PREFACE

Addressing model uncertainty is of fundamental importance in statistical data analysis. In practice, researchers rarely know the "correct model" and instead have to sort through a variety of possible specifications that differ along multiple margins. For instance, one has to decide what explanatory variables should be included, determine the functional specification through which they enter the model, and examine alternative distributional assumptions, dependence structures, and so on. Important advances in modeling have guided the richness of potential choices, whereas major recent developments in estimation methodology, simulation, and computation have facilitated their practical implementation.

The Bayesian approach offers a fully general probabilistic framework for simultaneously addressing both model and parameter uncertainty. Given data y and a set of competing models $\{M_1,\ldots, M_J\}$, each specified by a sampling density $f(y|\theta_j,M_j)$, prior $p(\theta_j|M_j)$ on the model parameters θ_j, and prior model probability $p(M_j)$, the posterior model probabilities are given by

$$p(M_j|y) = \frac{p(y|M_j)p(M_j)}{\sum_k p(y|M_k)p(M_k)},$$

where the marginal likelihood $p(y|M_j)$ is given by

$$p(y|M_j) = \int f(y|\theta_j, M_j)p(\theta_j|M_j)d\theta_j.$$

The posterior model probabilities can then be used for model comparison, model selection, and model averaging, depending on the inferential task at hand. In addition, any pair of competing models M_i and M_j can be compared on the basis of their posterior odds

$$\frac{p(M_i|y)}{p(M_j|y)} = \frac{p(y|M_i)}{p(y|M_j)} \times \frac{p(M_i)}{p(M_j)},$$

given by product of the Bayes factor (the ratio of marginal likelihoods) and the prior odds. If the goal is to select a single model from the set of alternatives, then one can naturally consider the model with the highest posterior model probability. On the other hand, if the goal is to produce a forecast and there are multiple models with nontrivial probabilities, these models and their respective probabilities can be used in model averaging. The idea behind model averaging is that instead of forming a predictive density for some future outcome y_f

$$p(y_f|y, M_j) = \int f(y_f|y, \theta_j, M_j) p(\theta_j|y, M_j) d\theta_j.$$

based on a single model, one can account for model uncertainty by considering a weighted predictive distribution given by

$$p(y_f|y) = \sum_j p(y_f|y, M_j) p(M_j|y).$$

The conceptual simplicity and intellectual appeal of this framework are nicely complemented by the proven ability of modern Bayesian computing to handle previously intractable problems. Every aspect of the Bayesian model comparison framework offers ample opportunities for interesting research. Important computational issues arise in evaluating marginal likelihoods and Bayes factors and in simulating the model parameters from their respective posterior distributions. Additional topics of interest include the suitability of information criteria to adequately approximate marginal likelihoods and Bayes factors in small samples. Specification of the primitives of this framework, $f(y|\theta_j,M_j)$ and $p(\theta_j|M_j)$, has also received much attention. In the case of $f(y|\theta_j,M_j)$, modeling advances have led to the development of methods for estimating and comparison of parametric and more flexible semiparametric and nonparametric models. Research examining the priors $p(\theta_j|M_j)$, on the other hand, has led to considerable innovations and the development of important types of prior distributions, such as intrinsic priors, that have desirable practical properties and have been of much interest in objective Bayesian analysis.

The aforementioned computational, modeling, and theoretical developments have been reflected throughout this volume of Advances in Econometrics. The volume begins with a set of papers that provide important computational contributions to the literature and study key contemporary questions in macroeconomics and finance. The methodological issues examined in these papers include massively parallel computation, dynamic model selection in time-varying parameter models, small sample model comparison of structural macroeconomic models, Bayesian thresholding methods in hierarchical graphical models, Hamiltonian Monte Carlo and parallelization in multi-core environments, and adaptive reversible jump MCMC for variable selection.

The second half of the volume is devoted to papers that offer innovations in theory and methodology, and study applications in microeconomics, industrial organization, banking, and transportation. Among the topics considered in these papers are the modeling of endogeneity in discrete data models with applications in banking and labor economics, the implementation of parameter-based and non-parameter-based approaches to variable selection, survey of key results in objective Bayesian model selection methodology, multistep LASSO estimators for structural models of demand, and the use of parameter expansion algorithms for the estimation of copula models for correlated counts with an application to technology patents.

The content of this volume of Advances in Econometrics is a manifestation of the major improvements in model building and evaluation that have been achieved in the Bayesian paradigm in recent years, which should appeal to readers with computational, modeling, theoretical, and applied inclinations. The volume contains contributions from leading international scholars, summarizes central topics and developments in the literature, and provides new state-of-the-art techniques, methodology, and findings that we hope will serve as a basis for important further research in years to come.

In closing, we wish to express our gratitude to the authors and referees for their hard work; we also wish to thank the production team at Emerald for their patience and professionalism during the preparation of the volume. Last but not least, we wish to thank the sponsors whose generous support made possible a research conference on Bayesian model comparison that was held on the campus of the University of California, Irvine, in February 2014:

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