How Some Managers Walk the Line

Analyzing Linear Regressions of Active & Passive Funds

Marc Odo, CFA®, CAIA®, CIPM®, CFP® | October 12, 2017 | Swan Blog

In a recent Swan blog post, we explored how the active-vs-passive debate misses the point by failing to discuss what investors care about most: absolute performance and risk management. In this post, we will dive deeper by analyzing the broad market's impact on a variety of manager types.

The technique we will use for this analysis is referred to as a linear regression. It's called a linear regression because you literally draw a straight line through a scatterplot of a manager's returns and the benchmark. The goal of the linear regression is to get a line that best fits the data. Alpha, beta, and R-squared (R^2) are generated via a linear regression.

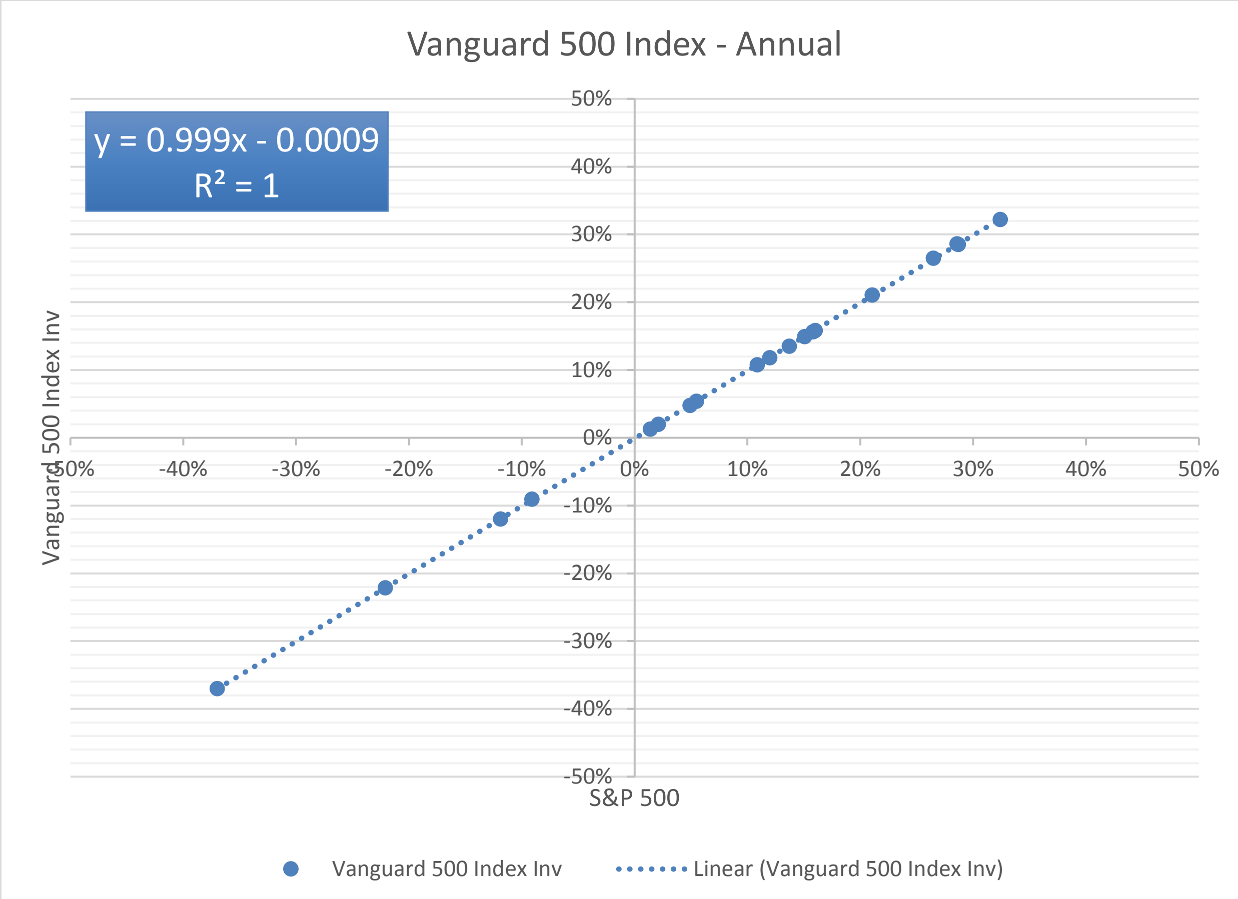
From a statistical standpoint, this is a well-established technique. But from an investing standpoint, does it really make any sense to track that line of best fit? If the market is down -30%, -40%, or -50%, shouldn't the investor try to be as far away from that market line as possible?

