



Risk-Adjusted Return: A Better Small-Cap Measure

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Executive Summary

For most investors, the first step in evaluating a mutual fund is to look at its historical performance despite mutual fund disclosure that “past performance is no guarantee of future results.” The second step likely would be to look at a fund’s rating by a financial data company such as Morningstar or Lipper, but these ratings are primarily derived from past performance, so the investor returns to square one.

Often in strong rising markets, risk-adjusted returns are underappreciated, especially in the small-cap market. In this paper, we look at the significance of incorporating a risk-adjusted return measure in the evaluation of small-cap mutual funds rather than focusing solely on performance metrics. In addition, we explore the notion that it is high-quality small-cap stocks rather than headline-grabbing stocks that lead to consistent long-term performance.

PERFORMANCE VS RISK-ADJUSTED RETURNS

Most investors focus on absolute and relative performance, regardless of asset class. This is reasonable, since the primary purpose of investing is capital appreciation. However, as it relates to capital preservation, investors also need to be keenly aware of their exposure to risk and volatility. When investing in the volatility-prone small-cap sector, these are essential factors to consider.

The Chase for Performance

Human nature is such that we want to be associated with winners and we believe that winners will continue to win. In behavioral finance, the inclination to lean toward winners is called “recency bias,” which is the tendency to believe recent events will persist indefinitely in the future.

“Performance chasing” is a common occurrence in the investment world. Research shows that top performing

mutual funds attract the most assets from investors.

According to a 2009 research paper, individual investors consider a fund’s performance track record to be the most important factor in their purchase decision, with the 10-year and previous-year performance being the most influential. Performance chasing was found to be most predominant in the top quintile of funds.¹

But it’s not just individual investors who are swayed by the recency bias. In a study of the fund selection and termination practices of 3,400 retirement plan sponsors between 1994 and 2003, researchers found that retirement plan sponsors tended to select funds after they had experienced large excess returns. However, these funds typically performed no better post-selection than the funds they were replacing. The researchers write, “We find that plan sponsors hire managers after superior performance but on average, post-hiring excess returns are zero.”²

1. Palmiter, Alan R. and Taha, Ahmed E., Star Creation: The Incubation of Mutual Funds (October 31, 2009). Vanderbilt Law Review, Vol. 62, p. 1485.
2. Goyal, Amit and Wahal, Sunil, The Selection and Termination of Investment Managers by Plan Sponsors (November 2004).

In actuality, most top performing mutual funds tend to deliver weaker near-term future performance. Often, funds with the highest returns also have a high degree of volatility, which by definition, makes them inconsistent performers.

According to the June 2015 S&P Persistence Scorecard, of the actively-managed domestic equity funds that were in the top quartile of 12-month performance as of March 2011, only 4.69% remained top quartile two consecutive years later.³ Chart 1 shows a bleaker picture when looking at the five consecutive year measurement period, where essentially no funds (0.28%) remained in the top quartile of performance.⁴

Chart 1: Performance Persistence of Top Quartile Domestic Equity Funds (for periods ending 3/31/15)

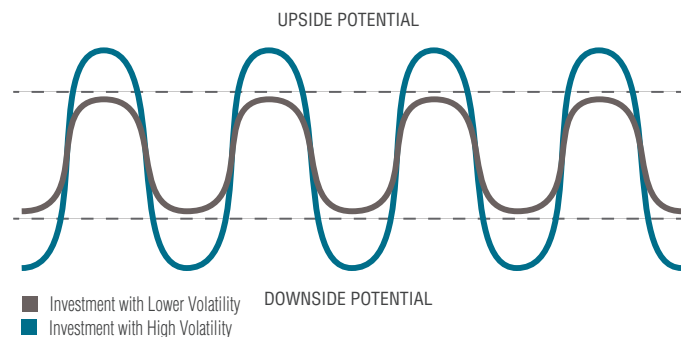
Fund Category	Fund Count as of 3/2011	% Remaining in Top Quartile			
		3/2012	3/2013	3/2014	3/2015
All Domestic	703	30.87	4.69	1.00	0.28
Large-Cap	269	30.86	3.72	0.00	0.00
Mid-Cap	101	28.71	0.00	0.00	0.00
Small-Cap	148	30.41	6.08	1.35	0.00
Multi-Cap	185	32.43	7.57	2.70	1.08

Source: S&P Dow Jones Indices LLC.

