1 General remarks

1.1 Course description

This is going to be a 'hands-on' course. At the end every participant will be expected to have programmed her own Matlab code that estimates DSGE models using state-of-the-art Bayesian techniques. The aim of programming everything by hand is to gain additional insights into how those techniques work, instead of just using Dynare as a black box.

Time: Friday, 9.30-12.
Place: Amsterdam, TI office.
Webpage: http://www.mwpweb.eu/AlexanderKriwoluzky/further_1.html

1.2 Grading

- Class participation (20%).
- Homework (30 %).
- Final exam. The exam is going to be a take home exam. The task will be to estimate the DSGE model used during the course based on the students own code (50 %).

1.3 Prerequisites

Course participants should be familiar with:

- Solving DSGE models, i.e. derive a loglinearized version of the model.
- Basic time series econometrics.
- Knowledge of Matlab is an asset, but is not required.
1.4 Readings

The book ‘Structural Macroeconometrics’ by DeJong with Dave will be the main textbook. Furthermore, some articles will be relevant but mostly as references for further reading. For additional information see section 2. Typos and errata of the textbook can be found here:


2 Syllabus

1. Introduction and GENSYS

- Introduction of the DSGE model used throughout the course: A New Keynesian model laid out in Ireland (2004) and in chapter 5.2.
- Derivation of the log-linearized solution.
- Derivation of the recursive laws of motion using GENSYS.
- Readings: chapter 2.2 (pages 22-25) and 5.2.
- Additional readings: Sims (2002).
- Papers mentioned during the class: Lubik and Schorfheide (2004), Sargent, Williams, and Zha (2006).

2. Kalman Filter and VAR representation

- State space form of the DSGE model.
- VAR representation and mapping between the DSGE model and a VAR model.
- Kalman Filter: Derivation and iteration steps.
- For additional insights on the Kalman Filter: ’Time series econometrics’ by Hamilton.

3. Likelihood estimation
• The Likelihood of a DSGE model.
• Finding the maximum of the likelihood. Computation of the Hessian.
• Parameter transformation.
• Readings: chapter 8.2 - 8.6

4. Bayesian Estimation

• Introduction Bayesian estimation.
• The prior distribution. Specification of prior distributions for parameters.
• For examples of the choice of prior distributions: Smets and Wouters (2003), Smets and Wouters (2007).

5. Sampling algorithm

• Monte Carlo Markov Chain: Metropolis sampling.
• In case there is time: Importance sampling, Gibbs sampling.
• Readings: 9.4.

6. Topics in Bayesian model estimation (2 weeks)

• Model comparison.
• Reading: chapter 9.5.
• Recommended reading: An and Schorfheide (2007), Geweke (1999), Gelfand and Dey (1994).
• Identification of structural parameters.
• Reading: Iskrev (2010).
• Recommended reading: Canova and Sala (2009).
• Diagnostics.

3 Homeworks

Write the following Matlab codes:

1. Function that solves a DSGE model given a parameter vector.

2. Function that computes the Kalman Filter. Further, program that performs invertibility check.

3. Function that computes Likelihood of the DSGE model. Code that finds the Maximum of the likelihood. Function that computes the Hessian at this point.

4. Function that computes the prior distribution for every parameter. Program that maximizes the Posterior distribution of the DSGE model.

5. Monte Carlo Markov chain with appropriate acceptance rate.

6. Function that performs identification checks. Code that computes the marginal data density.

7. Programs for diagnostics and result plots (impulse response functions and Prior vs. Posterior distribution).
References


