Structural Macroeconometrics

Universidad Di Tella
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Instructor: David N. DeJong

Texts

Primary:

DeJong, David N. and Chetan Dave. *Structural Macroeconometrics, 2nd Ed.* 2011. Princeton: Princeton University Press.

Secondary:

Cooley, Thomas F. and Prescott, Edward E. (1995) "Economic Growth and Business Cycles", *Frontiers of Business Cycle Research*, T. Cooley, Ed., Princeton U. Press: Princeton.

Judd, Kenneth L. *Numerical Methods in Economics*. 1998. Cambridge: MIT Press.

Stokey, Nancy L. and Robert E. Lucas. *Recursive Methods in Economic Dynamics.* 1989. Cambridge: Harvard University Press.

Textbook references in the syllabus are denoted in **bold type: DD, CP, KJ, SL.**

Overview

The focus of the course is on the empirical implementation of dynamic stochastic general equilibrium (DSGE) models. The course is organized around the following empirical exercise. Beginning with a model environment, a non-linear expectational system of difference equations is derived using Bellman's Principle of Optimality. The system is then approximated (using linear and non-linear representations), taking the form of a state-space representation. Appropriate data are then identified and aligned with their theoretical counterparts (often by removing trends and isolating cycles). Finally, the likelihood function associated with the state-space representation is evaluated using a filtering procedure.

Syllabus

I. Introduction

DD, Chapter 1, Chapter 2, Chapter 11.1

II. Example Environments

A. Asset Pricing

DD, Chapter 3.3; Lucas, Robert E. (1978) "Asset Prices in an Exchange Economy," *Econometrica* 46:429-445.

B. Real Business Cycles

DD, Chapter 3.1; CP, Chapter 1.

III. Dynamic Programming

LS, Chapter 3; SL, Chapter 9.

IV. Solution Methods

A. Log-Linear Approximation

DD, Chapter 4; Sims, Christopher A. (2001) "Solving Linear Rational Expectations Models," *Computational Economics* 20:1-20.

B. Projection Methods

DD, Chapter 5.1; KJ, Chapter 6.

V. Data Alignment

DD, Chapter 6; CP, Chapter 1. Gorodnichenko, Yuriy, and Serena Ng (2009) "Estimation of DSGE Models When the Data are Persistent," University of Michigan Working Paper. Available online at http://www.columbia.edu/~sn2294/papers/dsge.pdf

Conesa, Juan Carlos, Timothy J. Kehoe and Kim J. Ruhl (2007) "Modeling Great Depressions: The Depression in Finland in the 1990s," Federal Reserve Bank of Minneapolis *Quarterly Review,* November 2007. Available online at http://www.minneapolisfed.org/research/QR/QR3112.pdf

Ireland, Peter and Scott Schuh (2008) "Productivity and Macroeconomic Performance: Interpreting the Past and Predicting the Future with a Two-Sector RBC Model," *Elsevier for the Society of Economic Dynamics* 11(3):473-492.

VI. Likelihood Evaluation

A. State-Space Representations

DD, Chapter 8.

B. The Kalman Filter

DD, Chapter 8.4.

C. Efficient Importance Sampling

DD, Chapter 9. Richard, Jean-Francios, and Wei Zhang (2007) "Efficient High-Dimensional Monte Carlo Importance Sampling," *Journal of Econometrics*

D. The Particle Filter

DD, Chapter 10.1-10.3.

E. The EIS Filter

DD, Chapter 10.4-5.

Suggestions for Further Reading

IV.A. Log-Linear Approximation

Blanchard, Olivier J. and M. Kahn (1980) "The Solution of Linear Difference Models Under Rational Expectations," *Econometrica* 48: 1305-1311.

Klein, Paul (2000) "Using the Generalized Schur Form to Solve a Multivariate Linear Rational Expectations Model," *Journal of Economic Dynamics and Control* 24:1405-1423.

Uhlig, Harald (1999) "A Toolkit for Analyzing Non-linear Dynamic Stochastic Models Easily," in R. Marimon and A. Scott, Eds., *Computational Methods for the Study of Dynamic Economies,* Oxford University Press, New York: 65-78.

IV.B. Perturbation Methods

Schmitt-Grohe, Stephanie, and Martin Uribe (2004) "Solving Dynamic General Equilibrium Models using a Second-Order Approximation to the Policy Function," *Journal of Economic Dynamics and Control* 28:755-775.

IV.C. Value- and Policy-Function Iterations

Santos, Manuel S. and Jesus Vigo-Aguiar (1998) "Analysis of a Dynamic Programming Algorithm Applied to Economic Models," *Econometrica* 66:409-426.

IV. Solution Methods

Aruoba, S. Boragan, Jesus Fernandez-Villaverde, and Juan F. Rubio-Ramirez (2006) "Comparing Solution Methods for Dynamic Equilibrium Economies," *Journal of Economic Dynamics and Control* 30: 2477-2508.

VI.C. Efficient Importance Sampling

Geweke, John (1989) "Bayesian Inference in Econometric Models using Monte Carlo Integration," *Econometrica* 57:1317-1339.

Robert, C.P. and G. Casella (1999) *Monte Carlo Statistical Methods.* New York: Springer Verlag.

VI.D. The Particle Filter

Fernandez-Villaverde, Jesus, and Juan F. Rubio-Ramirez (2005) "Estimating Dynamic Equilibrium Economies: Linear Versus Non-Linear Likelihood," *Journal of Applied Econometrics* 20:891-910.

Fernandez-Villaverde, Jesus, and Juan F. Rubio-Ramirez (2007) "Estimating Macroeconomic Models: A Likelihood Approach," *Review of Economic Studies,* forthcoming. Available online at http://www.restud.com/uploads/papers/10078-2_paper_text.pdf

Gordon, Neil J., D.J. Salmond and A.F.M. Smith (1993) "A Novel Approach to Non-Linear/Non-Gaussian Bayesian State Estimation," *IEE Proceedings-F* 140(2):107-113.

Kitagawa, Genshiro (1996) "Monte Carlo Filter and Smoother for Non-Gaussian Non-Linear State Space Models," *Journal of Computational and Graphical Statistics* 5:1-25.

Ristic, Branko, Sanjeev Arulampalam, and Neil Gordon (2004) *Beyond the Kalman Filter*. Boston: Artech House.