THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

PhD Dissertation Presentation

Wentao Hu
Department of Statistics
The University of Chicago

"Inference for Time Series in Risk Measure and Regression"

June 11, 2025, at 9:30 AM
Jones 304, 5747 S. Ellis Avenue

Abstract

This dissertation mainly studies the statistical inference on expectile, time-varying regression coefficients and quantile regression coefficients for time series. For the first problem, We first present a central limit theorem at a single level and then develop a simultaneous inference theory over various levels under the short-range dependent condition. We also derives a weak convergence theory for expectile estimators of long-memory processes, and reveals the surprising fact that pointwise and simultaneous confidence bands are asymptotically the same.
For the second problem, we introduce a new methodology to conduct simultaneous inference of the nonparametric coefficient functions in a linear time series regression model where the nonparametric components are unknown multivariate functions of an observable random vector. In particular, we construct simultaneous confidence regions (SCR) for the coefficient functions by extending the high-dimensional Gaussian approximation to time-dependent processes.
For the third problem, we establish the Gaussian approximation theory for quantile regression coefficients on high confidence level inference. Based on the quantile regression model, we investigates the dynamics of U.S. tax progressivity from 1978 to 2022 by conducting year-by-year quantile regression and simultaneous inference on progressivity estimates. We can find the constancy of the progressivity is rejected in the 1980s with a gradual decline and during recessions with jumps in the progressivity.