To explore this further, we analyze the impact of systematic risk on four types of strategies, namely:

1. A pure passive manager, represented by Vanguard 500 Index
2. A traditional active manager, represented by Growth Fund of America
3. A factor-driven/smart beta strategy, represented by DFA US Large Cap Value
4. A hedged equity approach, represented by Swan's Defined Risk Strategy

The Passive Manager: Vanguard 500 Index

Below we see a linear regression for the Vanguard 500 fund (VFINX) from January 1998 to December 2016 using annual returns. There are no surprises here. Its plot points are immediately recognizable. The -37.02% return was 2008, the +32.18% return was 2013, et cetera. The returns of the passive fund track the S&P 500 index as closely as possible; the fund is doing exactly what it should be doing. But the problem is when the market tanks, the fund tracks it down in lock-step. In essence, it IS the market.

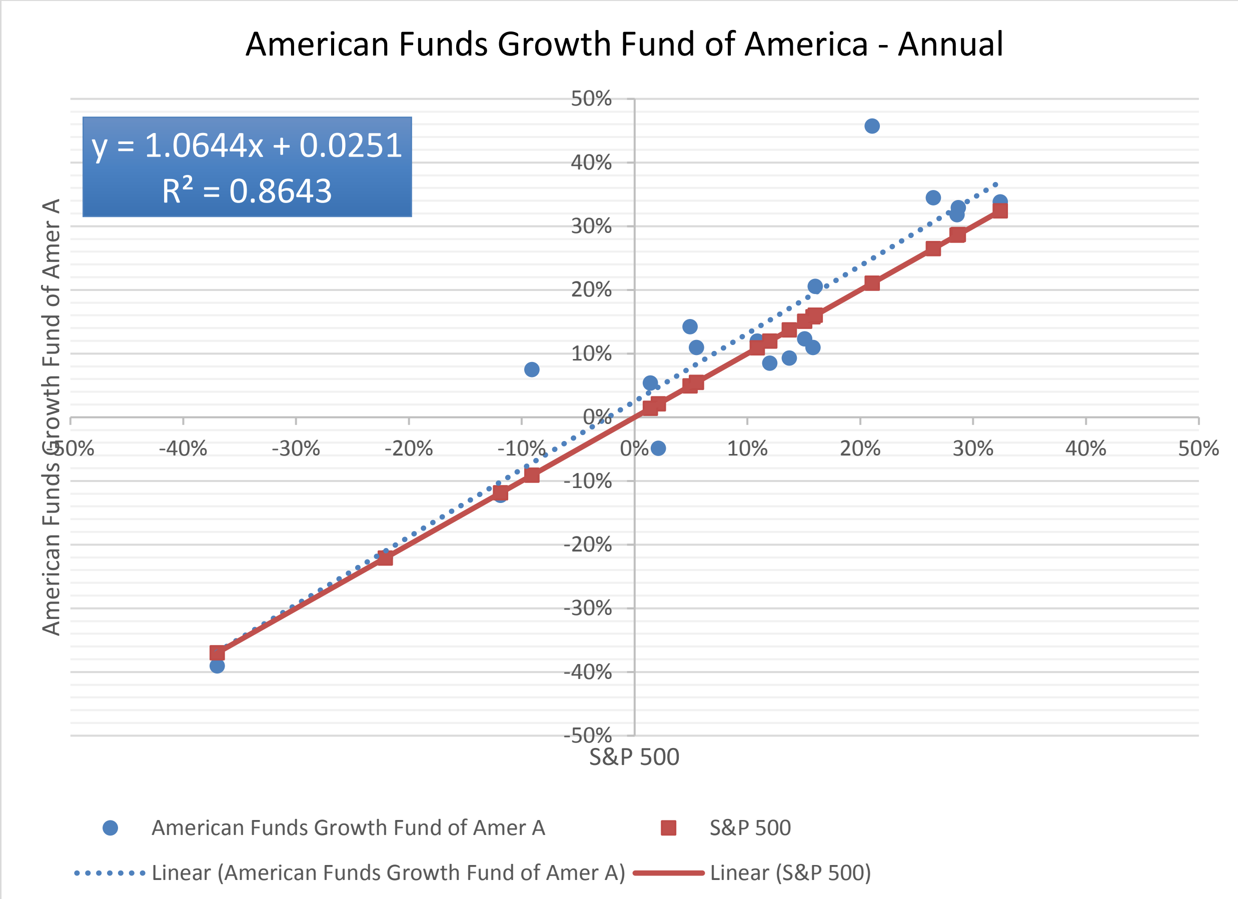


Source: Zephyr StyleADVISOR, Swan Global Investments

Essentially, the equation for the regression is the capital asset pricing model. The 0.999 coefficient is the slope of the line, also known as beta. The y-intercept of -0.0009 is the alpha, which is slightly negative due to fees. We see the R^2 as a perfect 1 (or 100%) meaning the 100% of the variance of returns in the fund is explained by the variance of returns in the benchmark.

The Traditional Active Manager: Growth Fund of America

Let us now look at a traditional active manager. In this case, we are looking at one of the most popular funds in existence, the Growth Fund of America (AGTHX). Again, we will use the time frame January 1998 to December 2016 and annual returns.

