

# WEEKLY MARKET MONITOR

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**BRETT HAMMOND**  
CHIEF INVESTMENT  
STRATEGIST

**LEO KAMP**  
CHIEF ECONOMIST

**DOUGLAS FORE**  
DIRECTOR OF PORTFOLIO  
ANALYTICS

### IS YOUR PORTFOLIO EFFICIENT?

From time to time, it is important for long-term investors, individuals and institutions alike, to “check their asset allocation seatbelts” (see Market Monitor, May 14, 2007). This advice is based on the notion that investors have already diversified their investments through an asset allocation plan. Although this may sound like common sense, until the latter half of the 20th Century the benefits of asset allocation weren’t well understood. Fortunately, today many investors know that an appropriate allocation among assets can help them weather the ups and downs of the market in better shape than if their portfolio is invested in a single asset class. Even if this is true, it is important to know why, which leads us to an understanding of what we call the efficient frontier and the role it plays in asset allocation.

- What is the efficient frontier and what is the reasoning behind it?
- How does the efficient frontier inform asset allocation?
- What are the main limits and cautions to the efficient frontier concept?

Beginning in the 1950s, future Nobel Prize winners Harry Markowitz and William Sharpe began to lay out what has become known as modern portfolio theory, one of the pillars of modern finance. In simple terms, they showed that a portfolio with more than one asset class can provide a better combination of risk and return compared to holding just one asset class or one stock.



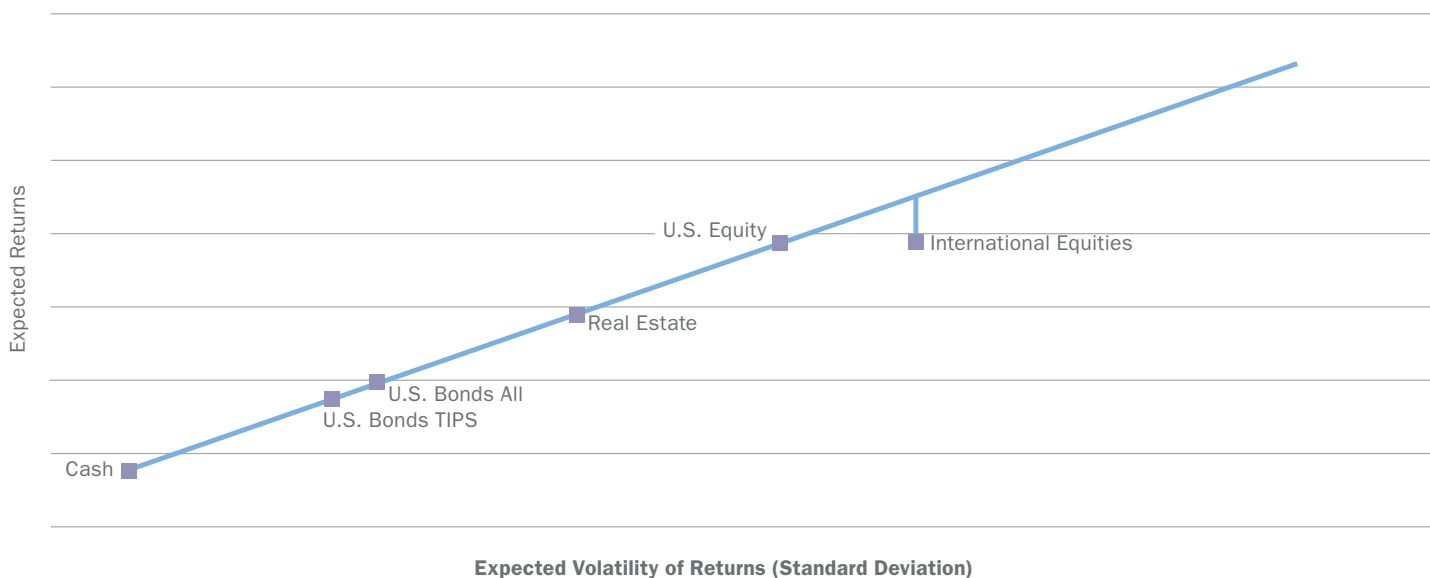
This can be illustrated by looking at Exhibit 1, which shows potential expected returns and volatilities (or risk) for some basic asset classes such as cash, bonds, real estate, domestic equities and international equities. Keep in mind that the actual future returns and volatilities (risk) of these asset classes are unlikely to match what you see in the exhibit, so we are using these for illustrative purposes only. In any event, if we draw a straight line that connects domestic equities and cash, we see that almost all of the asset classes lie on the line or very close to it. That's not magic, but rather the result of securities markets that are basically efficient, which means that if you want to invest in an asset class that could potentially provide a greater return, you will have to be willing to take greater risk.

For example, let's say an asset class—perhaps real estate—does not lie on the line as in Exhibit 1, but rather is way above the line so that it offers greater potential return for no extra risk or only a little extra risk. Perceptive investors would see that they could, in effect, get themselves a free or perhaps a cheap lunch by investing in real estate. As more and more investors discover this cheap meal and rush to get it, they would drive up the price of real estate, thus lowering expected future returns until this asset class drops down close to the line.

