Identification-robust bootstrap and asymptotic $C(\alpha)$ tests for estimating functions and pseudo-likelihood models

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This paper studies bootstrap score and $C(\alpha)$ tests for models with possible identification failure. Our objective is twofold. We first propose pivotal $C(\alpha)$-type statistics that are robust to potential identification failure and are flexible in incorporating a wide class of estimators of the (strongly identified) nuisance parameters. The results rely heavily on the properties of the mapping from structural parameters to generalized reduced-form parameters (which are identified by construction). Our main result is the first-order validity of the bootstrap $C(\alpha)$ test when for each bootstrap sample i. the auxiliary estimator for the nuisance parameters is kept fixed ; ii. the auxiliary estimator is updated using Newton-Raphson iteration regardless of the identification status of the model. When the model is not subject to identification failure, we recover the bootstrap validity of the $C(\alpha)$ test for the models that satisfy standard regularity conditions, a result which also appears to be new in the literature. Finally, the performance of the proposed methods is assessed through simulations. Joint work with Jean-Marie Dufour.