STANFORD UNIVERSITY
DEPARTMENT OF STATISTICS
DEPARTMENTAL SEMINAR

4:15 p.m., Tuesday, January 29, 2008
Sequoia Hall, Room 200

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Integration of Time- and State-Domain Methods for Volatility Matrix Estimation

Time- and state-domain methods are two common approaches for nonparametric volatility estimation. While the former predominantly uses data from recent history, the latter mainly relies on historical information. The question of combining these two pieces of valuable information is an interesting challenge in statistics. We surmount this problem by dynamically integrating information from both the time and the state domains. The estimators from these two domains are optimally combined via a data driven weighting strategy, which provides a more efficient estimator of volatility. Asymptotic normality is separately established for the time-domain, the state-domain, and the integrated estimators. By comparing their efficiencies, it is demonstrated that the newly proposed integrated estimator uniformly dominates the other two estimators. Extensive simulations and empirical studies further demonstrate convincingly that our integration procedure outperforms some popular ones such as the RiskMetrics, etc. Multivariate volatility estimation is far more important in econometrics. To attenuate the curse of dimensionality, a factor modeling strategy is proposed. To attack the mathematical complexity, the probabilistic tool, local time, is invoked to establish the asymptotic normality in the state domain. Similar asymptotic results to those in scalar volatility estimation are established. A simulation study, based on an essentially affine model for the term structure, is conducted, and our new procedure outperforms both timeand state-domain estimators. Empirical studies also favor our integrated estimator.