Time Series and Panel Data for the Social Sciences
CSSS/POLS 512
Spring 2026
Section Syllabus

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Lab Sections
Fridays 1:30 – 3:20 pm in zoom

Office Hours
By appointment in zoom
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Overview.
Sections complement the lectures by reviewing lecture materials, addressing assignment questions, and focusing on programming and statistical analyses in R. We meet once a week on Fridays, from 1:30 pm to 3:20 pm, and these sessions will be conducted online via zoom. All lab materials can be found on the course website, including Zoom recordings of each lab section. I will be available for general/public office hours after the labs. In addition, I also offer office hours by appointment via Zoom. Please note that it may take up to 24 hours for me to respond to a student's email, so it is a good idea to plan ahead and email me in advance, especially as the end of the quarter approaches. When you email me, please include (1) the topic you would like to discuss and (2) your availability for scheduling a meeting.

Programming Assistance. Slack is the most preferred communication channel, which allows you to insert code block in your messages. It has the added benefit of facilitating knowledge spillover through peer discussion and mutual assistance. Please post your questions on Slack related to R programming, graphic packages, or debugging. When you post a question, the best practice is to create a *minimal, reproducible example*, instead of taking a screenshot of a code snippet (see here

and here). Alternatively, please feel free to set an appointment for office hours for further consultation, or email/'Slack' me your questions. Remember that if you want me (or someone else) to debug your code, you should provide a minimal reproducible example of the error(s) along with the required data file for code execution.

Homework Submission.
Please submit your homework in PDF. There is going to be three homework assignments. Please submit these assignments on Canvas. Ensure that your homework is typed in LaTeX, using either Overleaf or with RMarkdown. You must upload your PDF file in the following format with no whitespaces:

> File name with three parts: (CSSS512)(HWn°)(NameSurname)
> e.g.: CSSS512HW1RamsesLlobet

Section Schedule.
Below is the tentative schedule of lab sections and the associated topics and materials, which are subject to adjustment depending on our progress and learning needs:

Week	Topic
1	Linear Regression and Autocorrelation
2	Time Series Diagnostics
3	Time Series Model Estimation and Assessment
4	Non-stationary Time Series
5	Panel Data Modeling: FE and RE
6	Dynamic Panel Modeling: GMM estimators
7	Selected Topics: TBD
8	Selected Topics: TBD
9	Selected Topics: TBD

Section Outline

Week 1: Linear Regression Review We review OLS and the conditional expectation function, distinguish estimation from inference, and cover four sources of endogeneity (omitted variables, measurement error, misspecification, simultaneity). We introduce clustered standard errors and the sandwich estimator. `R` topics include `dplyr` essentials, `texreg` for regression tables, and project output management.

Week 2: Time Series Diagnostics. This section will cover the Box-Jenkins Method for time series diagnostics, including decomposition of additive time series and functional form using `acf()` and `pacf()` functions to assess autoregressive, moving averages, and ARMA processes.

Week 3: Modeling Stationary Time Series. Introduces time series model estimation, interpretation, selection, and cross-validation.

Week 4: Modeling Non-stationary Time Series. Review of Time Series diagnostics and handling non-stationary processes via assessing nit root tests. We will also cover counterfactual forecasting and visualizing predictions for time series.

Week 5: Panel Data Modeling: FE and RE. Survey of panel data methods covering dynamic and heterogeneity modeling with lagged variables, fixed and varying effects, and counter-factual prediction.

Week 6: Dynamic Panel Modeling. Introduction to inference with generalized method of moments (GMM) and estimators to address Nickell bias, including Anderson-Hsiao, Arellano-Bond difference GMM, and Blundell-Bond System GMM. Additionally, we will cover tests for checking the assumptions of these estimators.

Week 7-9: Selected Topics on Panel Data Methods. Time permitting, and depending on class interest and progress in earlier topics, we may introduce advanced panel data topics such as spatio-temporal modeling, missing data, multilevel models for heterogeneity, and difference-in-differences or synthetic control designs.

Additional Resources. If you are looking for a dataset for your project, find below several repositories and databases for ideas on research questions and datasets for your final projects. Remember always to download the codebook, if available, to know in more detail what variables are included in a dataset.

1. **Kaggle**: A classic in computer and data science, Kaggle offers a vast repository of datasets covering various topics and applications. Additionally, it hosts open competitions with prizes of up to $50K, providing opportunities for data scientists to solve problems and share code and replication materials.

2. **Harvard Dataverse** and **TidyTuesday**: These repositories focus on more academically driven data projects and include replication materials.

3. **World Economics and Politics Dataverse**: If you prefer a institutional and macroeconomics-oriented dataset, the WEPD is a valuable resource. Additionally, consider consulting international agencies like the **World Bank**.

4. **Correlates of War**: One of the main quantitative databases in conflictology and international relations studies.

5. **General Social Survey**: For those interested in sociology, opinions, and values in the United States.

6. Epidemology and Biostatistics: Check out the WHO datasets to an external site. in these fields if your interest lies in these areas.

7. **Comparative Political Dataset**: A classic for those interested in comparative politics at the country level.