SelectAlts
Wisely Managed Absolute Return Portfolios

HOW DO YOU MEASURE DIVERSIFICATION?

Most people intuitively understand the appeal of **diversification**—spreading your risks around so that if something goes wrong in one investment hopefully some others will be doing well. Some say that diversification is the "only free lunch in investing."

The usual way of measuring diversification is with a statistic called "**correlation**," which measures how two assets behave relative to one another. Correlations vary between -1 and +1. Two assets that go up and down in perfect lockstep together have a correlation of +1 (although they do not necessarily go up or down by the same percentage). Two assets that always go in opposite directions have a correlation of -1. Two assets that have no statistical relationship to one another have a correlation of zero.

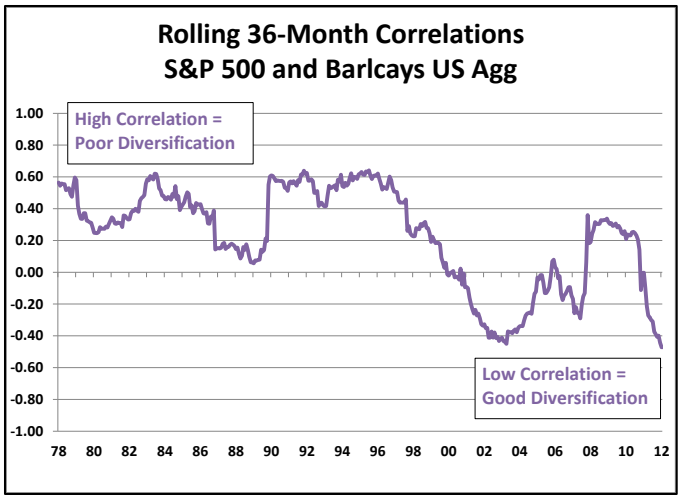
The lower (or more negative) the correlation between two assets, the better they diversify each other. Most equity-oriented asset classes have positive correlations with one another. The exhibit below is a "**correlation matrix**" of major asset classes since December 31, 2002. (The start date was chosen based upon the earliest available data for the frontier market return series.) The highest correlations (+1) are in red and the lowest are in green. Note that the only non-equity asset class, Barclays US Aggregate Bond Index, is the only one that had an extremely low correlation with other asset classes. Bonds have done a very good job of diversifying stock risk on average since 2002, but most equities were somewhat correlated, and in many cases, highly correlated.

Monthly Return Correlations
12/31/2002 - 10/31/2013

	S&P 500	Barclays US Agg	Russell 2000	S&P 500 Growth	S&P 500 Value	MSCI EAFE	MSCI Emerging Markets	MSCI Frontier Markets	FTSE NAREIT	FTSE EPRA/NAREIT
	US Stocks	US Bonds	US Small Stocks	US Growth Stocks	US Value Stocks	International Developed Market Stocks	International Emerging Market Stocks	International Frontier Market Stocks	US Real Estate Stocks	Global Real Estate Stocks
S&P 500	1.00									
Barclays US Agg	0.04	1.00								
Russell 2000	0.92	-0.05	1.00							
S&P 500 Growth	0.98	0.04	0.89	1.00						
S&P 500 Value	0.98	0.04	0.92	0.92	1.00					
MSCI EAFE	0.89	0.12	0.81	0.88	0.88	1.00				
MSCI Emerging Markets	0.80	0.13	0.76	0.80	0.76	0.89	1.00			
MSCI Frontier Markets	0.59	0.01	0.50	0.56	0.59	0.64	0.60	1.00		
FTSE NAREIT	0.76	0.20	0.78	0.71	0.78	0.69	0.61	0.42	1.00	
FTSE EPRA/NAREIT	0.85	0.24	0.82	0.81	0.85	0.87	0.80	0.56	0.92	1.00

The table above presents an average correlation over a very long time period (the 130 months since December 31, 2002). The reality is that correlations tend to be very unstable, that is, they vary quite a bit over time. Generally, more recent correlations (say over the latest 36 months) will provide a more accurate forecast of future correlation than a very long-term average.

For example, the graph at right shows how the correlation between the S&P 500 (an index of large-cap U.S. stocks) and the Barclays US Aggregate (an index of U.S. bonds) has varied over time. In this case, rather than the full time period, correlations are measured using rolling 36-month calculations. Prior to the internet/telecom bubble, the correlation between these two asset classes had been solidly positive, but afterward, the relationship turned more negative, with more variability.



