THE UNIVERSITY OF CHICAGO

Department of Statistics

STATISTICS COLLOQUIUM

JOINT SEMINAR WITH

THE STEVANOVICH CENTER FOR FINANCIAL MATHEMATICS

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Testing the Rank of Time-varying Covariance Matrices

MONDAY, May 17, 2021 at 4:00 PM

Via Zoom (session information will be e-mailed to subscribers)

ABSTRACT

We consider the instaneous (or spot) covariance matrix $\Sigma(t)$ of a multidimensional martingale of the form $dX(t)=\Sigma(t)^{1/2}dB(t)$, B a Brownian motion. The data is given by high-frequency observations of X on a fixed time interval. We test the null hypothesis H_0 that $\rank(\Sigma(t))\le r$ for all t against the alternative $\lambda_{r+1}(\Sigma(t))\ge v_n$ that the $r+1$st eigenvalue is larger than some separation rate v_n. This problem can be embedded in Ingster's nonparametric signal detection framework, but it has many unexpected features. For instance, the optimal detection rate v_n depends on a regularity assumption on $\Sigma(t)$ under the null, not the alternative and a possible spectral gap leads to significantly better detection rates. The proofs rely on perturbation and deviation inequalities for random matrices which might have independent interest. Further results under observational noise will be discussed and applications to intraday bond markets will be presented.

Joint work with Lars Winkelmann, Berlin

For further information and inquiries about building access for persons with disabilities, please contact Jonathan Rodriguez at 773.702.8333 or send him an email at jgrodriguez@galton.uchicago.edu. If you wish to subscribe to our email list, please visit the following website: https://lists.uchicago.edu/web/subscribe/statseminars.