What is Diversification Worth?

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The concept of diversification is often discussed, but I am increasingly of the opinion that many investors do not understand diversification at a deep level. This is unfortunate, because diversification is the one 'free lunch' in investing. Indeed, this was the genius of Harry Markowitz in showing that combining asset classes in a thoughtful way allowed investors to generate higher returns without increasing risk in their portfolios. On a practical basis, what does this mean for investors? How much more return can investors generate by being well diversified?

To explore this topic, I have used a variety of sources to estimate what I will call the *diversification premium*. The diversification premium is the additional return that investors can achieve by effectively diversifying their portfolios across a range of asset classes. Effective diversification requires something significantly more intelligent than just buying a bunch of funds or ETF's, but it is well worth the effort.

Calculating the diversification premium requires the use of what are called forward-looking models. If you simply choose a period of history, and calculate 'optimal portfolios' with the benefit of perfect hindsight, you can find some combination of investments which have generated high returns with low risk. This is the problem with 'portfolio optimization' on historical data: you end up estimating 'optimal portfolio' returns that are not achievable in real life. Forward-looking models compensate for these effects by generating statistical outlooks for portfolio performance that account for the uncertainties in the future. Forward-looking models are standard tools among institutional investors, as we will discuss below.

To estimate the diversification premium, we have taken forward-looking estimates of the best returns that can be achieved from a well diversified portfolio from a range of institutional sources, as well as from our own analysis using Quantext Portfolio Planner, a forward-looking portfolio planning model. The diversification premium is a function of the portfolio risk level, and we will be examining portfolios with annualized standard deviation of about 10%. Portfolios with 10% in annualized standard deviation are often a focus of study because this is about the risk level (on a forward looking basis) of a portfolio that is invested 60% in domestic stocks and 40% in bonds.

Ibbotson / PIMCO Study

For a very useful overview of forward-looking models, I recommend the following analysis performed by Ibbotson on behalf of PIMCO:

http://corporate.morningstar.com/ib/documents/MethodologyDocuments/IBBAssociates/Commodities.pdf

Ibbotson used forward-looking portfolio models to analyze the improvement in the return of a diversified stock and bond portfolio that could be achieved by including commodities. Ibbotson analyzed portfolios at three risk levels using three models, albeit with the third being a combination of the first two using the Black-Litterman methodology. The analysis ultimately yielded projections of the highest return than can

realistically be projected for portfolios that combined foreign and domestic stocks and bonds with commodities.

Yale's David Swensen

David Swensen is widely known for his phenomenal 20-year track record as the portfolio manager of Yale's endowment. Mr. Swensen focuses on strategic diversification as a core of portfolio strategy. In an interview in July of 2007, Mr. Swensen stated that the Yale portfolio is expected to return about 10.1% per year, with expected standard deviation of 11.8% per year:

http://registeredrep.com/investing/altinvestments/finance_illiquidity_beautiful/

These numbers, specifically stated as 'expected,' can only have been generated using forward-looking models.

Bridgewater's Ray Dalio

Bridgewater (www.bwater.com) is a highly-respected institutional fund manager, with $140 Billion under management. In an article titled *Engineering Targeted Returns and Risks*, Ray Dalio (the firm's founder and Chief Investment Officer) comes up with his estimates of the maximum return that can be achieved (on a forward-looking basis) for a given level of risk. The subtitle of this article states the punch-line of the analysis: "how to achieve a 10% return with 10% to 12% risk."

http://www.bwater.com/Uploads/FileManager/In_the_News/engineering_targeted_returns_and_risks_pmpt_060215.pdf

Quantext All-ETF Portfolio

Using Quantext Portfolio Planner, we previously created a broadly-diversified all-ETF portfolio with risk levels consistent with the other portfolios discussed here:

http://seekingalpha.com/article/39239-asset-allocation-and-the-all-etf-portfolio

We found significant benefits from using sector specific ETF's in energy (IGE and IYE) and utilities (XLU), as well as TIPS (TIP). We also found that certain country-specific ETF's provided valuable diversification benefits (specifically EWJ and EWM).

