

Bayesian Methods for Empirical Macroeconomics

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- This is a course in Bayesian econometrics with a focus on models used in empirical macroeconomics
- Material is developed in two phases (the second phase will occupy most of the course)
- 1. Basic ideas underlying Bayesian theory (using regression model as an example)
- 2. Bayesian methods for models which are currently very popular in empirical macroeconomics
- I put my lecture slides on a website:
http://personal.strath.ac.uk/gary.koop/DIW_course.html
- I also have a website of Matlab code available through my website
- <http://personal.strath.ac.uk/gary.koop/>

- Material relating to empirical macroeconomics is based on: Koop, G. and Korobilis, D. (2009). *Bayesian Multivariate Time Series Methods for Empirical Macroeconomics* (available on my website).
- Bayesian theory and regression material taken from my textbook: Koop, G. (2003). *Bayesian Econometrics*, published by Wiley.
- I also have a book of solved exercises that I will draw on occasionally: Koop, G., Poirier, D. and Tobias, J. (2007). *Bayesian Econometric Methods*, Cambridge University Press, (Volume 7 in the *Econometrics Exercises Series* edited by Karim Abadir, Jan Magnus and P.C.B Phillips)

- The course will assume that participants have a basic knowledge of:
- probability (definitions and rules relating to conditional, marginal and joint probabilities and definitions and properties of common distributions such as the multivariate Normal and t-distributions).
- basic matrix algebra
- Appendices to Koop (2003) summarize probability theory and matrix algebra used in this course.

- Code for references: K = Koop (2003), KK = Koop and Korobilis (2009), KPT = Koop, Poirier and Tobias (2007)
- **Topic 1: Bayesian Basics**
- i) An overview of Bayesian econometrics (Reading: K, Chapter 1).
- ii) Bayesian inference in the regression model.
- iii) Computational topics: Monte Carlo integration and Gibbs sampling
- Reading: K, Chapters 2, 3 and 4.

- **Topic 2: Bayesian VARs**

- Reading: KK, sections 1 and 2, plus K pages 137-143 and KPT, chapter 17.
- i) Unrestricted VARs: Shrinkage and the Minnesota Prior
- ii) Restricted VARs
- iii) An example involving the New Keynesian Phillips curve
- iv) Other methods which help with shrinkage in VARs

- **Topic 3: Bayesian State Space Modelling**
- Reading: KK, section 3 and K, chapter 8.
- i) The Normal linear state space model
- ii) Linearized DSGE models as state space models
- iii) Computational topic: the Metropolis-Hastings algorithm (Reading, K pages 92-99)
- iv) Stochastic volatility

- **Topic : TVP-VARs**
- Reading: KK, section 4
- i) TVP-VARs as state space models
- ii) Methods for ensuring parsimony in TVP-VARs
- iii) TVP-VARs with stochastic volatility