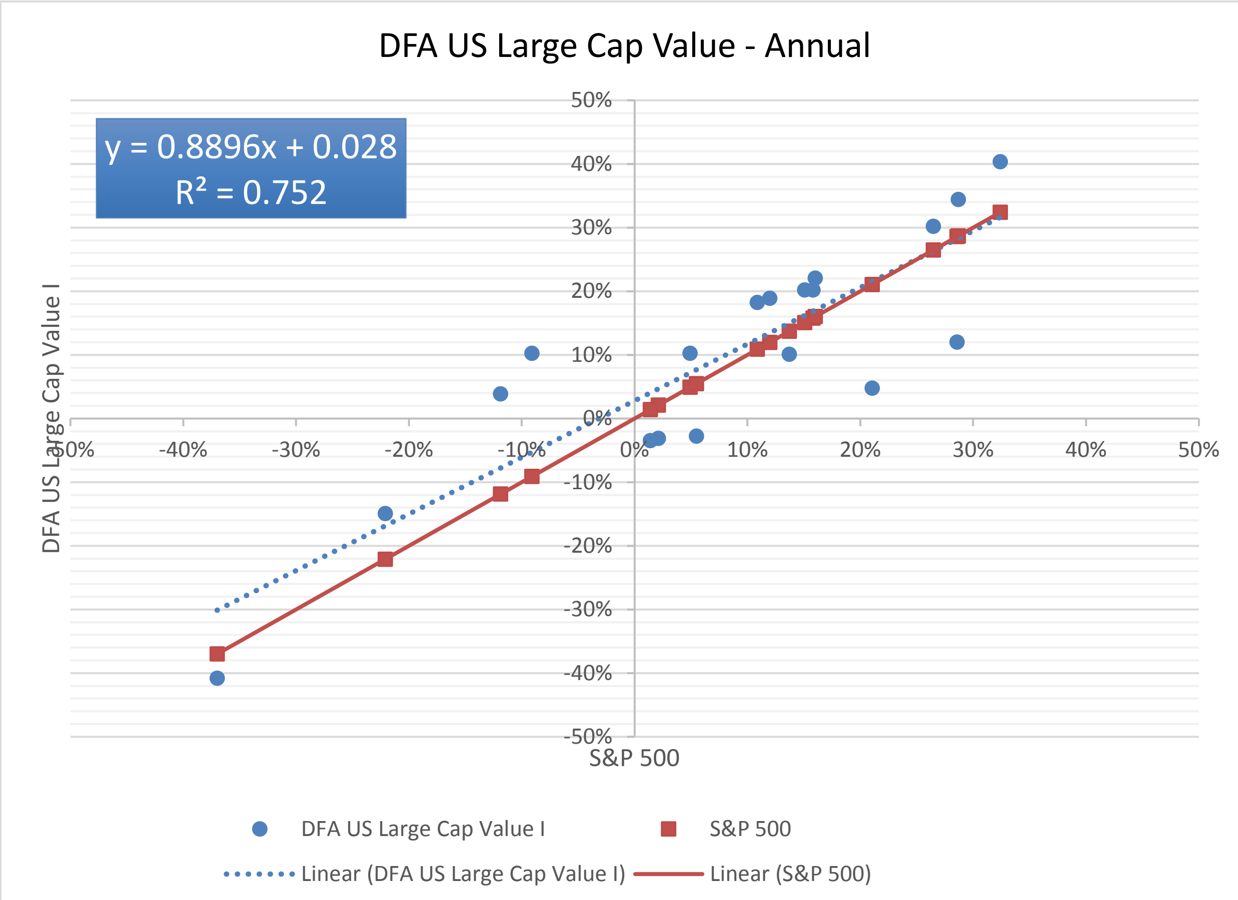


Source: Zephyr StyleADVISOR, Swan Global Investments

Unlike the Vanguard index fund, the straight red line of the S&P 500 does not perfectly fit this data. However, it isn't very difficult to draw the blue dotted line through the scatterplot and come up with a solution that captures 86.43% of the variance of returns. We see Growth Fund's beta being slightly above 1.0 as the coefficient is 1.064 and we see a positive alpha, even after taking into account fees. But seeing how closely the individual dots hug the red line of the S&P 500, we can conclude that systematic risk is the primary driver of performance.

The Factor-Driven Strategy: DFA US Large Cap Value

What about a factor-driven, "smart beta" strategy, like DFA US Large Value (DFLVX)? Even though this is classified as a large cap value fund, the majority of its returns can be explained by the S&P 500 (red line). There is slightly more dispersion from the best fit line than we saw with Growth Fund of America, and there is positive alpha in this regression. But it is still safe to say by looking at the blue dotted line that the DFA fund has a linear relationship with S&P 500 market, for better or worse.

