

Bai, Jushan

Inferential theory for factor models of large dimensions. (English) Zbl 1136.62354
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Summary: This paper develops an inferential theory for factor models of large dimensions. The principal components estimator is considered because it is easy to compute and is asymptotically equivalent to the maximum likelihood estimator (if normality is assumed). We derive the rate of convergence and the limiting distributions of the estimated factors, factor loadings, and common components. The theory is developed within the framework of large cross sections (N) and a large time dimension (T), to which classical factor analysis does not apply.

We show that the estimated common components are asymptotically normal with a convergence rate equal to the minimum of the square roots of N and T . The estimated factors and their loadings are generally normal, although not always so. The convergence rate of the estimated factors and factor loadings can be faster than that of the estimated common components. These results are obtained under general conditions that allow for correlations and heteroskedasticities in both dimensions. Stronger results are obtained when the idiosyncratic errors are serially uncorrelated and homoskedastic. A necessary and sufficient condition for consistency is derived for large N but fixed T .

MSC:

62H25 Factor analysis and principal components; correspondence analysis
62P20 Applications of statistics to economics

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