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Guest editorial

Recent advances in Bayesian econometrics

This special issue of the *Journal of Econometrics* contains a selection of papers presented at a conference held in Marseilles in June 2001. The purpose of the meeting was to bring together econometricians and statisticians interested in Bayesian methods and applications, so that every participant could exchange information on his/her expertise with respect to the evolutions of this field of research. The eight papers of this volume only partially reflect this purpose since many more papers were presented during the conference than those that were accepted for publication after a rigorous reviewing process.

Recent and current research in Bayesian econometrics is quite diversified and is applied to almost all fields of econometrics in terms of applications. There are also specific Bayesian themes (in the sense that the research topic does not exist from a non-Bayesian perspective), among which the development of efficient algorithms for Bayesian computations has progressed tremendously during the last fifteen years. This progress has mainly concentrated on the developments of Markov Chain Monte Carlo integration techniques. The paper of *Bauwens, Bos, van Dijk and van Oest* is in this vein. They transform the usual Cartesian coordinates of the parameter space into one distance parameter and several direction parameters. The latter are sampled through a Metropolis–Hastings algorithm, while the distance is sampled exactly conditionally on the directions. This enables a relatively systematic exploration of the shape of the posterior density. They illustrate the performance of their algorithms on sampling from a bimodal mixture and on sampling a posterior density characterized by bimodality and strong skewness.

Another paper on a specifically Bayesian theme is *Kleibergen's* paper. In his paper a very important problem in Bayesian analysis is tackled, namely, that of producing a posterior odds ratio which is, at least partially, robust to the Jeffreys–Lindley (or Bartlett) paradox. This paradox states that the Bayes factor for the null model goes to infinity as the sample size or the support goes to infinity. This result contradicts the result of a classical test which would reject the null at any fixed level of significance. In his paper, Kleibergen produces a way of inducing prior probabilities and prior parameter densities for nested models which serve to offset the usual limiting behavior of the posterior odds ratio as the prior for the parameters of the encompassing or nesting model becomes increasingly diffuse.

Another type of research in Bayesian econometrics consists in applying the Bayesian paradigm to an inference problem that has been investigated from a non-Bayesian viewpoint. The Bayesian solution is sometimes quite different from the classical one. Three papers may be considered to fall in this category.

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Koop and Poirier present Bayesian variants of some classical semiparametric regression techniques in the linear regression model context. One part of the regression function is linear in the usual way, another part being added as an unknown flexible function of the regressors. The Bayesian solution they propose turns out to be ‘sophisticatedly simple’ and relies paradoxically on analytical results valid for the Bayesian analysis of the Normal linear regression model with a natural-conjugate prior density. They propose a prior density that governs the degree of smoothness of the flexible function through a scalar parameter and is thus easy to change. This of interest for a sensitivity analysis.

Mouchart and Scheihing ask the question how much information is lost when inference on a parameter of interest λ is based on the exact posterior distribution, proportional to the prior times the complete likelihood stemming from the data density $p(x|\lambda,\psi)$, where x is the data sample and ψ is a nuisance parameter, or when it is based on an approximate posterior, which is defined as the (same) prior times a piece of the likelihood, say $p(x|z,\lambda)$ where z is a function of x such that the likelihood factorizes into $p(x|z,\lambda)\,p(z|\lambda,\psi)$. They study this question in the context of a 2×2 contingency table, where λ is a parameter characterizing the lack of independence between the two characteristics, x are the four entries, and z are the marginal totals. They show that information is lost under plausible sampling schemes. Information loss is measured in two different ways, one of which being the Hellinger distance between the exact posterior and the approximate one.

Strachan and Inder contribute to the Bayesian analysis of the vector error-correction model much used for the analysis of cointegrated time-series. A difficult issue in the Bayesian framework with this model is the existence of the posterior moments of the parameters of the cointegrating relations. They argue in favour of expressing prior information about the cointegrating space, thus avoiding the need for linear restrictions on the cointegrating vectors. They also consider the issue of inference on the cointegrating rank by the computation of the Bayes factor.

The three remaining papers are partly motivated by an empirical issue but contain methodological contributions or conclusions.

Chopin and Pelgrin consider the switching regression model when the number of regimes is not known exactly a priori and must be inferred simultaneously with the parameters of the switching regressions. This problem belongs to the more general one of inference in hidden Markov chain models which suffer from an identification problem (a permutation of the regime labels does not change the likelihood). The authors propose a new way to parametrize the transition process of the regimes. Their approach leads them to use a Monte Carlo hidden Markov model filter, which is a particle filter algorithm, rather than Gibbs sampler algorithm that has been used for such models by others.

Lubrano and Protopopescu investigate what Bayesian econometricians can say about the ranking of economic departments and research systems. They adapt the tool of stochastic dominance for comparing the scientific production of seven European countries plus California. They derive dominance curves for the Weibull model at the first and second order together with the Lorenz’ curve and show how these curves may be compared in a Bayesian framework. They find a group of three dominant European countries: The Netherlands, the UK and Belgium.

Osiewalski and Pipien compare ten bivariate ARCH models for the returns of the Polish zloty with respect to the US dollar and to the German mark, using daily data covering about 2 years. The comparisons are made through the Bayes factors, which require the value of the marginal likelihoods of each model. They use three methods for the numerical computation of each marginal likelihood and find that the harmonic mean of the values of the data density evaluated at draws of the posterior is more stable than two other methods (one is due to Chib and Jeliazkov (2001) and the other is obtained by a Laplace approximation).

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