Available online at www.sciencedirect.com
ScienceDirect
Journal of Econometrics 140 (2007) 1–4
JOURNAL OF Econometrics
www.elsevier.com/locate/jeconom

Guest editorial

Analysis of spatially dependent data

Spatial models have a long history in the regional science and geography literature. Somewhat more recently, spatial models have also become an important tool in economics for the analysis of spatially dependent data. The purpose of this volume is to bring together a variety of studies that relate both to the further theoretical development of such models, and their application to various economic issues.[1]

Baltagi, Song, Jung, and Koh consider a spatial panel data model which involves time series autocorrelation, as well as spatial dependence between spatial units at each point in time. The model also allows for heterogeneity of spatial units via random effects. They derive several Lagrangian multiplier tests for this model including a joint test for serial correlation, spatial correlation, and random effects. The joint LM test derived in this paper encompass those derived in earlier studies by Anselin and Bera (1998) and by Baltagi et al. (2003). It is shown that the earlier LM tests are marginal LM tests that ignore either serial correlation over time or spatial error correlation. Testing for any one of these ignoring the other two is shown to lead to misleading results. The paper also derives conditional LM and LR tests that do not ignore these correlations and contrast them with their marginal LM and LR counterparts. The small sample performance of these tests is investigated using Monte Carlo experiments.

Spatial models do not only relate to spatial dependencies and interactions across geographic space, but may be viewed more generally as models for cross sectional dependence and interactions. Lee (2004) relates the class of spatial Cliff–Ord models to certain social interaction models. The paper by Brock and Durlauf in this volume aims at developing an analysis of the identification problem for social interactions in binary choice models using individual level data. The paper explores the identifiability of model parameters without assuming that the distribution of random payoff terms is known, and extends the analysis of Manski (1988) and Brock and Durlauf (2001a,b). Among other things, the paper also analyzes the identification of social interactions in the presence of unobserved group effects.

A key ingredient in spatial model is the choice of metric space and locations for the observed agents. However, in many cases the agents' locations may not be known with certainty by the econometrician. Conley and Molinari investigate the consequences of measurement errors in locations/distances upon inference. Their approach is to use

[1]The papers in this annals issue are grouped roughly according to whether their focus is mostly theoretical or empirical. Within each group the papers are arranged alphabetically by author.

doi:10.1016/j.jeconom.2006.11.001

smoothed periodogram covariance matrix estimators that are consistent in the presence of bounded, potentially endogenous location errors. They present Monte Carlo results that relate to the impact of location errors upon the precision of estimators of an asymptotic variance. They also give Monte Carlo results which relate to two new specification tests for parametric estimators of that asymptotic variance. Among other things, these results relate to comparisons of parametric and nonparametric estimators of that asymptotic variance. They find that nonparametric estimators are quite robust to location errors, as are method of moments estimators. On the other hand, MLE estimators perform poorly.

The paper by Kapoor, Kelejian, and Prucha considers a panel data model where the disturbances have an error component structure. The innovations are modeled as a first order spatially autoregressive process and are thus allowed to be spatially correlated. The model blends specifications typically considered in the spatial literature with those considered in the error components literature. The paper introduces generalizations of the generalized moments (GM) estimators suggested in Kelejian and Prucha (1999) for estimating the spatial autoregressive parameter and the variance components of the disturbance process, and discusses alternative weighting schemes for the moments. Kapoor, Kelejian, and Prucha then use those GM estimators to define a feasible generalized least squares procedure for the regression parameters, and give formal large sample results for the proposed estimators. The estimators remain computationally feasible even in large samples.

Kelejian and Prucha suggest a nonparametric heteroscedasticity and autocorrelation consistent (HAC) estimator for an asymptotic variance covariance (VC) matrix which would naturally arise in a spatial framework in which an instrumental variable (IV) procedure is used to estimate the model parameters. They formally demonstrate consistency of their estimator under a set of relatively simple assumptions that covers, among others, the important and widely used class of Cliff–Ord type spatial models. The specification of the HAC estimator allows for more than one measure of distance, each of which may be measured with error, and only assumes that one of the distance measures considered by the researcher corresponds to the true one. The authors also derive the asymptotic distribution of an IV estimator for the parameters of a general spatial model and demonstrate that a consistent estimator of the VC matrix involved can be based on the suggested HAC procedure.

The paper by Lee considers the estimation of a mixed regressive spatial autoregressive model, which is, in the terminology of Anselin, also often referred to as a spatial autoregressive model with autoregressive disturbances, for short SARAR(1,1). The paper introduces a computationally simple generalized method of moments (GMM) for the estimation of this model. This method is based on the method of elimination and substitution in linear algebra, and the modified GMM procedure can substantially reduce the computational burden. The approach reduces the joint estimation of the entire unknown parameter vector into the estimation of separate components. The paper shows that for the mixed regressive spatial autoregressive model, the nonlinear estimation is reduced to the estimation of the (single) spatial effect parameter. The paper furthermore identifies situations under which the modified GMM estimator can be as efficient as the joint GMM estimator. Among other situations, this will be the case if the disturbances have zero third moments, e.g., if the disturbances are distributed Gaussian.

Among the most widely used spatial models are variations on the one put forth by Cliff and Ord (1973, 1981). For these models maximum likelihood estimation is tedious and