On fixed-b asymptotics for blockwise empirical likelihood and beyond

Xianyang Zhang
University of Missouri, Columbia, Columbia, Missouri, USA – zhangxiany@missouri.edu

Xiaofeng Shao*
University of Illinois at Urbana-Champaign, Champaign, Illinois, USA – xshao@illinois.edu

Blockwise Empirical likelihood has become an important inferential methodology for time series data since Kitamura extended Owen's empirical likelihood for iid data to dependent setting by blocking. In this talk, we describe an extension of the fixed-b approach to the blockwise empirical likelihood estimation framework, where b is the ratio of block size relative to sample size and is held fixed in the asymptotics. Under the fixed-b asymptotics, the empirical log-likelihood ratio statistic evaluated at the true parameter converges to a nonstandard yet pivotal limiting distribution which can be approximated numerically. The impact of the block size is reflected in the fixed-b limiting distribution. Compared to the Chi-squared based inference procedure used in most existing work, the fixed-b approach provides a better approximation to the finite sample distribution of the empirical log-likelihood ratio statistic; Correspondingly, as shown in our simulation studies, the confidence region based on the fixed-b approach has more accurate coverage than the traditional counterpart. If time permits, the upper bounds on the coverage probabilities of the blockwise empirical likelihood ratio confidence region and a penalized empirical likelihood approach will be discussed.

Keywords: Blocking; Convex hull constraint; Coverage accuracy; Time series.