Optimizing Portfolio Allocations Using Excess Returns
A Case Study

We recently received a call from The Directed Account Plan (formerly TWA Pilots). The Directed Account Plan provides participants with a menu of model portfolio multi-manager investment choices. Each multi-manager investment option has a specific objective (e.g. large U.S. growth) and managers in the portfolio all manage their portfolios toward that similar objective. The Investment Board was looking for a method to create an efficient allocation within each model investment option to managers with a similar style that would produce a high alpha and a low tracking error to the style specific benchmark. Traditional asset allocation helps us make an allocation decision between dissimilar assets but provides little help in answering this manager allocation decision among managers which are similar in objective and style.

Assuming that we have already decided how much of a portfolio to allocate to large growth, for example, how should we allocate resources between the plan's five large growth mutual funds?

Traditional methods of asset allocation break down at this level because managers with similar styles have very high correlations to each other. When managers have high correlations to each other traditional optimization methods find no advantage to diversification and will place all of the assets with the manager with the highest risk-reward ratio. This traditional solution does not address the plan's goal of creating a mix of funds within each style that has a high excess return and low tracking error to its benchmark. To create an efficient mix of managers that diversifies across manager skill, we suggested optimization using excess returns of each of the managers. The result is then an efficient frontier that gives the highest possible excess return for every level of tracking error.

There are two reasons why one would want to optimize using excess returns. The first reason would be in the case of a plan like The Directed Account Plan which is offering strategies that contain multiple managers of the same style. In this scenario the plan desires to maximize the excess return of the group of managers but also keep the tracking error to their benchmark in check. The second reason would be to diversify the excess return across the managers. The second idea is a little more esoteric but if you assume that each manager obtains his excess returns in a different manner it makes sense. To simplify this idea, just compare it to the effects of having a diverse portfolio, where at any given time, a couple of assets may be underperforming, but the returns of the assets that are outperforming will keep the portfolio in the black. By diversifying your excess returns you can help increase the chance that there will always be performance above the benchmark.

What are the differences in this method versus traditional asset allocation?

As an example let's look at the large growth managers included in the Large Growth strategy in the plan. The inputs for traditional optimization are expected return,

expected risk and correlations between managers. AllocationADVISOR then calculates the arithmetic mean return, standard deviation and correlations of the historical monthly returns to create these inputs. However, for purposes of allocating assets among managers of similar styles, we input a time series of risk-adjusted excess returns to create the inputs for the optimization. In essence we optimized the portfolio with data similar to that of alpha. This risk-adjusted excess return is used as a substitute to the expected return series normally used in traditional asset allocation (the Y axis). AllocationADVISOR also creates a standard deviation of the excess return series, thus calculating an expected tracking error to use as what would normally be thought of as expected risk (the X axis). The correlations calculated by AllocationADVISOR are now the correlations of excess returns between managers, which is much lower than the correlations of the returns of the managers.

Create your own allocations using this method.

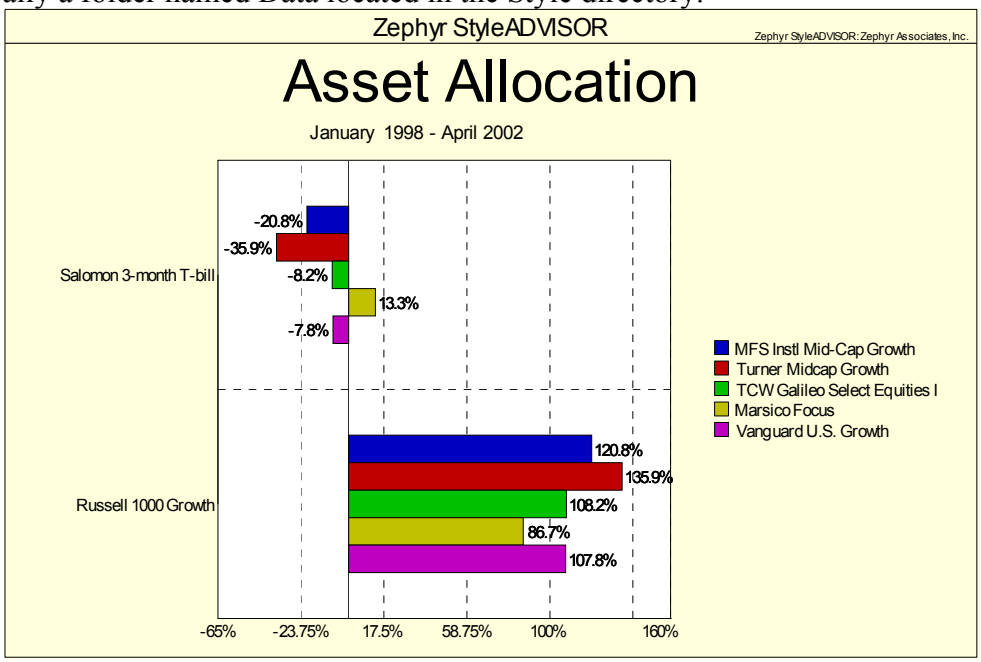
It takes only a few simple steps to create an analysis like this in AllocationADVISOR. First, we create the excess return series in StyleADVISOR. To do this, choose the Blank Workbook template from the StyleADVISOR task wizard and drag the Asset Allocation Graph into the blank sheet. You will now be prompted to select the managers and the other parameters for this workbook. Select all the managers that you want to optimize; you can select mutual funds, separate account composites, etc. For this case we will use 5 growth mutual funds; MCGEX, TMGFX, TGCEX, MFOCX, and VWUSX.

