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Locally Stationary Factor Models: Identification and Nonparametric Estimation

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Abstract.

In this paper we propose a new approximate factor model for large cross-section and time dimensions. Factor loadings are assumed to be smooth functions of time, which allows to consider the model as locally stationary while permitting empirically observed time-varying second moments. Factor loadings are estimated by the eigenvectors of a non-parametrically estimated covariance matrix. As is well-known in the stationary case, this principal components estimator is consistent in approximate factor models if the eigenvalues of the noise covariance matrix are bounded. To show that this carries over to our locally stationary factor model is the main objective of our paper. Under simultaneous asymptotics (cross-section and time dimension go to infinity simultaneously), we give conditions for consistency of our estimators. A simulation study illustrates the performance of these estimators.