Department SEMINARS

Spatial autoregressions with an extended parameter space and similarity-based weights

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A B S T R A C T

We provide in this paper asymptotic theory for a spatial autoregressive model (SAR, henceforth) in which the spatial coefficient, λ, is allowed to be less than or equal to unity, as well as consistent with a local to unit root (LUR) model and of the moderate integration (MI) from unity type, and the spatial weights are allowed to be similarity- based and data driven. Other special cases of our setting include the random walk, a model in which all the weights are equal, the standard SAR model in which $|\lambda| < 1$ and the similarity based autoregression in which $\lambda = 1$ and data do not display a natural order. As the norming rates for the asymptotic theory are very different in the $|\lambda| < 1$ - compared with the $\lambda = 1$ and LUR cases, we resort to random norming that treats all cases in a uniform manner. It turns out that standard CLT results prevail in a large class of models in which the infinity norm of the inverse of the weighting structure that characterizes the reduced-form process is $O(n^{\gamma})$, $\gamma \in [0, 1)$, and is non-standard in the case $\gamma = 1$. We use a shifted profile likelihood to obtain results which are valid for all cases. A small simulation experiment supports our findings and the usefulness of our model is illustrated with an empirical application of the Boston housing data set in which the estimate of λ appeared to be very close to unity.

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