学位論文の要約

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学位論文題名

Bayesian Analysis on Ordered Probit Models with Individual Heterogeneity
(個人の異質性を入れた順序選択モデルのベイズ推定)

In their seminal study of the Bayesian ordered probit model, Albert and Chib (1993) use latent variable representation to estimate the posterior distribution of explanatory variables. Cowles (1996), Nandram and Chen (1996), and Chen and Dey (2000) offer several suggestions on the sampling of cutpoints. Albert and Chib (2001) consider an algorithm to transform cutpoints into an unconstrained variable and remove their ordering constraint using a one-to-one map. Chen and Dey (2000) propose a sampling algorithm identified by fixing two cutpoints, leaving for estimation the variance in error term. Moreover, Muller and Czado (2005) present a Bayesian auto regressive ordered probit model based on the Liu and Sabatti (2000) method. Further, Hasegawa (2009) extends these algorithms to the Bayesian dynamic ordered probit model.

In an analysis of subjective well-being, the backgrounds and preferences of respondents are complicated, and individuals may interpret concepts in different ways (Brady, 1985). Many studies have considered ordered choice models, incorporating heterogeneity among individuals (Farewell (1982); Terza (1985); Greene(2007); Eluru et al. (2008); Greene and Hensher (2010b); King et al. (2004); Kapteyn et al. (2007)). However, to the best of our knowledge, no study has so far accommodated individual heterogeneity in the cutpoints of ordered probit models.

Therefore, we first present a sampling algorithm for the univariate ordered probit model with individual heterogeneity and apply the model to happiness data. Our findings indicate that the model with individual heterogeneity act better than that without heterogeneity do. In some instances, we need to model several related ordered responses from the same individuals. Since these ordered responses are correlated, we need to use a multivariate model, rather than several separate univariate models. Therefore, we propose a Bayesian multivariate ordered probit model with individual heterogeneity to meet the requirements. In addition, to deal with panel data, we conduct a new Bayesian algorithm in a dynamic ordered probit model.

Key Words: Bayesian analysis, Markov chain Monte Carlo (MCMC), Individual heterogeneity, Ordered probit model.