Testing Spatial Autoregressive Model and a Formulation of Spatial ARCH (SARCH) Model with Applications

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Abstract

Spatial econometrics is essentially concerned with statistical techniques to take account of economic interactions among agents located on space. So far the focus in the spatial regression literature has been on detecting and modelling the presence of spatial dependence through conditional mean (first moment). Also there is no acceptable procedure to test an estimated spatial regression model. We first derive a simple specification test for spatial autoregressive (SAR) model using the information matrix (IM) test principle. As a byproduct of our test development, we obtain a general model that has similar features like autoregressive conditional heteroskedasticity (ARCH) in time series context. Our suggested spatial ARCH (SARCH) model can take account of some of the stylized facts observed in spatial data. We also provide a review of the IM test and various implications for model selection and robust estimation since these issues are relevant for modelling spatial data. To illustrate the usefulness of our test and SARCH model, we apply our theoretical result to Boston housing price data and show the importance of modelling the conditional second moment in spatial context.

Key words: spatial dependence, information matrix test, spatial autoregressive process, spatial ARCH model

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