Comparison Method of Spatial Autoregressive Probit Estimation

Fevi Novkaniza
Department of Mathematics, Faculty of Mathematics and Natural Science
University of Indonesia
Depok, 16425, Indonesia
fevi.novkaniza@sci.ui.ac.id

Anik Djuraidah
Department of Statistics, Faculty of Mathematics and Natural Science
Bogor Agricultural Institute
Bogor, Indonesia
anikdjuraidah@gmail.com

Abstract

Probit models with spatial dependencies were first studied by McMillen (1992), where an EM Algorithm was developed to produce consistent (maximum likelihood) estimates for these models. In spatial autoregressive probit model, the spatial dependent structure adds complexity in the estimation of parameters. LeSage and Smith (2001) use Bayesian estimation via Markov Chain Monte Carlo methods that sample sequentially from the complete set of conditional distributions for all parameters. Klier and McMillen (2008) have proposed a linearized version of the GMM estimator that avoids the infeasible problem of inverting n-by-n matrices when employing large samples. They show that standard GMM reduces to a nonlinear two-stage least squares problem. Martinetti and Geniaux (2017) proposed approximate likelihood estimation which based on the full maximization of likelihood of an approximate multivariate normal distribution function. We use some extensive simulation for these methods and show the best estimation method which can handle sample sizes with many observations and various value of coefficient spatial lag, provided the spatial weight matrix is inconvenient sparse form, as is for large data sets, where each observation neighbours only a few other observations.

Keywords: SAR, probit, bayes, Linearized GMM, approximate likelihood

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Biographies
Fevi Novkaniza is a lecturer in Department of Mathematics, Faculty of Mathematics and Natural Science University of Indonesia and currently a second year Ph.D. student in Department of Statistics, Bogor Agricultural University. She earned Bachelor of Science degree from Department of Mathematics, Faculty of Mathematics and Natural Sciences, University of Indonesia and Master of Science in Mathematics from Department of Mathematics, Faculty
of Mathematics and Natural Sciences, Bandung Institute of Technology. She is an active researcher and has some conference papers that are published in American Institute of Physics (AIP) Proceedings. Her research interests include stochastic process, linear and non-linear statistical model and actuarial science. She receives BUDI Scholarship from LPDP and Ristekdikti Ministry of Indonesia for the PhD opportunity in year 2016. She is a member of IndoMS Society.

Anik Djuraidah is currently a fulltime senior lecturer in Department of Statistics, Faculty of Mathematics and Natural Sciences Bogor Agricultural University. She earned PhD in Statistics from Bogor Agricultural University. She is an active researcher that has published journals indexed in SCOPUS and conference papers. Her research interests include in Spatial, Spatio-temporal Analysis and Statistical Downscaling methods that specified using extreme value distributions. She is one of supervisors of Master and PhD student in Spatial and Spatio-temporal area data modeling and simulations.