanism analysis identifies four reinforcing pathways. First, by heightening managerial environmental awareness, common ownership encourages greater resource allocation to sustainable projects. Second, it generates institutional synergy through coordinated supervision, knowledge transfer, and best-practice diffusion among shareholders. Third, it relaxes financing constraints, enhancing firms' ability to undertake long-term, high-risk innovation projects. Fourth, the potential for coordinated divestment strengthens exit threats, incentivizing proactive en-

vironmental strategies. The heterogeneity analysis shows that the positive impact is more pronounced in non – heavily polluting industries and in non – SOEs, highlighting the moderating roles of industry environmental sensitivity and ownership structure.

Contributions: This study extends the literature on common ownership by shifting the focus from financial performance to environmental innovation, offering a novel institutional governance perspective on green innovation. It also identifies multiple pathways through which common institutional ownership fosters environmental innovation, enriching theoretical understanding and providing actionable insights for policymakers to leverage capital market structures—alongside green finance policies—to promote corporate sustainability.

Value: This study makes several contributions. First, it extends the literature on common institutional ownership by linking it to green innovation—a domain underexplored in emerging markets—thereby offering a new perspective on the governance – sustainability nexus. Second, it deepens understanding of the drivers of green innovation by identifying institutional investors as a governance mechanism capable of overcoming managerial inertia and resource constraints. Third, it provides empirical evidence from China's evolving capital markets, where the influence of institutional investors is growing alongside more stringent environmental regulation, yielding lessons for other transitional economies. Fourth, the study's heterogeneity findings underscore the importance of institutional and industry contexts in shaping the ownership – innovation relationship.

Suggestions for future research: The findings carry important implications for policy and practice. For policymakers, fostering a diverse institutional investor base and encouraging collaboration among shareholders can stimulate corporate green innovation without relying solely on direct subsidies or regulatory mandates. Regulators may strengthen disclosure requirements on both environmental performance and ownership structures to enhance transparency and market discipline. For managers, engaging constructively with institutional shareholders and aligning corporate strategy with their sustainability expectations can attract long – term capital and enhance competitive positioning.

Limitations remain. The analysis focuses on listed companies in China, potentially constraining generalizability; future work could test the framework in unlisted firms or cross – country contexts. Although endogeneity concerns are addressed through instrumental variables and robust estimation, unobserved heterogeneity may persist. Moreover, patent – based measures of green innovation may not fully capture process improvements or non – patented innovations. Future research could broaden the measurement of green innovation, explore long – term dynamic effects, and examine the interplay between common institutional ownership and environmental regulatory intensity.

Key Words: common institutional ownership; green innovation; managerial environmental awareness; financing constraints; institutional synergy

Can Synergy Lead to Greenness? The Impact of CEO – board homogenetic nexus on Corporate Carbon Performance from the Perspective of Board Functions

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Abstract:

Purpose: Amid escalating global environmental challenges, China has elevated its dual carbon goals to a strategic national priority, positioning corporate carbon performance as a critical driver of high – quality economic development. While existing literature predominantly examines external institutional pressures or static managerial attributes, it overlooks the role of interactive social ties between CEOs and board members in shaping carbon performance. Addressing this gap, we propose the novel concept of "CEO – board homophilous ties" (e. g. , shared hometown or alumni connections) and investigate their impact on corporate carbon performance through board functional dynamics, thereby advancing strategic leadership perspectives in sustainability research.

Method: Grounded in agency theory and resource dependence theory, this study analyzes panel data from China's A – share industrial firms (2003 – 2020), combining public disclosures with manually collected social tie information. A two – way fixed effects model tests the CEO – board homophilous ties – carbon performance relationship, with moderation analyses on board power asymmetry and directors' environmental expertise. Endogeneity concerns are addressed through instrumental variable estimation, propensity score matching, and difference – in – differences approaches. Robustness checks include variable substitution and temporal sample adjustments.

Findings: Three key results emerge: (1) CEO – board homophilous ties significantly improve corporate carbon performance, validated by rigorous endogeneity controls; (2) This effect strengthens under boards with greater power relative to management or environmental experience among directors; (3) Heterogeneity analyses reveal stronger impacts in non – state – owned enterprises, non – polluting industries, and geographically in western China (strongest), followed by eastern and central regions.

