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RESEARCH ON THE CONSTRUCTION OF THE INTER-PROVINCIAL IMPLICIT CARBON EMISSION INTENSITY NETWORK AND ITS SPATIAL IMPACT

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Abstract

With the advancement of China's "dual-carbon" targets, it is crucial to rigorously assess the mechanisms by which inter-provincial implicit carbon emission intensity shapes regional low-carbon development. Drawing on inter-provincial input-output tables for 30 provinces (including autonomous regions and municipalities) in mainland China over 2010 to 2020, this study employs a multi-regional input-output (MRIO) model to estimate each province's implicit carbon emission intensity. We then use social network analysis to construct an inter-provincial implicit carbon emission intensity spatial network, identifying key metrics—network density, centrality, strength, and connectivity—from both structural and evolutionary perspectives. To uncover how these network characteristics influence implicit carbon intensity, we introduce quadratic assignment procedure (QAP) regression and interaction models. Our findings reveal that: 1) During 2010-2020, the characteristic metrics of China's overall implicit carbon emission intensity network underwent structural fluctuations and exhibited pronounced regionalization patterns; 2) Overall network density rose from 0.4017 in 2010 to 0.4275 in 2020, indicating enhanced spatial clustering; 3) Network centrality has a significant positive effect on carbon intensity, whereas network strength and connectivity each exert inhibitory effects; 4) Interaction-term analyses further demonstrate a synergistic interplay between input and output based carbon networks, significantly lowering regional carbon intensity; 5) Moreover, macro-level variable-including per capita GDP, environmental regulation intensity, and high-technology development also show significant effects. These insights offer important policy implications for optimizing regional carbon-governance networks and fostering cross-regional low-carbon collaboration.

Key words: implicit carbon emission, input-output model, social network analysis

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