

## **Inference when the limit distribution of the test statistic depends discontinuously on nuisance parameters**

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The talk is about tests and confidence intervals based on a test statistic that has a limit distribution that is discontinuous in a nuisance parameter or the parameter of interest. It is shown that standard fixed critical value (FCV) tests and subsampling tests often have asymptotic size - defined as the limit of the finite sample size - that is greater than the nominal level of the test. A precise formula for the asymptotic size of such tests is provided under a general set of high-level conditions that are relatively easy to verify. The asymptotic size is determined by a sequence of parameter values that approach the point of discontinuity of the asymptotic distribution. The problem is not a small sample problem. For every sample size, there can be parameter values for which the test over-rejects the null hypothesis. Analogous results hold for confidence intervals. Size-correction methods are discussed that eliminate over-rejection asymptotically.

Several examples, such as inference in the AR(1) model and issues of pretesting, will be discussed.