The Importance of Risk-Adjusted Returns

There are several ways to look at risk. Volatility, generally the most common, is the daily change in the price of an asset and measured by standard deviation. Standard deviation is a statistical measure that shows the likelihood of an investment to yield above- or below-average returns over a period of time. An investment with high volatility will have extreme and erratic price movements, which can ravage long-term performance. While these investments can have explosive price increases, they can quickly reverse course and experience devastating price plunges. Therefore,

Graph 1: Varying Volatility Bands



a lower standard deviation is desired and translates to less volatility.

Graph 1 illustrates the fluctuation extremes in price performance of a highly volatile investment versus a less volatile investment.

But volatility doesn't tell the whole story. The Sharpe Ratio measures the risk-adjusted return of an asset, i.e., how much return an investor receives for the level of risk they are assuming. Also, this ratio becomes more meaningful over time since it shows how a fund has performed in different market environments over a full market cycle. Mathematically speaking, the higher the Sharpe Ratio, the better the risk-adjusted return.

Lastly, volatility also represents price movement to either the upside (good) or the downside (bad). Since most investors are impacted more by losses than gains, limiting downside exposure is highly desirable. The Sortino Ratio explains returns relative to downside volatility by only considering downside deviation in the equation. Here, a higher Sortino Ratio indicates less risk of large losses.

Using these risk metrics when analyzing mutual funds will produce a more comprehensive picture of a fund's

3. S&P Dow Jones Indices, Global Research & Design, Does Past Performance Matter? The Persistence Scorecard (June 2015).

4. Compared to prior Scorecards going back to 2012, the March 2015 results are on the higher end for the three-year March percentages which range from 3.78-5.28% of all funds. The Scorecard is published twice a year with the September representing the other performance period end. The September-end three year percentages are almost twice that of March with a range of 7.23-10.04%. Five year numbers, however, are consistently at or near zero in all time periods.

performance and the level of risk involved to achieve that performance. However, these metrics are most useful in comparing one fund to another.

NOT ALL SMALL-CAPS ARE CREATED EQUAL

As a group, the small-cap sector is large in terms of the number of companies it contains. Looking at the universe of U.S. Stocks by Market Cap Deciles⁵ in Chart 2, the largest number of companies is in the smallest market cap deciles.

Chart 2: U.S. Stocks by Market Cap Deciles
(as of 12/31/14)

		Number of Firms	Average Size (\$B)
Micro-Cap	Decile 10	1392	\$0.13
	Decile 9	398	\$0.49
Small-Cap	Decile 8	392	\$0.94
	Decile 7	283	\$1.63
	Decile 6	209	\$2.46
Mid-Cap	Decile 5	205	\$3.59
	Decile 4	200	\$5.32
	Decile 3	173	\$9.21
Large-Cap	Decile 2	177	\$18.37
	Decile 1	168	\$86.02

Source: University of Chicago Center for Research and Securities Prices.

The small-cap sector also includes a substantial number of low-quality companies, which tend to have volatile price behavior often in concert with liquidity issues. However, high-quality companies do exist in the small-cap domain and research suggests that the stocks of these companies consistently outperform other market caps.

