

Hallin, Marc; Puri, Madan L.

A multivariate Wald-Wolfowitz rank test against serial dependence. (English) Zbl 0821.62022
Can. J. Stat. 23, No. 1, 55-65 (1995).

Summary: Rank-based cross-covariance matrices, extending to the case of multivariate observed series the (univariate) rank autocorrelation coefficients introduced by *A. Wald* and *J. Wolfowitz* [Ann. Math. Stat. 14, 378-388 (1943; Zbl 0060.302)], are considered. A permutational central limit theorem is established for the joint distribution of such matrices, under the null hypothesis of (multivariate) randomness as well as under contiguous alternatives of (multivariate) ARMA dependence. A rank-based, permutationally distribution-free test of the portmanteau type is derived, and its asymptotic local power is investigated. Finally, a modified rank-based version of *G. C. Tiao* and *G. E. P. Box*'s [J. Am. Stat. Assoc. 76, 802-816 (1981; Zbl 0483.62074)] model specification procedure is proposed, which is likely to be more reliable under non-Gaussian conditions, and more robust against gross errors.

MSC:

- 62G10 Nonparametric hypothesis testing
- 62M10 Time series, auto-correlation, regression, etc. in statistics (GARCH)
- 62H15 Hypothesis testing in multivariate analysis
- 62E20 Asymptotic distribution theory in statistics
- 62H10 Multivariate distribution of statistics

Cited in **3** Documents

Keywords:

Wald-Wolfowitz rank test; rank cross-covariance matrix; multivariate ARMA models; multivariate portmanteau test; multivariate model identification; rank-based cross-covariance matrices; rank autocorrelation coefficients; permutational central limit theorem; contiguous alternatives; ARMA dependence; rank-based, permutationally distribution-free test; asymptotic local power

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