ROBUST REGRESSION METHODS FOR ASSET ALLOCATION MODELING

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Many strategies for asset allocation involve the computation of expected returns and covariance or correlation matrix of financial instruments returns. How much of each instrument to own is determinate by an attempt to minimize risk (the variance of linear combinations of investments in these financial assets) subject to various constraints such as a given level of return, concentration limits, etc. The expected returns and the covariance matrix contain many parameters to estimate and two main problem s arise. First, the data will very likely have outliers that will seriously affect the covariance matrix. Second, with so many parameters to estimate, a large number of observations are required and the nature of markets may change substantially over such a long period.

In this thesis we use robust procedures, such as FAST-MCD, quadrant-correlation-based covariance and 2D-Huber-based covariance, to address the first problem and regularization LARS methods that fully utilize the market weights of all assets for the second. High breakdown affine equivariant robust methods are effective, but tend to be costly when cross-validation is required to determine regularization parameters. We, therefore, also consider non-affine invariant robust covariance estimation. When back-tested on market data, these methods appear to be effective in improving portfolio performance.

Finally, robust asset allocation methods have great potential to improve risk-adjusted portfolio returns and therefore deserve further exploration in investment management research.

References

1. *Hastie, T., Tibshirani, R., and Friedman*, J. (2001), Elements of Statistical Learning, New York: Springer-Verlag.
2. *Huber, P. J.* (1981), Robust Statistics, New York: Wiley.
3. *Maronna, R. A., Martin, R. D. and Yohai*, V. J. (2006), Robust Statistics: Theory and Methods. John Wiley and Sons.