Although this example and Exhibit 1 show that markets may be generally efficient if not perfectly so, asset allocation can still take advantage of the differences among asset classes. Exhibit 2 shows a hypothetical efficient frontier. Note that instead of a straight line, the efficient frontier is a curve that rises above the individual asset classes. Each point on the curve represents a different combination (or allocation) of the asset classes shown in the exhibit, and each point represents a combination of risk and return that is superior to the points below the curve. In other words, we can combine the asset classes in the exhibit into some portfolio that is on the curve. And that portfolio will provide more expected potential return for the same potential risk as any of the individual asset classes or it will provide less expected potential risk for the same expected return as any of the individual asset classes. What that means is that an investor can do better by combining assets than by holding just one asset class.

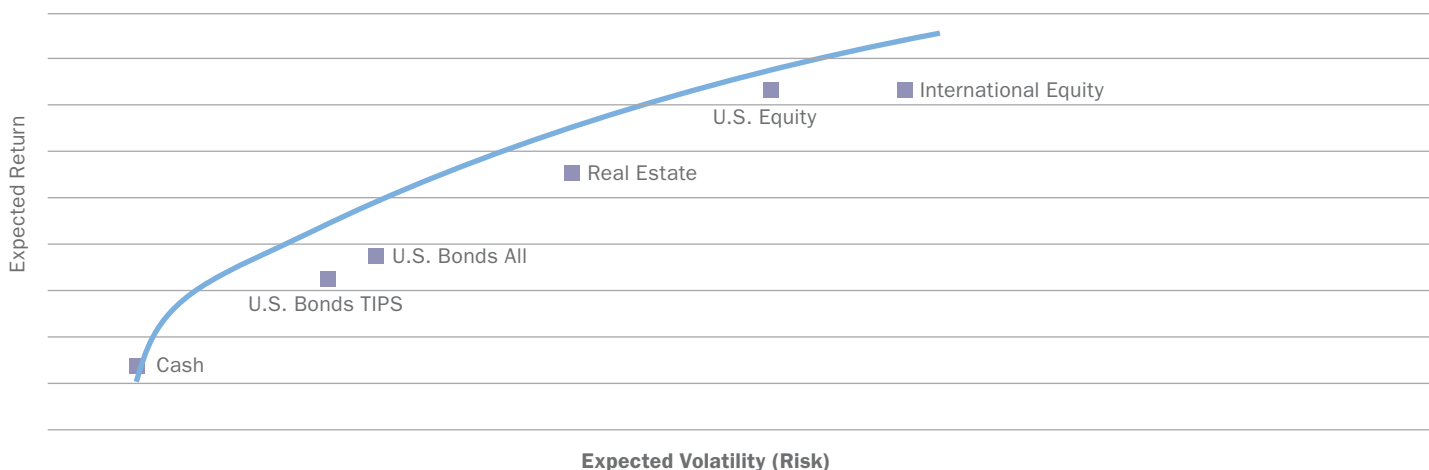
Moreover, there is no way to combine asset classes to create a portfolio that is above the curve, i.e., an asset allocation that has a better combination of risk and return than some point on the curve. This is why the curve is called the efficient frontier. When we combine asset classes efficiently, the frontier bows out to reduce expected risk, increase expected return or some of both.

**EXHIBIT 1: EXPECTED RETURNS AND EXPECTED VOLATILITY**



Source: Morgan Stanley Research

**EXHIBIT 2: HYPOTHETICAL EFFICIENT FRONTIER**



Source: Author's Calculations Using Morgan Stanley Research Data

The basic reason the efficient frontier looks the way it does is because asset class returns do not all behave alike. They tend to rise and fall at different rates and at different times. To put it another way, asset class returns aren't perfectly correlated and some, such as real estate and inflation bonds, tend to have very low to negative expected correlations with other asset classes, such as equities. The fact that asset classes aren't perfectly correlated allows us to build simple models that pick what we call "optimal" portfolios along the efficient frontier.

Although Exhibit 2 shows the efficient frontier, it doesn't show what asset allocations are associated with specific points along the curve itself. Exhibit 3 is an area graph that does just that. In addition to the basic equity and bond asset classes shown earlier, in this exhibit we added or broke down some of them to include short-term bonds, high-yield bonds, small and large-cap growth stocks, and small and large-cap value stocks. (Data this time are from Ibbotson Associates and are, again, used for illustrative purposes only.)

Exhibit 3 shows the different allocations on the efficient frontier for different levels of risk. The left side of the graph shows more conservative portfolios dominated by cash, bonds and inflation-linked bonds. The right side of the graph shows more risky portfolios dominated by value and international equities. (The horizontal axis in this

exhibit does not show specific risk levels because the efficient frontier is curved. That means changes in risk levels on the curve aren't equal the way they would be if the efficient frontier were a straight line.)

