Analyzing Mutual Fund Risk

by Arturo Neto,CFA (Contact Author | Biography)
There are a number of attractive mutual funds and fund managers that have performed very well over both long-term and short-term horizons. Sometimes, performance can be attributable to a mutual fund manager's superior stock-picking abilities and/or asset allocation decisions. In this article, we'll summarize how to analyze a mutual fund's portfolio and determine whether there are specific performance drivers.

Portfolio Analysis
All mutual funds have a stated investment mandate that specifies whether the fund will invest in large companies or small companies, and whether those companies exhibit growth or value characteristics. It is assumed that the mutual fund manager will adhere to the stated investment objective. It's a good start to understand the fund's specific investment mandate, but there is more to fund performance that can only be revealed by digging a bit deeper into the fund's portfolio over time.

1. Sector Weights
Sometimes fund managers will gravitate toward certain sectors either because they have deeper experience within those sectors, or the characteristics they look for in companies force them into certain industries. A reliance on a particular sector may leave a manager with limited possibilities if they have not broadened their investment net.(To learn more, read *Words From The Wise On Active Management*.)

To determine a fund's sector weight, we must either use analytical software or sources like Yahoo! or MSN. Regardless of how the information is obtained, the investor must compare the fund to its relevant indexes to determine where the fund manager increased or decreased his allocation to specific sectors relative to the index. This analysis will shed light on the manager's over/underexposure to specific indexes (relative to the index) in order to gain additional insight on the fund manager's tendencies or performance drivers.

The analysis can be as simple as listing the fund and relevant indexes side by side with a breakdown by sector. For example, for a large cap manager, the simplest way to determine sector reliance is to place the fund's sector breakdown next to both the S&P 500 Growth Index and the S&P 500 Value Index. Both of these indexes exhibit unique sector breakdowns because certain sectors routinely fall into the value category, while others fall into the growth category. Technology, known more as a growth sector, will have a higher weight in the S&P Growth Index than in the S&P 500 Value Index. Industrials, on the other hand, known as a value sector, will have a higher weight in the S&P 500 Value Index than in the S&P 500 Growth Index. A comparison of the fund relative to the sector breakdown of these two indexes will indicate whether the fund is in line with its stated mandate and reveal any over/under allocations to a specific sector. (For more insight, read *Benchmark Your Returns With Indexes*.)

The key to this analysis is to perform it on both current as well as historical data in order to identify any tendencies the fund manager may have. (To learn more, read *Shifting Focus To Sector Allocation*.)

2. Attribution Analysis
There are fund managers who claim to have a top-down approach and others that claim to have a bottom-up approach to stock-picking. Top-down indicates that a fund manager evaluates the economic environment to identify global trends and then determines which regions or sectors will benefit from these trends. The fund manager will then look for specific companies within those regions or sectors that are attractive. (To learn more, read *Build A Model Portfolio With Style Investing*.)

A bottom-up approach, on the other hand, ignores, for the most part, macroeconomic factors when searching for companies to invest in. A manager that employs a bottom-up methodology will filter the entire universe of companies based on certain criteria, such as valuation, earnings, size, growth, or a variety of combinations of these types of factors. They then perform rigorous due diligence on the companies that pass through each phase of the filtering process.

In order to determine whether a fund manager is actually adding any value to performance based on asset allocation or stock picking, an investor needs to complete an attribution analysis that determines a fund's performance driven by asset allocation versus performance driven by stock selection. Attribution analysis, for example, can reveal that a manager has placed incorrect bets on sectors but has picked the best stocks within each sector. Using this example, this manager should have a bottom-up approach. If the manager's mandate describes a top-down methodology, this might be a cause for concern because we've discovered that the fund manager has done a poor job of asset allocation (top-down).

Let's look at a five-sector portfolio as an example:

In the tables below, we compare a mutual fund portfolio with its relevant benchmark and identify how much of the portfolio's performance was attributable to asset allocation (sector weights) versus how much was attributable to superior stock picking.

