THE IMPACT OF CHASING RETURNS ON QUARTILE RANKINGS

Rama Malladi, *Department of Accounting, Finance, and Economics, California State University Dominguez Hills, Carson, CA 90747, 310-243-3560, rmalladi@csudh.edu*

Jennifer Brodmann, *Department of Accounting, Finance, and Economics, California State University Dominguez Hills, Carson, CA 90747, 310-243-2607, jbrodmann@csudh.edu*

ABSTRACT

There is a general perception that a fund must be in the top quartile for several years to outperform a benchmark, such as the S&P 500, in the long run. This superior performance may lead notoriety amongst investors and growth in Assets Under Management (AUM). We explore if funds that take on more risk stay in the top quartile compared to those that take less risk. We collect data and create 4,000 bootstrap-simulated funds that invest in four different return strategies and levels of risk. We examine fund return, AUM, and quartile rankings annually to show that if a fund's goal is to achieve higher AUM, it should aim to be in the 1st quartile every year.

Keywords: asset management; risk and return; quartile; fund performance

INTRODUCTION

The goal of investment fund managers is to produce superior risk-adjusted returns to their investors. When a manager successfully achieves this goal, the assets under management (AUM) tend to grow. Some managers may close their funds to new investors, however, most money managers prefer to have a larger AUM to less in order “to capture the attractive economies of scale that the business offers[1]. This AUM growth can be achieved in two ways: by earning superior returns or by bringing in new investor capital into their funds. Managers attract this new capital by exhibiting superior performance compared to their peers. Investment funds vie to be ranked first among thousands of funds on the market and aim at least to be in the top, or 1st, quartile (the top 25th percentile). Clients exit when performance falls below the top quartile and a floundering fund can find itself with a disappearing clientele. This winner-takes-all approach can be seen in the mutual fund industry where the market is concentrated among the top ten fund managers.

Howard Marks of Oak Tree Capital in Los Angeles has been a critic of investors who chase high returns. He proposes that attempting to achieve a superior long-term record by stringing together a run of top-decile years is unlikely to succeed. [22] agrees: “When you’re looking at a fund’s quartile, you’re looking at history. If you can, it’s usually best to take the long view when investing. Thus, five- and 10-year quartile returns should give you a better feel for how a fund has performed. Long-term quartile returns tend to average out anomalies, such as a bad year, an out-of-favor investment approach, and the like.”

In this paper, we investigate the assumptions of conventional investors and examine which funds will be “winners” and “losers” over the long term. We analyze funds with different strategies and levels of risk and identify the funds that rank in the top quartile over 10, 30, and 60 years. Our results indicate that if a fund aims to achieve higher AUM, it should aim to be in the 1st quartile every year. However, if a fund aims to win the quartile race and be in the 1st quartile over a long period, aiming for consistent performance in the 2nd quartile every year is a safer bet. Our findings add to the literature by examining the endurance of fund performance when adopting strategies with varying degrees of risk. Our results indicate that the most-risky funds gain higher returns, but less-risky funds have a higher probability of ranking in the 1st quartile. This research supports the fund strategy proposed by Howard Marks—invest for slightly above average performance for top performance in the long run.

Our paper is structured as follows, Section 1 introduces our study, Section 2 provides an overview of the literature on fund strategy, fund performance and fund flows, Section 3 discusses the Methodology and Data used in the paper, segment them into quartiles and assess performance and

[1] Please refer to Book Review of Investor’s Dilemma in Financial Analyst Journal, https://goo.gl/FM55Gb

probability of being in the top-quartiles, Section 4 discusses our main findings, and Section 5 concludes.

LITERATURE REVIEW

Fund Strategy and Performance

Many studies explore the relationship between fund strategy and performance [4] [6] [13] [18]. [6] examines the past and present performance of UK pension funds and find that funds in the top quartile are more likely to remain in that quartile than if by chance. For growth-oriented mutual funds, they find that mid-year losers are more likely than mid-year winners to experience increased fund volatility later in the annual assessment period. This finding may stem from investment in riskier assets to chase higher returns. The performance-related component of fund manager compensation may also encourage fund managers to take excessive risk [18]. We create a model that incorporates strategies with different levels of risk to determine which strategy has a higher return and performance.

