

Instructor: Frank Schorfheide, University of Pennsylvania

Title: Recent Advances in the Econometric Analysis of DSGE Models

Topics: The lectures will discuss recent advances in Bayesian estimation of Dynamic Stochastic General Equilibrium (DSGE) models, focusing mostly on computational techniques, illustrated in the context of substantive applications. We begin with an introduction to Bayesian inference. We proceed with the estimation of linearized DSGE models and discuss Metropolis-Hastings algorithms to generate draws from the posterior distribution of DSGE model parameters. We then proceed with sequential Monte Carlo techniques designed for irregular posteriors. Finally, we cover the use of particle filters to approximate likelihood functions of nonlinear DSGE models. The particle filter approximation of the likelihood is then embedded in a Metropolis-Hastings algorithm.

The lectures are based on: Herbst, Ed and Frank Schorfheide (2015): *Bayesian Estimation of DSGE Models*, Princeton University Press.

Lecture 1: Introduction to Bayesian Inference and DSGE Modeling

Readings: Chapters 1.1, 2, 3.1-3.2, 3.5, and 4

MATLAB Exercises for Lecture 1 (Self Study)

Exploring the Metropolis-Hastings algorithm; estimating a DSGE model using the MH algorithm.

Lecture 2: Sequential Monte Carlo (SMC) Methods to Estimate DSGE Models

Readings: Chapters 5, 6

MATLAB Exercises for Lecture 2 (Self Study)

Using SMC to approximate the bimodal posterior of a state-space model; using SMC to approximate the posterior of a DSGE model.

Lecture 3: Particle Filters for Nonlinear DSGE Models.

Readings: Chapters 7 - 10

MATLAB Exercises for Lecture 3 (Self Study)

Approximating a likelihood function with the particle filter. MATLAB programs will be provided.

Study Questions: to help you review the material.