"Gheorghe Asachi" Technical University of Iasi, Romania

INVESTIGATING THE SPATIO-TEMPORAL DYNAMICS AND UNDERLYING DRIVERS OF REGIONAL CARBON EMISSION REDUCTION CAPACITY

Wenwen Hao[1], Shujun Ye[1], Qian Meng[2*]

[1]*School of Economics and Management, Beijing Jiaotong University, No.3 Shangyuan Village, Xizhimen Wai, Haidian District, Beijing, China*
[2]*Beijing Sport University, No.11 Beisanhuan West Road, Haidian District, Beijing 100191, China*

Abstract

Using a sample of 244 cities in China as the research object, Kernel density estimation, Markov chain, and GTWR were applied to study the spatial and temporal differences and drivers of urban carbon emission reduction capacity. The results show that: (1) Regional carbon emission reduction capacity varies significantly, showing a trend of southward and east-west fluctuation. Some regions have dispersed carbon emission reduction capacity, while some regions have concentrated it; (2) China and most regions have multilevel differentiation in carbon emission reduction capacity, and there are obvious gaps in carbon emission reduction capacity among different cities in the region. (3) There is a phenomenon of "club convergence" in the carbon emission reduction capacity of Chinese cities, cities with similar capacity are more likely to be close to each other, and it is difficult to realize rapid improvement. (4) The factors driving the carbon emission reduction capacity of cities and the intensity of their effects change dynamically with time and space, and there are stage and regional differences in the influence of different factors.

Key words: carbon emission reduction capacity, dynamic evolution, GTWR model, Kernel density estimation, spatiotemporal differentiation, spatial Markov chain

Received: February, 2025; Revised final: June, 2025; Accepted: July, 2025; Published in final edited form: August, 2025

---

*Author to whom all correspondence should be addressed: e-mail: mengqian@cupes.edu.cn; Phone: +010 82099071