Value: Theoretically, this study extends strategic leadership research by shifting from isolated executive traits to relational CEO – board dynamics, proposing a functional trade – off mechanism between weakened monitoring and enhanced advisory roles. Practically, it informs governance optimization for low – carbon transitions. Future research should expand to diverse firm types, incorporate dynamic social tie measurements, and quantify functional transformation pathways.

Implications/limitations/suggestions for future research: This study confirms the positive impact of CEO – board homogenetic nexus on corporate carbon performance, providing theoretical foundations for optimizing corporate governance and facilitating low – carbon transitions. However, there are limitations to this study, which provide insights for future research. First, the sample focuses on China's A – share industrial firms, leaving the generalizability of findings to other firm types untested. Second, the meas-

urement of CEO – board homogenetic nexus primarily relies on shared hometown or alumni nexus; future studies could incorporate additional social relationship dimensions and explore their dynamic evolution. Finally, while the study theoretically examines the transformation mechanism between board monitoring and advisory functions, it does not quantify the underlying pathways. Future research could employ mediation models to empirically assess the transmission effects of these functions.

Key Words: corporate carbon performance; CEO – board homogenetic nexus; board functions; relative board power; the directors with environmental experience

Carbon – Neutral – Oriented Human Resource Management: A Qualitative Study Based on 9 Firms

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Abstract: Purpose. With China's "30 · 60" decarbonization goals being elevated to a national strategy, carbon peaking and carbon neutrality have become critical pathways for advancing Chinese – style modernization. Although technological innovation plays a key role in carbon reduction, it is insufficient to achieve deep decarbonization goals, and coordinated efforts across economic and social domains are urgently needed. As one of the primary units of carbon emissions, companies play a pivotal role in this process. Existing research on carbon peaking and carbon neutrality in the social sciences has primarily focused on the macro level, with limited attention to micro issues at the organizational level, particularly regarding the carbon – neutral – oriented human resource management (CN – HRM). This study aims to address the following research questions: What are the content and dimensions of CN – HRM? What are its distinctive features? And how can organizations construct CN – HRM systems?

Design/Methodology. Following the principles of theoretical sampling, we selected nine companies from the Carbonstop Inc.'s Corporate Carbon – Neutral Goal database, based on the presence of managerial GHG reduction practices. The nine firms are, Alibaba, DHL, Meta, Microsoft, Mitsui & Co., Patagonia, Schneider Electric, Siemens, and Tencent. We conducted interviews with nine experts and practitioners familiar with the focal firms' carbon reduction and efficiency enhancement practices and collected secondary data from these firms. We gathered data with a total of approximately 300, 000 words. We then performed a qualitative analysis using multi – level coding techniques.

Findings. First, this study identified eight categories and eighteen first – order constructs that constitute CN – HRM, which were subsequently grouped into three dimensions: ability, motivation, and opportunity. The eight categories include: recruiting and deploying carbon – neutral – related employee, training and developing carbon – neutral – related employee, evaluating and enhancing carbon – neutral performance, motivating carbon reduction and efficiency – enhancing behaviors through compensation and benefits, formulating CN – HRM strategies, designing and analyzing carbon – neutral organizational structures and related positions, fostering a carbon – neutral organizational culture and climate, and assuming responsibility for external HRM ecosystem development. Second, the study distinguished CN – HRM from related concepts such as socially responsible HRM, green HRM, and sustainable HRM, and argued that CN – HRM is significantly different from these constructs in both content and dimensions. Third, following both inductive and abductive approaches, we proposed the construction trajectory of CN – HRM based on the corporate life cycle theory.

Originality/Value. The study made several contributions. First, the study expanded the content and dimension research of CN – HRM, enriching research on strategically targeted HRM systems in the context of China's "30 · 60" decarbonization goals. Second, through conceptual comparison and qualitative research, we differentiated the CN – HRM from related concepts,

demonstrating its unique conceptual connotations, providing scope for its theoretical development in strategic HRM domain. Third, the study summarized and developed a theoretical framework of CN – HRM construction trajectory that adapts to the common characteristics of different stages of the corporate's life cycle, thus expanding CN – HRM's application research and highlighting the complexity and diversity of these construction trajectories at the HR practice level. This approach avoids overly abstracting specific HRM functions and responds to the call for more empirical research on concrete HRM functions. Furthermore, the findings provide principles and guidelines for organizations to develop CN – HRM systems that align with their unique characteristics.

Key Words: carbon – neutral – oriented human resource management; China's "30 · 60" decarbonization goals; reduce carbon and enhance efficiency; qualitative study; multi – level coding technique