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## **THE IMPACT OF SCI-TECH FINANCE ON PROVINCIAL CARBON EMISSION PERFORMANCE: EMPIRICAL EVIDENCE FROM CHINA**

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### **Abstract**

Amid global trends of technologization and low-carbon transition, sci-tech finance (STF) has become a crucial driver for economic sustainable development and ecological environmental improvement. Grounded in green finance theory and green innovation theory, this study investigates the impact of STF on provincial carbon emission performance (CEP). Using panel data of 30 provinces in the Chinese mainland from 2010 to 2020, this study constructs a comprehensive multidimensional indicator system for STF and employs a super-SBM model with undesirable outputs to accurately assess provincial CEP. This study empirically analyzes the impact of STF on provincial CEP, as well as its regional heterogeneity and the spatial spillover effect. This study also explores the mediating effect of sustainable industrial structure (SIS) and the moderating effects of financial agglomeration (FA) and fiscal decentralization (FD). The findings reveal that STF positively affects provincial CEP, with a significant effect in the eastern region but an insignificant effect in the central region and western region. Moreover, STF exhibits a positive spatial spillover effect, indicating that its benefits extend to neighboring provinces. SIS plays a partial mediating effect in this relationship, while FA exhibits an “inverted U-shaped” moderating effect, and FD shows a linear moderating effect. A series of endogeneity and robustness tests confirms the stability of the research results. This study extends the integrated research on STF and CEP by elucidating the underlying mechanisms and boundary conditions, providing a theoretical basis and practical implications for policymakers to tailor strategies for improving provincial CEP.

*Key words:* carbon emission performance, financial agglomeration, fiscal decentralization, sci-tech finance, sustainable industrial structure

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