

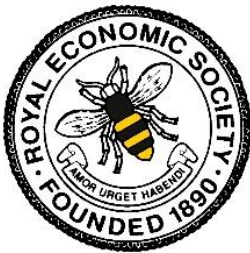
## PhD course: Spatial Health Econometrics

University of York, Monday 17<sup>th</sup> July 2017

The aim of the course is to introduce student to spatial econometrics methods and show how they have been applied in health economics.

### Programme

- 9.15-10.15 Part I. Introduction to Spatial Econometrics Methods
- 10.15-10.30 Coffee break
- 10.30-11.30 Part I – continued
- 11.45-1.00 Part II. Applications
- 1.00-1.45 Lunch
- 1.45-3.15 Part II. Applications - continued
- 3.15-3.30 Coffee break
- 3.30-5.30 Part III. Advances



## Part I. Introduction to Spatial Econometrics Methods (Francesco Moscone; 2 hours)

In health economics there are many phenomena that are characterised by a strong spatial dimension; from health care providers connected through networks of services and patients, to the regional concentration of health risk factors and needs. Spatial Health Econometrics is interested in testing health economic theories (both formal and informal) that predict interaction of networked economic agents at the micro (e.g. hospitals, GPs, etc.) or macro level (e.g. local authorities, countries, etc.), and/or the geographical concentration of their unobserved characteristics. The objective of this module is to introduce health economists to the motivations underlying the adoptions of spatial econometric models in health economics and illustrate how to incorporate these spatial effects using standard econometric models, such as the spatial lag, spatial error and spatial Durbin models.

### Syllabus

Anselin, L., J. Le Gallo, J. Jayet (2007). Spatial panel econometrics. In L. Matyas and P. Sevestre (Eds.), *The Econometrics of Panel Data, Fundamentals and Recent Developments in Theory and Practice* (3rd ed.). Dordrecht, Kluwer.

Baltagi, B.H. (2013). *Econometric Analysis of Panel Data* (5th Edition ed.), Wiley.

\*Baltagi, B.H., F. Moscone, R. Santos (2017) *Spatial Health Econometrics, Contributions to Economic Analysis*, B. H. Baltagi (ed.) and Moscone F. (ed.), Emerald Publishing, Forthcoming.

Lee, L., J. Yu (2011), Estimation of Spatial Panels, *Foundations and Trends in Econometrics*, Volume 4(1–2), p. 1-164. <http://dx.doi.org/10.1561/08000000015>

\*Moscone, F., E. Tosetti (2014), *Spatial Econometrics: Theory and Applications in Health Economics*. In T. Culyer (ed.), *Encyclopedia of Health Economics*. Elsevier.

Part II. Application in Health Econometrics (Luigi Siciliani, Francesco Longo, James Gaughan, Francesco Moscone, Rita Santos)

This module will show how the spatial econometrics methods described in part I can be applied within the health economics literature on topics such as hospital competition, mental health expenditure, health outcomes, long-term care, and peer effects.

*Hospital competition*

Gravelle, H., R. Santos, L. Siciliani (2014) Does a hospital's quality depend on the quality of other hospitals? A spatial econometrics approach, *Regional Science and Urban Economics*, 49, 203-216.

Longo, F., L. Siciliani, H. Gravelle, R. Santos (2017) Do hospitals respond to rivals' quality and efficiency? A spatial econometrics approach. CHE Research Paper 144

[https://www.york.ac.uk/media/che/documents/papers/researchpapers/CHERP144\\_hospital\\_quality\\_efficiency\\_spatial\\_econometrics.pdf](https://www.york.ac.uk/media/che/documents/papers/researchpapers/CHERP144_hospital_quality_efficiency_spatial_econometrics.pdf)

*Long term care*

Gaughan, J., H. Gravelle, L. Siciliani (2015) Testing the bed-blocking hypothesis: Does higher supply of nursing and care homes reduce delayed hospital discharges? *Health Economics*, 24 (S1), 32–44.

*Mental health*

Moscone, F., M. Knapp, E. Tosetti (2007) Mental health expenditure in England: A spatial panel approach, *Journal of Health Economics*, 26(4), 842-864.

*Health expenditure*

Skinner J., Moscone F., Tosetti E. and Yates L. (2017). The Association between Medical Care Utilization and Health Outcomes: A Spatial Analysis. Mimeo

*Peer effects*

Bramoullé, Y., H. Djebbari, B. Fortin (2009). Identification of peer effects through social networks. *Journal of Econometrics*, 150(1), 41-55.

doi:<https://doi.org/10.1016/j.jeconom.2008.12.021>

Burridge, P., J.P. Elhorst, K. Zigova (2014). Group Interaction in Research and the Use of General Nesting Spatial Models. University of Konstanz, Department of Economics, Working Paper Series.

