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Space–time variability analysis of poverty alleviation performance in China's poverty-stricken areas

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ABSTRACT

China has achieved significant achievements in poverty reduction since the launch of its reform and opening policy in 1978. The rural poor population decreased by nearly 67 million from 2010 to 2012. Analysing and understanding the spatio-temporal variation of poverty alleviation performance in contiguous poverty-stricken regions can provide a reference for Chinese policymakers. In this paper, based on the analytic hierarchy process (AHP), we build an evaluation index system of poverty alleviation performance and then establish a Bayesian spatio-temporal model to explore the space–time variability of poverty alleviation performance in poor areas. The spatial distribution indicates the eastern region's higher performance in poverty alleviation compared to the western region. The spatial–temporal feature shows that the increasing trend of poverty alleviation performance presents a pattern of "high in the central, low in the east–west" and most poor counties' development of poverty alleviation performance are consistent with overall trend. These findings suggest that the government

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could pay more attention to the development in the western region and vigorously carry out precise poverty alleviation measures.

1. Introduction

China has witnessed four stages of its poverty alleviation policy evolution, as follows: targeting special poverty areas (before 1985), targeting regions (1986–1993), the Seven-year Priority Poverty Reduction Program (1994–2000) and the Village-based Poverty Reduction Program (2001–2010) (Zhang and Wang, 2013). "*The Outline for Development-oriented Poverty Reduction for China's Rural Areas (2011–2020)*" was implemented in May 2011. Meanwhile, poor areas in China were divided into 14 contiguous poverty-stricken areas (CPSR), including Wumeng Mountain area; Liupan Mountain area; south Xinjiang area; Lvliang Mountain area; Tibetan ethnic area in Sichuan, Yunnan, Gansu and Qinghai provinces; south area of Great Khingan Mountains; Dabie Mountain area; Wuling Mountain area; border area in western Yunnan; rocky desertification area in Yunnan, Guizhou and Guangxi provinces; Yanshan–Taihang Mountain area; Qinba Mountain area; Luoxiao Mountain area; and Tibet area (The state council leading group of poverty alleviation and development of China, 2011). By the end of 2012, China still had a population of approximately 100 million people concentrated in contiguous poverty-stricken regions (CPSR). While the effect factors resulting in a slow increase in poverty alleviation are multidimensional, setting up a comprehensive appraisal index system of poverty alleviation performance in poor areas plays an important role in the adjustment and implementation of poverty reduction work in the future.

Many researchers have studied poverty alleviation in China's different regions. You and Tian (2009) constructed an AHP-FCE (analytic hierarchy process-fuzzy comprehensive evaluation) combination appraisal model and conducted a static and a dynamic evaluation of the total poverty alleviation performance at a county level from 2000 to 2005. Fu (2012) established a comprehensive evaluation index system of poverty alleviation performance and carried out an overall evaluation in Lanzhou City in 2010, using the theory and method of system engineering. Zhang (2013) studied the conditions of 66 counties in poor areas in Guizhou Province. Chen (2015) quantitatively assessed the poverty alleviation performance in 10 ethnic counties of Hubei Province in 2013. Selecting the northwest Sichuan Tibetan area as the research subject, Wang (2015) established an econometric model reflecting the relationships among government funding for poverty alleviation, the poor population and their income, as well as performed an empirical analysis on the practical effects of government funding for poverty alleviation. Nevertheless, there is a lack of research and analysis on temporal and spatial pattern characteristics of poverty alleviation performance in China's CPSR. Understanding the spatio-temporal variation in poverty alleviation performance in poor areas can provide valuable information for Chinese policymakers.

Some researchers also combined the ecosystem with poverty alleviation to study the poverty problems (Fisher et al., 2013). Suich et al. (2015) studied the relationship and measured the linkage pattern between ecosystem services and poverty alleviation. These research studies have shown that ecosystem protection can be benefit to poverty alleviation. Imran et al. (2014) developed a composite communal asset index (CAI) and built a geographically weighted regression (GWR) model to investigate rural poverty and marginality in Burkina Faso based on the remote-sensing products. Besides, nonlinear regression analysis, factor analysis and cluster analysis (Zhang and Zhuang, 2010), fuzzy analysis (Zhuang et al., 2012) and data envelopment analysis (Yang et al., 2015) have all been used in poverty alleviation investigations (Chen and Ge, 2015; Yang et al., 2015; Zhang and Wang, 2013; Zhang and Zhuang, 2010).

As mentioned, these cited studies cannot describe the temporal and spatial process of poverty alleviation performance, including spatial differences in a certain year and temporal changes during a specific period. On this premise, we constructed a comprehensive evaluation system based on the AHP to assess the poverty alleviation performance in China's CPSR (except the Tibet area), considering