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Goodness-of-fit tests when parameters are estimated.
(English. English summary)

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Summary: “Several nonparametric goodness-of-fit tests are based on the empirical distribution function. In the presence of nuisance parameters, the tests are generally constructed by first estimating these nuisance parameters. In such a case, it is well known that critical values shift, and the asymptotic null distribution of the test statistic may depend in a complex way on the unknown parameters. In this paper we use bootstrap methods to estimate the null distribution. We shall consider both parametric and nonparametric bootstrap methods. We shall first demonstrate that, under very general conditions, the process obtained by subtracting the population distribution function with estimated parameters from the empirical distribution has the same weak limit as the corresponding bootstrap version. Of course in the nonparametric bootstrap case a bias correction is needed. This result is used to show that the bootstrap method consistently estimates the null distributions of various goodness-of-fit tests. These results hold not only in the univariate case but also in the multivariate setting.”