Adaptive-to-model checking for regressions with diverging number of predictors

Falong Tan

Hunan University
E-mail: falongtan@hnu.edu.cn

Abstract: In this paper, we construct an adaptive-to-model residual-marked empirical process as the base of constructing a goodness-of-fit test for parametric single-index models with diverging number of predictors. To study the relevant asymptotic properties, we first investigate, under the null and alternative hypothesis, the estimation consistency and asymptotically linear representation of the nonlinear least squares estimator for the parameters of interest and then the convergence of the empirical process to a Gaussian process. We prove that under the null hypothesis the convergence of the process holds when the number of predictors diverges to infinity at a certain rate that can be of order, in some cases, o(n^(1/3)/log n) where n is the sample size. The convergence is also studied under the local and global alternative hypothesis. These results are readily applied to other model checking problems. Further, by modifying the approach in the literature to suit the diverging dimension settings, we construct a martingale transformation and then the asymptotic properties of the test statistic are investigated. Numerical studies are conducted to examine the performance of the test.