properties of Bayesian post-model-selection estimators, the situation is analogous to that encountered in the frequentist analysis. Here too we propose an alternative to standard BMA, namely one in which the weights depend on the models' selection probabilities, thereby taking account of the selection procedure.

We also point out that the properties of model averaging or post-model-selection estimators can only be derived under an assumed true model. However, under such an assumption, one would simply use that model without applying model selection or model averaging. It is this circularity that makes the problem so difficult to deal with.

Traditional exploratory frequentist data analysis and model building can be viewed as informal model selection in which the precise selection procedure is difficult to reconstruct, which makes it especially difficult to perform valid inference. Therefore, almost any (frequentist) data analysis is subject to model selection uncertainty. Without entering the debate on the relative merits of frequentist and Bayesian methods, we point out that, to avoid model selection uncertainty, Bayesian methods are preferable as long as the frequentist properties of the resulting estimator are not of interest.

**Key words**: model selection, model uncertainty, model selection probability, post-model-selection estimation, inference, Bayesian model averaging, frequentist model averaging, Akaike weights, bootstrap.

# Contents