Simulation-based Bayesian Econometrics Lectures

Instructor: Herman K. van Dijk, Econometric Institute, Erasmus University Rotterdam, Econometrics Department, VU University Amsterdam and Tinbergen Institute.
Web: http://people.few.eur.nl/hkvandijk

This one afternoon set of lectures assumes basic background in simulation based Bayesian econometric inference. The focus is on more advanced, recently developed simulation methods and filtering methods that may be useful for the analysis of flexible dynamic time series models like GARCH processes, time varying parameter models, dynamic mixture models and further for Bayesian model averaging involving marginal and predictive likelihoods. Applications are in fields of economics, neuro-imaging and DNA analysis.

The focus is on the following three topics:

1. A concise introduction to Bayesian econometric inference and discussion of the usefulness of basic Monte Carlo simulation methods like Gibbs, Metropolis Hastings and Importance sampling in this context.
2. Key issues of the 21-st Century: The knowledge economy with income-education effects, patterns in the brain; risk of rare events and the study of DNA sequences using a class of importance sampling EM algorithms in order to construct accurate finite mixture candidate densities for effective MCMC and Importance Sampling.
3. Parallel Sequential Monte Carlo for Efficient Density Combinations: the Deco MatLab Toolbox with Macroeconomic and Financial Economic Applications.

A set of slides will be made available before the tutorial

Background reading: published papers are available at the listed Journals, Discussion papers are available at Tinbergen Institute: http://www.tinbergen.nl/discussionpapers/

J. Geweke, G. Koop, and H. K. van Dijk (eds), 2011, *The Oxford Handbook of Bayesian Econometrics,* Oxford University Press.

Hoogerheide, L.F., Van Dijk, H.K., 2010, "Bayesian Forecasting of Value at Risk and Expected Shortfall using Adaptive Importance Sampling", *International Journal of Forecasting,* 26(2), 231-247.

Monica Billio, University of Venice, Gretta Assoc. and School for Advanced Studies in Venice; Roberto Casarin, University of Venice, Gretta Assoc. and School for Advanced Studies in Venice; Francesco Ravazzolo, Norges Bank; Herman K. van Dijk, Erasmus University Rotterdam, VU University Amsterdam, (2013), Time-varying combinations of predictive densities using nonlinear filtering, *Journal of Econometrics*, Science Direct, p.1-20.

Mireille Schaap, Richard JLF Lemmers, Roel Maassen, Patrick J van der Vliet, Lennart F Hoogerheide, Herman K van Dijk, Nalan Baştürk, Peter de Knijff, and Silvère M van der Maarel, Genome-wide analysis of macrosatellite repeat copy number variation in worldwide populations: evidence for differences and commonalities in size distributions and size restrictions, *BMC Genomics* 2013, 14:143 doi:10.1186/1471-2164-14-143.

Lennart Hoogerheide, VU University Amsterdam; Anne Opschoor, Erasmus University Rotterdam; Herman K. van Dijk, Erasmus University Rotterdam, and VU University Amsterdam, 2012, A Class of

Adaptive Importance Sampling Weighted EM Algorithms for Efficient and Robust Posterior and Predictive Simulation, *Journal of Econometrics*, Vol. 171 (2) 101–120.

Roberto Casarin, , University Ca' Foscari of Venice and GRETA; Stefano Grassi, CREATES,Aarhus University; Francesco Ravazzolo, Norges Bank, and BI Norwegian Business School; Herman K. van Dijk, Erasmus University Rotterdam, and VU University Amsterdam, 2013, Parallel Sequential Monte Carlo for Efficient Density Combination, The Deco Matlab Tool box, 2013-04-09, TI-DP.

Nalan Basturk, Erasmus University Rotterdam, Lennart Hoogerheide, VU University Amsterdam; Anne Opschoor,Erasmus University Rotterdam; Herman K. van Dijk, Erasmus University Rotterdam, and VU University Amsterdam, 2012, The R Package MitISEM: Mixture of Student-t Distributions using Importance Sampling Weighted Expectation Maximization for Efficient and Robust Simulation, TI-DP.