What has changed? The most likely answer lies with investor psychology. Bonds are much less volatile than stocks most of the time, and investors have generally shifted their assets towards bonds in the face of stock market downturns. This has the effect of further driving down the price of stocks and driving up the price of bonds, lowering their correlation. Ameliorating this **risk premium** effect is the fact that both stocks and bonds are similarly affected by changes in interest rates. Both stocks and bonds are priced based upon the present discounted value of future cash flows—dividends in the case of stocks and coupon interest payments in the case of bonds. A change in the **discount rate** would similarly affect both stocks and bonds, causing them to move together. Investors have suffered through two enormous stock market declines since 2000, and this may have caused changes in the equity risk premium to have become much more volatile (causing stocks and bonds to move in opposite directions), swamping the discount rate effect (which would cause stocks and bonds to move in the same direction).

The **discount rate** is the interest rate level that equates the future cash flows of a financial asset with its present value or price. With bonds, all cash flows are known, and the discount rate is the yield-to-maturity. With stocks, future dividends are uncertain, which helps to explain why stock prices are much more volatile that bond prices.

A **risk premium** is that part of the discount rate that compensates investors for assuming certain kinds of risk. The other part of the discount rate is known as the risk-free rate, which measures the interest rate on a riskless investment—generally U.S. T-bills. Bonds generally have a much lower risk premium than stocks, but both kinds of risk premiums are dynamic.

Particularly since the Great Recession of 2008, the capital markets have been described as "risk on/risk off," a sort of mass bipolar disorder in which investors either greedily rush into stocks and out of bonds, or stampede in the other direction out of fear. The natural result has been a negative correlation between stocks and bonds. It is uncertain how long this may last.

Combining asset classes with low correlations can significantly lower the volatility of portfolio returns. The usual way of measuring volatility is with a statistic called "**standard deviation,**" which is a measure of the variability of returns, generally monthly returns. The calculation of standard deviation can be based upon either actual historical returns or based upon a forecast.

Under certain assumed conditions (the most important of which is that returns are **"normally distributed"** in a bell-shaped curve around the average return), the full distribution of expected returns are given by just two numbers: the expected mean (average return) and the expected standard deviation. For example, if an asset has a an expected return of, say, 10%, and an expected standard deviation of, say, 15%, then roughly two-thirds of the time the annualized return will fall between -1 and +1 standard deviations around the mean. That is, about two-thirds of the returns will fall between -5% and +25%. Similarly, about 95% of the observations will fall between -2 and +2 standard deviations, or -20% and +40%.

Negatively correlated asset classes can do wonders to lower the volatility (standard deviation) of a portfolio, as the graph below illustrates. The two assets used are the S&P 500 and the 10-Year Treasury Bond. We assume the following:

