

Finance Applications of Robust Statistics and Influence Functions

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The first part of this talk briefly discusses the following results for cross-section factor models and mean-variance portfolio optimization. Robust distances reveal many more multi-dimensional outliers than one-dimensional outliers in fundamental factor models exposures data (EP, MB, size, etc.), a fact that is widely ignored by commercial fundamental factor model based portfolio optimization software providers. Robust regression applied to Fama-French cross-section regression asset pricing models yield results that differ from least squares in financially significant ways. In the context of mean-variance portfolio optimization we show by example that independent outliers in assets (IOA) is an appropriate model for firm specific outliers and that a robust covariance matrix based on pairwise quadrant correlation yields better out-of-sample backtesting performance than the MCD estimator as an exemplar of traditional robust covariance estimation. The second part of the talk focuses on applications of influence functions to risk measure and performance measure estimators. We show that influence functions reveal important differences between parametric maximum-likelihood estimators and non-parametric estimators of expected shortfall (ES), and that the ES MLE has a serious shortcoming that can be corrected by use of a semi-scale estimator. Finally, we discuss the use of influence functions to compute standard errors of risk and performance measure estimators for serially correlated returns.

This talk is based on joint work with Xin Chen, Chris Green and Shengyu Zhang.