Getting The Most Return For Your Risk, Part 2

Geoff Considine, Ph.D.

Most investors have specific financial goals that they wish to achieve. The goal may be to generate a certain level of average annual return, to have the best chances of providing a desired stream of income in retirement, or to leave a certain size of estate to the family or to a charity. How do you come up with a portfolio plan that provides the best odds to meet your (or your clients') goals? There are plenty of generic asset allocation plans available, but do they really make sense? The critical issue that resides at the core of all of these challenges is how to build a portfolio that is likely to deliver the most return for a given level of risk. A related question is as to the realistic bounds on return that can be planned for on a forward-looking basis. Every investor will benefit from having a portfolio that provides solid diversification benefits across asset classes, but what is the best that we can realistically plan on?

The basics of portfolio theory set the stage for this discussion. When you combine a range of assets (stocks, bonds, commodities, etc.) in a portfolio, you can generate more return for a given risk level than the individual assets or asset classes can generate alone. The revelation that this is always the case (if done properly) is the remarkable concept at the center of modern portfolio theory. This is why investors should want diversified portfolios. The limit in the return that you could have obtained in some historical period (found by determining the asset allocation that gets you the most return at each risk level) is called the ***efficient frontier***. This is the standard name for the optimized curve of average return at each level of risk. The problem is that simply calculating an efficient frontier using ***historical data*** will find you the portfolios that would have been best for that period of time---and thus you end up with high concentrations in the asset classes that were the out-performers in that period. Because no asset class out-performs forever, these asset classes typically deliver sub-par returns over the next historical period. William Bernstein, in ***The Intelligent Asset Allocator***, performs this analysis over a series of successive five-year periods. He examined the performance of portfolios optimized over the past five years and held for the next five years for successive five-year periods for the period 1975-1998. The annualized return of the 'optimized portfolios' was 8.4% per year, while a portfolio that was simply invested equally in the six major

asset classes that he considered generated 15.8% per year. Allocating your investments based on the efficient frontier from the past is not a good idea.

Does this mean that we should just invest based on an arbitrary allocation? No. There are analytical tools (i.e. software) that can help in this process---but these are far different from just running a calculation to find the efficient frontier from historical data. The cutting edge of software tools for portfolio management has been developing fairly rapidly, as the theory itself has evolved---but most of the development has been in high-end applications or by firms that use these tools for proprietary (internal) applications. Many (most?) wealth managers, advisors, and individuals are unaware of the best practices in portfolio planning analytics.

What are the best practices for portfolio planning analysis? At its core, a good portfolio planning tool needs to generate forward-looking estimates of risk and return for securities and funds and be able to account for the correlations between the various portfolio holdings. The output of such models will be used to generate forward-looking portfolios that effectively exploit diversification effects. There has been surprisingly little written about how to test these forward-looking analyses for operational use. I have written a number of articles on testing these models (specifically our own portfolio planning tool called ***Quantext Portfolio Planner***). through a range of historical periods and in a range of market conditions (a wide range of these articles are available at Quantext.com).

One of the most interesting issues that I have encountered in extensive testing of ***Quantext Portfolio Planner (QPP)*** is that there appeared to be a consistent constraint on forward-looking average portfolio return relative to risk for the risk levels of equity-dominated portfolios---regardless of the makeup of the portfolio. While it is easy to find portfolios that have historically generated very high levels of return for fairly low levels of risk, these portfolios tend to yield .poor results going forward. When I use QPP to generate forward-looking projections, it is very hard to design a portfolio that is projected to generate average annual return beyond about the annualized standard deviation in return. In other words, **the best that you can realistically hope for is a one-to-one**

ratio between expected return and risk. It is, in fact, quite remarkable how consistently this limit shows up:

http://seekingalpha.com/article/21808-getting-the-most-return-for-your-risk

In this article, I reference a series of portfolios for which I projected risk and return in which I consistently ran up on this limit. More recently, I have found this same limit when attempting to maximize the forward-looking performance of an all-ETF portfolio:

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

I had already written about this result in a range of articles when a reader sent me an analysis by Ray Dalio, president and Chief Investment Office of ***Bridgewater Associates***:

http://web.mit.edu/charvak/www/Science/Bridgewater/pmpt040105.pdf

Research at Bridgewater suggests the same conclusion that I observed—that the best that investors can plan to get is annual returns of 10% for a portfolio with annualized standard deviation of about 10% to 12%. Mr. Dalio's analysis comes to this conclusion from a very different analysis process, which makes the agreement with our simulation model quite striking.

