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HOW DOES ARTIFICIAL INTELLIGENCE ENABLE GREEN TOTAL FACTOR PRODUCTIVITY? - EVIDENCE FROM CHINA

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Abstract

Artificial intelligence (AI) has been widely recognized as a pivotal driver accelerating the advancement of national green economies and fostering green technological innovation within firms. Drawing on the resource-based view (RBV) and industrial ecology theory (IET), this study employs an empirical testing of the panel data from firms listed on China's Shanghai and Shenzhen A-share markets over the period 2009 to 2022 to investigate how AI shapes GTFP. The findings indicate that AI enables corporate GTFP. Both R&D capital input (RDM) and R&D personnel input (RDP) function as mediating channels through which AI influences GTFP. Carbon emissions (CE) act as a positive moderator, intensifying the relationship of AI on GTFP. Meanwhile, the enhancement of GTFP driven by AI is more pronounced in state-owned enterprises compared with their non-state-owned counterparts; the enhancement of GTFP attributable to AI is more substantial among firms in high-tech industries; AI exerts a stronger influence on GTFP in heavy-pollution firms compared to non-heavy-pollution firms; In regions where environmental regulations are relatively lenient, AI generates a larger marginal improvement in GTFP. Building on the above research conclusions, enterprises should actively respond to the impact of AI and reasonably apply AI, and government management departments should also take active and effective control measures against the wave of AI.

Key words: artificial intelligence technology, carbon emissions, corporate innovation input, green total factor productivity, resource-based view

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