Once the funds have been selected, click on the Indices button that is on the left side of the Analysis Information dialogue box. Delete all of the indices except for cash and the Russell 1000 Growth. The index and cash are going to be used to create our excess return series for each of the funds.

Risk adjusting the benchmark is the final step. Select the Parameters tab in the Analysis Information dialogue. Since some managers are inherently riskier than others, we are going to let the optimizer raise the bar for their benchmark. To do this we must allow the optimizer to short the cash equivalent in order to lever up the allocation to the Russell 1000 Growth. This allows a high beta manager to have a benchmark that has more than 100% allocation to the benchmark (investment style). This negates any extra return a fund might have gained by taking on extra risk. This will be easier to see once you have run the entire analysis. Next select the Parameters page and then select the constraints section on the right. Click on Individual, and give the Salomon 3-month T - bill a low bound of -100. This will allow the optimizer to create a risk adjusted single index benchmark for the funds.

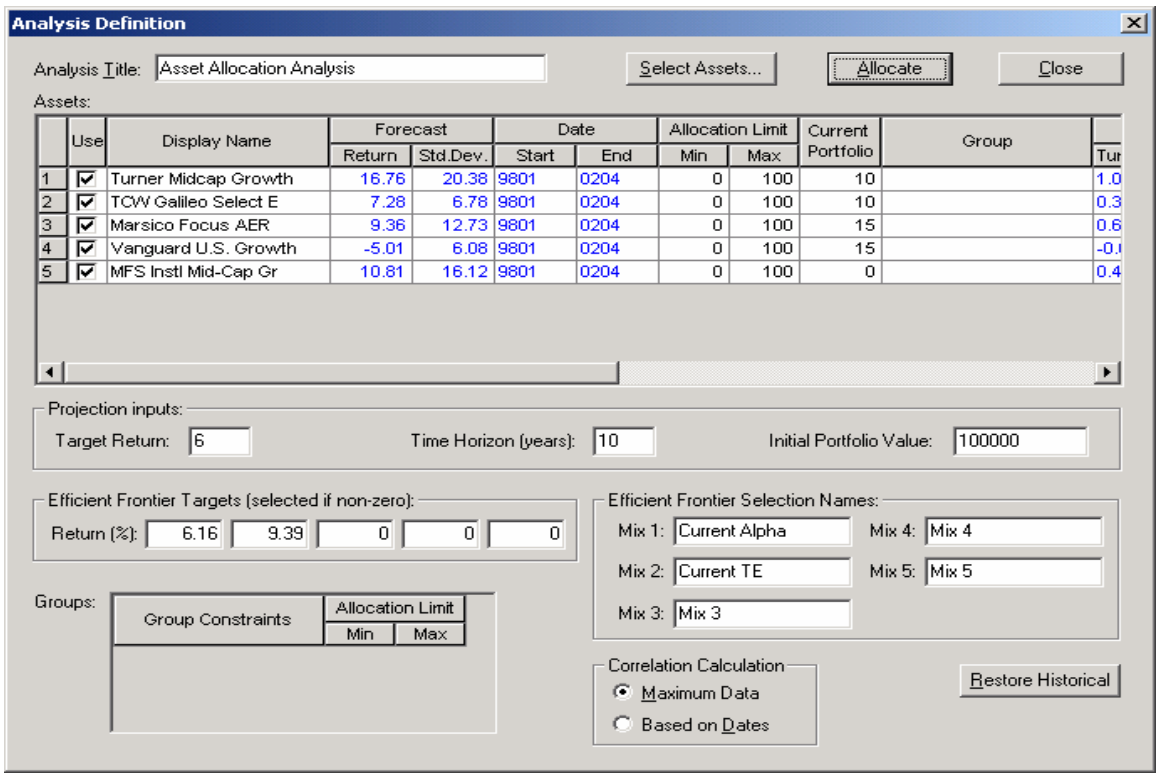
You should now have a bar graph displaying the custom risk adjusted benchmarks for each fund. The higher beta funds such as Turner Midcap Growth will get the largest percent shorted in cash, while the low beta managers will have long allocations in cash to account for their lower volatility. Now export the excess returns for use in AllocationADVISOR by right clicking anywhere on the Asset Allocation graph and

