

## “Inference for CP Tensor Factor Model”

### Abstract

High-dimensional tensor-valued data have recently gained attention from researchers in economics and finance. We consider the estimation and inference of high-dimensional tensor factor models, where each dimension of the tensor diverges. Specifically, we focus on the factor model that admits CP-type tensor decomposition, allowing for loading vectors that are not necessarily orthogonal. Based on the contemporary covariance matrix, we propose an iterative higher-order projection estimation method. Our estimator is robust to weak dependence among factors and weak correlation across different dimensions in the idiosyncratic shocks. We develop an inferential theory, establishing consistency and the asymptotic normality under relaxed assumptions. In a unified framework, we consider a test for the number of factors in a tensor factor model and justify its consistency. Through a simulation study and an empirical application with sorted portfolios, we illustrate the advantages of our proposed estimator over existing methodologies in the literature.