Persistence, Fund Flow and Performance

Investors may invest in funds that have performed well in the past because they believe that they will perform well in the future. This 'persistence of performance' has been studied extensively in the literature, and studies fund that this holds in the short-term for both hedge funds and mutual funds. For hedge funds, maximum persistence is more evident in the short-term [1] [2]. This finding also holds for mutual funds [5] and may stem from investors using "hot hands" strategies or other types of prevalent investment strategies [7] [11] [13]. This short-run persistence may be more pronounced for small cap/growth funds [15]. Additionally, for mutual funds, past performance may also predict future risk-adjusted performance [10]. This may also hold in the long-term, where [24] finds that mutual fund persistence holds for multi-year periods and that flow-related buying increases stock prices.

Several studies have examined fund flow behavior based on fund performance. [3] propose that fund flows can act as a benchmark to assess returns, flows, and performance. They find that fund flows have a rational response to past performance, even when performance is inconsistent, and that fund managers do not outperform the passive benchmark on average. Fund flows can be affected by participation costs, where mutual funds with higher participation costs tend to be more concentrated in higher performing funds compared to lower cost mutual funds [14]. Fund flows may also be affected by residuals, such as in [16], where he finds that when a fund experiences a negative residual in its most recent period, the fund's growth rate decreases by 0.35%. This also been investigated by [19], where they provide evidence supporting a convex relationship between past returns and fund flows in mutual funds that shift strategy after poor performance. Poorly performing funds that replace their managers have less fund outflow than funds that retain management [8]. Fund outflows may be affected by the tax considerations of investors [17]. [17] find that individual investors may tend to hold onto funds that have increased in value and sell funds that have lost value. We examine fund flows through by creating four funds with varying levels of risk to determine which will funds will have higher AUM.

DATA AND METHODOLOGY

Because management fees and manager performance compensation are tied to AUM, we assume that every manager in our analysis is trying to maximize AUM at any given point in time. In our paper, we assume that there are four fund types based on manager strategy: high risk–high return ("most risky"), medium risk–medium return ("risky"), low risk–low return ("less risky"), and least risk–least return ("least risky"). When a manager follows the most-risky strategy each year, the manager is implicitly aiming to be in the top quartile in that year. Our primary goal in this paper is to test if a manager who adopts a top-quartile strategy ends up in the top quartile after several years. Second, based on the fund's recent performance, investors either add or withdraw capital from the fund. We assume that the recent two-year performance impacts a fund's net inflow.

Data

Since we assume that a manager follows one of four strategies (most risky, risky, less risky, and least risky) to stay in the top quartile, we identify an appropriate asset class that mirrors the manager's strategy. We use the following four representative assets in our model. For all asset classes, we use data for a 39-year period from January 1, 1979 to January 1, 2018. However, the reader is free to choose a different asset class in the model.

Most Risky: Russell 2000 Price Index, annual, not seasonally adjusted, average aggregation method. The data for this index is obtained from the Federal Reserve Economic Database (FRED).[2] The Russell 2000 Index measures the performance of the small-cap segment of the US equity universe. It is a subset of the Russell 3000 Index and includes approximately 2,000 of the smallest securities based on a combination of their market cap and current index membership. The Russell 2000 represents approximately 10% of the US market.

Risky: Russell 1000 Price Index, annual, not seasonally adjusted, average aggregation method. The data for this index is obtained from FRED. The Russell 1000 Index measures the performance of the large-cap segment of the US equity universe. It is a subset of the Russell 3000 Index and

[2] Russell 2000 and 1000 Price Index from the FRED https://goo.gl/2u6LpZ

includes approximately 1,000 of the largest securities based on a combination of their market cap and current index membership. The Russell 1000 represents approximately 90% of the US market.

Less Risky: 10-year constant maturity Treasury bond. The data is sourced from Professor Aswath Damodaran's website at NYU.[3] The underlying data is obtained from FRED. Treasury bond return includes coupon and price appreciation.

Least Risky: 3-month Treasury bill. The data is sourced from Professor Aswath Damodaran's website at NYU. The underlying data is obtained FRED.

