

# BAYESIAN ECONOMETRIC METHODS FOR EMPIRICAL MACROECONOMICS

## MATLAB Computer Session 3: Introduction to Bayesian VAR models

Dimitris Korobilis and I have created a website containing Matlab code for Bayesian estimation of VARs and other models popular with empirical macroeconomists

(see [http://personal.strath.ac.uk/gary.koop/bayes\\_matlab\\_code\\_by\\_koop\\_and\\_korobilis.html](http://personal.strath.ac.uk/gary.koop/bayes_matlab_code_by_koop_and_korobilis.html)). It is associated with our monograph. Koop, G. and Korobilis, D. (2010). *Bayesian Multivariate Time Series Methods for Empirical Macroeconomics* which is available on this website. The monograph and website provide additional material and background detail about this exercise. However, I have put the material directly used in this exercise on the website associated with this course:

[http://personal.strath.ac.uk/gary.koop/Polish\\_Ministry\\_of\\_Finance\\_course.html](http://personal.strath.ac.uk/gary.koop/Polish_Ministry_of_Finance_course.html)

### MATLAB Exercises:

#### 1. VAR posteriors using analytical results, and their properties

Use the MATLAB code `BVAR_ANALYT.m` that estimates the VAR model using analytical methods (i.e. no posterior simulation is done), with a choice of three available priors (Noninformative, Minnesota and natural conjugate).

- (a) Load the macroeconomic dataset provided, and experiment with the prior hyperparameters of the Minnesota prior. (Note: This code does not directly print out any output to the screen. So you will have to figure out what the program is producing and how to print it out).
- (b) Take a training sample of the first 40 quarters of data and estimate a VAR model using this training sample (and a Noninformative prior. Use the posterior from the training sample VAR to determine the prior hyperparameters of a Normal-Wishart prior. Estimate a VAR using this prior and the remainder of the data. Compare your results with those of part a).

#### 2. Automatic Variable selection

Use the code `VAR_SELECTION.m` which implement a small simulation experiment using stochastic search variable selection (SSVS) as implemented in a paper by Dimitris Korobilis (see page 17 of the monograph or the manual of the Matlab website for more details). The comments at the top of this code give more explanation. Compare the true values of the parameters, with OLS estimates and the posterior means calculated using SSVS. Imposing all restriction indices  $\gamma$  to be equal to 1, gives you the unrestricted model with the independent Normal-Wishart prior. How the unrestricted model compares with the restricted (SSVS) model? Do the same exercise using the macroeconomic dataset used in Exercise 1 and set the maximum number of lags to 4. Which lags of each variable are being selected by the algorithm?

#### 3. Prediction and impulse response analysis

Perform prediction and impulse response analysis using the code `BVAR_FULL.m` and replicate the results of the first empirical illustration in the monograph. This code gives you the option to choose six between different priors. Experiment with all of them and try different prior hyperparameter choices.