INVESTMENT RISK AND PERFORMANCE

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Risk-Adjusted Performance Measures: A Case Study

Investors evaluating fund or manager performance often rely on risk-adjusted performance measures, such as the information ratio, the Sharpe ratio, and alpha, to help them choose appropriate investments as well as to understand past performance. This article explores what investors can learn by applying some of the most common measures to evaluate the performance stories of two fixed-income funds.

"Some investments do have higher expected returns than others. Which ones? Well, by and large they're the ones that will do the worst in bad times."

—William F. Sharpe[1]

Investors who use risk-adjusted performance measures to choose among funds or managers generally expect that such measures can help them avoid the investments Sharpe was referring to in the above quote. Performance measures are also routinely used to seek insight into current investments to ensure the manager's strategy and performance are as expected given market conditions. This article concludes a series presented over the past year on widely used risk-adjusted performance measures with a hypothetical case study that applies the performance metrics to two fixed-income funds.[2] Without knowing any details about Fund A or Fund B, what can we learn from performance measuresz alone?

Annualized performance statistics for each fund are presented in Exhibit 1 on a trailing-year basis over periods ranging from 1 to 10 years. Performance is evaluated over a market cycle of 3 years and a long-term horizon of 10 years. Both funds have successfully outperformed their benchmark, the Barclays Capital Aggregate Bond Index, in each period except the most recent. Fund B has generated significantly better performance with less risk over both the short-term and long-term time horizons. Based on these performance measures, is there any reason to invest in Fund A? Surprisingly, the answer is yes.

MARKET CYCLE COMPARISON

Excess return relative to the benchmark—also known as naive alpha—is always of interest to investors. Most inves-

tors, though, are sophisticated enough to look beyond excess return and evaluate how risk taking has affected returns. Two of the most popular ways to evaluate a fund's risk are standard deviation (how volatile was the fund?) and beta (how risky was the fund versus the market?). In our example, Fund B outperforms Fund A over a three-year market cycle and does so with less volatility: Fund B generates an excess return of 2.24% with a standard deviation of 4.11, while Fund A generates an excess return of 1.15% with a standard deviation of 4.20.

Fund B also has a higher risk-adjusted alpha, calculated as the fund's return less the index return scaled by the fund's beta.[3] For the three-year period, Fund A's alpha of 1.29%, though positive, appears anemic when compared with Fund B's alpha of 3.93%. Not only was Fund B's excess return significantly higher, but its beta was considerably lower: 0.75 versus 0.98. Compared with Fund A, Fund B appears to be a winner, with exceptional returns over a full market cycle, less volatility, and substantially lower systematic risk.

Fund B's lower beta, however, might not indicate that it has taken less risk relative to its benchmark but, rather, that it has taken less benchmark-related risk. Recall that beta measures how sensitive a fund's returns are to the factors that are driving the index returns. A low beta may indicate that the fund's returns are not well correlated with the index returns and are being driven by different factors. The usefulness of beta is limited without knowing the value of R^2. R^2, or the coefficient of determination, measures how closely a fund's returns

Exhibit 1. Hypothetical Case Study

FUND A

Trailing Period	Excess Return to Index (%)	Standard Deviation	Alpha (%)	Beta	R^2	Tracking Error	Information Ratio	Sharpe Ratio
1	−0.88	2.98	0.77	0.79	0.84	1.43	−0.62	2.32
3	1.15	4.20	1.29	0.98	0.86	1.55	0.74	1.86
5	0.74	3.30	0.68	1.01	0.87	1.49	0.50	1.80
7	0.75	3.23	0.81	0.99	0.85	1.18	0.64	1.34
10	0.83	3.51	1.06	0.96	0.85	1.42	0.58	1.37
Annual Period	2011	2010	2009	2008	2007	2006	2005	
Fund Return	6.96	7.75	9.32	5.23	5.94	4.37	3.24	
Index Return	7.84	6.54	5.93	5.24	6.97	4.33	2.43	
Excess Return	−0.88	1.21	3.39	0.37	−0.35	0.55	1.00	

