

General Instructions for Research Paper

ECON747: SPATIAL ECONOMETRIC MODELS AND METHODS, Term I 2026-27

1. **Type of research paper.** The research paper for this course can be either a theoretical development/extension (with Monte Carlo simulations) or an empirical application of the spatial econometric models and methods learnt from the class. You may focus on one class of models and methods for your research paper. Your understanding of the methods is a key factor for assessing your research paper.
2. **You are encouraged** to do an individual research paper, but grouping is fine with a maximum of two students per group. You are expected to decide the topic of your research paper by Week 4 and brief the class in Week 5.
3. **Initial submission.** You are required to send your draft project in a single PDF file to the instructor (zlyang@smu.edu.sg) on Friday, Week 14.
4. **Oral presentation.** Oral presentation will be on **Week 15, in classroom**. Each group is allocated **25-30min**, depending on the number of groups.
5. **Final submission:** submit the final version of your research paper before **10:00pm Wednesday, Week 15**; in a single pdf file to instructor's email address.
6. **Project style.** The language of the project is English. The project should have a cover page, be printed on one side of the paper, be 1.5-line spaced, have a margin of one inch on all four sides, and contain **at least 25 pages**.
 - The **title page** should list the full title, authors' information (name, email address, and school), an abstract, and key words;
 - The **abstract** should summarize your work concisely.
 - Illustrations and tables should be numbered and entitled (e.g., Table 1. *title*; Figure 1. *title*), and incorporated into the text (not appendix).
 - The paper should be divided into sections and, if necessary, subsections.
 - Mathematical symbols should be typewritten using LaTeX or Word. Be **consistent with the notations** used in the lecture notes.
 - Equations that are referred to latter should be numbered, and the numbers should be placed in parentheses in the righthand side margin.
 - All table columns should have an explanatory heading.

Please refer to the accepted version of a paper in the reading list.
7. **Reference style.** References should be cited in the text as name and year within brackets and listed at the end of the paper alphabetically. Where reference is made to more than one work by the same author published in the same year, identify each citation in the text as, e.g., Collins (1998a, b). Where a paper has three or more

authors, cite it in the text as, e.g., Collins *et al.* (1998). All references must be complete, accurate, and consistent in formats for journal papers as in [1], for books as in [2], and for a chapter in an edited book as in [3]:

- [1] Lee, T., White, H., Granger C., 1993. Testing for neglected nonlinearity in time series models. *Journal of Econometrics* **56**: 269-290.
- [2] Brock, W., Hsieh, D., LeBaron, B., 1991. *Nonlinear Dynamics, Chaos, and Instability: Statistical Theory and Economic Evidence*. MIT: Cambridge, MA.
- [3] Hansen, B. E., 1993. The likelihood ratio test under non-standard conditions: testing the Markov switching model of GNP. In *Nonlinear Dynamics, Chaos and Econometrics*, Pesaran MH, Potter SM (eds). Wiley: Chichester.

8. Assessment Criteria:

- Understanding of the key methods involved, **30%**
- Quality of the data and the analysis for an empirical paper **or** Innovativeness of the theoretical development/extension for a theoretical paper, **20%**
- Correctness and effectiveness of the Matlab codes, **20%**
- Quality of academic writing, **20%**
- Timeliness, **10%**

9. Academic Integrity. Please be mindful of copyright issues. Indicate clearly

- the source of materials that you quote/use/duplicate in your paper, and
- the author(s)/papers of a result/theorem that you used in your paper.
- You may **use AI** to improve your writing and help your derivations, but you must incorporate the AI results based on **your own understanding**. Directly copying the AI outputs into the paper will result in a severe penalty.

References:

- [1] Lee, L. F. (2004). Asymptotic distributions of quasi-maximum likelihood estimators for spatial autoregressive models. *Econometrica* **72**, 1899-1925.
- [2] Liu, S. F. and Yang, Z. L. (2015a). Asymptotic distribution and finite-sample bias correction of QML estimators for spatial error dependence Model. *Econometrics* **3**, 376-411.
- [3] Liu, S. F. and Yang, Z. L. (2015b). Modified QML estimation of spatial autoregressive models with unknown heteroskedasticity and normality. *Regional Science and Urban Economics*, **52**, 50-70.
- [4] Baltagi, B. H. and Yang, Z. L. (2013a). Standardized LM tests for spatial error dependence in linear or panel regressions. *Econometrics Journal* **16**, 103-134.
- [5] Baltagi, B. H. and Yang Z. L. (2013b). Heteroskedasticity and non-normality robust LM tests of spatial dependence. *Regional Science and Urban Economics* **43**, 725-739.

- [6] Yang, Z. L. (2015b). LM tests of spatial dependence based on bootstrap critical values. ***Journal of Econometrics* 185**, 33-39.
- [7] Lee, L. F. and Yu, J. (2010). Estimation of spatial autoregressive panel data models with fixed effects. ***Journal of Econometrics* 154**, 165-185.
- [8] Yang, Z. L., Yu, J. H, and Liu, S. F. (2016). Bias correction and refined inferences for fixed effects spatial panel data models. ***Regional Science and Urban Economics* 61**, 52-72.
- [9] Liu, S. F. and Yang, Z. L. (2020). Robust estimation and inference of spatial panel data models with fixed effects. ***Japanese Journal of Statistics and Data Science* 3**, 257–311.
- [10] Lee, L.-F. and Ju, J. H. (2012). Spatial panels: random components versus fixed effects. ***International Economic Review* 53**, 1369-1412.
- [11] Yu, J., de Jong, R. and Lee, L. F. (2008). Quasi-maximum likelihood estimators for spatial dynamic panel data with fixed effects when both n and T are large. ***Journal of Econometrics* 146**, 118-134.
- [12] Yang, Z. L. (2018). Unified M-estimation of fixed-effects spatial dynamic panel data models with short panels. ***Journal of Econometrics* 205**, 423-447.
- [13] Yang, Z. L. (2021). Joint tests for dynamic and spatial effects in short dynamic panel data models with fixed effects and heteroskedasticity. ***Empirical Economics* 60**, 51-92.