By Vern Sumnicht, MBA, CFP®

Improving Modern Portfolio Theory

Exceptional volatility and the lack of overall investment return during the "lost decade" have investors and their advisors touting the apparent death of modern portfolio theory (MPT). On the contrary, to paraphrase Mark Twain, "The rumors of MPT's death have been greatly exaggerated."

A quick review of the basic tenets of MPT begs the question: Which of the principles derived from MPT are no longer relevant?

- Are investors no longer risk averse?
- Are equity and bond markets no longer fairly priced or efficient?
- Is the allocation of the portfolio, as a whole, more important than individual security selection or market timing?
- Should investors no longer invest for the long-term?
- Is there no longer an Efficient Frontier where every level of risk has an optimal allocation of asset classes that will maximize returns?
- Would investors rather be concentrated in a few asset classes than be diversified among a greater number of asset classes with low correlation to each other?

Common sense instructs most investors that these basic principles, derived from MPT, remain as relevant today as they were the day they were conceived. Most of the present confusion seems to derive from mean variance optimization (MVO); this is the asset-allocation formula used to determine the efficient frontier of optimal asset-allocation portfolios. But MVO was not intended to be used for managing portfolios, and it should not be considered equivalent to MPT.

With advances in research and technology, academia has derived a field of study from traditional MPT known as post-modern portfolio theory. This field of study is giving legitimacy to obvious weaknesses in the way MPT is applied by investors. What follows is an outline of the weaknesses of how MPT has traditionally been applied, along with solutions to improve these weaknesses.

Problem #1: Standard deviation is a poor measure of risk.

The use of standard deviation (SD) as a measure of risk assumes all investment returns follow a bell-shaped, symmetrical curve. Yet, seldom does any investment return distribution actually resemble a classic "bell curve." Plotting most investment return distributions will result in a graph that is skewed either positively (like the green curve below) or negatively (like the blue curve) in Figure 1.

By using standard deviation as the measure of risk, the blue and green curves are considered equal (i.e., same expected return and SD). Yet, these are not equal investments: The green curve has volatility with more upside risk, and the blue curve has volatility with more downside risk. An unexpected gain (so-called upside "risk") is not what an ordinary investor considers risk. Losing money is risk!

An asset-allocation algorithm should not use standard deviation to measure risk, but instead should only consider the possibility of losing money as a measure of risk. By doing so, one would determine that the investment represented by the blue line was more risky because the blue investment line indicates a much higher probability of losing $50 than does the investment represented by the green line.

This definition of risk is supported by post-modern portfolio theory and behavioral finance research. Perhaps most importantly, it is supported by the common sense of individual investors. An allocation that uses standard deviation as its measure of risk is an algorithm that can be improved. The optimal asset allocation model would consider "the possibility of loss," rather than standard deviation, as the measure of risk.

Problem #2: Is your diversification truly reducing risk?

The traditional equity asset classes that most advisors and investors recognize as the norm for allocating equity portfolios consist of large-, mid-, and small-capitalization growth and value, along with international and emerging markets.

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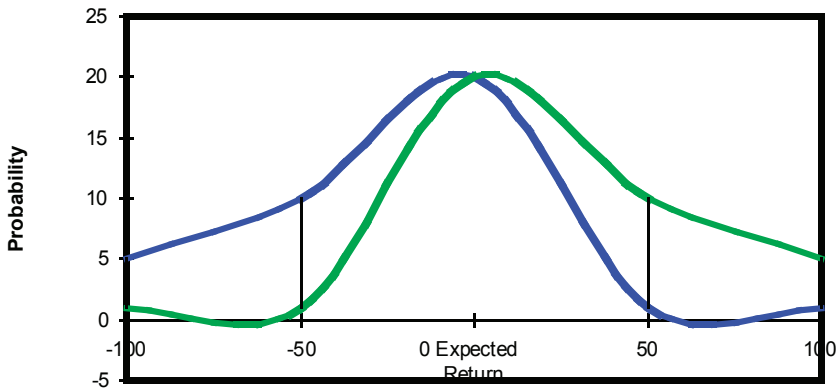
Figure 1: Return on Investment



Over the past few years, these equity asset classes have become highly correlated (see Table 1). When the correlation coefficients among asset classes within investment portfolios begin to converge on 1.0, they lose the value of diversification for reducing risk (losses) within those portfolios.

To make matters worse, research shows that in down markets—when diversification is needed the most to help protect from losses—these asset classes become even more highly correlated and thus provide even less risk protection. This process was well-defined in 2008, when an overall liquidity crisis drove most asset classes downward in unison as investors of all types liquidated everything they could sell.

The ideal asset allocation should be applied using asset classes with low correlation. By comparing the matrix of correlation coefficients in Table 1 to the matrix in Table 2, it is apparent that advisors using Table 2 asset classes are allocating investment portfolios to asset classes with lower correlations.

Also, the correlations among asset classes change over time. Therefore, investors must monitor the correlations within their portfolios to ensure proper diversification.

Problem #3: A more robust and objective asset allocation algorithm is needed.

Investors and advisors constantly struggle to make the mean variance optimization algorithm (MVO) work to determine their optimal portfolio allocation. Step one is determining expected returns, standard deviations, and correlation coefficients for each asset class. Then, each asset class' minimum and maximum percentage allocation is set. MVO has been the method of choice for investors to determine optimal asset allocations since it was developed in the 1950s. Despite decades of use, this buy/hold asset allocation algorithm has many flaws that can be improved.