choose Export…Excess Returns vs. Style Benchmark as Series. Save these files to your data directory so that they can be accessed by AllocationADVISOR. The data directory is typically a folder named Data located in the Style directory.



Allocate your funds in AllocationADVISOR.

Once the excess returns generated in StyleADVISOR are saved open AllocationADVISOR and select New Analysis, this will open the Analysis Definitions dialogue box. Click on Select Assets and pick the 5 excess return series from the Managers in Home Directory Database. Once selected the forecasted return will be the expected excess return while the forecasted standard deviation will now represent the expected tracking error for each fund. By scrolling to the right you will see a correlation matrix of all the excess returns. The correlations of excess returns are generally much lower than the correlation between the manager's returns. These lower correlations can be explained by the fact that these funds get their excess return through different methods of stock selection, so there will be a benefit provided by diversifying the excess returns. You'll notice that the Vanguard U.S. Growth fund has a negative expected return. This negative excess return is not detrimental to our portfolio because of its very low tracking error and excess returns with negative correlations to most of the other funds. In fact, this fund will be beneficial since it will reduce the tracking error to any portfolio that it is added to. The negatively correlated returns will also add a diversification effect. Now insert the weights of your current portfolio if you wish to see where it falls around the frontier; just add the percent weights or dollar values under the Current Portfolio column.

