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Understanding Downside Risk Stats ...in 5 Minutes or Less

Post-MPT offers a powerful set of tools for analyzing and evaluating portfolio and manager performance. If you're not quite sure how to use them, this issue of IT Insights is for you. Using two hypothetical portfolios for comparison, it presents downside risk statistics and how to interpret them in layman's terms.

Risk and return statistics for two hypothetical portfolios are shown in Table 1. We'll assume an investor evaluating these portfolios has a 10% goal and a five-year holding period.

Downside risk, measured by downside deviation, is the risk that a portfolio will not meet the investor's goal. Only returns below the goal are considered to be risky. At a 10% goal, the Aggressive Portfolio has a downside deviation of 4.35%. This value can be used to make a statement about the portfolio's riskiness compared to other portfolios at the same goal. Here, this portfolio is 13% more risky than the Moderate Portfolio.

	Aggressive Portfolio	Moderate Portfolio
Expected Return	11.50%	7.88%
MPT:		
Standard Deviation	15.68%	7.62%
Sharpe Ratio	0.48	0.48
Post-MPT:*		
Downside Deviation	4.35%	3.83%
Downside Probability	38.36%	72.03%
Average Downside Dev	5.36%	3.63%
Expected Downside Dev	4.64%	6.37%
Downside Magnitude at the 99th Percentile	16.72%	11.14%
Sortino Ratio	0.34	-0.55
*10% Goal and 5 Year HP		

There is about a two-in-five chance (38.36% downside probability) of falling short of goal with the Aggressive Portfolio. In the event of failure, the average shortfall is 5.36% (average downside deviation), and the average return is expected to be 4.64% (expected downside return).

In a worst case scenario (at the 99th percentile), the portfolio will underperform the goal by nearly 17% (16.72% downside magnitude).

The Moderate Portfolio has almost a three-in-four chance (72.03% downside probability) of not meeting the goal, with an expected downside return of 6.37%. Worst case scenario calls for a return that is 11.14% below goal.

Expressing expected downside return in wealth terms can also be informative. For example, assuming an initial $1 million investment, goal wealth after five years would be $1,610,510. With the Aggressive Portfolio, the expected downside return is $1,254,840, about $355,000 less goal. With the Moderate Portfolio, the expected downside return is $1,361,604, or about $249,000 below goal.

The tradeoff, then, is that the Aggressive Portfolio has a better chance than the Moderate Portfolio of making goal (38% compared to 72% downside probability) but the consequences, in the event of failure, are greater ($355,000 average shortfall compared to $249,000).

On a risk-adjusted basis, the Aggressive Portfolio provides a better Sortino ratio (0.34 versus –0.55 for the Moderate Portfolio). This is because the Aggressive Portfolio's proportionately greater expected return more than compensates for the slightly greater risk.■