

Is a Total Market Fund the Most Diversified Portfolio?

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Diversification has been called the only free lunch in investing. Many investors consider total-market funds, such as Vanguard's Total Stock Market Index Fund (VTSMX), to be not only the most efficient (based on modern financial theory and, specifically, the efficient markets hypothesis) but also the most diversified. Leaving aside the question of whether Vanguard's fund is the most efficient portfolio, let's evaluate whether it's the most diversified.

Certainly, VTSMX is the most diversified domestic stock fund if we consider only its number of holdings. According to Morningstar, as of November 30, the fund held 3,598 stocks. However, VTSMX's market capitalization weighting shows that its top 10 holdings make up 14.5% and its top 25 holdings make up 26.8% of the portfolio. Now, consider the Vanguard Small Cap Value Index Fund (VISVX). While it held just 856 stocks, the fund's top 10 holdings made up just 4.7% and its top 25 holdings just 10.5% of the portfolio. From that perspective, its holdings are less concentrated and could thus be considered more diversified.

Another fund that many investors use to own U.S. stocks is the Vanguard 500 Index Fund (VFINX). Most investors would be surprised at just how concentrated the fund's risk is due to its market-cap weighting mechanism. As of December 2016, the fund's top 10 holdings made up 18.2% of the portfolio, its top 25 holdings made up 33.4% (2.3 times as concentrated as VISVX) and its top 50 holdings made up 47.9%. In other words, almost half of the risk in the portfolio of 500 stocks was concentrated in just 10% of the stocks it owned.

Again, I am not debating whether the market-cap weighting creates the most efficient portfolio. I'm only pointing out that the market-cap weighting mechanism used by index funds results in more concentration of individual company risk.

An interesting point is that the first index fund wasn't originally designed to be market-cap weighted. The credit for creating the first S&P 500 index fund is generally given to John McQuown, who, in 1973, started a fund using dollars from Wells Fargo's pension plan. What most people don't know is that the initial idea was for the fund not to own stocks by their market-cap weighting, but to own an equal amount of each stock. The reasons were likely that it would be considered more diversified and that equal-weighting had historically produced higher returns. The fund's creators didn't necessarily realize it at the time, because there was no literature yet on the size and value factors, but the higher returns were very likely due to the equal-weighting mechanism providing exposure to those factors and their related premiums.

The fund's original design was to hold an equal dollar amount of each of the 1,500 or so stocks listed on the NYSE, which seemed the most appropriate replication of "the market." However, McQuown and his team quickly realized that keeping an equal-weighting mechanism involved high transaction costs and daily management was difficult. (This could have been addressed if they had used cash flows from dividends and new inflows to rebalance the portfolio, and if they had been willing to accept the tracking error that would result. But then it would not have been an index fund, as it would not have tracked the index.) Eventually, they settled on the S&P 500 as their index and the use of market-cap weighting. The face of the investment world was changed forever. An important benefit of market-cap weighting is that it minimizes turnover and trading costs.

Given this background, thinking about diversification in terms of the number of securities held and the concentration of those holdings isn't the only way, or necessarily the right way, to think about diversification. Modern financial theory provides an alternative way to think about diversification.

Thinking differently about diversification

The 1992 publication of Eugene Fama and Kenneth French's paper, "The Cross-Section of Expected Stock Returns" changed the way we thought about the diversification of portfolios. Prior to then, we lived in a single-factor world, with market beta as the sole equity factor. With the introduction of the Fama-French three-factor model, adding size and value, we could now think of a portfolio as a collection of diversifying factors.

Before we dive into the brave new world of factor-based investing, it's important to review a basic fact: factors are long-short portfolios. For example, because beta is the measure of the risk of a portfolio relative to the risk of the stock market,

a total stock market (TSM) fund has by definition an exposure to beta of 1. However, while a TSM fund has about a 10% allocation to small-cap stocks, it has no exposure at all to the size factor. This seeming contradiction confuses many investors. But think about it this way: while the small stocks in a TSM fund do provide positive exposure to the size factor, its large stocks provide an exactly offsetting amount of negative exposure. That puts net exposure to the size factor at 0. Similarly, while roughly 30% of the holdings of a TSM fund are value stocks, providing positive exposure to the value factor, growth stocks in such funds provide an exactly offsetting amount of negative exposure, resulting in a net exposure to the value factor of 0. Thus, a TSM fund has the following factor exposures: beta: 1; size: 0; value: 0. Along these same lines, a TSM fund would have zero exposure to other investment factors that are now part of the literature and used in multi-factor models, such as momentum, profitability and quality.