Guccio, C., D. Lisi (2016). Thus do all. Social interactions in inappropriate behavior for childbirth services in a highly decentralized healthcare system. *Regional Science and Urban Economics*, 61, 1-17. doi:<http://dx.doi.org/10.1016/j.regsciurbeco.2016.08.004>

Lee, L. (2007). Identification and estimation of econometric models with group interactions, contextual factors and fixed effects. *Journal of Econometrics*, 140(2), 333-374. doi:<http://dx.doi.org/10.1016/j.jeconom.2006.07.001>

Lee, L., X. Liu, X. Lin (2010). Specification and estimation of social interaction models with network structures. *Econometrics Journal*, 13(2), 145-176. doi:10.1111/j.1368-423X.2010.00310.x

Lin, X. (2010). Identifying Peer Effects in Student Academic Achievement by Spatial Autoregressive Models with Group Unobservables. *Journal of Labor Economics*, 28(4), 825-860. doi:10.1086/653506

*Some STATA codes*

create weight matrices: `spmat`

Drukker, D, Peng, H, Prucha, I. (2013) Creating and managing spatial-weighting matrices with the `spmat` command. *Stata Journal*, 13, n2, pp 242-286

[http://econweb.umd.edu/~prucha/papers/SJ\\_SPMAT\(2013\).pdf](http://econweb.umd.edu/~prucha/papers/SJ_SPMAT(2013).pdf)

cross-section function: `spreg`

Drukker, D, Prucha, I, Raciborski, R. (2013) Maximum likelihood and generalized spatial two-stage-least-squares estimators for a spatial autoregressive model with spatial-autoregressive disturbances. *Stata Journal*, 13, n2, pp 221-241

<https://pdfs.semanticscholar.org/368f/c4ddb2fbd2605c90d414331bb17c1c50bdb6.pdf>

panel model:

Belotti, F., Hughes, G., Mortari, A. (2017) Spatial panel data models using Stata. *Stata Journal*, 17, n1, pp 139-180

<http://www.stata-journal.com/sjpdf.html?articlenum=st0470>

### Part III. Advances in Spatial Econometrics Methods (Yongcheol Shin; 2 hours)

This module will present recent advances in the spatial econometrics literature, covering the spatial dependence, the spatial heterogeneous parameters, the endogenous spatial weight matrix, nonlinearity and so on. It proposes a STARDL approach that can allow for the consistent estimation of heterogeneous coefficients in a flexible manner. It derives the generalised spatial representation from which we develop dynamic, spatial and diffusion multipliers.

Recently, a few studies have attempted to develop a joint approach that can accommodate both weak and strong CSD. Shi and Lee (2016), Bai and Li (2015) and Kuersteiner and Prucha (2015) have also developed the econometrics framework for jointly modelling spatial effects and interactive effects. See also Bailey et al. (2016) and Mastromarco et al. (2015).

#### *References*

Aquaro, M., N. Bailey and M.H. Pesaran (2015): "Quasi Maximum Likelihood Estimation of Spatial Models with Heterogeneous Coefficients," mimeo., University of Southern California.

Bai, J. and K. Li (2014): "Spatial Panel Data Models with Common Shocks," mimeo., Columbia University.

Bai, J. and K. Li (2015): "Dynamic Spatial Panel Data Models with Common Shocks," mimeo., Columbia University.

Bailey, N., S. Holly and M.H. Pesaran (2016): "A Two-Stage Approach to Spatio-Temporal Analysis with Strong and Weak Cross-sectional Dependence," *Journal of Applied Econometrics*. 31, 249-280.

Kuersteiner, G.M. and I.R. Prucha (2015): "Dynamic Spatial Panel Models: Networks, Common Shocks, and Sequential Exogeneity," mimeo., University of Maryland.

Mastromarco, C., L. Serlenga and Y. Shin (2016): "Modelling Technical Inefficiency in Cross Sectionally Dependent Stochastic Frontier Panels," *Journal of Applied Econometrics* 31, 281-297.

Shi, W. and L.F. Lee (2017): "Spatial Dynamic Panel Data Models with Interactive Fixed Effects," *Journal of Econometrics* 197, 323-347.

Shin, Y. (2017): Modelling the Cross-section Dependence and the Spatial Heterogeneity in the Multidimensional Dataset, Lecture Handout, University of York.