

Rukmanee Butchon 2008: The Efficient Study of the Six Multivariate Normal Distribution Tests. Master of Science (Statistics), Major Field: Statistics, Department of Statistics. Thesis Advisor: Assistant Professor Boonorm Chomtee, Ph.D. 241 pages.

The objectives of this research are to compare controlling type I error and power of the six multinormality tests: S, K, T, WF, HZ and O in both known and unknown parameters for the three distributions: multivariate normal, multivariate lognormal and multivariate student-t distributions for fixed parameters; 2, 3, 4 variables (p); 20, 30, 40, 50 sample sizes (n); 0.05, 0.1 levels of significance (α). The data were simulated by Monte Carlo Technique and 5,000 replications for each situation. The results are as follows:

1. For Type I error: S, K, T statistics can be rightly control type I error when known parameters. W_F statistic can be properly control type I error both known and unknown parameters when $n=20$. O is a good statistic for controlling type I error both known and unknown parameters when $n=30, 50$. However, HZ statistic can be nicely control type I error for almost situations.

2. For Power of the test: it can be concluded to 2 parts. Part 1: For known parameter cases, when data are multivariate lognormal distribution, W_F statistic provides the highest power of the test when $n=20$. HZ statistic gives the maximum power of the test when $n=30, 40, 50$. When data are multivariate student-t distribution, K statistic is the best statistic for all cases. Part 2: For unknown parameter cases, when data are multivariate lognormal distribution, W_F statistic gives the highest power of the test when $n=20$. However, both W_F and HZ statistics provide the high power of the test when $n=30$. In addition, HZ, S, T and O statistics are the maximum power of the test at $n=40, 50$. In case of data are multivariate student-t distribution, W_F statistic is the best when $n=20$. Also, both W_F and HZ statistics are the best when $n=30$. However, T statistic is the best when $n=40, 50$.

In summary, HZ statistic is recommended as an optimal test for multivariate normal distribution testing because it can be nicely control type I error and provides the highest power of the test in almost situations.

Student's signature

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