Structural Macroeconometrics (SMA11): Syllabus

PRELIMINARY AND SUBJECT TO CHANGE, 14 Feb 2011

Antti Ripatti
http://opetus.ripatti.net/meconom/

Description

This is a hands-on course on building and estimating dynamic macroeconomic models (DSGE models). We limit ourselves on perturbation methods and (log-)linear approximations. We first study model solution techniques, then compute and compare model and data moments, and finally estimate the parameter distribution by Bayesian techniques. Other techniques are reviewed too. The course can be passed by a term paper where these methods are applied. The course exercises involve working with the term paper. Therefore, it is highly suggested that a participant is prepared to work with her/his own model.

Goal

The main objective is to develop skills to analyze and validate dynamic stochastic general equilibrium model.

Course material

Unified treatment of the course material: David N. DeJong and Chetan Dave (2007) *Structural Macroeconometrics*, Princeton University Press, ISBN-13:978-0-691-12648-7 (DD from now-on).
Large part of the time series econometrics may be found from: Hamilton, James D. *Time Series Analysis*. Princeton, NJ: Princeton University Press, 1994. ISBN: 9780691042893. (Ham)
Digestible introduction to Bayesian econometrics: Koop, Gary (2003): *Bayesian Econometrics*, John Wiley & Sons, to those who have the frequentist background.
Canova, Fabio *Methods for Applied Macroeconomic Research*, Princeton University Press.
For the Bayesian estimation of DSGE, the classical review article is An and Schoerfheide (2007) Bayesian Analysis of DSGE Models, Econometric Reviews, 26(2-4), 2007, 113-172.
The toolboxes have also useful material: User Guides of Dynare toolbox (www.dynare.org) and YADA (www.texlips.net/yada). Iris-toolbox (www.iris-toolbox.com) is highly recommended package but lacks methodological user guide.

Overview

1. Approximating and solving DSGE models
   How to stationarize model, techniques in solving the deterministic steady-state, (log)-linearizing, solving a linear model using Blanchard-Kahn, Sims-Klein and AiM approach.
   DD: 1-2; Dynare 3-4; YADA 4-5
   Sergio Rebelo (2002): Production, Growth and Business Cycles: Technical Appendix
2. Time series properties of the model and data
   Here summarize data that can be measured data or generated by the DSGE model. Impulse response functions, spectral analysis, autocovariance function, forecast error variance decompositions, filtering the data and model
   DD 3-5; Ham 3, 6, 10-11; Dynare 3-4; YADA Ch 4-5
3. Calibrating and matching moments
   GMM, single equation methods, calibration, calibrating steady-state, comparing model and data moments
   DD: 6-7; Ham 14

LP Hansen (2000): Generalized Methods of Moments: A Time Series Perspective (and references there-in)

4. Likelihood approach
   Kalman filter and the maximum likelihood, filtering and decompositions, optimization algorithms, Bayesian methods, simulating posterior
   DD: 8-9; Dynare 5-6; YADA 5,8-10; Ham 5, 13
   Michal Andrle, Tibor Hlédik, Ondra Kameník, Jan Vlček (2009) Implementing the New Structural Model of the Czech National Bank

Course requirements

Students are supposed to have strong background in the (time series) econometrics and in the linear algebra related to econometrics and macroeconomics. Time series analysis courses that are supplied by the Department of Mathematics and Statistics give a good background. Students should be interested in working with dynamic economic models. They are typically macroeconomic models, like DSGE models. Quantitative methods involve programming in matrix languages. Hence, some experience with Matlab (or other matrix language) is very important. The exercises of the FDPE macro course give necessary experience.

Exercises and the term paper

I strongly believe that the best way to learn the techniques is by doing. Therefore, the course can be passed only with a term paper. The exercises are the event to work with the term paper under my direct guidance. Hence, I do not give separate exercises, but rather define a learning goal for each exercise. They also give special sessions/demos in coding the model for Dynare/YADA/Iris. Please, bring your own laptop to the exercises or organize a connection to your workstation/mainframe.

Computation

You need Matlab or Gauss and a computer. I recommend Matlab. Your University provides the required license. Install also the Optimization Toolbox. Octave is a substitute for Matlab, but then you are stuck with Dynare. The only Matlab packages that have most of the desired features are Dynare, YADA and Iris-toolbox. Install them all and familiarize with the basic commands and ideas. Gauss code exists too, but I may only give the very limited support of that code.