FUND B

Trailing Period	Excess Return to Index (%)	Standard Deviation	Alpha (%)	Beta	R^2	Tracking Error	Information Ratio	Sharpe Ratio
1	−3.59	3.22	−1.08	0.68	0.62	3.15	−1.14	1.30
3	2.24	4.11	3.93	0.75	0.63	2.90	0.77	2.17
5	1.48	4.50	2.46	0.85	0.67	2.57	0.58	1.49
7	1.25	3.88	1.42	0.97	0.66	2.23	0.56	1.25
10	1.23	4.22	1.58	0.94	0.73	2.02	0.61	1.23
Annual Period	2011	2010	2009	2008	2007	2006	2005	
Fund Return	4.25	9.43	13.86	3.68	8.98	4.68	3.49	
Index Return	7.84	6.54	5.93	5.24	6.97	4.33	2.43	
Excess Return	−3.59	2.89	7.93	−1.56	2.01	0.35	1.06	

correlate with those of its index. A high R^2 means that most of the fund's returns can be "explained" by movements in the benchmark and the beta can be considered reliable. A low R^2 suggests an unreliable beta; a significant portion of the fund's returns are being driven by out-of-benchmark factors.

James P. Dowd, CFA, chief investment officer of North Capital, Inc., uses R^2 along with tracking error as a threshold to determine whether a fund's benchmark is relevant when choosing investments for his clients. After selecting asset classes, Dowd chooses managers with strategies that match the selected benchmarks. Because he determines allocations based on risk factor exposures, Dowd prefers managers who adhere to their style—"who do what they say they will." He searches for not necessarily the best-performing fund in a category (which may have hidden risk factors) but one that is expected to produce returns in accordance with the style or factor exposure he is seeking. As an example, he notes that most tracking error in U.S. equity funds comes from the value effect or the small-cap effect. "Once performance is normalized for systematic risk, what's left is the real alpha,"

Dowd says. He often finds that performance appears less attractive when normalized for factor risks.

Fund B's R^2 for the three-year cycle, 0.63, suggests that nearly one-third of that fund's returns and risk exposures are uncorrelated with those of its benchmark. In contrast, Fund A's R^2 of 0.86 is much higher; just 14% of the volatility in Fund A is uncorrelated with the benchmark's volatility. Fund B appears to have invested a significant portion of its portfolio outside the benchmark. Relative to its benchmark, Fund B did not take fewer risks; it took different risks.

Fund B's tracking error confirms this assessment. Tracking error, or active risk, answers the question, How much have the fund's returns deviated from the benchmark's returns? Tracking error is calculated as the standard deviation of the fund's returns less the benchmark's returns. The lower the tracking error, the closer the fund's returns are to the index's returns. Fund B's tracking error of 2.90 and Fund A's tracking error of 1.55 indicate that Fund B is taking more risk, not less risk, than Fund A. Yet, tracking error does not differentiate between outperformance and underperformance. How can we tell whether the extra risk was worth it to the investor? The information ratio can help answer that question.

The information ratio (IR) quantifies how well the manager's bets against the index paid off. The information ratio is generally calculated as excess return divided by tracking error. It is a variation of the Sharpe ratio that uses a passive benchmark index instead of a risk-free rate. Information ratios are often used to compare and rank funds within a universe; higher IRs are better. A caveat is that the indices used in fund comparisons should be the same. Even small differences in index composition can yield large differences in information ratios (see Roll 1978). What the information ratio cannot tell us is whether good performance was the result of one extreme event—luck or perhaps a strategy that is not repeatable—or consistently generated small gains, an indication of manager skill.

For the three-year period, Fund B's information ratio of 0.77 is similar to, though slightly better than, Fund A's information ratio of 0.74. A review of calendar year returns over the three-year period reveals that Fund B substantially outperformed the market in 2009, a period when fixed-income market conditions afforded opportunities to invest in risky bonds at historically cheap levels. This opportunity may not present itself again; thus, the

ability of Fund B to generate alphas of similar magnitude in the future is questionable.

The last performance metric, the Sharpe ratio, is used to compare the funds on a return-to-total-risk basis. The Sharpe ratio answers the question, How well did a fund perform by investing in risky assets instead of T-bills? The ratio is calculated as the mean excess portfolio return over a risk-free rate divided by the portfolio's standard deviation. The appeal of the Sharpe ratio lies in its simplicity and its usefulness in comparing funds even when their benchmarks differ. The higher the Sharpe ratio, the better the risk-adjusted return. Fund B's better performance and lower standard deviation over the three-year market cycle translate into a higher Sharpe ratio relative to Fund A.