To diversify a portfolio across the size and value factors, you must “tilt” it so that the portfolio owns more than the market’s share of small and value stocks. And because these factors have provided premiums and have had low correlations to each other, the diversification benefit of tilted portfolios historically has produced higher Sharpe ratios, meaning they earn higher risk-adjusted returns, where risk is measured in terms of levels of volatility.

Let’s look at an example using live funds. We’ll consider two portfolios, A and B. Portfolio A is the typical 60/40 portfolio. It consists of just two funds, the Vanguard Total (U.S.) Stock Market Index Fund (VTSMX) and the Vanguard Intermediate-Term Treasury Fund (VFITX). Portfolio B is a 40/60 portfolio that also uses just two funds, the DFA U.S. Small Cap Value Fund (DFSVX) for its equity portion and the same bond fund, VFITX, for its fixed income portion. (Full disclosure: My firm, Buckingham, recommends DFA funds in constructing client portfolios.) The period covered is April 1993 (the inception date of DFSVX) through March 2016 (so we can perform annual rebalancing). The following table shows the annualized returns, standard deviation and loadings (exposure) the portfolios have to each factor. The figures in parentheses represent each fund’s factor loading (using the regression tool available at [Portfolio Visualizer](#) and the Fama-French research factors). To calculate the portfolio’s factor loading, multiply the fund’s loading by the allocation percentage. For example, portfolio B’s allocation to DFSVX is 40% and the fund’s loading on market beta was 1.1. Thus, the portfolio’s loading on market beta was 0.44.

	Portfolio A	Portfolio B
Annualized Return (%)	8.1	8.8
Standard Deviation	12.0	11.3
Beta	0.6 (1.0)	0.44 (1.1)
Size	0.0 (0.0)	0.38 (0.96)
Value	0.0 (0.0)	0.25 (0.62)
Term	0.11 (0.27)	0.16 (0.27)

Portfolio B is able to hold less equity risk (less exposure to market beta) because the equities it does own have higher expected returns. Since 1927, in the U.S. small-value stocks have outperformed the S&P 500 by about 3.5% per year, without adjusting for risk (volatility). With that said, while the two portfolios had relatively similar returns and volatility, portfolio B was more efficient, with both higher returns and less volatility. Furthermore, not only was it less volatile, but it experienced far less downside risk. In 2008, portfolio A lost 16.9% while portfolio B, thanks to its greater allocation to safe bonds, lost just 6.7% (VTSMX returned -37.0%, VFITX returned 13.3% and DFSVX returned -36.8%). The use of a strategy to build portfolios with lower exposure to market beta and greater exposure to other factors, and how such a strategy historically has reduced tail risk, is the subject of my book, *Reducing the Risk of Black Swans*, which I co-authored with Kevin Grogan.

From a diversification perspective, portfolio A has exposure to beta of 0.6, just a 0.11 loading on the term factor and no exposure to the size and value factors. Portfolio B is more diversified, with relatively more equal weightings on the three equity factors and a higher loading on the term factor, as compared to portfolio A. Portfolios can also be structured to gain exposure to the momentum factor, which neither of these portfolios has. Additionally, portfolios can be constructed to gain exposure to still other factors, such as profitability and quality.

The S&P 500 has virtually the same exposure to the market beta and value factors as a total-market portfolio. About its only difference is that the index has a negative loading of about 0.2 to the size factor, meaning its holdings have higher market capitalizations.

Total market funds have all of the risks in one factor basket – market beta – while a tilted portfolio can diversify its risks across multiple factors, not just beta, size and value. If factor premiums are used to lower exposure to beta, a portfolio can increase its exposure to the term factor in its bond holdings as well, further diversifying risks. Harvesting different risk baskets, each with premiums and returns that have a low correlation to the others, is a prudent way for investors to diversify their portfolios while improving their risk-adjusted returns.

As mentioned earlier, a strategy that calls for diversifying portfolios by harvesting different risk baskets can be expanded to include other investment factors that academic research has shown not only provided return premiums but also have had low correlation with other traditional portfolio assets. For those interested in learning more about diversifying across factors, pick up a copy of my latest book, *Your Complete Guide to Factor-Based Investing*, which I co-authored with Andrew Berkin, the director of research for Bridgeway Capital Management.

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