Monetary and Fiscal Policy

Instructor:

Dr. Frank Schorfheide

Professor of Economics, University of Pennsylvania

Bundesbank Gastprofessor, Freie Universität Berlin

Email: *schorf@ssc.upenn.edu*

Topic:

This course provides an introduction to empirical methods for the analysis of monetary and fiscal policy questions with estimated dynamic stochastic general equilibrium models (DSGE). While the course will be self-contained, the material is complementary to the lectures on *Macroeconomic Analysis* by Prof. Trabandt and *Structural Vector Autoregressive Analysis* by Prof. Lütkepohl.

The term DSGE model encompasses a broad class of macroeconomic models that spans the standard neoclassical growth model discussed in King, Plosser, and Rebelo (1988, JME) as well as New Keynesian monetary models with numerous real and nominal frictions along the lines of Christiano, Eichenbaum, and Evans (2005, JPE) and Smets and Wouters (2003, JEEA). A common feature of these models is that decision rules of economic agents are derived from assumptions about preferences, technologies, information, and the prevailing fiscal and monetary policy regime by solving intertemporal optimization problems. As a consequence, the DSGE model paradigm delivers empirical models with a strong degree of theoretical coherence that are attractive as a laboratory for policy experiments. Modern DSGE models are flexible enough to accurately track and forecast macroeconomic time series fairly well. They have become one of the workhorses of monetary policy analysis in central banks.

Unfortunately, the barriers to entry into the DSGE literature are quite high. The solution of DSGE models demands familiarity with numerical approximation techniques and the estimation of the models is nonstandard for a variety of reasons, including a state-space representation that requires the use of sophisticated filtering techniques to evaluate the likelihood function, a likelihood function that depends in a misspecification that renders traditional econometric techniques based on the "axiom of correct specification" inappropriate.

The goal of this course is to lower the barriers to entry into this field by providing an overview of what have become the "standard" methods of solving and estimating DSGE models in the past decade and by surveying the most recent technical developments. The course focuses on methods more than substantive applications. We will work through numerous numerical illustrations and I will provide detailed references to applied research during the lectures.

Readings:

The main readings for this course are a handbook chapter and a book that I have written with several co-authors.

Herbst, Edward and Schorfheide, Frank (2015): *Bayesian Estimation of DSGE Models,* Princeton University Press, Princeton. See [Link]

Fernandez-Villaverde, Jesus, Juan Rubio-Ramirez, and Frank Schorfheide (2016) "Solution and Estimation Methods for DSGE Models," in: H. Uhlig and J. Taylor (eds.): *Handbook of Macroeconomics*, Vol 2., p.527-724, Elsevier, New York. See [Link]

I will subsequently refer to these documents as HS and FVRRS, respectively. Additional references will be provided throughout the lectures. You can find all of my papers as well as replication code on my academic website [Link].

Course Outline and Schedule

The goal of this course is to teach you state-of-the-art computational techniques that are used in the solution and estimation of monetary and fiscal DSGE models. The course will enable you to follow current research in empirical macroeconomics that is based on estimated DSGE models and allow you to conduct your own research in this area.

The course consists and twelve ninety-minute lecture/lab sessions, starting on Tuesday, May 29. These sessions will be held in Gary 21. The first session of each day (8:30-10:00) with take place in a lecture hall (Room 102). The second session (10:20-11:50) will take place in the computer lab (PC Pool 2). The second session will be a mixture of lecture and hands-on computer exercises in MATLAB. There will be short quizzes based on the computer exercises.

It is expected that you attend all of the lecture/lab sessions. Your course grade will be determined based on your attendance record, the performance on the quizzes, and the written final exam. **The final exam will take place on Monday, July 2nd from 10:00am to noon (120 minutes) in Gary 21, Room 102.**

Monday, May 28, 14:15-15:45. Location: Gary 21

Public Lecture	Room 107	DSGE Model Econometrics
Readings		This lecture touches upon many of the topics in HS and FVRRS.

Tuesday, May 29, 8:30-10:00 & 10:20-11:50. Location: Gary 21

Session 1	Room 102	Introduction to DSGE Modeling: A Small-Scale Monetary DSGE Model.
Session 2	PC Pool 2	Solving the DSGE Model, State-Space Representation.
Readings		HS 1.1, 1.2, 2.1; FVRRS 8.1.

Wednesday, May 30, 8:30-10:00 & 10:20-11:50. Location: Gary 21

Session 3	Room 102	DSGE Model Implications: Autocovariances, Forecast Error Variances, Impulse Response Functions.
Session 4	PC Pool 2	Empirical Analogs.
Readings		FVRRS 8.2, 8.3.

Monday, June 4, 8:30-10:00 & 10:20-11:50. Location: Gary 21

Session 5	Room 102	Statistical Inference.
Session 6	PC Pool 2	Computing the Likelihood Function of a DSGE Model with the Kalman Filter.
Readings		HS 2.2, 3.1, 3.2; FVRRS 9, 10, 10.2.

Tuesday, June 5, 8:30-10:00 & 10:20-11:50. Location: Gary 21

Session 7	Room 102	Frequentist Estimation of DSGE Models: MLE, Simulated Minimum Distance, IRF Matching, GMM.
Session 8	PC Pool 2	Frequentist Estimation of DSGE Models.
Readings		FVRRS 11.

Wednesday, June 6, 8:30-10:00 & 10:20-11:50. Location: Gary 21

Session 9	Room 102	Bayesian Estimation of DSGE Models: Metropolis-Hastings Algorithm.
Session 10	PC Pool 2	Bayesian Estimation Techniques in Practice.
Readings		HS 3.5, 4; FVRRS 12.1, 12.2.

Thursday, June 7, 8:30-10:00 & 10:20-11:50. Location: Gary 21

Session 11	Room 102	Applications to Monetary Policy Analysis.
Session 12	Room 108	Applications of Fiscal Policy Analysis.
Readings		To Be Announced.

On **Thursday, May 30, 12:15-13:45**, I will give a presentation as part of the Research Seminar in Economics on a topic that is closely related to the contents of this course. Attendance is recommended but not required. **Location: Boltzmann 20, Room 202 (Kaminzimmer).**