Based on the performance measures discussed above, Fund B appears superior to Fund A. Yet, a comprehensive evaluation of the numbers has raised some questions. Fund B takes a notable amount of risk outside the benchmark. What types of risk is the fund taking? Could such risk taking periodically produce substantially negative performance events? How does Fund B's R^2 affect the relevance of the information ratio? Is the fund in the appropriate style category? Finally, in order to generate the sizable outperformance achieved in 2009, risk taking was likely very aggressive, and this aggressive risk taking is probably responsible for the large negative excess return in the most recent annual period.

COMPARISON OVER A LONG-TERM TIME HORIZON

Over a longer-term horizon, some performance measures become more informative and others become less so. Betas—and as a result, alphas too—may not be as informative if they are used to analyze data for forward-looking projections. Betas measured over shorter time spans tend to have more meaning because they reflect recent market conditions and managers' relative strategies better than betas annualized over long periods of time. Investors should ask, Given the market conditions that have occurred and the stated fund strategy, is the performance close to what one would expect?

Trends and patterns in performance measures over the long term can be more informative than the performance measures themselves. An evaluation of the two funds over the 1-, 3-, 5-, 7-, and 10-year annualized time

periods shows that Fund A's highest standard deviations—and thus its lowest Sharpe ratios—have been associated with upside volatility, or outperformance. Fund B tends to have higher standard deviations relative to Fund A regardless of whether its returns are higher or lower. Fund B's beta has steadily declined over the years, while its tracking error has steadily increased. Apart from the most recent year, Fund A's beta has been relatively consistent and its tracking error has been somewhat range bound. Fund A's 10-year R^2 of 0.85 is slightly lower than its 3-year R^2 of 0.86, whereas Fund B's 10-year R^2 of 0.73 is notably higher than its 3-year R^2 of 0.63. Has Fund B had a change in management or strategy over time?

One risk-adjusted performance measure that does become more valuable over time is the information ratio; an IR based on a long-term time horizon can indicate persistence in skill. For the 10-year period, the information ratios for the two funds are similar. But we can see that Fund B is riskier, and over the years, its strategy has increasingly shifted to embrace greater risk taking outside the benchmark. Fund A delivers a similar information ratio based on lower returns and a more conservative risk posture. Fund B's information ratio indicates that it is delivering high risk-adjusted returns relative to the stated benchmark, but we are not sure what risks it is taking; the benchmark (and the IR) is a better fit for Fund A. In contrast to the market cycle comparison, Fund A has a higher Sharpe ratio over the long-term horizon.

OTHER FACTORS TO CONSIDER

Although risk-adjusted performance measures are informative, investors should look beyond quantitative measures and consider qualitative factors as well. Dowd uses both risk-adjusted performance measures and such qualitative fund aspects as management, investment process, and assets under management to select among funds for his clients. Dowd prefers funds managed by an investment team that applies a consistent process to achieve returns that are explainable relative to the strategy. He looks for a process that is transparent and understandable with investment performance that is scalable. He also compares management's narrative on performance with its stated process. Performance that cannot be explained in accordance with the investment process raises a red flag. The amount of assets under management can also be of concern. "If assets under management are not above a certain level for a strategy, that raises questions about resources," Dowd explains.

CONCLUSION

What can we conclude from this performance analysis? Although Fund B has performed well over a market cycle and a long-term horizon, Fund A has delivered a comparable relative reward for its investors while taking less risk. Fund A adheres more closely to its benchmark, suggesting its performance is more explainable given its style and its risk exposures are more transparent. Because Fund A's periods of higher volatility are associated with higher performance, Fund A does not appear to have had outsized negative performance events. Fund B engages in more aggressive risk taking, uses more out-of-benchmark securities, and generates performance with higher upsides and lower downsides. Fund B may appeal to investors focused on return rather than risk, but investors who prefer known risk exposures and a risk budget similar to that of their chosen benchmark, such as Dowd, will likely prefer Fund A.◆

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NOTES

1. As quoted in Jason Zweig, "The Man Who Explained It All," *Money Magazine* (July 2007): http://money.cnn.com/2007/05/21/pf/sharpe.moneymag/index.htm.
2. The funds presented, as well as their related performance statistics, are hypothetical and not intended to represent actual funds or fund performance.
3. This alpha is known as regression alpha and scales performance for risk taken versus the benchmark index. Jensen's, or *ex post*, alpha adds an adjustment for the risk-free rate and is calculated as Fund return − [Risk-free rate + (Fund beta × Index return)].

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