

Course Title: Quantitative Spatial Economics

Semester: Summer term 2024

Course Convenor: Professor Gabriel M. Ahlfeldt, Humboldt University

Course Description:

This course provides an applied introduction to Quantitative Spatial Models (QSMs) of internal city structure and economic geography. We start from neoclassical urban economics and the standard spatial equilibrium framework. We then expand into the spatial general equilibrium to integrate labour and land markets, and add worker heterogeneity to obtain closed-form solutions for discrete location choices. The course is applied in the sense that the main objective is to enable students to simulate QSMs to perform counterfactual analyses of spatial shocks and policies. To this end, we will be i) working with spatial data to generate the necessary model inputs; ii) setting, estimating, and inverting the primitives of the model; iii) using numerical procedures to solve for the spatial general equilibrium.

Using these skills, students in their final coursework will simulate the effects of a major transport infrastructure expansion on the spatial distribution of population, employment, wages, property prices, and the effect on aggregate GDP.

This course is designed for students with a research interest in spatial economics, including students considering an academic career. Therefore, students are expected to attend the Berlin Quantitative Spatial Economics Research Seminar, which will take place right after the tutorials. This is a unique opportunity to see leading spatial economists presenting their research and engage with the speakers and the spatial economics community in Berlin. The speaker schedule is available from the BQSE website www.bqse.de.

Course Objectives:

1. To provide a solid understanding of key concepts in spatial economics.
2. To develop quantitative skills for analyzing spatial economic data.
3. To write numerical solution algorithms for the quantification and simulation of spatial models.
4. To apply theoretical knowledge to real-world spatial economic issues.

Prerequisites:

Formal training in econometrics equivalent to "Advanced Econometrics" and in microeconomics equivalent to "Advanced Microeconomic Analysis". Experience in coding for data analysis is essential. Experience in using geographic information systems, MATLAB, and Stata will be helpful.

Core Readings:

Ahlfeldt, G. M., J. Barr (2022). "The Economics of Skyscrapers: A Synthesis". *Journal of Urban Economics*. 129. <https://doi.org/10.1016/j.jue.2021.103419>

Ahlfeldt, G. M., S. J. Redding, D. M. Sturm, N. Wolf (2015): "The Economics of Density: Evidence from the Berlin Wall". *Econometrica*, 83:6, p. 2127-2189. <https://doi.org/10.3982/ECTA10876>

Brueckner, J. (1987). "The Structure of Urban Equilibria: A Unified Treatment of the Muth-Mills Model". Handbook of Regional and Urban Economics, Volume 2, 1987, Pages 821-845.

[https://doi.org/10.1016/S1574-0080\(87\)80006-8](https://doi.org/10.1016/S1574-0080(87)80006-8)

Roback, J. (1982). Wages, Rents, and the Quality of Life. Journal of Political Economy, 90:6, 1257–1278.

<http://www.jstor.org/stable/1830947>

Monte, F., S. J. Redding, E. Rossi-Hansberg (2018): "Commuting, Migration, and Local Employment Elasticities". American Economic Review, 108:12, 3855-90. <https://doi.org/10.1257/aer.20151507>

Redding, S. J. and E. Rossi-Hansberg (2017): "Quantitative Spatial Economics". Annual Review of Economics 2017 9:1, 21-58. <https://doi.org/10.1146/annurev-economics-063016-103713>

Additional readings will be provided throughout the course.

Course Format:

Lectures: 2 semester hours per week

Tutorials: 2 semester hours per week

Assessment:

Term paper on an own research application of a QSM. This will entail the comparison of the simulated effects of a spatial shock or policy within the model to patterns observed in data: 75%

Poster summarizing the results documented in the term paper: 25%

A further requirement for the successful completion of the course is a contribution (multimedia presentations) to the tutorials of sufficient quality.

Weekly Topics:

After a generic introduction to the course in week 1 (Topic 0), we will cover the following topics in the subsequent weeks.

Topic 1: Rosen-Roback framework

Topic 2: Monocentric City Model

Topics 3-4: Urban general equilibrium and land use

Topics 5-8: Quantitative spatial economics and internal city structure

Topics 9-12: Quantitative spatial economics and economic geography

Final Notes:

This syllabus is subject to change. Students will be notified of any modifications.