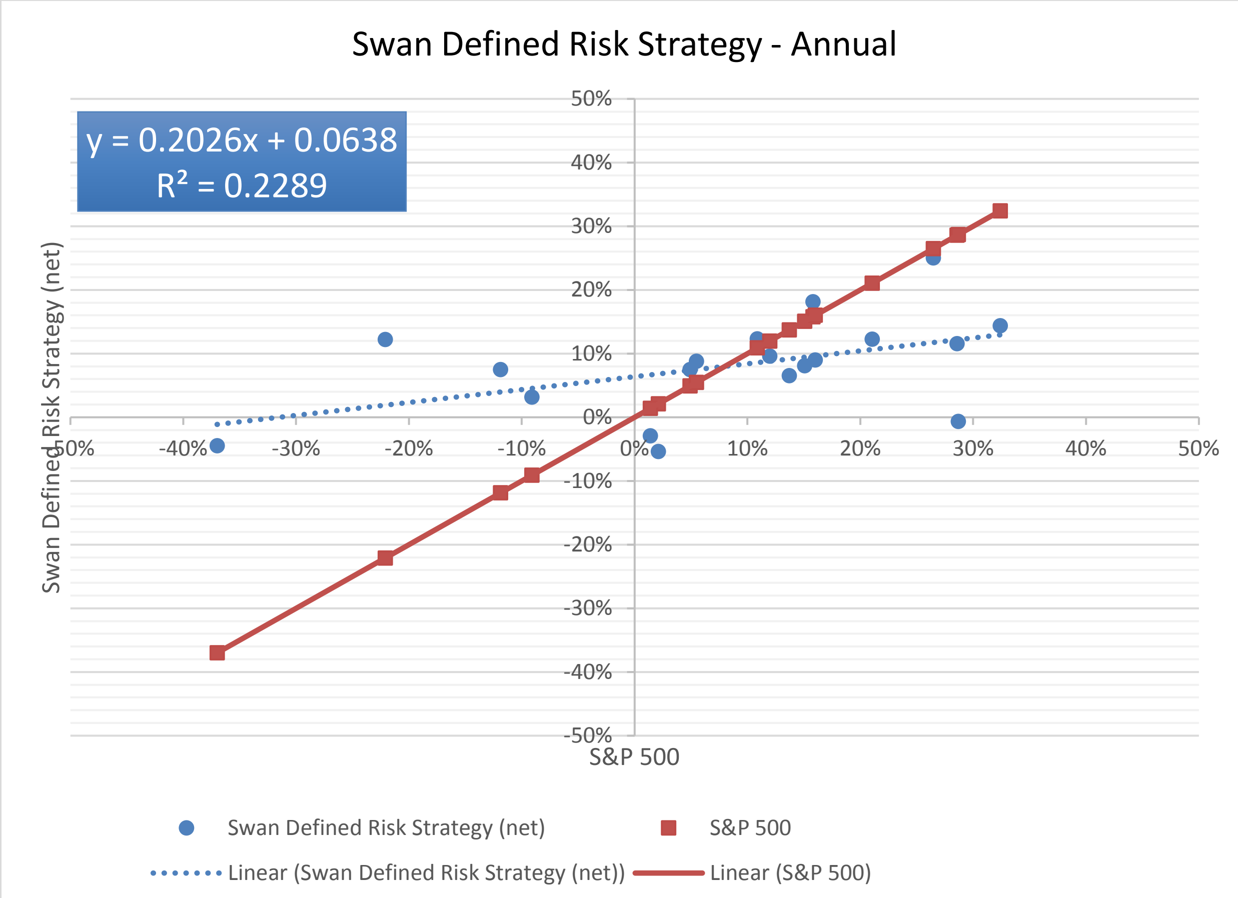


Source: Zephyr StyleADVISOR, Swan Global Investments

With both Growth Fund of America and DFA US Large Value we see that the market risk is the primary driver of both positive and negative returns. Broadly speaking, a bad year in the market equates to a bad year for the stock-picker or the factor fund. On the flip side, a good year in the market will mean a good year for either strategy.

The Hedged Equity Approach: Swan's Defined Risk Strategy

Finally, let's turn our attention to the Defined Risk Strategy. The dots of the scatterplot are much "flatter" than the red market line, meaning the beta is low. The DRS lacks some of the upside of the market, but more