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The Impact of Skewness and Fat Tails on the Asset Allocation Decision

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Abstract

The authors modeled the non-normal returns of multiple asset classes by using a multivariate truncated Lévy flight distribution and incorporating non-normal returns into the mea eries of controlle the M-CVaR optimiza tional mean–va n would have be

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In a seri d mean-condition ramifications of skewness and kurtosis for optimal asset allocations. In our first four

scenarios, prior to running the optimizations, we used the multivariate TLF distribution model to simulate a large number of returns with appropriate variance, skewness, and kurtosis, which, in turn, enabled us to more accurately measure the downside risk of a portfolio by using the CVaR.

In our first example, in which returns are symmetrically distributed and have uniform tails, the MVO and the M-CVaR lead to the same results. When there are varying levels of skewness and kurtosis in the opportunity set of assets, the MVO and the M-CVaR lead to significantly different asset allocations. In particular, the combination of a negative skewness and a fat tail has the greatest impact on the optimal asset allocation weights. Intuitively, the M-CVaR prefers assets with higher positive skewness, lower kurtosis, and lower variance.

Over the last 20 years, global high yield, U.S. REITs, U.S. TIPS, and value stocks have had significant negative skewness, whereas non-U.S. government bonds have had positive skewness. The kurtosis for global high yield, U.S. REITs, and U.S. TIPS is higher than it is for other asset classes. In a 14-asset-class bootstrapping analysis, the M-CVaR, relative to the MVO, leads to significantly higher allocations to non-U.S. government bonds and U.S. nominal bonds and lower allocations to global high yield, U.S. REITs, and commodities.

An out-of-sample test showed that the M-CVaR outperformed the MVO in the financial crisis of 2008, with excess gains ranging from 0.84 percentage point to 1.44 percentage points across the efficient frontier. This outperformance suggests that higher-moment information embedded in historical returns had some predictive power in the crisis.

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