Quantext Portfolio Planner 1-to-1 Result

Over the last several years, I have found that a wide range of portfolios converge to a result that the best that investors can realistically plan for on a forward-looking basis is about a 1-to-1 ration between average annual return and standard deviation in return for portfolios with annualized standard deviation of around 10%:

This limit is not an input, but arises consistently as we analyze a wide range of portfolios. The All-ETF portfolio discussed in the previous section is one example, but there are many more, such as this analysis of the diversification benefits provided by the top holdings of Berkshire Hathaway.

http://seekingalpha.com/article/17192-monte-carlo-analysis-of-major-berkshire-hathaway-holdings

Calculating the Diversification Premium

To benchmark these results, we have combined an S&P500 ETF (IVV), a Russell 2000 ETF (IWM) and a bond index ETF (AGG) to find a portfolio with a standard deviation of that matches each of the risk levels in the portfolios analyzed using the different approaches listed above.

The 'diversification premium' is the difference between the projected average annual return of each 'optimal' portfolio from the various sources and the benchmark portfolio with the same risk level. The estimated diversification premiums for portfolios with annualized standard deviation on the order of 10% are shown below.

Source	Diversification Premium
Ray Dalio / Bridgewater	2.0% - 2.5%
Ibbotson Associates-Black Litterman	2.0%
Ibbotson Associates- Building Block	1.8%
Ibbotson Associates- CAPM	2.6%
David Swensen / Yale	2.2%
Quantext Portfolio Planner / All ETF	2.7%
Average	2.2%
QPP 1-to-1 Rule	2.5%

Diversification Premium

The Ibbotson analysis ignored several factors in the forward-looking analysis that are important. First, they did not break out domestic equities into even large cap and small cap. Second, Ibbotson did not break out international equities into developed markets and emerging markets. Third, the Ibbotson study did not include REIT's as a separate asset class. The incremental portfolio benefit of being able to differentiate between large and small cap and emerging and developed international stocks will be positive, as will the inclusion of REIT's. I believe that including these factors in developing 'optimal' portfolios using Ibbotson's forward-looking models would result in higher estimates of the diversification premium.

The QPP 1-to-1 Rule result is for a portfolio with 10% in annualized standard deviation, for which the portfolio built from the three benchmark asset classes project an average annual return of 7.5%.

The agreement between these results is remarkable, given the diverse sources of the forward-looking estimates and the range of asset classes considered.

Discussion

The results of this analysis suggest that investors with portfolios in the risk range of a 60/40 portfolio of stocks and bonds can generate 2%-2.5% per year in return beyond what is achievable with a broad mix of domestic stocks and bonds. This is an estimate of the size of the 'free lunch' that investors will miss by being under-diversified. These benefits are calculated in Quantext Portfolio Planner, assuming that investors own sector-focused ETF's. The Ibbotson research also treats portfolios built out of broad asset classes. These results do not mean, however, that effective diversification necessarily requires owning hundreds of stocks. My analysis of Berkshire Hathaway suggests that their equity holdings are very well-diversified, even though the Berkshire portfolio is highly concentrated.

Sadly, many investors are not even as well diversified as the benchmark portfolio that I used in this study (a mix of S&P500, Russell 2000, and a bond ETF). For these investors, the potential diversification premium is even greater than the numbers shown here.

Going Further

My research has suggested that even greater benefits can accrue to investors who are willing to take on investments in individual stocks, as opposed to only investing in broad indices:

http://seekingalpha.com/article/47407-value-of-individual-stocks-in-a-fund-portfolio

One reason that investors can improve on simply buying index ETF's is that market cap weights of major indices are not optimal. This has been demonstrated by a range of authors and I am partial to the research by Rob Arnott. Market cap weights in an index tend to be over-weight in the assets that have recently out-performed.

My current estimates suggest that investing in individual stocks (as opposed to market cap weighted index funds) can be worth about another 1% per year in returns for a portfolio with a standard deviation of around 10%.

Investing in individual stocks does expose investors to more specific risk of a company having serious financial difficulties or collapsing altogether, but good forward-looking tools help to manage and mitigate this risk:

http://seekingalpha.com/article/68135-using-default-risk-to-limit-downside-in-individual-stock-investing

Let us not forget that owning individual stocks means that there are no annual expenses (except for brokerage fees from buying or selling). ETF's that focus on commodities, emerging markets, or other narrow sectors often have higher expense ratios than the 0.09% a year of an S&P500 index ETF. Building and managing diversified portfolios out of individual stocks used to be prohibitively expensive due to brokerage fees, but firms like FOLIOfn have made this approach viable (disclaimer: Quantext is a strategic advisor to FOLIOfn).

Quantext Portfolio Planner is a portfolio management tool. Extensive case studies, as well as access to a free extended trial, are available at http://www.quantext.com

Quantext is a strategic adviser to FOLIO*fn*,Inc. (www.foliofn.com), an innovative brokerage firm specializing in offering and trading portfolios for advisors and individual investors.