



Why an All-Fund Portfolio is Not Ideal

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One of the interesting issues in portfolio planning is as to the relative merits of investing in a portfolio of all mutual funds or ETF's as compared to including a strategic mix of individual stocks. This is a particularly important issue because many retirement plans do not allow their participants to invest in individual stocks. This is an issue that has long bothered me—so much so that when I set up the 401(k) plan for my company, I looked until I found one that supported investment in individual stocks. Plans that allow investment in individual stocks are few and far between, however. What this means is that participants in fund-only plans have to maintain separate accounts for individual equity holdings. There are a number of issues that have resulted in retirement plans not giving their participants the ability to choose their individual investments and I will not delve into these issues here. For a wide range of reasons, but with retirement plans playing a big role, the direct ownership of securities by individuals is quite low and dropping – as cited below from a talk by Vanguard founder, John Bogle:

“...direct holdings of stocks by individual investors have plummeted from 92 percent of all stocks in 1950 to only 32 percent today, as corporate control fell into the hands of giant financial institutions—largely pension funds and mutual funds—whose share soared commensurately, from 8 percent to 68 percent, a virtual revolution in ownership.”

Source: http://www.vanguard.com/bogle_site/sp20060208.htm

There are, of course, real costs to investors when investments are handled by ‘intermediaries’—the fund managers. Aside from the known costs, made painfully clear by the eminent Mr. Bogle (see link above), there are lesser-known portfolio impacts of building a portfolio from a set of funds.

The risks associated with investing in individual securities (as opposed to baskets of securities in the form of mutual funds or ETF's) are understood. If you invest in a small number of individual stocks, you are exposed to substantially higher risk of company failure or malfeasance. Further, many individuals tend to overweight the proportion of their assets in their employer's stock when this option is available—particularly when the employer stock is doing well. On the other hand, when you invest in individual stocks you pay no “annual fees” and you can control your distributions of gains. Mr. Bogle has

long focused attention on the long-term costs of fund fees and these are a major drag on many investors' portfolios. ETF's charge lower fees than mutual funds and can help investors to mitigate the long-term impact of fees on their portfolios.

There is another more subtle (but substantial) cost of building your portfolio out of funds—even low-cost ETF's—that is due to portfolio effects. This issue is not at all appreciated and I have yet to see an article that really details the problem with portfolios that are made up entirely of 'baskets' of securities (i.e. funds). To grasp the negative portfolio impacts of building a portfolio out of a series of funds, you must understand a bit of portfolio theory. What Harry Markowitz taught us with the invention of portfolio theory is that you can get a higher return relative to the risk that you bear if you combine assets in your portfolio that are not well correlated to one another. When you combine individual securities to build your portfolios, you are in the best position to exploit the positive portfolio effects of combining assets with low correlation. A mutual fund or ETF is typically made up of enough individual issues that the fund has captured some portion of the benefits of diversification internally. When you combine two funds in your portfolio, there is less potential for exploiting diversification effects than if you combined two securities with the same individual risk/return statistics. To start to appreciate these effects, you need to understand that the diversification benefits of combining assets in a portfolio effectively top out once you hit about twenty securities in your portfolio. This effect is well known. See, for example, this article from *Investopedia* on over-diversification:

<http://www.investopedia.com/articles/01/051601.asp>

The diversification benefits of combining ten individual stocks together in a portfolio are typically far greater than the diversification benefits of combining ten individual funds together in a portfolio (having accounted for any differences in risk in individual stocks and funds). This effect is present even without the impacts of fees and can easily be costing you 1%-2% in return per year.

This is all sounding pretty abstract, so let's get down to an example. I have started by creating a portfolio of ETF's and a couple of good Vanguard bond funds. This portfolio will look pretty 'diverse' by the standards of most investors and financial advisors.

Ticker	Name
IYY	iShares Dow Jones US Total Market Ind
IDU	iShares Dow Jones U.S. Utilities
IYM	iShares Dow Jone U.S. Basic Materials
ICF	iShares Cohen & Steers Realty Majors
VBIX	Vanguard Intermediate Term Bond Index
VBMFX	Vanguard Total Bond Market Index
ADRE	BLDRS Emerging Markets 50 ADR Index
ADRU	BLDRS Europe 100 ADR Index (ADRU)

Funds in the Portfolio

The portfolio components (above) include a broad market index as well as focused ETF's for utilities, basic materials, and REITS. There are two bond funds, and I have included an emerging markets fund and a European large-cap fund. I am not saying that this is an optimal mix of funds. This is an example case. We are going to look at the relative merits of adding some individual securities (XOM, C, EXC, and BA) to this mix. I selected these individual securities to keep default risk fairly low—these are large firms—and also to allow me to create an overall portfolio with similar total risk to the original (all fund) portfolio.

