Bayesian Analysis of a Multivariate Spatial Ordered Probit Model

Ping Gao

Graduate School of Economics and Business Hokkaido University

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Abstract

Many phenomena are correlated and spatially dependent. In addition, some of them are ordinal discrete responses. Thus, we need a model that captures the interactions of multivariate ordinal outcomes and spatial relationships. Following Smith and LeSage (2004) and Jeliazkov et al. (2008), this study proposes a new algorithm for a multivariate spatial ordered probit (MSOP) model to address this need. In applying this model, the parameters are calculated using the Bayesian inference based on Markov chain Monte Carlo (MCMC) sampling. The validity and accuracy of the MSOP model is verified by simulated datasets, and the model performs very well with the simulated data. In addition, this study illustrates the model by applying it to two response variables, self-rated health and life satisfaction of elderly people in six provinces in East China. The empirical results show that the spatial dependences are indispensable on the response variables.

KEY WORDS: Bayesian inference, Markov chain Monte Carlo (MCMC), multivariate outcomes, ordered probit model, spatial dependence. JEL CLASSIFICATION: C11, C35, C51.