

Testing When Parameters are Subject to Linear Inequality Constraints*

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Abstract

This paper introduces the concept of an implicit nuisance parameter for testing the null hypothesis of linear equality constraints against the two-sided alternative hypothesis when the true parameter is subject to equality and inequality constraints in the maintained hypothesis. We propose an approach to identify the implicit nuisance parameter and provide a comprehensive study of asymptotically uniformly valid Wald, QLR, and score tests in an extremum estimation set-up. Among the two Wald tests, one QLR test, and three score tests developed in this paper, three tests fully exploit the information in the parameter space and the asymptotic distributions of their test statistics are discontinuous in the implicit nuisance parameter. The other three tests employ part of the information in the maintained hypothesis through projection and the asymptotic distributions of their test statistics are not discontinuous in any model parameter but depend on polytope projections. We present an algorithm based on Fourier-Motzkin Elimination to compute such projections. Numerical results from a Monte Carlo study of the finite sample performance of our tests and an empirical illustration are presented.

Keywords: Implicit nuisance parameter; Wald tests; Quasi Likelihood Ratio test; Score tests; Extremum estimation; Bonferroni-type correction; Polytope projection.

JEL Codes: C12, C18

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