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A simple randomization test for spatial correlation in the presence of common factors and serial correlation

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Abstract

A randomization test is proposed for detecting spatial dependence in panel models with cross-sectional dependence induced by an unobserved common factor structure. Spatial dependence is related to the position of observations in space while cross-sectional dependence is generally not; yet spatial correlation tests have power against both. Permuting the pairs of neighbouring observations in the proximity matrix yields a simple spatial dependence test which is robust to the presence of non-spatial cross-sectional correlation, serial correlation and can accommodate short and unbalanced panels. The proposed procedure is evaluated and compared to alternatives through Monte Carlo simulation; it is then illustrated by an application to recent research on technology spillovers. A user-friendly R implementation is provided.

Keywords: Panel data, Common factors, Spatial dependence, Serial correlation, Randomization test

1. Introduction

Both spatial panel and common factor models have become popular for analyzing economic processes observed over spatial units through time. Each of

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