

Topics in Bayesian Econometrics
Fall 2011
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Outline

The course present a self-contained exposition of Bayesian methods applied to reduced form models, to structural VARs, to a class of state space models (TVC models, factor models, stochastic volatility models, Markov switching models). It is assumed that participants are familiar with the following topics:

- (a) Basic VAR techniques: in particular, the identification of shocks and calculation of standard errors of impulse responses.
- (b) Filtering techniques.
- (c) Current models used in dynamic macroeconomics.

In addition, a working knowledge of Matlab programming language is required to perform well in the course.

The lectures are based on chapters 9 to 11 of my book: *Methods for Applied Macroeconomic Research*, Princeton University Press, 2007. Lecture notes will be posted on my homepage www.crei.cat/people/canova together with homeworks and sample programs.

The course will include lectures and student presentation of papers that use the techniques discussed in class.

The grade will be based on a term paper (60 percent), on two homeworks (20 percent) and on the in-class presentations (20 percent).

Program

Week 1 (3-4 November) Introduction to Bayesian Methods, Estimation and inference.

Week 2 (10-11 November) Posterior simulators and robustness.

Week 3 (17-18 November) Bayesian methods for regression models.

Week 4 (24 November 2 classes this day) Bayesian methods for VARs models and univariate dynamic panels.

Week 5 (1-2 December) Bayesian methods for state space models.

1) Introductory methods

- Preliminaries : Bayes Theorem, Prior Selection, Nuisance Parameters.
- Inference, Uncertainty, Confidence Intervals, (Asymptotic) Normal Approximation, Multiple models, Testing models, Forecasting.
- Hierarchical and Empirical Bayes Models, Meta-analysis.

References

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- Poirier, D. (1995) *Intermediate Statistics and Econometrics*, MIT Press.
- Koop, G. (2004) *Bayesian Econometrics*, Wiley and Sons
- Zellner, A. (1971) *Introduction to Bayesian Inference in Econometrics*, Wiley and Sons
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2) Posterior Simulators

- Normal Approximations
- Acceptance and Importance Sampling
- MCMC methods (Gibbs sampler and Metropolis-Hastings)
- Prior Robustness

References

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- Tierney, L (1994) Markov Chains for Exploring Posterior Distributions (with discussion), *Annals of Statistics*, 22, 1701-1762.

3) Regression models

- Linear regression model with two benchmark priors.
- Testing hypotheses/models. Predictions.
- Adding heteroschedasticity and autocorrelation
- Univariate dynamic regression models. BMA.
- Nonlinear univariate regression models
- Multivariate models. SUR.

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- Zellner, A., Hong, (1989) Forecasting International Growth rates using Bayesian Shrinkage and other procedures, *Journal of Econometrics*, 40, 183-202.

4) Bayesian VARs

- Likelihood function for an M variable VAR(q)
- Priors for VARs (Minnesota (Litterman), General, DSGE)
- Structural BVARs
- Bayesian dynamic panels

References

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- Ballabriga, C. (1997) "Bayesian Vector Autoregressions", manuscript.
- Canova, F. (1992) " An Alternative Approach to Modelling and Forecasting Seasonal Time Series " *Journal of Business and Economic Statistics*, 10, 97-108.
- Canova, F. (1993a) " Forecasting time series with common seasonal patterns", *Journal of Econometrics*, 55, 173-200.
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- Zha, T. (1999) "Block Recursion and Structural Vector Autoregressions", *Journal of Econometrics*, 90, 291-316.

5) Bayesian State Space Models

- State Space Models and Kalman filter
- Classical Inference in state space models
- Gibbs sampler for state space models
- Application 1: TVC- VARs
- Application 2: Factor models
- Application 3: Stochastic volatility
- Application 4: Markov switching models

References

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- Chib, S. (1996) Calculating Posterior Distributions and Model Estimates in Markov Mixture Models, *Journal of Econometrics*, 75, 79-98.
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- Hamilton, J. (1989) ”A New Approach to the economic analysis of nonstationary time series and the business cycle”, *Econometrica*, 57, 357-384

8) Papers for presentation

1) Sala, X., Doppelhofer, G., Miller, R. (2004), "Determinants of Long Term growth: A Bayesian Averaging of Classical Estimates (BACE) approach", *American Economic Review*, 94, 567-588.

2) Ciccone, A. and M. Jarocinski, (2010) Determinants of Economic Growth: will data tell, *American Economic Journals: Macroeconomics*, 2(4), 222-245.

3) Canova, F (2005) The transmission of US shock to Latin America, *Journal of Applied Econometrics* 20, 229-251.

4) Canova, F. and Pappa, P (2007) Price differentials in monetary unions: The role of fiscal shocks, *Economic Journal*, 117, 713-737.

5) Marcet, A. and M Jarocinski (2009) Prior for growth rates, Small sample bias and the effects of monetary policy, UAB and LSE manuscript.

6) Mumtaz, H. and Surico, P. (2009) Evolving International Inflation Dynamics: Evidence from a time varying Dynamic Factor Model, forthcoming, *Journal of the European Economic Association*.

7) Canova, F. and Gambetti, L. (2009) Structural Changes in the US economy: is there a role for monetary policy? *Journal of Economic Dynamics and Control*, 33, 477-490.

8) Gambetti, L., Pappa, E. and Canova, F. (2008) The structural dynamics of Output and Inflation: what explains the changes?, *Journal of Money, Credit and Banking*, 40, 369-388.

9) Canova, F., Ciccarelli, M. and Ortega, E. (2007), "Similarities and Convergence in G-7 Cycles", *Journal of Monetary Economics*, 54, 850-878.

10) Sims, C. and Zha, T. (2006) Were there regime switches in US monetary policy, *American Economic Review* 96(1), 54-81.

Students can also suggest s papers for presentation which are related to the topics presented in class.