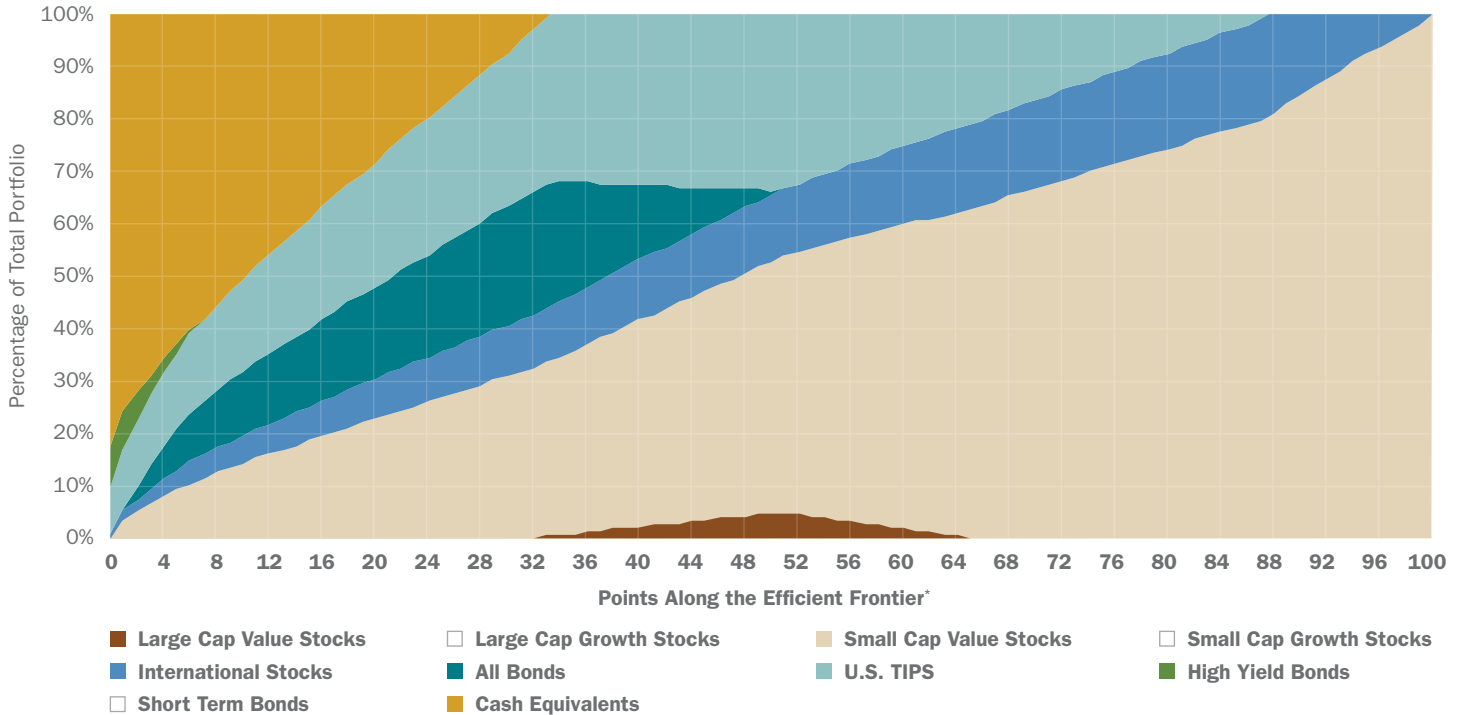
What are some of the limitations of the efficient frontier and these optimal portfolios? One is that it is a static picture. For example, asset class returns can change over long periods of time. Interest rates, for example, began a long downward trend in the 1980s, culminating in the extremely low rates that occurred in this decade. If this trend reverses then it is possible that future bond returns will be below long-term averages. In addition, during times of crisis, correlations among asset classes can rise dramatically to be nearly perfect so that many or all asset classes move in lock step, at least for a period of time. Also, the efficient frontier doesn't say anything to the investor about which portfolio she should choose, only that some portfolios are more efficient than others, and that some are more risky than others. The investor needs other information and judgment to decide what combination of risk and return are best.

To address some of these concerns, the field of finance has been working on extensions of the theory behind the efficient frontier as well as potential replacements for it. These include dynamic models that try to account for the uncertainty of pinning down future asset class returns, the emergence of

new asset classes, changing behavior of old asset classes, different investment time horizons and other factors. In any case, the basic concepts associated with the efficient frontier and asset allocation are powerful ones that can really add

value to a long-term investment strategy. This is one of the fundamental principles of the TIAA-CREF philosophy and it helps the individual investor keep their eye on an overall strategy rather than chasing yesterday's returns.

**EXHIBIT 3: HYPOTHETICAL EFFICIENT FRONTIER AREA GRAPH**



\* The horizontal axis above is a linear representation of the points along the curved efficient frontier line from the graph in Exhibit 2. The model picks the “best” assets and mixes of assets, therefore, some assets receive higher allocations than others and some may not be represented in the area graph illustration. Source: Author’s Calculations Using Ibbotson Associates Data

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Brett Hammond, Leo Kamp and Douglas Fore are available to comment on economic data. If you wish to speak with them, please contact Chad Peterson, Media Relations, 212-916-4808 or email [cpeterson@tiaa-cref.org](mailto:cpeterson@tiaa-cref.org).

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