Can the Bartlett test really detect the heterogeneity of variances?

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The hypotheses about the variances were established to propose a favorable situation (simulation on H_0 is true, $H_0 : \sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \sigma_4^2 = \sigma^2$ and an unfavorable one (on H_0 is false, $H_1 : 4\sigma_i^2$, with i = 0, 1, 2 e 3) in order to assess the efficiency of Bartlett's Test (1937). Six scenarios with seven response variables were generated without considering correlation between the variables: two under the hypothesis about the true averages, without differences as to the variance simulation ($H_0 - H_0$), and about heteroscedasticity ($H_0 - H_1$), two under H_1 homoscedastic, with two standard deviations of difference between the averages, $H_1 : 2s - H_0$ and also with eight standard deviations of difference, $H_1 : 8s - H_0$, and two under H_1 heterocedastic, $H_1 : 2s - H_1$ e $H_1 : 8s - H_1$, respectively. In order to evaluate the tests in each simulated response variable, the number of accepted null hypotheses was calculated. The results were presented as percentage (accepted number of H_0/1000). Overall, Bartlett's Test obtained high acceptance values of homoscedasticity, even for the simulated scenario under means difference of eight standard deviations (95.8%). This result suggests that in addition to Bartletts test other means of evaluating the variance homogeneity should also be used.

Keywords: Multivariate Analysis; simulation; Bartletts Test; variance homogeneity.