More recently, this apparent limit on reasonable projected returns for fully-diversified portfolios got another round of support---this time from Ibbotson Associates, a leading financial markets research firm. In analyzing the impact of commodities on equity portfolios, I found the following article from Ibbotson Associates called ***Strategic Asset Allocation and Commodities*** (March 2006):

http://www2.pimco.com/pdf/Ibbotson%20Strategic%20Asset%20Allocation%20and%20Commodities%202006%20Global.pdf

The goal of the monograph from Ibbotson was to examine how some allocation to commodities could enable a broadly diversified portfolio to generate more return, without increasing risk. For the study to be meaningful, the projections of risk and return had to be performed on a forward-looking basis. The authors of the study generated forward-looking analyses using three different methods (although it is worth noting that the third was a form of composite of the first two using the Black-Litterman model). The calculated optimal portfolios used their forward-looking analysis of risk, return, and correlation between major domestic and foreign equity and bond indices---with and

without commodities. We will pay attention to the optimized ***Moderate*** and ***Aggressive*** portfolios proposed by Ibbotson, which were designed to have projected annualized standard deviations in annual return of 10% and 15%, respectively (see Tables 12, 15, and 17 in the Ibbotson study). In the final composite analysis in the Ibbotson study, the highest forward-looking return that could be generated for the ***Moderate*** portfolio was 9.5% per year (with a standard deviation of 10%), when commodities were included. The highest forward-looking return that could be generated for the ***Aggressive*** portfolio was 11.26% per year (with standard deviation of 15%). These composite results fell in between the two earlier model analyses in the Ibbotson study. **The projected 'optimal' portfolios in the Ibbotson study converged towards the one-to-one ratio between return and risk for portfolios with substantial equity allocations**. The Ibbotson analysis supports the results from QPP and the conclusions that Mr. Dalio draws.

Running Some Numbers

In my research, I have found that the allocations used by Ibbotson are not optimal in a global sense, although they may indeed be fairly optimal given the limits of the asset classes considered. I constructed portfolios out of ETF's and a few individual stocks that generally capture the asset classes used in the Ibbotson study. I started out with a series of ETF's and two individual stocks:

Ticker	Name
TIP	iShares TIPS Bond Fund
IWM	iShares Russell 2000 Index
EFA	iShares EAFE Index
EEM	iShares MSCI Emerging Markets Index
^DJC / DJP	iPath Dow Jones - AIG Commodity Index
COP	Conoco-Phillips
EXC	Excelon

Portfolio components

DJP is actually an ETN—rather than an ETF. I will use the actual Dow Jones – AIG Commodity Index (ticker: ^DJC) as a proxy for DJP because DJP has a very limited data record. The inclusion to the two additional stocks (EXC and COP) allows us to increase the commodity exposure to energy. As the Ibbotson article notes, the Dow Jones – AIG Commodity Index has a 33% allocation to energy, and I wanted the flexibility to adjust the portfolio's exposure to energy. Electrical utilities (EXC) provide an interesting and useful energy exposure that I have written about in other articles. The Ibbotson study had three different fixed income asset classes (including TIPS) but I have found this to be somewhat extraneous.

My goal was get the maximum ***forward-looking*** expected return from portfolios made up of these components, for the same two risk levels as the ***moderate*** and ***aggressive*** portfolios from the Ibbotson study. These portfolios will not be optimal in a broader sense because we are missing asset classes such as real estate and we do not have the ability to adjust the portfolio allocations to more targeted assets—either individual stocks or sectors such as precious metals. I chose to avoid tuning the allocations down to decimals, as I simply don't feel that this level of fine tuning adds value. There is too much uncertainty in the process. It is important to understand that the forward-looking results are a modeled quantity---they show the composite of the forward-looking estimates of risk and return for the assets and the correlations between assets. To generate these results, I ran QPP with all baseline settings and using the trailing three years of data through September 2007 to initialize QPP's calculations.

Moderate Portfolio

In building the moderate portfolio, I adjusted allocations to get the most projected return at a risk level that yields a forward-looking standard deviation in annual return of 10%. I emphasize again that I did not run an optimizer to get these levels to the 'optimal' levels. Rather, I adjusted the allocations by hand, using correlations between the assets and volatilities as my guide---the way that a judicious manager actually works. The results are shown below:

Ticker	Percentage of Funds
TIP	45%
IWM	17%
EFA	13%
EEM	3%
^DJC	12%
COP	5%
EXC	5%
Portfolio Stats	
Average Annual Return	Standard Deviation(Annual)
9.4%	10.0%

Moderate portfolio allocations and projected performance

This is portfolio is fairly well designed on a forward-looking basis---it is projected to generate 9.4% per year for a standard deviation in return of 10.0%. There is a fairly high allocation to commodities directly and via COP and EXC. To satisfy the risk constraint, I had to limit the emerging markets exposure. This portfolio also has a 45% allocation to TIPS, whereas the Ibbotson portfolio has a far less allocated to bonds as a class. One cause for this might be if QPP projected higher returns for TIPS than the Ibbotson analysis, but this is not the case. QPP's projection for average annual return for TIP is 5.1% per year and the Ibbotson composite analysis projects 5.3% for TIPS. The Ibbotson portfolio (their Table 17), using their hybrid forward-looking analysis, has 25.6% allocated to commodities, 22% to U.S. stocks, and 30.7% to foreign stocks. What is notable here is that this return is as good as I could find for this level of risk—and it is remarkably close to the 9.48% per year that Ibbotson ends up with for this level of risk. This portfolio is not estimated to reach the 1:1 ratio between return and risk, but its pretty close (0.95) in Ibbotson's analysis. Our moderate risk portfolio is remarkably similar to Ibbotson in its projections.

