

# A complex strategy unmasked

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## **A simple and accurate heuristic to optimize portfolios with mean and semivariance, putting this technique within the reach of investors.**

When financial professionals optimize portfolios they generally rely on the mean-variance approach. This is for good reason: mean-variance problems have well-known, closed-form solutions, and therefore much is known about the resulting optimal portfolio.

Mean-semivariance optimization, in turn, is not based on well-known, closed-form solutions but on rather-obscure numerical algorithms. And largely for this reason, many institutional investors shy away from optimizing portfolios with this approach.

But have professionals been missing out on a valuable tool? And does mean-semivariance optimization have to be as complex as it seems?

In [\*Mean-Semivariance Optimization: A Heuristic Approach\*](#), published in the Journal of Applied Finance, [IESE Prof. Javier Estrada](#) explains the nuts and bolts of mean-semivariance optimization and proposes a simple and accurate heuristic approach to solve these problems.

## **Great potential for portfolio optimization**

Markowitz laid the foundation for portfolio optimization when he suggested that at the heart of the portfolio-optimization problem there is an investor whose utility depends on the expected return and risk of his portfolio, the latter quantified by the variance of returns. Variance was thus adopted by investors as the default magnitude to measure risk, and the rest is history.

However, Markowitz also endorsed enthusiastically another measure of risk - semivariance. In fact, he argued that semivariance is "the more plausible measure of risk," and explained that "an investor worries about underperformance rather than overperformance" so "semideviation is a more appropriate measure of investor's risk than variance."

Why is semivariance less widely used than variance as a measure of risk then? According to Markowitz for three reasons: cost, convenience and familiarity.

Familiarity is becoming less of a problem as more and more investors are learning about semivariance and more generally about the downside risk approach. Similarly, cost is becoming less of a problem as computing power is continuously increasing.

Convenience, however, has remained the thorn in semivariance's side. Here's why: to estimate mean-variance efficient portfolios, only estimates of means, variances and covariances are needed; to estimate mean-semivariance portfolios, in turn, the whole joint distribution of returns is necessary.

But the tide is turning for semivariance, thanks to a heuristic approach that proposes to "estimate the semivariance of portfolio returns by using an expression similar to that used to estimate the variance of portfolio returns."

This approach will simplify mean-semivariance optimization by solving the problem using a familiar expression, not a black-box numerical algorithm. Not only is this approach easy to implement, but it delivers a "portfolio semivariance that is both very highly correlated and very close in value to the exact magnitude it intends to approximate." This holds great potential for portfolio optimization.

## **Now part of downside risk excel add-in**

Prof. Estrada is not the first to address this issue; other researchers have proposed different ways to simplify the mean-semivariance optimization process. But this new heuristic is based on the well-known and widely-used closed-form solution of mean-variance optimization problems. In other words, any package used to solve mean-variance problems can be used to solve mean-semivariance problems with the heuristic proposed. Only the inputs differ.

An extensive analysis was conducted to evaluate the accuracy of the heuristic proposed. Across stocks, markets and asset classes, the approach proposed by Estrada yields portfolio semivariances that "are very highly correlated, as well as close in value, to the exact portfolio semivariances they intend to approximate."

Estrada's article has already had an impact on practitioners. The heuristic proposed in the article has been incorporated into the downside risk Excel add-in sold by the provider of financial software, Hoadley Trading & Investment Tools.

Thanks to this new heuristic, mean-semivariance optimization can now play a vital role in the construction of portfolios. And in these troubled economic times, investment professionals can use all the help they can get.

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