In "The Volatility of Correlation Important Implications for the Asset Allocation Decision," published in the *Journal of Financial Planning* in 2006 (www.fpanet.org/journal/articles/2006_Issues/jfp0206-art7.cfm), William J. Coaker demonstrates the instability of correlation variables. He concludes that, "rather than rely on historical correlations, a more comprehensive and dynamic approach is needed in making asset allocation decisions."

Coaker's findings confirm that the investment environment is constantly

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Table 1
Traditional Asset Class Correlation Coefficient
For three-year period ended June 30, 2010

	Midsize Growth Stocks	Midsize Value Stocks	Small Value Stocks	Small Growth Stocks	Large Value Stocks	Large Growth Stocks	Emerg Markets	Int'l Equities
Midsize Growth Stocks	1							
Midsize Value Stocks	0.95	1						
Small Value Stocks	0.87	0.96	1					
Small Growth Stocks	0.96	0.96	0.94	1				
Large Value Stocks	0.91	0.97	0.94	0.91	1			
Large Growth Stocks	0.98	0.94	0.87	0.95	0.93	1		
Emerg Markets	0.89	0.80	0.80	0.82	0.80	0.89	1	
Int'l Equities	0.91	0.88	0.79	0.86	0.89	0.92	0.94	1

Domestic Indexes = Russell Indexes; Emerging Mkts = MSCI Emerging Mkts Index; Intl Equities = MSCI EAFE

Table 2
Improved Asset Class Correlation Coefficient
For three-year period ended June 30, 2010

	Gold	Bonds	Utilities	Tech	Real Est.	Energy	Health	Finance	Materials
Gold	1								
Bonds	0.29	1							
Utilities	0.13	-0.06	1						
Tech	-0.03	-0.27	0.73	1					
Real Est.	0.07	-0.07	0.49	0.74	1				
Energy	0.30	-0.15	0.76	0.67	0.48	1			
Health	0.15	-0.03	0.67	0.71	0.67	0.49	1		
Finance	-0.01	-0.03	0.47	0.72	0.89	0.44	0.69	1	
Materials	0.23	-0.18	0.72	0.87	0.74	0.81	0.70	0.71	1

Indexes: Gold: Comex Spot Settlement, Bonds: Barclays Capital 20+ Yr. Treasury Bond, iShares DJ US Sector indexes, respectively.

changing in a random fashion, and investments are affected by many more factors than expected return, standard deviation, and correlation. Some of these economic and capital market factors include money supply, GDP growth, inflation, dividend yields, interest rates, unemployment, etc. These variables and others need to be brought into the algorithm for determination of optimally allocated portfolios (Efficient Frontier). A more robust and comprehensive model than MVO is needed to improve the investment performance results obtained from asset allocation and re-balancing decisions.

Problem #4: Portfolio management expenses are significant.

In general, the individual investor has little understanding of the impact of fees on net return. A survey by Boston-based State Street Corp. and Knowledge@Wharton (the online business journal for the Wharton School) found that just 43 percent of investors understand their adviser's fee structure "completely" or "fairly well." Yet, in a low-return environment, reducing costs becomes an increasingly critical way to improve investment returns for any portfolio.

Typically, actively managed equity-based mutual funds without commissions (no-load mutual funds) charge about 1 percent to 2 percent each year inside the fund, to manage and operate the fund. However, there are additional costs that are not typically considered in the cost equation. Transaction costs—the costs to buy and sell stocks inside the fund— can add another (undisclosed) 0.5 percent to 1.5 percent annually to an investor's cost to hold that mutual fund investment.

Additionally, when fund managers are faced with redemptions, they must sell securities from the fund's holdings to provide cash for the redemptions. When these securities are sold for a gain, the sale triggers a taxable event for the remaining investors holding the fund in non-qualified accounts, whether the investor has been a shareholder for 10 years or 10 days. Furthermore, many funds wait until late in December to make their capital gains distributions known, leaving little or no time for investors to make other decisions to offset the tax liability. These costs can add an additional 0.5 percent to 2 percent to the annual cost for investors.

Index ETFs can be a low-expense alternative to actively managed mutual funds that both avoid unnecessary expenses and enable an investor to balance his or her asset allocation according to MPT principles.

Apply the Principles

Understanding the weaknesses in how MPT is applied enables investors to improve the risk-adjusted returns that their portfolio achieves from asset allocation.

- The asset allocation algorithm shouldn't use standard deviation to measure risk.
- Asset allocation should be applied using asset classes that have truly low correlation to one another.
- The asset-allocation algorithm needs to be more robust than MVO. That is, more than three basic factors are required to determine optimal asset allocation. Changes in capital market and economic factors, like money supply, inflation, unemployment, dividend yields, etc., need consideration in determining optimal asset allocation.
- The asset-allocation approach should be applied using fee-sensitive investment vehicles to mitigate management, transaction, and tax expenses as much as possible.

The tenets of modern portfolio theory still hold true. What is needed is a rethinking of how to apply the principles. NA

Vern Sumnicht, MBA, CFP®, is the CEO of iSectors®, a NAPFA Resource Partner. For more information, call 800-iSectors (1-800-473-2867) or email info@iSectors.com.