Factor Modelling for High-Dimensional Time Series: A Dimension-Reduction Approach

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School of Physical and Mathematical Sciences

Following a brief survey on the factor models for multiple time series in econometrics, we introduce a statistical approach from the viewpoint of dimension reduction. Our method can handle nonstationary factors. However under stationary settings, the inference is simple in the sense that both the number of factors and the factor loadings are estimated in terms of an eigenanalysis for a non-negative definite matrix, and is therefore applicable when the dimension of time series is in the order of a few thousands. Asymptotic properties of the proposed method are investigated under two settings: (i) the sample size goes to infinity while the dimension of time series is fixed; and (ii) both the sample size and the dimension of time series go to infinity together. In particular, our estimators for zero-eigenvalues enjoy the faster convergence (or divergence) rates, which makes the estimation for the number of factors easier. Furthermore the estimation for both the number of factors and the factor loadings shows the so-called "blessing of dimensionality" property. A two-step procedure is investigated for the better identification of the number of factors when the factors are of different degrees of strength. Numerical illustration with both simulated and real data is also reported.

Speaker Biography

Qiwei Yao is Professor of Statistics at the London School of Economics and Political Science. He is Fellow of Institute of Mathematical Statistics and Fellow of American Statistical Association. He is an elected member of the International Statistical Institute, and has served on the editorial boards for Annals of Statistics, Journal of the American Statistical Association, Journal of the Royal Statistical Society (Series B), Statistics Sinica and many other journals.

Host: Prof. Pan Guangming, Division of Mathematical Sciences, School of Physical and Mathematical Sciences

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