HeiKaMEtrics-Seminar

Joint Heidelberg, Karlsruhe and Mannheim research seminar in Econometrics

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Generalized Linear Dynamic Factor Models – A Structure Theory

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15:30 – 16:10
Room S 031, L7, 3-5
University of Mannheim

Abstract:
In this lecture we present a structure theory for generalized linear dynamic factor models (GDFM's). GDMF's are a combination and generalization of linear dynamic factor models with strictly idiosyncratic noise and generalized linear static factor models; they have been proposed and developed in a number of papers by Forni, Lippi, Hallin and Reichlin and Stock and Watson. GDFM's provide a way of overcoming the "curse of dimensionality" plaguing multivariate time series modelling, provided that the single time series are similar. They are used in modelling and forecasting for financial and macroeconomic time series.

We consider a stationary framework; the observations are represented as the sum of two uncorrelated component processes: The so called latent process, which is obtained from a dynamic linear transformation of a low-dimensional factor process and which shows strong dependence of its components, and the noise process, which shows weak dependence of the components. The latent process is assumed to have a singular rational spectral density. For the analysis, the cross-sectional dimension N, i.e. the number of single time series is going to infinity; the decomposition of the observations into these two components is unique only for N tending to infinity. We present a structure theory giving a state space or ARMA realization for the latent process, commencing from the second moments of the observations.

The main parts are: Factorization of singular rational spectral densities by "tall" transfer functions, realization of state space and ARMA systems from a finite number of covariances of the latent process and the "averaging out" of the noise effects for N tending to infinity. Based on this structure theory an estimation procedure is proposed.