Methodology

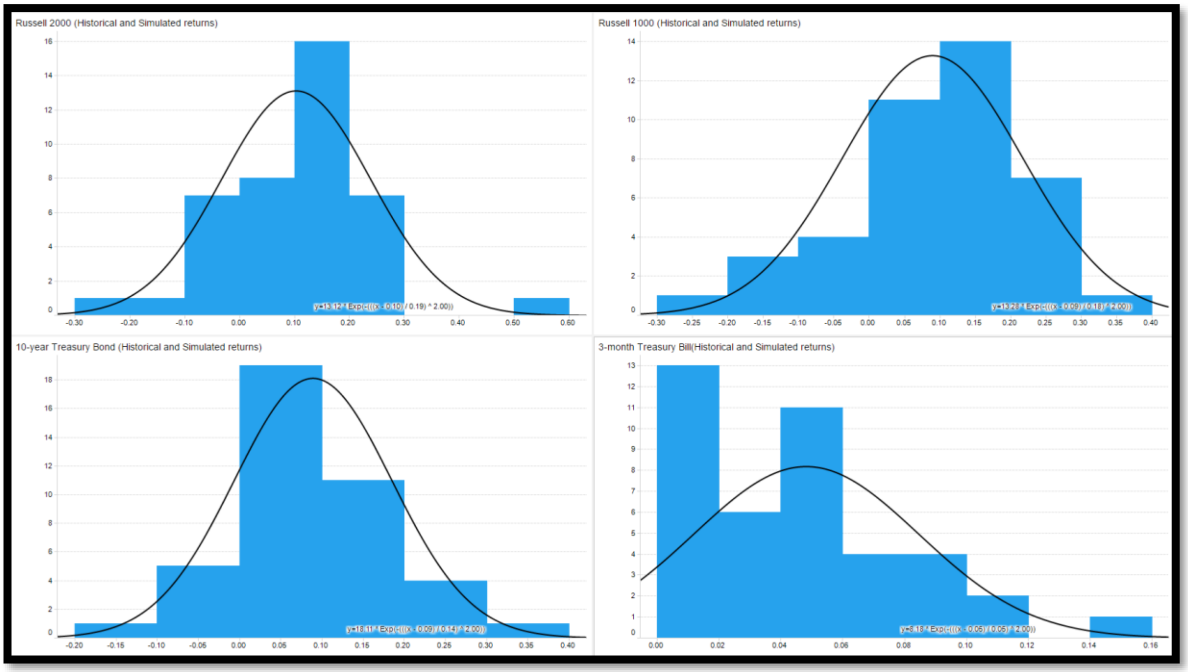
We use a seven-step process to decide if a fund manager following a specific strategy for several years can be expected to be in the top quartile. First, the annual return, R_{t+1}, of an asset class is defined using Equation 1.

$$
\begin{aligned}
&R_{t+1} = \frac{P_{t+1} - P_t}{P_t} \sim \mathbb{N}\left(\mu, \sigma^2\right) \\
&\text{Where} \\
&R_{t+1} \text{ is fund's return, before fees, at time t+1,} \\
&P_{t+1} \text{ is index value at t+1, adjusted for any dividends and stock splits,} \\
&P_t \text{ is index value at t, adjusted for any dividends and stock splits,} \\
&\mu \text{ is fund's normally-approxinated mean anual return, and} \\
&\sigma \text{ is fund's standard deviation of annual return.}
\end{aligned}
\tag{1}
$$

Second, mean (μ) and standard deviation (σ) for each asset class are derived using curve fitting to a normal distribution. Annual return distributions (actual and fitted to a normal distribution) based on R_{t+1} are shown in Figure 1.

[3] 10-year T-bond and 3-month T-bill return data from Professor Damodaran's website: https://goo.gl/fQWb1C

Figure 1: Histogram of Annual Returns from 1979 to 2018 for Four Asset Classes



"Most risky" Russell 2000 small-cap stocks are approximated to have normally distributed annual returns with a μ = 10.35% and σ = 14.73% (annualized risk). Likewise, "Risky" Russell 1000 large-cap stocks have a μ = 9.68% and σ = 13.44%, less risky" 10-year Treasury bonds have a μ = 7.82% and σ = 10.17%, and "least risky" 3-month Treasury bills have a μ = 4.53% and σ = 3.65%. We plot the probability density function for the four strategies in Figure 2 and confirm that the four asset classes conform to four distinct risk-return profiles. One can choose a different set of asset classes in our model as long as they represent four distinct risk-return profiles.

Third, we use historical annual returns from January 1, 1979 to January 1, 2018 for the four strategies. Each year results in a 1 (row, year) x 4 (column, strategy) matrix of annual returns. Then, by using bootstrap with replacement methodology, we create a matrix with 240,000 (1,000 funds x 4 strategies x up to 60 years) annual returns for further analysis. Summary annual returns for the four strategies are shown in Table 1.

