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## PORTFOLIO OPTIMIZATION

### Markowitz says Michaud has built a better mousetrap

'Father of MPT' concedes that resampling technique creates better asset allocations

By Joel Chernoff

Richard O. Michaud apparently has built a better mousetrap, according to the Big Cheese himself.

In a test of a traditional mean-variance optimizer and Mr. Michaud's resampling technique, Harry Markowitz, who is known as the father of modern portfolio theory, found that Mr. Michaud's methodology won out.

"Score one for Dick," Mr. Markowitz, a Nobel laureate, said in an interview.

For institutional investors, it's no small matter. In the current era of lower expected returns, they are scraping for added value wherever they can find it. If there's a way for institutions to enhance returns without taking any extra risk, they've got to take a look at it, said Mr. Michaud, who is president of New Frontier Advisors LLC, Boston.

Mr. Michaud and his son, Robert, patented the portfolio-optimization technology in late 1999. What the methodology does is calculate the average of hundreds of efficient frontiers, running the data through a Monte Carlo simulation. The upshot: Mr. Michaud's portfolios tend to be more diversified and more stable over time than asset allocations produced by traditional optimizers.

Mr. Markowitz said he and co-author Nilufer Usmen, an associate

professor of finance at Montclair State University's School of Business, Montclair, N.J., kept checking their results.

But, in the end, they found that Mr. Michaud's methodology beat the traditional optimizer in 10 out of 10 "truths," and in a way that was statistically significant. Overall, the Michaud optimizer produced the equivalent of 57 basis points in added return, according to their paper, which has been published online by the Journal of Investment Management next month. (The hard copy will be published in early January.)

"We were a little surprised by the results," said Mr. Markowitz, who is known as a master of understatement.

However, the Nobel laureate said the jury is still out. He said a different set of assumptions might produce a different result.

#### Another problem

In addition, Mr. Markowitz noted there might be another problem. Investors put their best estimates for expected returns, as well as historical variances and covariances, into an optimizer, which then spits out an efficient frontier — the line that shows the optimal asset mixes. But the historical data might be limited, and might not reflect a wider range of possible variances, he said.

Nevertheless, Mr. Michaud, who first called traditional optimizers



William Neumann

Richard O. Michaud, president of New Frontier Advisors, patented the portfolio-optimization technology with his son, Robert, in 1999.

"error maximizers" in 1989, is over the moon.

He said traditional optimizers tend to amplify errors in expected returns. The problem is that nobody knows the future with certainty, but the optimizer treats risk and return forecasts as ironclad. What's more, the optimizer also makes forecasts over a fixed period of time, not allowing for changes in economic conditions and market values.

That's why many plan sponsors have grown increasingly frustrated with the results provided by their optimizers.

Robert Borden, chief investment officer of the \$5.8 billion Louisiana State Employees' Retirement System, Baton Rouge, said his optimizer was driving "some perverse asset allocation changes," blaming the result on compression in risk premiums.

Increasing the Louisiana fund's 8% expected return by 20 basis points caused the optimizer, developed by Ibbotson Associates Inc., Chicago, to recommend shifting all of the fund's U.S. large-cap stocks into domestic midcap equities, he said at a recent asset allocation conference in Half Moon Bay, Calif., run by Information Management Network, New York.

"This 20 basis points of returns is absolute noise," he told the conference. "These tools today have become almost useless."

What's more, investors have been tampering with the results for years.

"You have to constrain the optimizer or it will throw everything into the highest-returning asset class," supplemented by Treasury bills, explained Dennis Hammond, managing director of Hammond Associates Institutional Fund Consultants Inc., St. Louis.

"You end up with a portfolio that is half emerging-market stocks and half T-bills," he said. To avoid this dilemma, investors cap their percentage allocations to specific asset classes. Or, as Mr. Michaud puts it, "People finagle with the inputs."

The problem is optimizers are extremely sensitive to minor changes in assumptions. "If you change the expected return by 20 basis points, the outcome ... could be changed pretty dramatically," explained Jeffrey Shen, vice president and head of asset allocation research in J.P. Morgan Fleming Asset Management's global multiasset group, New York.

What's more, errors not only are magnified, but they are inevitable, because nobody has perfect foresight.

Explained M. Barton Waring, managing director and head of the client advisory group at Barclays Global Investors, San Francisco: "What we're talking about here is the boundary of the science of finance and the art of finance. The



"We were a little surprised by the results," Harry Markowitz said.

optimizer is perfect science, but the assumptions we put into it will never be perfect because we can't know the future with perfection."

"Seldom have we found anybody who's a perfect forecaster," echoed Michael Henkel, Ibbotson's president.

Investors should never run an optimizer once and be satisfied with the results, he said. They should run the optimizer a number of times with differing assumptions, said Mr. Henkel, whose firm added a resampling technique to its EnCorr software suite about six months ago.

That's why Mr. Michaud has attempted to incorporate uncertainty into his optimizer. Investors feed the traditional optimizer specific data, or points. But lack of certainty about the future means there are no true points; they are "fuzzy areas," he said. Even putting good data into the traditional optimizer fails to correct the optimizer's tendency to exaggerate errors and deliver overly optimistic results, Mr. Michaud wrote recently.

#### **Avoiding 'fuzzy areas'**

Resampling — by generating hundreds of efficient frontiers using small changes around those points — gets around that problem. The benefit of resampling is that small changes in the assumptions used do not cause wild swings in recommended asset mixes. Plus, they tend to steer investors toward more diversified portfolios.

That added stability in results "adds a level of comfort" said Joseph Nankof, principal at Rocaton

Investment Advisors LLC, Darien, Conn. Mr. Nankof has used Mr. Michaud's resampling methodology for three and a half years.

Mr. Markowitz's research finds support for Mr. Michaud's methodology. In a test of 10 scenarios, or truths, Mr. Markowitz found the resampling methodology beat out a traditional optimizer 10 out of 10 times. "The Michaud player overestimated less and achieved more," Mr. Markowitz wrote.

In a second test, Mr. Markowitz compared the entire efficient frontier generated by the traditional optimizer with one generated by the resampling methodology. This time, the traditional approach fared better although it still fell short of Mr. Michaud's patented process. Mr. Michaud's methodology added 57 basis points over the traditional optimizer in the first test but just 12 basis points in the second test. This suggests that the "player" representing Mr. Michaud made a wise pick from its frontier — rather than its entire frontier being superior to the traditional frontier.

The results clearly have taken Mr. Markowitz up short, threatening a body of academic literature that says a rational investor, constantly updating his views of the market, will make the best choice.

"In particular, the results represent something of a crisis for the theoretical foundations of portfolio theory," he wrote. In a plea for help, Mr. Markowitz added: "the results presented in this paper are badly in need of an explanation."

Some possible answers, he added: the calculations used by the optimizer may not be the same as human behavior, or the economic assumptions may be wrong. Another problem: historical variances entered into the optimizer are not good enough. Instead, Mr. Markowitz suggests that investors add a measure of uncertainty for expected volatility.

All the same, "the results of the present paper imply that, for reasons unknown to us, when this theoretical correction is made the investor is still too optimistic for his or her own best interest." ■