importantly, avoids a good portion of the downside. It is possible to draw a line through the data, but the blue, dotted regression line doesn't do a very good job of explaining the DRS's performance. The R^2 "goodness of fit" is only 22.9%. There is positive alpha, meaning there has been an excess return harvested for the amount of risk taken.



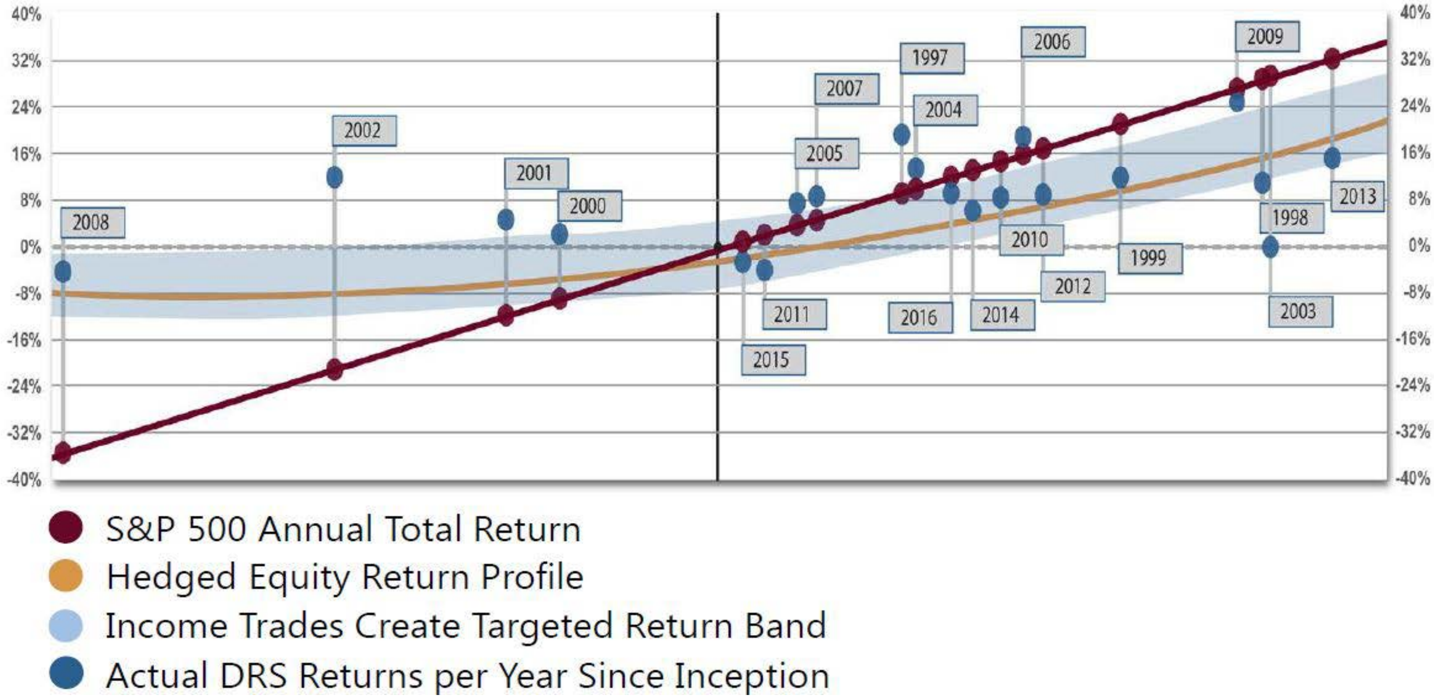
Source: Zephyr StyleADVISOR, Swan Global Investments. DRS returns are from the Select Composite, net of all fees. NOTE – this chart is for illustration purposes, not a guarantee of future performance. The charts and graphs contained herein should not serve as the sole determining factor for making investment decisions.

