

STANFORD UNIVERSITY  
DEPARTMENT OF STATISTICS  
DEPARTMENT SEMINAR

Sequoia Hall, Room 200  
4:15 p.m., Thursday, August 15, 2002

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**Improved Estimation of the Covariance Matrix of Stock Returns With an Application to Portfolio Selection**

This paper proposes to estimate the covariance matrix of stock returns by an optimally weighted average of two existing estimators: the sample covariance matrix and single-index covariance matrix. This method is generally known as shrinkage, and it is standard in decision theory and in empirical Bayesian statistics. Our shrinkage estimator can be seen as a way to account for extra-market covariance without having to specify an arbitrary multi-factor structure. For NYSE and AMEX stock returns from 1972 to 1995, it can be used to select portfolios with significantly lower out-of-sample variance than a set of existing estimators, including multi-factor models.