



Risk-Adjusted Return: A Better Small-Cap Measure

July 2017

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 weak or volatile markets, risk-adjusted returns take on even more importance. 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 December 2016 S&P Persistence Scorecard, of the actively managed domestic equity funds that were in the top quartile of 12-month performance as of September 2012, only 3.5% remained top quartile two consecutive years later.³ Chart 1 shows a bleaker picture when looking at the five consecutive year measurement period, where no funds remained in the top quartile of performance.

Chart 1: Performance Persistence of Top Quartile Domestic Equity Funds (for periods ending 9/30)

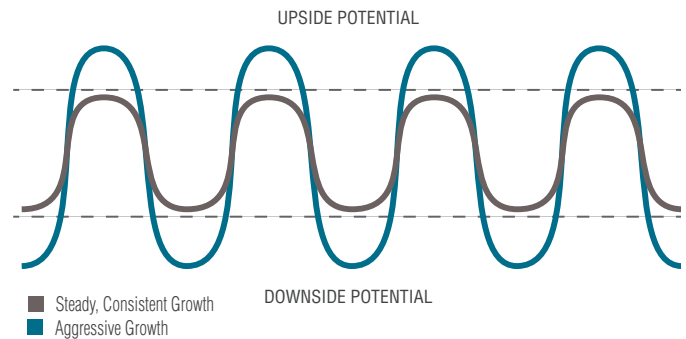
Fund Category	Fund Count as of 2012	% Remaining in Top Quartile			
		2013	2014	2015	2016
All Domestic	660	40.6	3.5	0.3	0.0
Large-Cap	246	33.3	10.6	0.8	0.8
Mid-Cap	95	43.2	16.8	3.2	0.0
Small-Cap	151	39.1	9.9	1.3	0.0
Multi-Cap	168	29.8	7.7	0.0	0.0

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 (December 2016).

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 Deciles⁴ in Chart 2, the largest number of companies is in the smallest market cap deciles.

Chart 2: U.S. Stocks by Market Cap Deciles

		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. Data as of December 31, 2014.

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.⁵

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.⁶

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.”⁷

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/VLEIX). 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 this stringent results-based

4. 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.

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

6. 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).

7. 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 6/30/17)

	Standard Deviation	Sharpe Ratio	Sortino Ratio	Upside Capture*	Downside Capture*
3-Year Trailing					
VLEOX	11.84	0.76	1.32	102.99	112.19
Russell 2000	15.38	0.52	0.82	114.78	151.59
Small Growth**	15.02	0.50	0.76	112.85	155.38
5-Year Trailing					
VLEOX	10.68	1.30	2.50	96.66	93.06
Russell 2000	13.88	0.98	1.69	108.88	135.55
Small Growth**	13.91	0.94	1.55	102.34	130.70
10-Year Trailing					
VLEOX	16.53	0.51	0.71	102.64	100.61
Russell 2000	20.13	0.41	0.59	121.30	130.18
Small Growth**	19.68	0.42	0.61	116.74	128.00

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 June 30, 2017. In fact, for the five year period ended June 30, 2017, the Fund's Sharpe Ratio placed it among the top 2% of Funds in the Morningstar Small Growth category out of 533 funds. 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 three trailing periods. As would be expected, the upside capture percentage is below the category, 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 85% of the time in down quarters since the third quarter of 2006.

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 11 of 13 Negative Quarters in the Past Decade

	3Q06	4Q07	1Q08	3Q08	4Q08	1Q09	2Q10	3Q11	2Q12	2Q13	3Q14	3Q15	1Q16
VLEOX	-2.98	-2.53	-10.44	-9.78	-25.60	-10.25	-8.66	-15.35	-2.50	3.75	-4.44	-5.88	-0.14
Small Growth [^]	-2.32	-3.61	-14.49	-9.87	-26.75	-8.47	-9.12	-22.37	-5.40	-0.13	-5.80	-11.98	-4.33
+/- Category	-0.66%	1.08%	4.05%	0.09%	1.15%	-1.78%	0.46%	7.02%	2.90%	3.88%	1.36%	6.10%	4.19%

