Akhari, Abdelhadi; Fihri, Mohamed; Hallin, Marc; Mellouk, Amal

Optimal pseudo-Gaussian and rank-based random coefficient detection in multiple regression. (English) Zbl 1455.62135

Summary: Random coefficient regression (RCR) models are the regression versions of random effects models in analysis of variance and panel data analysis. Optimal detection of the presence of random coefficients (equivalently, optimal testing of the hypothesis of constant regression coefficients) has been an open problem for many years. The simple regression case has been solved recently and the multiple regression case is considered here. The latter poses several theoretical challenges: (a) a nonstandard ULAN structure, with log-likelihood gradients vanishing at the null; (b) cone-shaped alternatives under which traditional optimality concepts are no longer adequate; (c) nuisance parameters that are not identified under the null but have a significant impact on local powers. We propose a new (local and asymptotic) concept of optimality for this problem and, for specified error densities, derive parametrically optimal procedures. A suitable modification of the Gaussian version of the latter is shown to qualify as a pseudo-Gaussian test. The asymptotic performances of those pseudo-Gaussian tests, however, are quite poor under skewed and heavy-tailed densities. We therefore also construct rank-based tests, possibly based on data-driven scores, the asymptotic relative efficiencies of which are remarkably high with respect to their pseudo-Gaussian counterparts.

MSC:
62J05 Linear regression; mixed models
62G10 Nonparametric hypothesis testing
62F03 Parametric hypothesis testing

Keywords:
aligned rank test; cone-shaped alternative; local asymptotic normality; multiple regression model; pseudo-Gaussian test; random coefficient; unidentified nuisance; testing for homogeneity; mixture models

Full Text: DOI Euclid

References:


[47] J.

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.