

ESTIMATION OF TIME-SERIES COVARIANCE MATRICES FOR LARGE DATASETS

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Time variation is a fundamental problem in statistical and econometric analysis of macroeconomic and financial data. Recently there has been considerable focus on developing econometric modelling that enables stochastic or structural change in model parameters and on model estimation by Bayesian or non-parametric kernel methods. In the context of the estimation of covariance matrix of large dimensional panels, such data requires taking into account time variation, possible dependence and heavy tailed distributions. In this paper we introduce a non-parametric version of regularization technique of sparse large covariance matrices developed by Bickel and Levina (2008) and others. We focus on the robustness of such procedure to time variation, dependence and heavy-tailedness of distributions. The paper includes a set of results on Bernstein type inequalities for dependent unbounded variables which are expected to be applicable in econometric analysis beyond estimation of large covariance matrices. We discuss the utility of the robust thresholding method comparing it with other estimators in simulations and empirical application like the designing of the minimum variance portfolios.

Keywords: covariance matrix estimation, large dataset, regularization, thresholding, shrinkage, exponential inequalities, minimum variance portfolio.

JEL classification: C13; C22; C51.

The full working paper can be found [here](#).