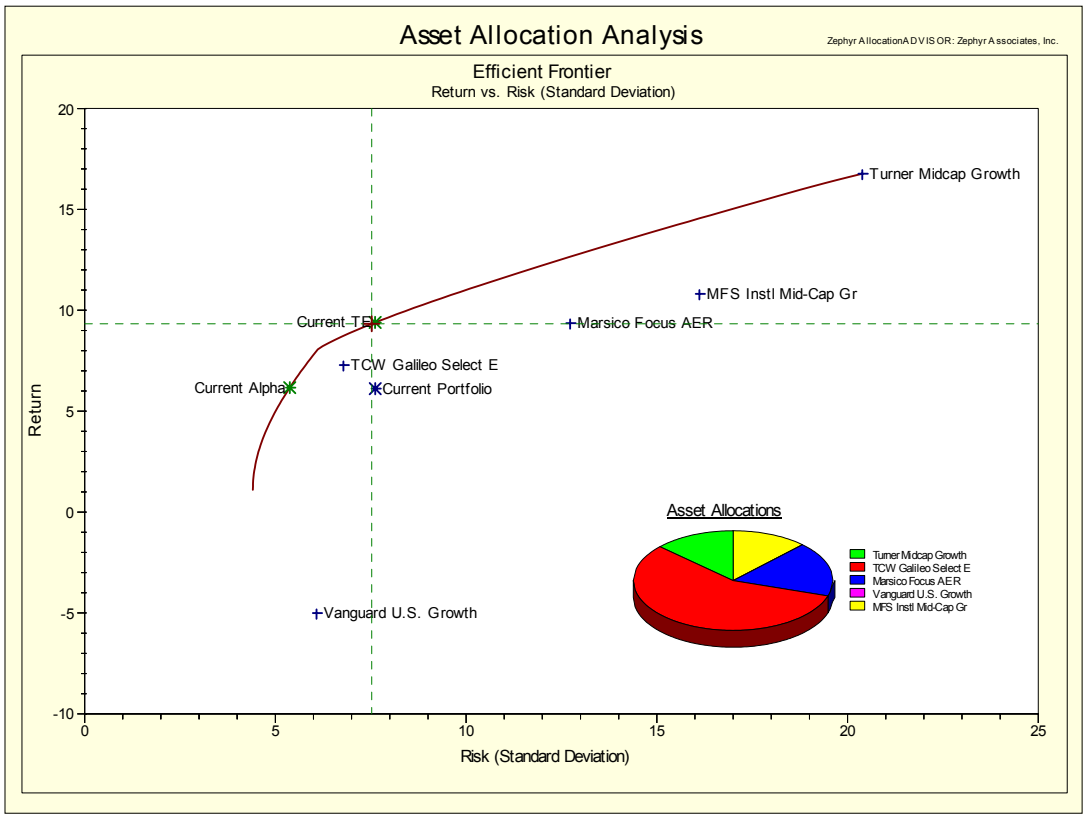


Once the funds have been selected click Allocate, this will draw the efficient frontier containing the 100 most efficient portfolios. To find the different allocations for each portfolio hit the space bar on your keyboard so that you can cruise up and down the efficient frontier. The portfolio on the far left is the one with the lowest tracking error. This combination of the managers would give you returns that track the benchmark the closest. As you cruise up the efficient frontier you will get an increase in the expected alpha but the portfolios will diverge away from the benchmark the farther right you go. This feature could be very useful to a plan sponsor who is trying to get a good alpha while maintaining the mandated tracking error. To view the actual allocations for each portfolio click on View, Efficient Frontier w/ Table, the table will display the allocations, the expected alpha, and the expected tracking error for the active portfolio.

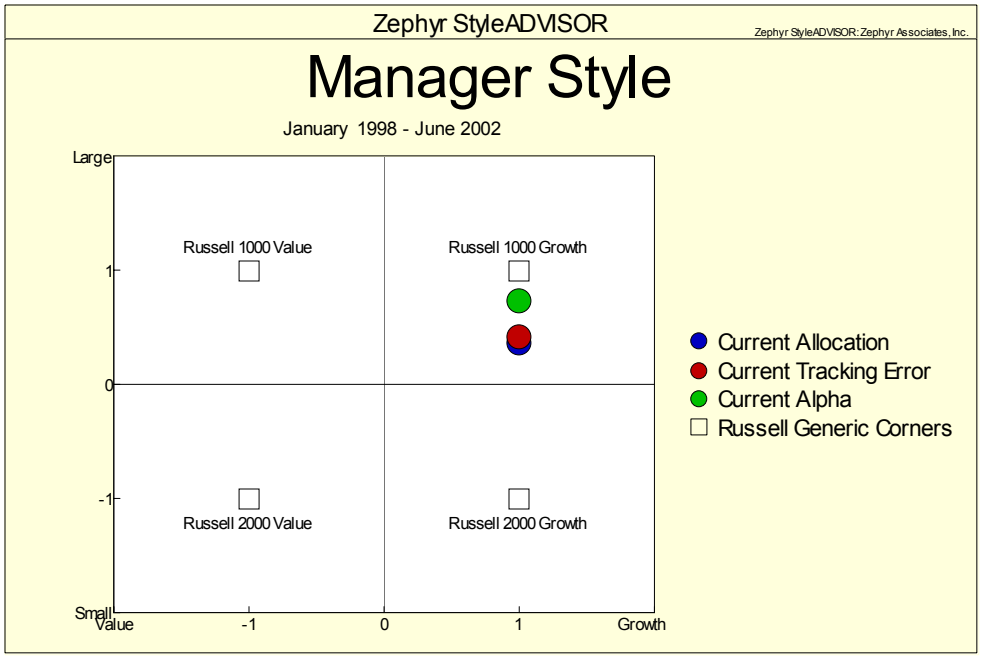
Create portfolio mixes

Now that the efficient frontier is drawn and you can view your options it is possible to save up to 5 theoretical portfolios on the frontier. While cruising the frontier find a spot that has a desired alpha or tracking error, click Ctrl + Spacebar, this should give you Mix 1. You can do this up to 4 more times. In this example we will assume that our current portfolio has the mandated tracking error to the benchmark. Cruise the frontier until the vertical crosshair is vertically aligned with the current portfolio, then hit Ctrl + Spacebar to create the mix. This mix gives us an example of how much we can increase our expected alpha by rearranging the manager allocations. Should you wish to be a little more conservative line up the vertical crosshair on the current portfolio and create a new portfolio with the same expected alpha as the current allocation. This new

portfolio however, will have a lower expected tracking error to index. The table below will give you the asset allocations for each mix as well as their expected alpha and tracking error.



If having the forecasted alpha and tracking error is not enough information, these mixes can be recreated and analyzed in StyleADVISOR. To export any of the selected mixes to StyleADVISOR, select File/Save Fund. This will give you the ability to analyze the funds historical style, returns, risk, up and down market performance, excess return consistency, and anything you would normally view in StyleADVISOR.



If you need a refresher on how to create a portfolio in StyleADVISOR consult the user's manual or call the support line (800)789-5323.

Summary

This optimization method provided a sound basis for allocating managers using a similar investment style within a multi-manager style specific investment option for this participant directed defined contribution pension plan.