Reading Course in Bayesian Econometrics

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Course Outline

Bayesian methods have become increasingly popular, especially in macroeconomics. The large dimensionality of macro-econometric models and the complexity of modern DSGE models often require the use of prior information and computational algorithms to conduct econometric inference. This course will give an introduction to Bayesian estimation both from a technical and practical point of view. The curriculum will cover basic notions of Bayesian inference and posterior simulators, with applications to regression and state space models. Empirical applications and more advanced topics will be treated in reading groups. Although the focus of the course is on macro-oriented models, micro-oriented student presentations are encouraged. This course is tailored towards advanced masters and graduate students in Economics or other related disciplines.

Learning Outcomes

Students should:

1. Become familiar to key concepts of Bayesian Inference and its differences from Frequentist inference
2. Be able to construct meaningful priors and be aware of the effects of prior information on inference
3. Understand main posterior sampling techniques, and how to summarize posterior information
4. Be knowledgeable of more advanced topics in econometric research on Bayesian methods and their applications to Economics

Details

Prerequisites:

Students should have basic knowledge of probability, regression, time series (ARMA modeling etc) and scientific programming. Familiarity with modern dynamic macroeconomic models is desirable.

Contact schedule:

1. 2 hours of lectures per week ($\times 4$)

   Lecture 1: Introduction to Bayesian Inference

   Lectures 2-4 : Prior elicitation and Posterior sampling algorithms with focus on Regression based models, State Space (SS) models

2. Reading group- Presentations

   The group will meet once weekly for two hours and discuss assigned papers.

3. Meeting Times: TBA

Evaluation

The course evaluation will be based on paper/book presentations and reports.

Books

Lectures will refer to different sources. Useful books are the following:

1. Canova (2007)
2. Geweke, Koop, and van Dijk (2013)
3. Herbst and Schorfheide (2015)
4. Koop, Poirier, and Tobias (2007)

Course structure and Reading List

Motivation - Bayesian Inference

- Subjective Probability, Exchangeability, de Finetti's representation*: Kreps (1988, Ch. 11) (Geweke, Koop, and van Dijk, 2013, Principles, Poirier D.)
- Some decision theory: Risk function, admissibility, Bayes decision: Casella and Berger (2002, Ch.10)
- Bayesian Inference: Priors, Likelihood, Posterior distribution, Credible Set: Canova (2007, Ch. 9) Lancaster (2004) Canova (2007, Ch. 9), Koop, Poirier, and Tobias (2007, Ch 4) Casella and Berger (2002, Ch. 9)

Posterior Simulation - Applications

- Normal Approximation, Acceptance and Importance sampling
- Markov Chain Monte Carlo: Gibbs Sampler, Metropolis - Hastings Algorithm (and variations of): Geweke, Koop, and van Dijk (2013, Intro to simulation and MCMC Methods (S.Chib))
- Normal Linear Regression Model, Generalized Regression Model*

- State Space Models : Geweke, Koop, and van Dijk (2013, Bayesian Inference for TS SS models (P.Giordani et al), Bayesian Macroeconometrics (M. Del Negro)), Canova (2007, ch 9-11)
- Bayesian VAR, Hierarchical/Empirical Bayes models, DSGE models: Canova (2007, Ch. 9-11),Herbst and Schorfheide (2015)

More Advanced topics and Applications - Suggested Papers**

- MCMC for limited information models: Chernozhukov and Hong (2003)
- Partial Identification : Chen, Christensen, O'Hara, and Tamer (2016); Liao and Jiang (2010); Moon and Schorfheide (2012)
- Robust Bayes: Giacomini and Kitagawa (2016)
- Particle Filters : Herbst and Schorfheide (2015); Bi and Traum (2014),
- Non Recursive SVAR: Canova and Perez Forero (2015)
- Set Identified VAR: Baumeister and Hamilton (2015)
- VARMA: Chan, Eisenstat, and Koop (2016)
- Dynamic model combination: Del Negro, Hasegawa, and Schorfheide (2016)
- Panel VARs: Canova and Ciccarelli (2009)

References

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CHIB, S., AND E. GREENBERG (1995): "Understanding the Metropolis-Hastings Algorithm," .

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*If time permits

** This list is by no means exhaustive. Students can present other papers after discussing it with me.