

Workshop: Advances in Econometric Methods

Background and Presentations

The workshop on “Advances in Econometric Methods” was well attended (about 35 participants), and had several researchers who have contributed in important ways to the econometric field.

The session had one resource paper entitled “Advances in Choice Modeling and Asian Perspectives”, by T. Yamamoto, T. Hyodo, Y. Muromachi and four supplementary papers:

- (1) Testing the choice of a mixing distribution in discrete choice models (M. Fosgerau, M. Bierlaire),
- (2) Random covariance heterogeneity in discrete choice models (S. Hess, D. Bolduc, J.W. Polak)
- (3) The multiple discrete-continuous extreme value (MDCEV) model: Role of utility function parameters, identification considerations, and model extensions (C.R. Bhat)
- (4) Discrete choice theory with constrained demand (A. de Palma, N. Picard, P. Waddell)

The resource paper examined several key developments in the econometric field since IATBR 2003, focusing on the increasing application of advanced models (especially the mixed logit model and its many variants) in Asian countries. The paper introduced the richness and complexity in the choice alternatives, as well as the diversity in decision mechanisms, that exist in Asian countries in the context of activities and travel choices.

The four supplementary papers focused on specific aspects of recent methodological developments. The first paper examined the issue of testing alternative mixing distributions in mixed logit choice models. This is an important issue, since different mixing distributions can, and generally will, lead to quite different trade-off values among variables, among other things. The paper introduces non-parametric and semi-parametric ways to address this issue. The second paper extended Bhat’s (1997) paper on systematic covariance heterogeneity in the Nested Logit model to more general discrete choice models, as well as includes randomness in the covariance heterogeneity. The paper indicates that there is no reason for randomness to be confined in the parameters or in the variance terms associated with individual utilities, but that it can also exist in covariance terms. The third paper introduces a new MDCEV model that can be used to model the choice of multiple alternatives simultaneously, along with the continuous choice that corresponds to each discrete alternative. The paper formulates such a model based on variety-seeking, and imposing specific assumptions on the stochastic terms of utility. The resulting model has closed-form expressions for the choice probabilities. The final paper focuses on theoretical developments in discrete choice theory with constrained demand.

Summary

The workshop acknowledged the exciting developments that have happened, and that continue to happen, in the use of simulation techniques for econometric model development. In particular, simulation techniques can be used to formulate and estimate advanced models that can be used as diagnostic tools to assess simpler models, can help in formulation of single and multiple discrete models with supply constraints, and can aid in developing a closer nexus between economic theory and econometric models. In the latter context, one can start model development from the primitives of economic theory and then develop models based on the theory. Many such models may not have a closed-form expression, but can be estimated using efficient simulation techniques.

However, the workshop group also cautioned about getting carried away with the simulation developments of the day. In particular, simulation techniques should not be used as a general panacea for specification ills or used as a “black box”. The analyst must have a clear understanding of the process being modeled, and the identification issues and implied competition patterns of open-form models. The analyst must also strive to collect good data and know the data well through exploratory analysis. In addition, the first order of business is to attribute as much differences in choice making across decision agents to systematic effects before superimposing random effects. Besides, one should be cautious in how much one can extract by way of structure among factors that are fundamentally unobserved.

The workshop identified several techniques, research topics, and other efforts that need attention in the coming years. First, studies need to estimate not only point values of such parameters as elasticity effects and trade-off values, but also estimate the uncertainty in these parameters. Well established bootstrap techniques may be used for such computations. Second, the field would benefit from exploring theories and formulations associated with non-compensatory decision mechanisms and other non-random utility maximizing models. Third, there is a need for disseminating information on econometric model development and innovations in a way that avoids the use of these developments without a clear understanding of the underlying theories and assumptions. This may be achieved by holding more workshop style events. Fourth, while there is good documentation of models and results in the literature, the documentation regarding “tricks” and “problem issues” in model estimation and forecasting is almost non-existent. Developing a repository of such experiences would be valuable to the field. Fifth, there is a continuing need to focus on theory, process, and dynamics that underlie model formulation and estimation.

Bhat, C.R. (1997), "Covariance Heterogeneity in Nested Logit Models: Econometric Structure and Application to Intercity Travel", *Transportation Research Part B*, Vol. 31, No. 1, pp. 11-21.