In 2013, AQR Capital's Cliff Asness and colleagues published "Quality Minus Junk," a research paper that found that high-quality stocks have high risk-adjusted returns. In the research paper, a quality security is

defined as a stock that is safe, profitable, growing and well managed. Quality Minus Junk (QMJ) is a composite portfolio that measures the additional return from investing in quality stocks versus investing in "junk" stocks.⁶

Asness, et al followed with another paper in January 2015, "Size Matters, if You Control Your Junk," which expanded on their past QMJ research and demonstrated that applying the quality screen to small-cap stocks led to a significantly increased Sharpe Ratio (risk-adjusted returns) for the group as well as consistent outperformance of high-quality large-cap stocks. Contrary to the fundamental belief that the highest returns belong to the riskiest small-caps, their results showed that it was the high-quality, low-volatility small-cap stocks that generated high returns.⁷

Additional evidence of quality driving returns is seen in companies with consistent earnings growth. A paper by Professors Barth, Elliott and Finn, "Market Rewards Associated with Patterns of Increasing Earnings," looks at the effect of earnings on returns. "This study demonstrates that firms with patterns of increasing earnings have higher price-earnings multiples than other firms and that this relation persists after controlling for growth and risk."⁸

VALUE LINE SMALL CAP OPPORTUNITIES FUND

Research findings that focus on Sharpe and Sortino Ratios and high-quality small-cap stocks in this paper substantiate the portfolio construction of the Value Line Small Cap Opportunities Fund (VLEOX). The stock selection process seeks growth-oriented companies that have consistently increased both their earnings and stock price over a long timeframe, preferably 10 years or more.

Ten years of growth is a challenging investment requirement in the small-cap sector, but this extended timeframe is used to gauge how individual companies fare in both positive and negative periods during a full market cycle. Companies that satisfy these stringent results-based

5. The market cap deciles from the University of Chicago Center for Research and Securities Prices (CRSP) are the universe of stocks from the NYSE, AMEX and Nasdaq (excluding ADR's REIT's, foreign companies, and closed-end funds) divided into 10 groups based on market capitalization with decile 1 (CRSP 1) being the largest companies and decile 10 (CRSP 10) being the smallest companies.

6. Asness, Clifford S. and Frazzini, Andrea and Pedersen, Lasse Heje, Quality Minus Junk (August 19, 2013).

7. Asness, Clifford S. and Frazzini, Andrea and Israel, Ronen and Moskowitz, Tobias J. and Pedersen, Lasse Heje, Size Matters, If You Control Your Junk (January 22, 2015).

8. Barth, Mary E. and Elliott, John A. and Finn, Mark W., Market Rewards Associated with Increasing Earnings Patterns (Autumn, 1999).

Chart 3: Risk Metrics (as of 9/30/15)

	Standard Deviation	Sharpe Ratio	Sortino Ratio	Upside Capture*	Downside Capture*
3-Year Trailing					
VLEOX	10.83	1.24	2.41	93.16	73.39
Russell 2000	13.59	0.83	1.41	n/a	n/a
Small Growth**	14.13	0.83	1.40	92.56	96.87
5-Year Trailing					
VLEOX	12.25	1.19	2.15	94.76	77.04
Russell 2000	15.96	0.77	1.28	n/a	n/a
Small Growth**	16.42	0.78	1.29	104.95	123.83
10-Year Trailing					
VLEOX	16.51	0.47	0.66	102.09	97.03
Russell 2000	19.70	0.36	0.51	n/a	n/a
Small Growth**	19.60	0.38	0.55	113.69	122.08

Source: Morningstar

*Market Capture Ratios are statistical measures of the Fund's overall performance in up and down markets. Market capture ratios are used to evaluate how well an investment performed relative to the S&P 500 Index during periods when that index has risen or fallen.

**Morningstar Small Growth category

criteria are usually on the larger side of the small-cap universe, from a capitalization perspective, and exhibit much less volatility.

The Fund's risk metrics also validate the research cited in this paper as a focus on high-quality companies has led to better risk-adjusted returns. Chart 3 shows that the Fund's standard deviation, Sharpe Ratio and Sortino Ratio are more favorable than the Morningstar Small Growth

category for the past 3, 5 and 10-year periods ended September 30, 2015. In fact, the Fund's Sharpe Ratio is the second highest of the Small Growth category's 190 funds over the 5-year period. The Sortino Ratio also ranked second over the same time period. The Fund also provided investors with more downside protection as measured by a lower downside capture percentage than the Morningstar category average for the same trailing period. As would be expected, the upside capture percentage is below the category, except in the 3-year trailing period, indicating that the Fund avoided excessive volatility.