Aggressive Portfolio

With the limited set of investment alternatives under consideration, and the risk constraint of 15% for the annualized standard deviation in return, QPP's best portfolio is projected to return 11.4% per year---remarkably close to the 11.26% projected by Ibbotson at this risk level (QPP results are shown below).

Ticker	Percentage of Funds
TIP	21%
IWM	20%
EFA	14%
EEM	15%
^DJC	20%
COP	5%
EXC	5%
Portfolio Stats	
Average Annual Return	Standard Deviation(Annual)
11.4%	15.0%

Aggressive portfolio allocations and projected performance

The Ibbotson ***Aggressive*** portfolio has 57% allocated to international stocks, while QPP ends up with only about 29%. The details of the allocations are less important than the apparent limits in terms of the potential for future average return within these asset classes. As I discussed earlier, this is not an optimal global portfolio. With other more targeted sectors and individual stocks available for consideration, I can get a portfolio at this risk level closer to the 1-to-1 ratio between forward-looking return and risk (i.e. standard deviation).

Discussion

In my own research over the years, with a very wide array of possible portfolios, I have found what appears to be an effective limit between forward-looking return and risk in a portfolio. This limit, roughly a one-to-one ratio between return and risk for the risk levels typically associated with diversified equity-focused portfolios, has important implications for financial planning. I got a lot of interesting feedback on this concept. A number of investors hastened to point out that they had gotten far better than this ratio of return to risk over recent years---and this completely misses the point. Other readers noted that their 'efficient frontier' calculations using optimizers showed that it has been possible to generate far more return at a specific levels of risk – but of course these optimizers have the benefit of knowing the realized returns and volatility when they do their calculations. If you had that kind of perfect foresight, you wouldn't need to diversify.

The idea of a plausible limit of the returns that investors can plan on for a given level of risk is really important. Our estimates of the future are full of uncertainty, but we need to plan anyway. When I read Ray Dalio's article on this topic, his conclusions and practical validations added more support to this idea—not least because the proposed relationship between forward-looking return and risk was very similar to what QPP produces. When I read the Ibbotson article, I was struck by the similarities to my own results on this issue. The Ibbotson article focuses on generating forward-looking analysis of portfolios, with emphasis on finding the highest possible return at a given risk level. The forward-looking best-case portfolios generated by Ibbotson converge towards to the 1-to-1 ratio for moderate risk levels and fall somewhat short at higher risk levels. QPP's analysis yields similar forward-looking maximum returns to Ibbotson at the moderate and higher risk level (i.e. the ***Aggressive*** case) and the QPP universe of investments in this case was also limited to seven, with broadly similar exposure to the Ibbotson case. In some of our other studies, in which I had more latitude in terms of asset selection, I have been able to generate higher forward-looking expected returns for the 15% risk level, although none have exceeded the 1-to-1 ratio by any meaningful amount.

The exact details of the allocations are not the important thing. What is important is that these three very different models for forward-looking analysis (QPP, Bridgewater's model, and Ibbotson's models) converge towards a remarkably similar result. The fact that they agree does not make these analyses correct, but it certainly adds confidence. This result also has interesting implications with regard to the 'rationality' of markets in a broad sense. Certainly not least important in this discussion is that the agreement between QPP (run with default settings) and analysis from ***Bridgewater Associates*** and ***Ibbotson*** should increase confidence in QPP for operational use.

From a practical standpoint, these results suggest that the best approach to asset allocation is to use a good forward-looking analysis to find a portfolio that is projected to generate as close to a 1-to-1 ratio between expected return and standard deviation in return (i.e. risk) as you can get. If your long-term financial plan is predicated on getting more return per unit of risk than this, it may be a good idea to reassess. This 'limit' can be exceeded as you move to a portfolio dominated by fixed income instruments---we are talking about portfolios with substantial equity exposure here. The asset allocation process also requires good judgment and knowledge, of course. The best tools in untrained hands will not produce great works. The central result, that there appears to be a good agreement in the broad results from a set of very different forward-looking models, provides users with some confidence that the results from these models reflect the potential for diversification to add value in investing, and are not heavily dependent on the specific model details.

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*](http://www.quantext.com)

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