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DOES AGRICULTURAL TFP GROWTH PROMOTE LOW-CARBON UTILIZATION OF ARABLE LAND IN CHINA? A COMPARISON BETWEEN MAJOR AND NON-MAJOR GRAIN-PRODUCING REGIONS

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Abstract

Agricultural Total Factor Productivity (TFP) is crucial for transforming agricultural growth patterns. However, its impact on the carbon emission intensity of arable land utilization remains contested, especially across regions with divergent food security roles. Utilizing panel data from 31 Chinese provinces (2007–2023), this study employs the Global Malmquist Productivity Index to measure agricultural TFP and examines its heterogeneous effects on the carbon emission intensity of arable land utilization in major (MGRs) and non-major grain-producing regions (NMGRs). The findings reveal that: (1) China's agricultural TFP exhibited sustained growth, while the carbon emission intensity of arable land utilization continuously declined. Agricultural TFP was consistently and significantly lower in MGRs than in NMGRs across all years; however, the difference in carbon emission intensity between these regions was insignificant. (2) Agricultural TFP growth does not contribute to low-carbon utilization of arable land in all regions. It significantly reduces carbon emission intensity in NMGRs, but this effect is insignificant in MGRs. (3) Decomposition of the Malmquist Index indicates that improvements in agricultural technical efficiency positively influence low-carbon utilization of arable land in both MGRs and NMGRs. However, agricultural technological progress contributes significantly only in NMGRs. (4) Further analysis suggests that environmental regulation can help rectify the path dependence of agricultural technological progress in MGRs, steering the impact of agricultural TFP growth towards facilitating the transition to low-carbon utilization of arable land. At the same time, agricultural fiscal expenditure significantly amplifies the carbon-reduction effects of technical efficiency improvements across both regions.

Key words: agricultural TFP, arable land, China, low-carbon utilization

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