The reason why the DRS has such a unique regression is because of its hedging. Even though the markets were down in 2000, 2001, 2002 and 2008, the DRS participated little in those bear markets. There haven't been any double-digit calendar year losses. Two of the negative years occurred during flat years in the market when the carrying cost of the hedge wasn't offset by gains in the equity market or premium collection income (2011 and 2015). There haven't been many years of extremely outsized returns, but most of the annual returns fall into a rather tight range, regardless of market conditions.

This, of course, is all by design.

The DRS does not want a linear relationship to the market. The DRS seeks to participate in markets when they are rising, but actively hedges against downward moves.

The goal of the DRS is illustrated by a target return band. The target return band is one of the key concepts or tools we use at Swan.



Source: Swan Global Investments. The S&P 500 Index is an unmanaged index, and cannot be invested into directly. DRS returns are from the Select Composite, net of all fees. NOTE – this chart is for illustration purposes, not a guarantee of future performance. The charts and graphs contained herein should not serve as the sole determining factor for making investment decisions.

The diagonal red line is the profit-loss diagram for the S&P 500. The curved gold line represents the return profile of the DRS's hedged equity position: the buy-and-hold position in the market combined with the protective elements of the hedge. The gold line lags the S&P 500 in up markets but is still upward sloping. In down markets, the hedged equity positions flatten out as the S&P 500 continues to drop. The grey-blue area around the gold curve is the anticipated range of impact from overlaying Swan's short-term premium collection trades over the hedged equity position. It is our goal that returns of the DRS will be within or above the blue shaded area. In 19 of 20 years, they have been.

For an in-depth discussion of the target return band please refer to the blog post, "The Target Return Band."

Vanguard, American and DFA were chosen as representatives for the different investment approaches due to their popularity with investors and their long track records. However, based upon the results seen in the first section, I could have run similar regression analysis on just about any of the 1,451 mutual funds in the domestic equity space, and the vast majority of funds would have had scatterplots that looked very similar to American or DFA. This is why at the outset of the paper we made the claim that the decision between active and passive management is not the debate we should be having. The real risk to an investor, the risk we should be focused upon, is systematic risk.

About the Author:

Marc Odo, CFA®, CAIA®, CIPM®, CFP®, Director of Investment Solutions, is responsible for helping clients and prospects gain a detailed understanding of Swan's Defined Risk Strategy, including how it fits into an overall investment strategy. Formerly, Marc was the Director of Research for 11 years at Zephyr Associates.

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