

Refined Procedures for Second Order Asymptotic Theory

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Abstract : Refined procedures for higher-order asymptotic theory for non-linear models are developed. These include a new method for deriving stochastic expansions of arbitrary order, new methods for evaluating the moments of polynomials of sample averages, a new method for deriving the approximate moments of the stochastic expansions; an application of these techniques to gather improved inferences with the weak instruments problem is considered. It is well established that Instrumental Variable (IV) estimators in the presence of weak instruments can be poorly behaved, in particular, be quite biased in finite samples. In our application, finite sample approximations to the distributions of these estimators are obtained using Edgeworth and Saddlepoint expansions. Departures from normality of the distributions of these estimators are analyzed using higher order analytical corrections in these expansions. In a Monte-Carlo experiment, the performance of these expansions is compared to the first order approximation and other methods commonly used in finite samples such as the bootstrap.

Keywords : edgeworth expansions, higher order asymptotics, saddlepoint expansions, weak instruments

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