Large Sample Justifications for the Bayesian Empirical Likelihood

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Abstract

This paper investigates asymptotic properties of the Bayesian empirical likelihood (BEL) that uses the empirical likelihood as an alternative to a parametric likelihood for Bayesian inference. By introducing a new formulation of the moment restriction model, we establish two asymptotic equivalence results. First, the posterior of the BEL is asymptotically equivalent to the posterior of the parametric Bayesian method that is based on the likelihood function of a feast favorable submodel. Second, the posterior of the BEL is also asymptotically equivalent to the posterior of the semiparametric Bayesian method that places priors on both the finite-dimensional parameter of interest and the infinite-dimensional nuisance parameter. Because parametric and semiparametric Bayesian methods are legitimate Bayesian procedures, the equivalence results provide large sample justifications for the BEL. This paper also reveals the relationship between the BEL and the semiparametrically efficient frequentist estimation.

Key words: Bayesian Empirical Likelihood; Bernstein-von Mises Theorem; Convolution Theorem; Local Asymptotic Normality

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