

Time Series Modelling with Semiparametric Factor Dynamics

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High dimensional regression problems which reveal dynamic behavior are typically analyzed by time propagation of a few number of factors. The inference on the whole system is then based on the low dimensional time series analysis. In this paper we address the problem of inference when the factors and factor loadings are estimated by semiparametric methods. We show that the difference of the inferences based on the estimated time series and ‘true’ unobserved time series is asymptotically negligible. Our results justify fitting vector autoregressive processes to the estimated factors, which allows one to study the dynamics of the whole high dimensional system with a low dimensional representation. We illustrate the theory with a simulation study. Also, we apply the method to a study of the dynamic behavior of implied volatilities and discuss other possible applications.

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