Portfolio			
--	Weight	Return	Contribution
Sector 1	0.30	4.2	1.26
Sector 2	0.20	3.7	0.74
Sector 3	0.30	6.2	1.86

Sector 4	0.10	3.0	0.3
Sector 5	0.10	2.2	0.22
Total:			**4.38**

Benchmark					
--	Weight	Return	Contribution	Overweight	Performance
Sector 1	0.20	6.2	1.240	0.10	−2.0
Sector 2	0.30	3.5	1.050	−0.10	0.2
Sector 3	0.20	3.7	0.740	0.10	2.5
Sector 4	0.15	1.5	0.225	−0.05	1.5
Sector 5	0.15	2.0	0.300	−0.05	0.2
Total:			**3.550**	**Total**:	**0.83**

Attribution			
--	Selection	Allocation	Interaction
Sector 1	−0.400	0.620	−0.200
Sector 2	0.060	−0.350	−0.020
Sector 3	0.500	0.370	0.250
Sector 4	0.225	−0.075	0.075
Sector 5	0.030	−0.100	0.010
Total:	**0.415**	**0.465**	--

Active Management Effect	**0.880**
Error	**−0.055**
Overperformance	**0.825**

In the first chart, we see the sector weights for the fund's portfolio for each of five sectors. The second column in that chart shows the return of each sector within that portfolio, and the third column calculates the contribution of each sector to the fund's total return (weight x return).

- *Step 1*: Determine the sector weights for both the fund and the index.
- *Step 2*: Calculate the contribution of each sector for the fund by multiplying the sector weight by the sector return. Repeat for the index.

- *Step 3:* Calculate the rate of return for the fund by adding the contribution of each sector together. Repeat for the index. In this case, the fund had a return for the period of 4.38%. The second chart shows the same calculations for the relevant benchmark. We could see that the total return for the benchmark was 3.55% and that the fund outperformed the benchmark by 0.83%. (To learn more, read Benchmark Your Returns With Indexes.)
- *Step 4:* Calculate the overweight amount by subtracting the index weight for each sector from the fund weight for each sector.
- *Step 5:* Calculate performance by subtracting the index return for each sector from the fund return for each sector. Notice that the fund had a 30% weight to Sector 1 while the benchmark only had a 20% weight. As such, the fund manager over allocated to this sector assuming it would outperform. We can see from the return of 4.2% for Sector 1 within the fund was 2% less than the return for the same sector within the benchmark. Now this might get a bit tricky: The fund manager made the correct choice of allocating to Sector 1 as the sector for the benchmark had a return of 6.2%, the highest of all five sectors; however, the security selection within the sector was not very good and therefore the fund only had a 4.2% return.
- *Step 6:* Calculate the selection attribution by multiplying the benchmark weight with the difference in performance.
- *Step 7:* Calculate the allocation attribution by multiplying the index return for each sector by the overweight amount.
- *Step 8:* Calculate the interaction by multiplying the overweight column by the performance column.

The third chart shows the calculation of both allocation and security selection contribution. In this example, the manager contribution to performance for overweighting Sector 1 was 0.62% but the manager did a poor job of security selection, which resulted in a contribution of -0.4%.

The last chart shows the active management effect of positive 0.88% minus the unexplained portion of -0.055, resulting in active management contribution of 0.825%.

As you can see, this information is very useful to determine whether a manager is driving performance through asset allocation (top-down) or security selection (bottom-up) analysis. The results of this analysis should be compared to the fund's stated mandate and the fund manager's process.

Conclusion

There are many other factors to consider when analyzing a mutual fund's portfolio. By analyzing the sector weights of a fund and the fund manager's attributions to performance, an investor can better understand the historical performance of the fund and how it should be used within a diversified portfolio of other funds. An investor can also break down the portfolio into market cap groupings and determine whether the fund manager is particularly skilled at picking companies with certain size characteristics.

Whichever factor or characteristic an investor wants to analyze, the results can provide valuable insight into a manager's skill and further enhance the investor's portfolio construction process.

Ideally, an investor would want a mix of good allocators and good stock pickers, as well as fund managers with different levels of expertise in certain sectors. This type of analysis, although time consuming, can provide the information required to properly construct a portfolio.

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