

## Calibration of the empirical likelihood for high-dimensional data

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**Abstract** This article is concerned with the calibration of the empirical likelihood (EL) for high-dimensional data where the data dimension may increase as the sample size increases. We analyze the asymptotic behavior of the EL under a general multivariate model and provide weak conditions under which the best rate for the asymptotic normality of the empirical likelihood ratio (ELR) is achieved. In addition, there is usually substantial lack-of-fit when the ELR is calibrated by the usual normal in high dimensions, producing tests with type I errors much larger than nominal levels. We find that this is mainly due to the underestimation of the centralized and normalized quantities of the ELR. By examining the connection between the ELR and the classical Hotelling's  $T$ -square statistic, we propose an effective calibration method which works much better in most situations.

**Keywords** Asymptotic normality · Coverage accuracy · High-dimensional data · Hotelling's  $T$ -square statistic