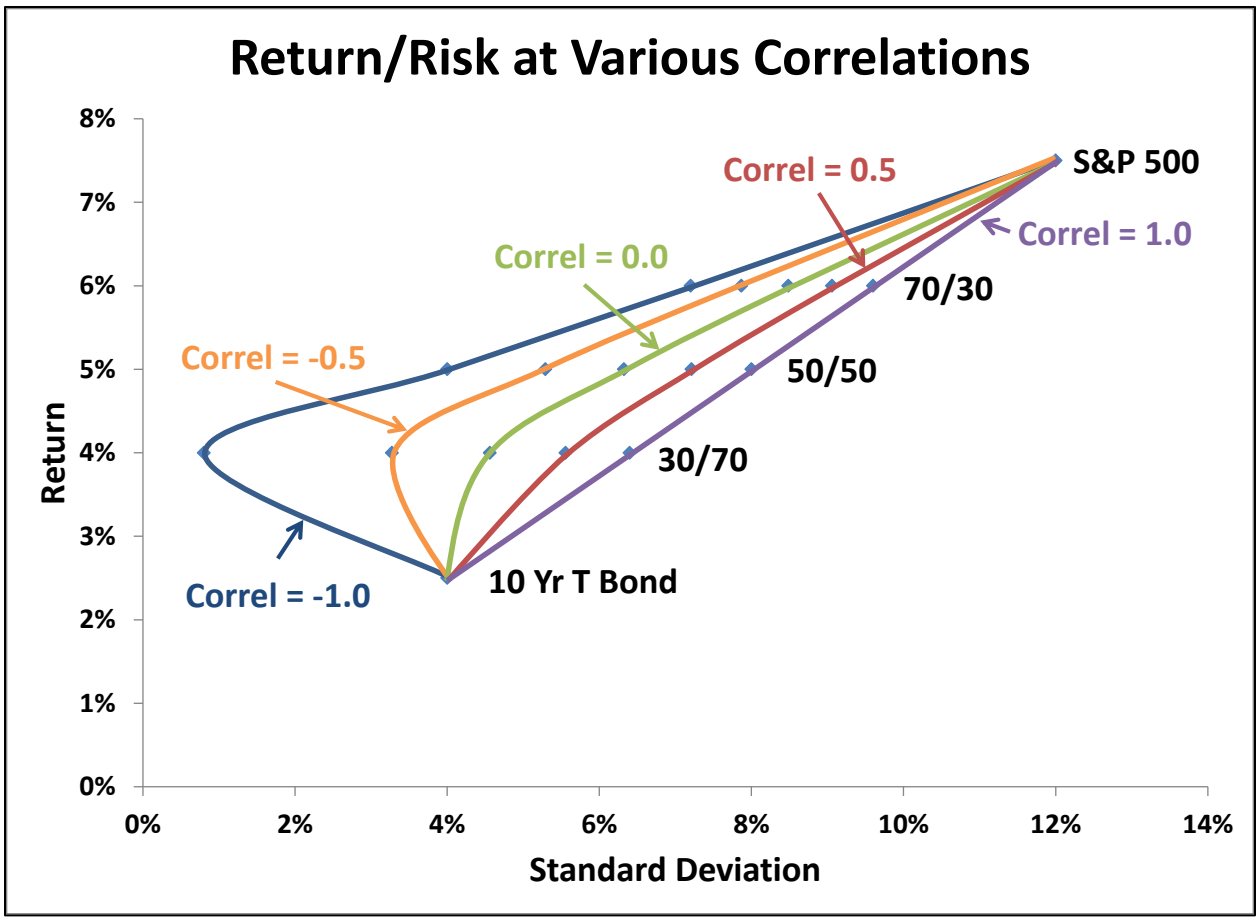
	S&P 500	10-Year Treasury
Expected Return	7.5%	2.5%
Expected Standard Deviation	12.0%	4.0%

We illustrate three portfolio combinations of these two assets:

	S&P 500	10-Year Treasury
Aggressive Portfolio	70%	30%
Moderate Portfolio	50%	50%
Conservative Portfolio	30%	70%

Holding constant all of the assumptions above, we show the incremental effects of five different assumed correlations between the two assets. Note that the expected return for each of the three portfolios remains the same regardless of the assumed correlation—correlation affects only expected standard deviation, not expected return.

The purple line is the extreme case of perfect correlation (+1.0) between the two assets, which results in no diversification benefit and no risk reduction. The red line is a correlation of +0.5, a realistic level with a modest but important level of risk reduction. The green line is a zero correlation between the two assets, and a significant reduction in risk. With the introduction of a -0.5 correlation in the orange line we get a "bend back" extreme risk reduction such that conservative portfolio actually has less risk than the 10-Year Treasury Bond alone. The dark blue line is the extreme case of a -1.0 correlation and a commensurately extreme level of risk reduction.



Any improvement in the return/risk tradeoff is worth pursuing, and can amount to significant differences in **ending wealth**. For example, the 50/50 portfolio under the assumption of a -1.0 correlation has exactly the same 4% standard deviation as the 10-Year Treasury Bond, but instead of an expected return of 2.5% (roughly the current yield-to-maturity), the expected return on the 50/50 portfolio is 5%.

A retirement nest egg of $1,000,000 will compound to $1,638,616 over 20 years at 2.5%. However, it will compound to $2,653,298 over 20 years at 5%, a difference of $1,014,681. That's about 62% more ending retirement wealth, which could make quite a difference in lifestyle!

It pays to diversify. And the best diversification is found among the investments with the lowest correlation to each other.

Kevin Means, CFA
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October 24, 2013

SELECT ALTERNATIVE INVESTMENTS LLC

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