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LETTER TO THE EDITOR

Richard Michaud
Robert Michaud

Discussion on article by Campbell R. Harvey, John C. Liechty and Merill W. Liechty, Bayes vs. Resampling: A Rematch (2008, Volume 6, Number 1)

In the last issue "Bayes vs. Resampling: A Rematch," Harvey, Liechty, and Liechty (HLL) replay the investment game originally put forth by Markowitz and Usmen (MU) in their 2003 paper (also published in this journal). MU compare the out-of-sample performance of Markowitz mean–variance optimized portfolios with Bayesian risk-return estimation to patented Resampled Efficiency™ (RE) optimization without enhanced estimates. In the MU study, the Michaud player always wins. Using different methods, HLL find that the Bayesian and Michaud players tie. HLL also propose a different evaluation criterion where their Bayesian player always wins. We would like to point out two basic issues with these results.

In the HLL replay of the MU experiment, they use a different RE algorithm than in MU. The rank-order algorithm for computing Resampled Efficient Frontier™ portfolios in MU is replaced with the λ-association method, a statistically inefficient and unstable, though compute-efficient method. HLL's replay also uses 500 simulations to compute the RE optimal portfolios while using 25,000 simulations to compute their Bayesian estimates. These two different methods are likely to account for many, if not all, of the differences between the HLL and MU results.

HLL's one-step-ahead framework is not a true out-of-sample test. In fact, it converges to an in-sample test. HLL's predictive return distribution is based solely on a sample history of a single play of the game. The result is self-referential. For example, the highest expected return asset is the asset with the highest return over the sample history. Their simulations will surely confirm the Bayesian player's belief that the expected highest return asset is truly the highest return asset. In other words, the Bayesian player cannot be wrong and the RE player's skepticism about the future is misguided. While their predictive distribution may be a better estimate of future return than history, there's a far better estimate: the true distribution. Moreover, the appropriate measure of relative performance does not vary by kind of investor. For more detailed discussion, see "Defense of Markowitz–Usmen" available at www.newfrontieradvisors.com/research.

A final note, while it is of interest to compare the relative value of Bayesian estimation versus RE optimization, the procedures are complementary, not exclusive. RE optimization, properly implemented, is an additional way to improve investment value of optimized portfolios whatever risk-return estimation methods used. Though interesting on their

own merits, HLL's results do not contradict either MU or previous work by Michaud.

Reference

Markowitz, H.M. and Usmen, N. (2003). "Resampled Frontires versus Diffuse Bayes: An Experiment." *Journal of Investment Management* **1**(4), 9–25.

Response

A Response to Richard Michaud and Robert Michaud

By Campbell R. Harvey, John C. Liechty and Merill W. Liechty

With regards to specific criticism relating to how we implemented the Resampled algorithm in our recent paper "Bayes vs. Resampling: A Rematch," Harvey, Liechty and Liechty (HLL), we readily acknowledge that we used a variation of the Resampled approach used by Markowitz and Usmen (MU) (2003) (also published in this journal), but in doing so we followed recommendations explicitly given by the proponents of the Resampled approach. For example, we were criticized for using the λ-associated Resampling algorithm instead of the rank-ordered algorithm. When the λ-associated method is put forth in Michuads' (1998) book they say, "As a practical matter, the choice between the two approaches may simply be a matter of convenience." (See appendix of chapter six, from Michaud 1998, page 67).

We also agree that the issue of sample size is important. HLL and MU follow the recommendations given by Michaud (1998) for the Resampled method which says that 500 Monte Carlo samples should be used to find the Resampled Efficiency portfolio. We agree that the reassessment of this guideline given by Michaud in their open letter, i.e., that 500 samples is probably too small, is probably correct, but the reader should recall that this is the particular recommendation that was given previously by Michaud for this specific set of data. For a proper Bayesian analysis, 500 samples are too restrictive. Therefore, HLL uses the recommended number of samples from each discipline, 500 for the Resampled method and (something much bigger) 25,000 for the Bayesian method. We would like to note that it is not our recommendation to integrate over 44 dimensions with a sample size of 500. Finally, we would like to remind the reader that our primary purpose in HLL was not to determine whether the guidelines put forward for the Resampled approach were optimal; we find it ironic that both of the main criticisms of the HLL comparison of the Resampled approach are that HLL followed Michaud's own recommendations for implementing the Resampled approach.

References

Markowitz, H.M. and Usmen, N. (2003). "Resampled Frontires versus Diffuse Bayes: An Experiment." *Journal of Investment Management* **1**(4), 9–25.

Michaud, R.O. (1998). *Efficient Asset Management*. Boston: Harvard Business School Press.