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Comment on Brownlees, Nualart & Sun: 'Realized Networks'

by

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Brief Summary

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BNS develop a framework to estimate realized covariance matrices by means of realized networks L_1-norm penalization of the realized covariance matrix.

- dervivation of asymptotic risk bounds
- finite sample evidence by means of a Monte Carlo study
- network analysis
- portfolio application

Main Findings

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- Realized networks are a powerful tool to bound estimation risk of high dimensional (realized) covariance matrices
- choice of realized cv estimation techniques is not decisisive
- Realized networks is useful shrinkage method for portfolio analysis
- Can be used to detect idiosycratic dependencies between assets/firm

Asymptotics

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- Does a BIC selected λ satisfy the condition for λ needed for Theorem 1 to hold?
- Does the choice of m stand in conflict with assumption a) of Theorem 1 ?
- How does the conditions for risk bound help in applied work?

Possible Refinements of the Lasso

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- Cross-validated choice of Lasso tuning parameter
- The naive equally weighted portfolio is often a very strong competitor in within-sample and out-of-sample competitions
- Adaptive Lasso to account for oracle properties
- Elastic net to keep the big fish in
- Portfolio Choice: Choosing λ based on performance measure

Network Analysis

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- Are covariances depictions of networks ?
- What do we learn from undirected models?
- How stable are the networks across time?
- How the lasso find the corret zero entries in the (inverse) of the cv matrix?
- How bumpy are the portfolio weights accross time (turnover cost of the portfolio)?

Towards a Dynamics of Covariances/Networks

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$$\mathbf{X} = \Lambda\,\mathbf{F}' + \boldsymbol{\varepsilon}$$

where $\mathbf{F} = (\mathbf{f}_1, \ldots, \mathbf{f}_T)'$ is a $T \times r$-dimensional matrix of unobserved factors.

$$\mathbf{f}_t = \Psi_1\,\mathbf{f}_{t-1} + \Psi_2\,\mathbf{f}_{t-2} + \cdots + \Psi_K\,\mathbf{f}_{t-K} + \mathbf{u}_t,$$

From Nowak, Hastie, Pollack & Tibshirani (2011)

$$\mathcal{L}\left(\Lambda, \mathbf{F}\right) = \sum_{t=1}^{T}\sum_{i=1}^{N}\left(x_{it} - \sum_{l=1}^{r}\lambda_{il} f_{lt}\right)^2 + \alpha \sum_{l=1}^{r}\sum_{i=1}^{N}|\lambda_{il}|$$

$$\text{s.t. } \frac{1}{T}\sum_{t=1}^{T} f_{lt}^2 = 1,$$