The downside capture advantage has allowed the Fund to be a defensive play as well. Chart 4 shows the Fund's performance relative to its Morningstar peer group in all of the negative return quarters for the past decade. The Value Line Small Cap Opportunities Fund outperformed the Small Growth category 86% of the time in down quarters since the first quarter of 2005.

CONCLUSION

Chasing performance is part of the human equation. The fact that momentum investing can occasionally be successful makes the tendency harder to resist.

While performance tends to be the measure of choice when selecting a mutual fund, focusing on the risk-adjusted returns of a fund allows an investor to determine how much risk was involved in the fund's return. In a market cap category that is typically volatile, incorporating higher-quality stocks and a focus on the Sharpe and Sortino Ratios into fund selection improves the likelihood of consistent long-term outperformance in small-cap investing.

Chart 4: Playing Defense - VLEOX Outperformed the Small Growth Category in 12 of 14 Negative Quarters

	1Q05	2Q06	3Q06	4Q07	1Q08	3Q08	4Q08	1Q09	2Q10	3Q11	2Q12	2Q13	3Q14	3Q15
VLEOX	-2.20	-3.72	-2.98	-2.53	-10.44	-9.78	-25.60	-10.25	-8.66	-15.35	-2.50	3.75	-4.44	-5.88
Small Growth*	-4.82	-6.89	-2.32	-3.61	-14.49	-9.87	-26.75	-8.47	-9.12	-22.37	-5.40	-0.13	-5.80	-11.98
+/- Category	2.62%	3.17%	-0.66%	1.08%	4.05%	0.09%	1.15%	-1.78%	0.46%	7.02%	2.90%	3.88%	1.36%	6.10%

Source: Morningstar

* Morningstar Small Growth category

Value Line Small Cap Opportunities Fund Performance

As of 9/30/15

AS OF 9/30/15

	Average Annual Return			
	1 Year	3 Year	5 Year	10 Year
Small Cap Opportunities Fund (VLEOX)	6.00%	13.63%	14.76%	7.86%
Russell 2000 Index	1.25%	11.02%	11.73%	6.54%
Morningstar Small Growth Category Average	2.39%	11.17%	12.11%	7.02%
Morningstar Return	Above Average		Above Average	Above Average
Morningstar Risk	Low		Low	Low
Gross Expense ratio: 1.27%				

The performance data quoted herein represents past performance and does not guarantee future results. Market volatility can dramatically impact the fund's short term performance. Current performance may be lower or higher than figures shown. The investment return and principal value will fluctuate so that an investor's shares, when redeemed may be worth more or less than their original cost. Past performance data through the most recent month end is available at vlfunds.com or by calling 800.243.2729.

The average annual returns shown above are historical and reflect changes in share price, reinvested dividends and are net of expenses. Investment results and the principal value of an investment will vary.

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Stephen Grant has been a portfolio manager at Value Line Funds since 1991. Over the past 20 years, Mr. Grant's quantitative/behavioral methodology has driven the success of several equity and hybrid funds.

Mr. Grant has a BA in Economics from Stanford University and an MBA in Finance from the Wharton School of the University of Pennsylvania.

You should carefully consider investment objectives, risks, charges and expenses of Value Line Mutual Funds before investing. This and other information can be found in the fund's prospectus and summary prospectus, which can be obtained free of charge from your investment representative, by calling 800.243.2729, or by clicking on the applicable fund at www.vlfunds.com. Please read it carefully before you invest or send money.

There are risks associated with investing in small and mid-cap stocks, which tend to be more volatile and less liquid than stocks of large companies, including the risk of price fluctuations.

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