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Title:

Maximum Likelihood Estimation for Spatial Econometric Models under the Presence of Missing Data

Abstract:

Maximum-likelihood (ML) estimation with spatial econometric models is a long-standing problem that finds application in several areas of economic importance. The problem is particularly challenging in the presence of missing data, since there is an implied dependence between all units, irrespective of whether they are observed or not. Out of the several approaches adopted for ML estimation in this context, that of LeSage and Pace (2004) stands out as one of the most commonly used with spatial econometric models due its ability to scale with the number of units. Here, we review their algorithm, and consider several similar alternatives that are also suitable for large datasets. We compare the methods through an extensive empirical study and conclude that, while the approximate approaches are suitable for large sampling ratios, for small sampling ratios the only reliable algorithms are those that yield exact ML or restricted ML estimates.

We also consider a direct “marginal” ML approach which turns out to be computationally superior over the EM algorithm. When the contiguity matrix is not sparse, we also consider approximate methods of the marginal approach to enable estimation for large data sets.