To build and analyze the portfolio, I have used our Quantext Portfolio Planner (QPP). This is a portfolio analysis tool that generates forward-looking projections of how a portfolio will perform, as well as analyzing historical performance. QPP uses historical data as inputs and then generates projections based on long-term relationships between risk and return in capital markets combined with the historical data. I have assumed a long-term average return of 8.3% per year for the S&P500, with a standard deviation of 15.07% per year—my standard baseline assumptions. To understand where these assumptions come from, see:

My initial all-fund portfolio is a fairly generic allocation, with 30% in the ‘all market’ fund, IYY, and 20% in bonds (below). The portfolio has a 20% allocation to international funds via ADRE and ADRU and some concentrations in utilities (IDU), basic materials (IYH), and REITS (ICF).

Fund Name	Percentage of Funds	Average Annual Return	Portfolio Stats					
			Average Annual Return	Standard Deviation(Annual)				
IYY	30.0%	9.02%	10.94%	15.62%				
IDU	10.0%	10.24%						
IYM	10.0%	13.38%	Historical Data					
ICF	10.0%	17.06%						
-	0.0%	-	Start:	End:				
VBIIX	10.0%	6.39%	6/1/2003	5/31/2006				
VBMFX	10.0%	4.78%	Average Annual Return	Standard Deviation (Annual)				
-	0.0%	-	15.27%	7.98%				
ADRE	10.0%	16.04%	Historical Beta: 88.40%					
ADRU	10.0%	14.95%	Historical Yield: 2.62%					
-	0.0%	-	Performance of S&P500 over historical period					
XOM	0.0%	20.59%	Average Annual Return on S&P500					
C	0.0%	13.81%	9.41%					
EXC	0.0%	14.37%	Annual Standard Deviation on S&P500					
BA	0.0%	18.86%	7.80%					
-	0.0%	-	Market Index (S&P500)					
-	0.0%	-						
-	0.0%	-	Average Annual Return	Standard Deviation (Annual)				
-	0.0%	-	8.30%	15.07%				
-	0.0%	-	<table border="1"> <tr> <td colspan="2">Simulated Portfolio Beta</td> </tr> <tr> <td colspan="2">88.40%</td> </tr> </table>		Simulated Portfolio Beta		88.40%	
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Sums to	100.0%		<table border="1"> <tr> <td>Diversification Metric:</td> <td>38%</td> </tr> </table>		Diversification Metric:	38%		
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All-Fund Portfolio

This portfolio has performed rather well over the past three years, the period from which we draw out historical data, with an average return of 15.27% per year and a standard deviation in annual return of 7.98% (*Historical Data* above). This portfolio has beaten

the S&P500 in terms of average return by almost 6% per year over this period, with about the same level of total volatility as S&P500 (as measured by standard deviation in return). The projected future performance (*Portfolio Stats*) of this portfolio is also pretty good, with an average annual return of 10.94% per year—2.6% per year better than the future performance of the S&P500 with only slightly more risk than the market as a whole. Note that this portfolio is projected to have a long-term volatility that is about twice what it has generated over the past several years—but this is a consequence of our standard assumption that market volatility will revert to its long-term average as opposed to the very low levels that we have seen over the past few years. For more discussion of where we get assumptions about total market volatility, see the following article:

<http://www.quantext.com/MarketRisk2.pdf>

The all-fund portfolio has a Beta of 89% and the mix of stocks has allowed us to increase the return relative to total risk in the portfolio by combining high Beta and low Beta assets together. To really make the most of portfolio effects, you need to exploit low correlation between the non-systematic returns of the portfolio components. The degree to which we have accomplished this is measured by the *Diversification Metric (DM)* in QPP. If the non-Beta components of returns (i.e. the fraction of return that is not driven by the market as a whole) are perfectly correlated, the *Diversification Metric* has a value of 0%. As the non-systematic components of return are less correlated, the value of the *Diversification Metric* increases. The value of 38% for the *DM* for this portfolio is quite good but not optimal. For realistic portfolios with this level of risk tolerance, the maximum levels of the *DM* that I have been able to generate are between 50% and 60%. Note that *DM* is an indicative metric. The higher the value of *DM*, the higher the average return relative to total portfolio risk that you can achieve.

The total portfolio return for a given level of risk is constrained because this portfolio consists of assets that are already somewhat diversified—they have already exploited some potential diversification effects internally and these are already reflected in the risk/return balance of the individual assets. If we were to replace one of these funds with a single stock that had the same average return and standard deviation, we have the

potential for a far more significant portfolio diversification impact. Obviously this is not true for all possible stocks, but lowering the weight in a fund and raising the weight in an individual equity has good potential to improve the overall portfolio diversification benefits which equates to raising the average return for a given total portfolio risk.

