Introduction to the special issue: recent developments in spatial statistics and spatial econometrics

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This Special Issue of *Annals of Regional Science* collects selected papers from the 17th International Workshop on Spatial Econometrics and Statistics, held in Dijon (France) on May 24–25, 2018. Organized by the LEDi (University of Burgundy) and the CESAER (INRAE, AgroSup Dijon), this edition followed previous workshops held in France since 2001 (Avignon, Besançon, Dijon, Grenoble, Orléans, Paris, Strasbourg, Toulon, Toulouse and Avignon). The aim of this international workshop is to promote and develop scientific exchanges between economists, econometricians, statisticians, geographers, ecologists, agronomists and mathematicians on spatial econometrics and statistics and their applications in several fields. This workshop also aims to discuss the state of the art and future challenges as well as opportunities in the fields of spatial econometrics and statistics and encourage exchanges between senior and junior researchers involved in spatial statistics and econometrics.

The 2018 workshop featured two special events. First, the Cem Ertur Prize was given to honor outstanding research by a junior researcher related to spatial statistics of spatial econometrics. The prize has been created in 2017 in memory of Cem Ertur, Professor of Economics at the University of Orléans (France). Two special sessions were organized, where selected applicants presented their contributions. The price has been awarded to Abhimanyu Gupta and Xi Qu for their paper “Consistent specification testing under network dependence,” which proposes a series-based nonparametric specification test for a regression function when data are network dependent. Second, a plenary session dedicated to the memory of Raymond Florax, Professor of Economics at Purdue University and Vrije Universiteit Amsterdam, has been organized. Two of Raymond Florax’s colleagues and friends presented a paper for this session: Thomas de Graaff (Vrije Universiteit Amsterdam) and Bernard Fingleton (University of Cambridge).

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All papers in this issue have gone through full anonymous reviews according to the standard practice of the journal. The special issue groups together a mix of spatial statistic and econometric theories, methods and applications.

The first set consists of mostly methodological papers. G. Lang, E. Marcon and F. Puech complement the literature that assesses the spatial distribution of economic activities using micro-geographic data with distance-based methods. These methods are particularly interesting in that they allow overcoming the biases related to the modifiable areal unit problem (MAUP). In their paper, they introduce a new distance-based statistical method, which is a relative density function, similar to the location quotient and that is complementary to Duranton and Overman's K_d function, which evaluates absolute concentration. They provide various simulated and real examples to illustrate this new function. T. De Graaff proposes an alternative approach to combine stochastic frontier models and spatial dependence using skew-normal distribution functions. The resulting model is straightforward to estimate, combines spatial dependence and technical efficiency in a single error term and produces consistent estimates. The latter point is shown using simulations, and an empirical application is provided for European regions. J. Le Gallo, F. López and C. Chasco focus on the scan statistics for spatial group-wise heteroskedasticity of regression residuals in spatial econometric models. They develop Lagrange multiplier versions of spatial group-wise heteroskedasticity based on the scan approach and show with Monte Carlo simulations that they have good small-sample properties. As this methodology also detects, in the case of rejection of the null hypothesis, the locations of the clusters with unequal variance, it can be used as a diagnostic tool in specification search, a feature exemplified on a sample of housing prices in Madrid. F. López, R. Mínguez and J. Mur compare maximum-likelihood and instrumental variables methods for estimating Spatial Seemingly Unrelated Regressions models especially focusing on the importance of sample size and the trade-off between accuracy and speed. This is undertaken with a comprehensive simulation experiment using the *spsur*, a new R package. An empirical application to the case of *Airbnb* in downtown Madrid is also provided.

The special issue also features a number of applications. Housing data are investigated in two papers, given the importance of the spatial dimension in housing prices. S. Yousfi, J. Dubé, D. Legros and S. Thanos compare the hedonic pricing method with the comparable sales approach preferred by professionals. They show that the latter approach is in fact a constrained version of a spatial autoregressive model. Based on US transaction data from Lucas County, Ohio, they compare the results obtained by the comparable sales approach to those obtained with an a-spatial hedonic pricing model and conduct an out-of-sample exercise to evaluate the in-sample prediction performances of both approaches and show that the comparable sales approach has good properties. Y. Ling also analyzes housing data with a hedonic housing model. His proposal is to address spatial and temporal latent structures simultaneously using a Bayesian framework and a stochastic partial differential equation approach. The model is estimated on a sample of apartment transactions in Corsica (France) using integrated nested Laplace approximation, and the results show that this model has the best prediction performance of all candidate models. Other dimensions of urban structure can also be investigated with spatial

econometrics: F. Sari investigates the spatial disparities in access to particular recreational amenities, e.g., the application for smart phones Pokémon GO. As the Pokéstops are not randomly located, it is of interest to uncover the spatial disparities in their distributions, especially the differences between urban and rural neighborhoods. Various spatial econometric models are estimated on data collected for the French department of *Loire-Atlantique* and the metropolis of Nantes and reveal strong disparities with the location of Pokéstops being correlated with local amenities rather than population characteristics.

More aggregated spatial levels are also of interest. A.M. Vallone and C. Chasco evaluate the influence of spatial proximity on the evolution of cities to detect regional differences in their spatiotemporal dynamics. Using an original R package, *esdaR*, they apply various techniques of space–time exploratory data analysis: non-parametric density functions, discrete spatial Markov chains, analysis of movement direction and ranking mobility of urban distribution. The entire Chilean urban system is investigated on a long time period, 1930–2002. For regional data, B. Fingleton estimates the possible job shortfall across UK and EU regions following Brexit. Starting with a reduced form derived from urban economics, he then estimates a time–space dynamic panel data model with a Spatial Moving Average Random Effects structure of the disturbances estimated by a dynamic spatial Generalized Moments estimator. The results indeed point to job shortfalls in the UK and across EU but with considerable spatial and sectoral heterogeneity.

All the papers in this special issue make significant contributions to the current theoretical and empirical literature in spatial statistics and spatial econometrics. This special issue offers the opportunity to disseminate them to the academic community interested in the analysis of spatial data, and we are sure that it will inspire them for future and valuable research.

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Compliance with ethical standards

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