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## A New Design for Portfolios

by

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### **Abstract**

Given all the problems associated with the inferior investment technology currently being used, it is little wonder that capital markets appear to be efficient. Only when asset management practice has achieved a level of sophistication consistent with the thoughtful use of investment information is it likely to provide statistically significant risk-adjusted performance.

Many academics in finance, as well as professional index fund managers, believe the U.S. financial markets are efficient, meaning that whenever new information is released, it's quickly reflected in stock prices. In a highly efficient system, the theory goes, asset managers cannot outperform the general market over long periods. Stocks will rise and fall as new information becomes available, but investors get the news at the same time and no one has an edge.

The track record of professional investors certainly supports the idea of market efficiency. With very few exceptions, they have failed to consistently keep pace with their appropriate market benchmarks. Consequently, people are often advised to invest exclusively in index funds, which mirror the market and which typically have lower management fees and other expenses than actively managed funds.

However, accepting the notion that market efficiency renders asset management ineffective is nihilistic. The argument implies that trying to understand the stock markets is futile. Are we to believe that the most sophisticated investment firm, blessed with talented professionals and advanced technology, is no more likely to outperform the market than a pair of inexperienced investors? This line of thinking also suggests that investment techniques cannot be improved. Neither conclusion seems sensible.

Here is a more realistic hypothesis: The historically poor performance of professional investors is not due to market efficiency; it is the result of deficiencies in the practice of asset management. Few would argue that investing is practiced as well as it should be. And accepting that point of view leads to a constructive critical analysis of the investment process.

The objective of effective asset management is not solely to identify securities that will provide superior returns. Because the portfolio is the ultimate carrier of investment value, defining a suitable mix of assets is an essential component of the management process. Portfolios behave quite differently than individual stocks. Typically, the risk of a portfolio of U.S. stocks is roughly half that of the average of the risk of the individual securities in it.

Sophisticated asset managers are concerned with portfolio efficiency, which means maximizing return for a given level of risk. Portfolio optimization software uses risk estimates and return forecasts as inputs to produce an efficient portfolio. An optimizer program attempts to enhance portfolio efficiency by finding the portfolio that best increases return relative to risk. The standard procedure for increasing portfolio efficiency, developed by the Nobel Prize-winning economist Harry Markowitz, has been available for nearly 50 years.

Can smart professional investors use Markowitz's model and still wind up with ineffective results? J.D. "David" Jobson and Bob Korkie, financial economists from the University of Alberta, answered that question two decades ago. They showed that optimizer programs often generate portfolios with little investment value. When the pair entered stock data--past performance, forecasts, or a combination of the two--into the program, they

discovered the optimizer placed too much emphasis on assets that exhibited the highest return and lowest risk. The problem is that these securities are unlikely to have the same extreme returns and risks in subsequent periods. The portfolios that result from this process have little value, they concluded, and advised investors to avoid the optimization technology that was then available.

For the past 20 years, the important work of Jobson and Korkie has been largely ignored, which partly accounts for the flawed results of so many of today's asset managers. Another factor is that--until quite recently--no useful alternative existed. As a result, Wall Street professionals usually rely on several widely accepted methods of constructing their portfolios. For example, asset managers tend to limit the weight of any one stock or asset to some fixed figure, such as 5 percent. Another common investment practice is to make sure a portfolio's sector and industry weightings do not exceed certain levels. Perhaps not surprisingly, exceptional performance rarely flows from such general approaches.

Is there a better way to construct a portfolio? The answer became more clear in 1979, when Richard Roll, a financial economist from UCLA, had an insight that fundamentally changed our understanding of portfolio optimization. Roll's contribution was to look at portfolio efficiency within a statistical framework. His research--and that of Jobson and Korkie--implied that many different portfolios may have a statistically similar investment value. The "statistical equivalence" of a group of portfolios is a highly useful investment concept when used properly. For example, if a portfolio is statistically equivalent to an optimized portfolio, it probably does not need to be rebalanced.

After studying the research of these pioneers for many years, I wrote a book containing eight proposals for enhancing the investment value of optimized portfolios and asset allocations. Although some of the proposals are statistical methods that have been available for a long time, two of these techniques, invented by me and my son Robert O. Michaud, recently received U.S. patents. A number of the proposals, including the patented ones, are provably effective at increasing portfolio investment value. Separately and collectively, they help inaugurate a new era of investment management practice.

The optimization process is based on understanding the true characteristics of asset returns. Trying to estimate returns is problematic because capital market history happens only once and in only one fashion. Resampling, a statistical technique that is part of the patented process, is a way of replaying history many times to get a better idea of the true nature of asset returns.

The resampling process simulates alternative realizations of capital market history. Properly averaging the different optimal portfolios for the different resampled histories leads to a very different set of optimal portfolios. This new set of portfolios is called the "resampled efficient frontier" and the individual portfolios are said to be "resampled efficient." These new portfolios have many desirable investment characteristics. For example, small changes in the data inputs are not usually associated with large changes in the optimal portfolios as was the case with the traditional optimization process. Also, resampled efficient portfolios are often consistent with investor expectations. Most

important, resampled efficiency is provably effective at enhancing the investment value of optimized portfolios and asset allocations.

The patent also describes a second innovation: a statistical test to determine when to rebalance a portfolio or an asset allocation. Many investors may be surprised to learn that prior to publication of my book, no such test existed. While a particular portfolio may look very different from an optimal portfolio, its investment value may be similar, and the portfolio may not need to be rebalanced. I estimate that 50 percent or more of trades normally part of institutional asset management today are very likely to be unnecessary. Reducing the need to trade reduces the cost of asset management, increases the value of investment assets, and improves the efficiency of capital markets worldwide. Optimization is like surgery; it is a fault-intolerant process. If you don't need to optimize, don't do it. With this new rule, we now know when rebalancing is advisable and when it should be avoided.

The rebalancing test and resampled portfolio efficiency provide new tools for enhancing the investment value of optimized portfolios and asset allocations. Other tools can improve the investment value of the input data. Those who have access to these new technologies and are able to use them wisely are likely to be able to outperform those who do not. Given all the problems associated with the inferior investment technology currently being used, it is little wonder that capital markets appear to be efficient. Only when the asset management practice has achieved a level of sophistication consistent with the thoughtful use of investment information is it likely to provide statistically significant risk-adjusted performance.