

論文の内容の要旨

論文題目 Bayesian Analysis for Microeconomic Models of Discrete Choice Variables
(離散選択変数のマイクロ計量経済モデルのためのベイズ分析)

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As symbolized by the Nobel prize in 2000 awarded for Daniel McFadden, econometrics has accumulated enormous studies to deal with discrete variables. In spite of the rich literature, there always emerges a requirement for new econometric techniques along with development of new economic theories. Among a various directions in this expanding study field, this thesis concentrates on models for multiple

discrete variables.

We analyze models which are characterized by mutual dependencies of multiple dependent variables. When there are such dependencies, as studied in spatial statistics, we have two ways of the modeling. One is the simultaneous specification, while another is the conditional specification. Since both specifications have advantages and disadvantages, an appropriate choice among them depends on a situation.

The simultaneous specification assumes that the models for all the dependent variables are satisfied simultaneously. The difficulty of the simultaneous specification is that we need to justify the simultaneity, which requires special assumptions exogenous to the statistical model. In econometrics, the concept of an equilibrium often plays the role of this assumption. Thus, the simultaneous specification has been more popular than the conditional specification in econometrics and there is a rich literature in the name of simultaneous equation models.

The conditional specification assumes that each model separately describes the conditional model of one variable given the other dependent variables. The disadvantage of this specification is that since conditional distributions do not always guarantee the existence of the joint distribution, we need to check the recoverability of the joint model. This recoverability has been studied in statistics in the name of compatibility. In discrete variables, the compatibility condition often yields a serious restriction on feasible models.

As a technique for econometric analysis for our models, we adopt a Bayesian approach. In complicated models for discrete variables, it is often difficult to obtain a closed form of the likelihood function and hence to incorporate maximum likelihood estimation. The Bayesian methodology is an attractive alternative for such a case. Historically, practical usages of Bayesian statistics in this field are rather new, since it has been enabled by a development of computer-intensive Bayesian methodologies such as the Markov chain Monte Carlo(MCMC). Discrete variable models have provided attractive application topics for the MCMC since its early stage.

This thesis contains three chapters which deal with Bayesian analysis for distinct econometric models of multiple discrete variables. The organization is as follows: Next to this overview, Chapter 2 provides a study for empirical entry game

models. In entry games, players make a binary decision whether to enter a market or not, taking account to strategies of the other players. It causes that the observed set of binary decisions must be dependent each other. Especially, when we assume that players take pure Nash equilibria, the corresponding statistical model is a simultaneous specification. Based on these discussions, we provide a Bayesian estimation procedure and apply it to Japanese airline market.

Chapter 3 considers statistical analysis for asymmetric information in insurance markets. We focus on two binary variables, an occurrence of an accident and a purchase of an insurance for each consumer. A conventional methodology adopts the bivariate probit model and detects the existence of information asymmetry by a positive correlation for the error terms of two probit equations. We extend this approach to identify two fundamental elements of asymmetric information, moral hazard and selection problems, separately. To do so, we face a question which specification we should use, conditional or simultaneous. It is shown that the conditional specification can not achieve the separated identification, while the simultaneous specification requires additional assumptions on consumer's behavior. Then we incorporate the simultaneous specification with appropriate behavioral assumptions. We present a Bayesian inferential technique and apply it to American dental insurance market.

Chapter 4 analyzes effects of a governmental intervention to a market which is stuck in an inefficient Nash equilibrium. Specifically, we study Japanese private nursing home market, in which asymmetric information yields a complicated price mechanism which might harm many consumers. We provide a prediction study for a counterfactual intervention which abandons the undesirable custom. To do so, we construct a model for simultaneous demand and supply. The advantage of our approach is that although the demand side model consists of discrete choices of individual consumers, utility parameters can be estimated using only aggregate data. However, the conventional estimation procedure via the generalized method of moments can not identify our predictor of interest. Then we construct a likelihood function, paying a special attention to the simultaneity of supply and demand. To reduce the influence of distributional assumptions, we adopt a nonparametric Bayesian approach.