Semiparametric Bayesian Partially Identified Model based on Support Function

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Abstract

Bayesian partially identified model has received a growing attention in recent years in the econometric literature, due to its immediate applications in empirical studies. Classical Bayesian approach in this literature has been assuming a parametric model, by specifying an ad-hoc parametric likelihood function. However, econometric models usually only identify a set of moment inequalities, and therefore assuming a known likelihood function suffers from the risk of misspecification, and may result in inconsistent estimations of the identified set. On the other hand, moment-condition based likelihoods such as the limited information (Kim 2002) and exponential tilted empirical likelihood (Schennach 2005), though guarantee the consistency, lack of probabilistic interpretations. We propose a semiparametric Bayesian partially identified model, by placing a nonparamtric prior on the unknown likelihood function. Our approach thus only requires a set of moment conditions but still possesses a pure Bayesian interpretation. We study in detail the posterior of the support function, which is essential when the object of interest is the identified set. The posterior is consistent in estimating both the identified set and the support function, and achieves a near parametric concentration rate. The comparison results of the Bayesian and frequentist confidence sets in Moon and Schorfheide (2012) still holds. We also derive two-sided Bayesian credible sets for the identified set. It is found that while the Bayesian credible sets of the partially identified parameter is too small from the frequentist point of view, that of the identified set has the correct asymptotic frequentist coverage probability. Finally, the semiparametric Bernstein von Mises theorem is proven for the support function.

Key words: partial identification, posterior consistency, support function, two-sided Bayesian credible regions,.

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