Simulation Based Estimation of Multinomial Discrete Choice Model with Fixed Effects

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Abstract

Multinomial discrete choice models, including binary choice models as special examples, form a class of widely used nonlinear models. Including unobservable heterogeneities in such models is necessary in many applications due to the unobservable individual preference, attributes or technologies. Unfortunately this causes the issue of point identification if the fixed effects approach is used. Following the set identification proposed by Honoré and Tamer 2006, I further develop the estimation method by Chernozhukov et al. 2013a for both static and dynamic multinomial discrete choice models with fixed effects, whose parameters and conditional average partial effects on choice probabilities can be only set identified. Although there has been estimation method for binary choice models of closed-form, what I study in this paper provides extension in two ways. First, specification for multiple choices is studied for both static and dynamic models. Second, it allows components with open-forms due to multiple choices and assumption on errors other than GEV distributions. For these models, conditional probabilities for each alternatives and partial effects can be found by Monte Carlo method. Therefore I propose a simulation based estimation for all the set identified quantities and show that this estimation is consistent under some general conditions and a perturbed bootstrap method can be used to implement its inference. Numeric examples with generated data are included in order to compare the simulation based estimation with the extant method when closed-forms are available and show its behavior for model with only open-form components. I find that the estimated bounds of partial effects work well since they are close to the results of extant estimation for closed-form model and cover true effects in most of the cases for both models with and without closed-forms.

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