

Maximum Likelihood Estimation for Dynamic Factor Panel Data Models

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Abstract:

This paper presents new results for Gaussian likelihood evaluation and signal extraction in the context of dynamic factor panel data models with regression effects. The results lead to practical, feasible and computationally efficient maximum likelihood procedures for the estimation of regression coefficients, factor loadings and other parameters. The models may contain fixed or random effects in the cross-section dimension and dynamic factors in the time series dimension. The dynamic latent factors are explicitly modelled by stochastic processes. The length of the time series T can be short, say $T=10$, while the cross-section (or panel) dimension can be large, say $N=10,000$. We illustrate our methods with empirical applications of a Nelson-Siegel factor model for modeling the term-structure ($T=500$, $N=17$), a dynamic factor analysis for a large panel of macro-economic time series ($T=100$, $N=500$) and a repeat sales index analysis for real estate prices ($T=40$, $N=10,000$).