Source: Morningstar
[^]Morningstar Small Growth category

Value Line Small Cap Opportunities Fund Performance

As of 6/30/17

Average Annual Return

	1 Year	3 Year	5 Year	10 Year
Investor Class - VLEOX	17.89%	8.98%	14.43%	7.73%
Institutional Class - VLEIX¹	18.19	9.15	14.53	7.78
Russell 2000 Index	24.60	7.36	13.70	6.92
Morningstar Small Growth Category Avg.	23.12	6.67	12.81	7.05
Morningstar Category Rank (%) - VLEOX	89	22	21	34
# of Funds in Category	678	599	533	398
Morningstar Return	Above Avg.			Above Avg.
Morningstar Risk	Low			Low
VLEOX Gross/Net Expense Ratio: 1.25% VLEIX Gross/Net Expense Ratio*: 3.47% / 1.00%				

Overall Rating



(Investor)
Among 599 Small Growth Funds
(as of 6/30/17)

The Overall Morningstar Rating™ is based on risk adjusted returns, derived from a weighted average of the 3-, 5-, and 10-year Morningstar metrics.

Morningstar rates funds based on enhanced Morningstar risk-adjusted returns.

¹Indicates Morningstar Extended Performance. Extended performance is an estimate based on the performance of VLEOX, adjusted for fees. The Inception Date of VLEIX is November 1, 2015.

*EULAV Asset Management (the “Adviser”) and EULAV Securities LLC, the Fund’s principal underwriter (the “Distributor”), have agreed to waive certain class-specific fees and/or pay certain class-specific expenses incurred by the Institutional Class so that the Institutional Class bears its class-specific fees and expenses at the same percentage of its average daily net assets as the Investor Class’s class-specific fees and expenses (excluding 12b-1 fees and any extraordinary expenses incurred in different amounts by the classes) during the period March 17, 2016 through July 31, 2017 (the “Expense Limitation”). The Adviser and the Distributor may subsequently recover from assets attributable to the Institutional Class the reimbursed expenses and/or waived fees (within 3 years after the fiscal year end in which the waiver/reimbursement occurred) to the extent that the Institutional Class’s expense ratio is less than the Expense Limitation. The Expense Limitation can be terminated or modified before July 31, 2017 only with the agreement of the Fund’s board. The Fund’s performance would be lower in the absence of such waivers.

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.

ABOUT THE AUTHOR



Stephen Grant, Portfolio Manager

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.

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The Morningstar Rating™ for funds, or “star rating” is calculated for managed products (including mutual funds, variable annuity and variable life subaccounts, exchange-traded funds, closed-end funds, and separate accounts) with at least a three-year history. Exchange-traded funds and open-ended mutual funds are considered a single population for comparative purposes. It is calculated based on a Morningstar Risk-Adjusted Return measure that accounts for variation in a managed product’s monthly excess performance, placing more emphasis on downward variations and rewarding consistent performance. The top 10% of products in each product category receive 5 stars, the next 22.5% receive 4 stars, the next 35% receive 3 stars, the next 22.5% receive 2 stars, and the bottom 10% receive 1 star. The Overall Morningstar Rating for a managed product is derived from a weighted average of the performance figures associated with its three-, five-, and 10-year (if applicable) Morningstar Rating metrics. The weights are: 100% three-year rating for 36-59 months of total returns, 60% five-year rating/40% three-year rating for 60-119 months of total returns, and 50% 10-year rating/30% five-year rating/20% three-year rating for 120 or more months of total returns. While the 10-year overall star rating formula seems to give the most weight to the 10-year period, the most recent three-year period actually has the greatest impact because it is included in all three rating periods. The Value Line Small Cap Opportunities Fund (Investor) received 4 stars for the 3-, 5- and 10-year periods ended 6/30/17 among 599, 533 and 398 Small Growth funds, respectively.

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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