

Bayesian Analysis and Modeling Summer Workshop 2015

Bayesian Analysis and Modeling Research Group
University of Melbourne

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Tuesday, 1 December 2015

Seminar Room 605, Level 6, FBE Building
111 Barry Street, Carlton, VIC 3053

Session 1: Bayesian Macroeconometrics

9:00 – 9:10 Welcoming and registration

9:10 – 9:55 **Francesco Ravazzolo** (Norges Bank and BI Norwegian Business School)

Multi-country Bayesian Panel Markov-switching MIDAS

We propose a Bayesian panel Markov-switching model with mixed data sampling (MIDAS). We follow the unrestricted MIDAS approach and provide a Markov-chain Monte Carlo (MCMC) procedure for posterior approximation.

9:55 – 10:40 **Rodney Strachan** (University of Queensland)

Reducing Dimensions in Large Time-varying Parameter VAR Models

This paper proposes a new approach to estimating high dimensional time varying parameter vector autoregressive models (TVP-VARs). Such models are rarely used with more than 4-5 variables. However recent work has shown the advantages of modelling VARs with large numbers of variables and interest has naturally increased in modeling large dimensional TVP-VARs. We propose a specification that uses strong and perfect correlations in a factor-like structure to estimate a TVP-VAR for 15 variables. We show clear empirical evidence in favour of our model and improvements in estimates of impulse responses.

10:40 – 11:10 Morning tea

Session 2: Bayesian Modeling

11:10 – 11:55 **Roberto Leon-Gonzalez** (National Graduate Institute for Policy Studies, Tokyo)

Efficient Bayesian Inference in Generalized Inverse Gamma Processes for Stochastic Volatility

This paper develops a novel and efficient algorithm for Bayesian inference in inverse Gamma Stochastic Volatility models. It is shown that by conditioning on auxiliary variables, it is possible to sample all the volatilities jointly directly from their posterior conditional density, using simple and easy to draw from distributions. Furthermore, this paper develops a generalized inverse Gamma process with more flexible tails in the distribution of volatilities, which still allows for simple and efficient calculations. Using several macroeconomic and financial datasets, it is shown that the inverse Gamma and Generalized inverse Gamma processes can greatly outperform the commonly used log-normal volatility processes with student-t errors.

11:55 – 12:40 **Rémi Piatek** (University of Copenhagen)

Bayesian Nonparametric Methods for the Inference of Factor Models

Inference for factor models has been following two main strands: In the econometric literature, constrained estimation methods that secure identification and ensure interpretability have been developed. In the statistical literature, flexible approaches based on Bayesian nonparametric (BNP) methods have been introduced to approximate any type of distribution in a data-driven way, but without providing any guarantee on the formal identification of the model. The goal of the present paper is to combine these two worlds. It extends BNP methods for the inference of factor models, relaxing the usual distributional assumptions, without sacrificing the identification of the model that is relevant in many econometric applications. To do so, we first adapt the retrospective Markov chain Monte Carlo sampler for the inference of Dirichlet process factor models. The retrospective sampler, tailored to sample from the exact posterior distribution of the infinite Dirichlet process, improves on widespread approaches that rely on a truncated version of the Dirichlet process. Second, we apply Marginal Data Augmentation (MDA) methods to safeguard the identification of the factor model. We conduct an extensive Monte Carlo study to investigate the performance of our sampler, and to check its robustness against prior specification.

12:40 – 2:00 Lunch

Session 3: Bayesian Structural Modeling

2:00 – 2:45 **Leif Anders Thorsrud** (BI Norwegian Business School)

Commodity Prices and Fiscal Policy Design: Procyclical Despite a Rule

We analyse if the adoption of a fiscal rule insulates the domestic economy from commodity price fluctuations in a resource-rich economy. To do so we develop a time-varying Dynamic Factor Model, in which both the volatility of structural shocks and the systematic fiscal policy responses are allowed to change over time. We focus on a particular country, Norway, that is put forward as exemplary with its handling of resource wealth; income from the sale of petroleum is first saved in a sovereign wealth fund for then to be spent following a fiscal rule. We find that, contrary to standard theory and common perception, fiscal policy has been more (not less) procyclical with commodity prices since the adoption of the rule. Fiscal policy has thereby exacerbated the commodity price fluctuations on the domestic economy. In contrast, following a global activity shock that also increases commodity prices, public spending is now countercyclical relative to GDP. We conclude that studies that find a countercyclical fiscal policy response in the recent boom, should attribute it to global activity shocks and their domestic propagation, rather than the adopted fiscal framework.

2:45 – 3:30 **Eric Eisenstat** (University of Queensland)

A New Approach to Identifying Noise Shocks

A logical implication of agents inability to distinguish news and noise shocks on impact is that the response of the economy to the two shocks at $t=0$ will be identical. We provide simple illustrations of this general property of impulse responses to news and noise shocks within either a present-value model for dividends and stock prices, or a standard New Keynesian model. However, this feature also implies that standard structural VAR methods cannot be used to estimate news and noise shocks from time series data.

Observing the fact that news and noise shocks do exert differentiable impacts on relevant variables with a lag, we propose a Vector Autoregressive Moving Average (VARMA) model with a particular structure that captures the aforementioned properties of noise and news shocks. Specifically, the contemporaneous impact matrix contains two identical columns, while the moving average matrix contains at least two non-zero columns. The addition of the moving average term (along with straightforward exclusion and sign restrictions) is sufficient to identify structural news and noise shocks.

Based on recent developments in Bayesian VARMA methods, we construct a straightforward algorithm that estimates the VARMA in expanded form and recovers the structural parameters ex-post. Evidence with artificial data indicate that this algorithm can accurately and efficiently recover the structural parameters and impulse response functions of the true DGP. Finally, we estimate the effects of "surprise", news and noise shocks on TFP, using quarterly US data.

3:30 – 4:00 Afternoon tea

Session 4: Bayesian Methodology

4:00 – 4:45 **Robert Kohn** (University of New South Wales)

Efficient Approaches to Intractable Likelihood Problems in Time Series and Panel Data Models

The talk will cover recently developed methods for carrying out pseudo marginal likelihood and particle Gibbs methods for time series and panel data models that will try to exhibit the flexibility of these methods compared to more traditional MCMC approaches. The talk will also contrast these with current variational Bayes methods used to solve the same problems. Both approaches use unbiased estimates of the likelihood.

4:45 – 5:30 **Gael Martin** (Monash University)

On Consistency of Approximate Bayesian Computation

Approximate Bayesian computation (ABC) methods have become increasingly prevalent of late, facilitating as they do the analysis of intractable, or challenging, statistical problems. With the initial focus being primarily on the practical import of ABC, exploration of its formal statistical properties has begun to attract more attention. The aim of this paper is to establish general conditions under which ABC methods are Bayesian consistent, in the sense of producing draws that yield a degenerate posterior distribution at the true parameter (vector) asymptotically (in the sample size). We derive conditions under which arbitrary summary statistics yield consistent inference in the Bayesian sense, with these conditions linked to identification of the true parameters. Using simple illustrative examples that have featured in the literature, we demonstrate that identification, and hence consistency, is unlikely to be achieved in many cases, and propose a simple diagnostic procedure that can indicate the presence of this problem. We also formally explore the link between consistency and the use of auxiliary models within ABC, and illustrate the subsequent results in the Lotka-Volterra predator-prey model.

6:00 Drinks and workshop dinner
