

On the goodness-of-fit test in a factor model with high-dimensional data

Damien PASSEMIER*

Department of Electronic and Computer Engineering, Hong Kong University
of Science and Technology, Hong Kong, eepassemier@ust.hk

Jian-Feng YAO

Statistics and Actuarial Science, Hong-Kong University, Hong Kong
jeff Yao@hku.hk

Factor models appear in many areas, such as economics or signal processing. If the factors and errors are Gaussian, a likelihood-based theory is well-known since Lawley (1940). However, these results are obtained in the classical scheme where the data dimension p is kept fixed while the sample size n tends to infinity. This point of view is not valid anymore for large-dimensional data, and usual statistics have to be modified. In this talk, we consider the strict factor model with homoscedastic variance. First, we give the bias of the maximum likelihood estimator of the noise variance by giving a CLT. We then give a bias-corrected estimator. Secondly, we present a corrected likelihood ratio test of the hypothesis that the factor model fits. Throughout the talk, simulation experiments are conducted to assess the quality of our results.

Key Words: Factor model, covariance matrix, random matrix theory, high-dimensional statistics, maximum-likelihood estimation, likelihood ratio test.