

Heteroskedasticity testing through a comparison of Wald statistics

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Abstract This paper shows that a test for heteroskedasticity within the context of classical linear regression can be based on the difference between Wald statistics in heteroskedasticity-robust and nonrobust forms. The test is asymptotically distributed under the null hypothesis of homoskedasticity as chi-squared with one degree of freedom. The power of the test is sensitive to the choice of parametric restriction used by the Wald statistics, so the supremum of a range of individual test statistics is proposed. Two versions of a supremum-based test are considered: the first version does not have a known asymptotic null distribution, so the bootstrap is employed to approximate its empirical distribution. The second version has a known asymptotic distribution and, in some cases, is asymptotically pivotal under the null. A simulation study illustrates the use and finite-sample performance of both versions of the test. In this study, the bootstrap is found to provide better size control than asymptotic critical values, namely with heavy-tailed, asymmetric distributions of the covariates. In addition, the use of well-known modifications of the heteroskedasticity consistent covariance matrix estimator of OLS coefficients is also found to benefit the tests' overall behaviour.

Keywords Heteroskedasticity testing · White test · Wald test · Supremum

JEL Classification C12

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