After a bit of experimentation, I came up with a mixed portfolio that includes the funds along with allocations into some of the aforementioned individual stocks (below).

			Portfolio Stats	
Fund Name	Percentage of Funds	Average Annual Return	Average Annual Return	Standard Deviation(Annual)
IYY	5.0%	9.02%	12.89%	14.85%
IDU	5.0%	10.24%		
IYM	5.0%	13.38%		
ICF	5.0%	17.06%	Historical Data	
-	0.0%	-	Start:	End:
VBIX	11.0%	6.39%	6/1/2003	5/31/2006
VBMFX	10.0%	4.78%	Average Annual Return	Standard Deviation (Annual)
-	0.0%	-	18.97%	7.33%
ADRE	15.0%	16.04%	Historical Beta: 71.99%	
ADRU	5.0%	14.95%	Historical Yield: 3.16%	
-	0.0%	-		
XOM	0.0%	20.59%	Performance of S&P500 over historical period	
C	13.0%	13.81%	Average Annual Return on S&P500	
EXC	13.0%	14.37%	9.41%	
BA	13.0%	18.86%	Annual Standard Deviation on S&P500	
-	0.0%	-	7.80%	
-	0.0%	-		
-	0.0%	-		
-	0.0%	-		
Sums to	100.0%			
<div style="border: 1px solid black; padding: 5px; text-align: center;"> Simulated Portfolio Beta 71.99% </div>			Market Index (S&P500)	
			Average Annual Return	Standard Deviation (Annual)
<div style="border: 1px solid black; padding: 5px;"> Diversification Metric: 56% </div>			8.30%	15.07%

Portfolio Mix of Stocks and Funds

The mixed portfolio that I ended up with has markedly higher *historical* and *projected* average return than the all-fund portfolio, with less risk (i.e. lower standard deviation in returns). The inclusion of a significant concentration into Citigroup (C), Excelon (EXC), and Boeing (BA) allowed the portfolio to substantially increase the benefits of diversification. The portfolio is projected to generate 2.6% more in average return with slightly less risk than the all fund portfolio. The difference in historical performance is even more impressive, but we all know that using trailing performance as a forecast of future performance is a recipe for problems. While XOM (Exxon Mobil) was a candidate for inclusion, it did not help in building a portfolio with the risk constraints that I set forth, largely because XOM is extremely volatile and the portfolio effects just weren't too impressive.

I was able to generate the higher total portfolio returns with less risk because of improved portfolio diversification effects between the non-systematic returns of the portfolio components. This is exactly the effect described earlier. The individual equity components have more potential for adding diversification effects to the portfolio than the funds because the funds' risk / return balance reflects a considerable fraction of the available diversification effect that has already been exploited between the stocks that make up the fund. We see the impact of the inclusion of individual equities very clearly when we look at the *Diversification Metric (DM)* value of 56%. This is much higher than the 36% from the original portfolio. The higher value of DM means that the non-systematic volatility in returns (the fraction of returns that are not explained by moves in the broader market) offset each other better between these assets.

The benefits of adding individual equities to a portfolio made up mostly of funds are easily explained from portfolio theory (for standard presentations see the *Investopedia* article cited above or *A Random Walk Down Wall St*), but most investors don't grasp the implications of this issue for their own portfolios. Investing in a number of funds has the benefit of lowering your exposure to the default risk of any individual firm, but an all-fund portfolio diminished your ability to fully exploit the only real 'free lunch' available to investors: diversification effects. While most individual investors feel more

comfortable investing in mutual funds or ETF's for their simplicity and the desire to minimize stock-specific risk, it does not take a lot of work with QPP (or with a careful analysis of historical data for that matter) to demonstrate the value to the overall portfolio of having a substantial allocation into a small number of well-chosen individual stocks. Three individual stocks (as shown here) will typically be too few for a real application, but five to ten individual stocks should be plenty to effectively maximize diversification effects in a portfolio with broad exposure to asset classes via ETF's or low-cost mutual funds. My analysis suggests that many investors can generate an average of 1% to 2% (or more in the case shown here) per year in additional return (for a given level of total portfolio risk) by investing in perhaps 1/4 to 1/3 of their portfolios in a small number of high-quality individual stocks. To really calculate the effects, you must run the numbers of course.

*Note: The **Quantext Portfolio Planner (QPP)** and **Quantext Retirement Planner (QRP)** are the only tools available to individual investors and financial advisors that I am aware of that are capable of effectively accounting for total diversification effects (systematic and non-systematic) and the ability to capture these effects is very important in building your best portfolio to capture the benefits discussed in this article. For more information on this issue, see our recent article on this topic:*

<http://www.quantext.com/TrueDiversification.pdf>

More information on **Quantext Portfolio Planner** and a free trial are available at <http://www.quantext.com/gpage3.html>