

DIW Masterclass on Bayesian Approaches to the Analysis of Panel Data

Instructor:

Dr. Frank Schorfheide
Christopher H. Browne Distinguished Professor of Economics
Department of Economics
University of Pennsylvania

E-Mail: schorf@upenn.edu

Web: <https://web.sas.upenn.edu/schorf/>

Dates:

Tuesday June 4, 2024: 9:30 – 17:15

Wednesday June 5, 2024: 9:30 – 12:45

Summary:

This course provides a self-contained introduction to Bayesian analysis of panel data models. We will start with an introduction to Bayesian inference, covering the basic building blocks, which involve inference in a heteroskedastic linear regression model and Gibbs sampling to generate draws from the posterior distribution. Moreover, we will consider nonparametric inference. We then proceed with Bayesian and empirical Bayes inference on a vector of means with particular emphasis on the determination of hyperparameters of the prior distribution. We combine the pieces to analyze linear and nonlinear panel data models. Finally, we consider the estimation of two-way effects models for matched data sets, e.g., student-teacher or firm-employee data sets. Much of the course draws from my recent research on these topics, in particular the papers listed below.

Outline:

Day 1

Lecture 1 (90min): Introduction to Bayesian Inference and Gibbs Sampling I

Lecture 2 (90min): Introduction to Bayesian Inference and Gibbs Sampling II

Lecture 3 (90min): Bayesian and empirical Bayes inference on a vector of means, extensions to panel data settings (P2, WP2).

Lecture 4 (90min): Parametric and nonparametric approaches to correlated random effects models (P2, P3)

Day 2

Lecture 5 (90min): Application: forecasting with a panel Tobit model (P1)

Lecture 6 (90min): Empirical Bayes estimation of two-way effects models (WP2)

Reading List:

(WP1) Cheng, Xu, Sheng Chao Ho, and Frank Schorfheide (2024): "Optimal Estimation of Two-Way Effects under Limited Mobility," *Working Paper*.

(P1) Liu, Laura, Hyungsik Roger Moon, and Frank Schorfheide (2020): "Forecasting with Dynamic Panel Data Models," *Econometrica*, 88(1), 171-201.

(P2) Liu, Laura, Hyungsik Roger Moon, and Frank Schorfheide (2023): "Forecasting with a Panel Tobit Model," *Quantitative Economics*, 14(1), 117-159.

(P3) Liu, Laura (2023): "Density Forecasts in Panel Data Models: A Semiparametric Bayesian Perspective," *Journal of Business & Economic Statistics*, 41(2)

(WP2) Moon, Hyungsik Roger, Frank Schorfheide, and Boyuan Zhang (2023): "Bayesian Estimation of Panel Models with Potentially Sparse Heterogeneity," *Working Paper*,
https://web.sas.upenn.edu/schorf/files/2023/10/sparse_heterogeneity_v12.pdf