Figure 2: Probability Density Functions for Four Type of Funds

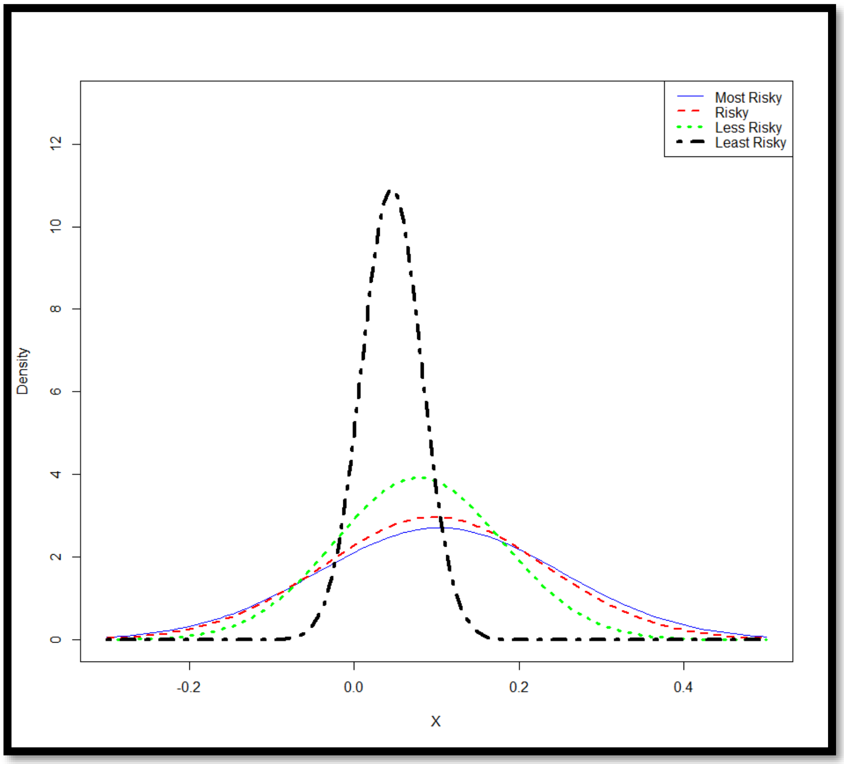


Table 1: Probability Density Functions for Four Type of Funds

	Most Risky	Risky	Less Risky	Least Risky
N	60,000	60,000	60,000	60,000
Mean	10.27%	9.64%	7.74%	4.50%
Median	12.99%	11.84%	8.20%	4.64%
StdDev	14.46%	13.26%	10.02%	3.59%
Skewness	0.25	(0.68)	0.25	0.62
Kurtosis	1.06	(0.08)	(0.29)	(0.17)

This table reports the probability density functions for the four types of funds, which are Most Risky, Risky, Less Risky, and Least Risky. The table also summarizes the annual returns for each of the four strategies.

Fourth, we rank all 4,000 funds in each year based on the simulated annual returns and place them in four quartiles. The 1st quartile contains the best-performing 1,000 funds in that year, and 4th quartile contains the worst-performing 1,000 funds. Fifth, we assume that investors react to fund performance. We assume that fund inflows linearly respond to a fund's performance in the most recent two-year period as shown in Table 2. For example, if a fund is in the 1st quartile two years before (t - 2) (i.e., $Q_i(t\text{-}2) = 1$), where i, fund number, is between 1 and 4,000, and in the 2nd quartile last year (t - 1) (i.e., $Q_i(t\text{-}1) = 2$), then that fund is in 12 bin and gains 20% net inflow. We denote this 20% as $D_{i,t}(Q_i(t\text{-}2), Q_i(t\text{-}1))$ and refer to it as fund i's drawdown, or net inflow, after being in the quartiles, $Q_i(t\text{-}2)$ and $Q_i(t\text{-}1)$, during the past two years. A positive $D_{i,t}(Q_i(t\text{-}2), Q_i(t\text{-}1))$ indicates fund inflows, and a negative value indicates fund outflows. Similarly, a fund in 4th quartile for two years in a row (44 bin) loses 30% of assets due to outflows. This linearity restriction can be easily relaxed by changing values in Table 2. We have not found a systematic model in the literature that provides a specific framework for creating fund flows that we can use in Table 2. Therefore, we develop a framework to accommodate a relationship that exists between fund flows and fund past performance. This framework can also accommodate convex relationship as suggested by [16] [8] [23] [19] and [14].

Table II: Drawdowns of Funds

Last two rankings	Drawdown		Last two rankings	Drawdown
$Q_i(t\text{-}2), Q_i(t\text{-}1)$	$D_{i,t}(Q_i(t\text{-}2), Q_i(t\text{-}1))$		$Q_i(t\text{-}2), Q_i(t\text{-}1)$	$D_{i,t}(Q_i(t\text{-}2), Q_i(t\text{-}1))$
11	30%		31	10% (same as 13)
12	20%		32	0% (same as 23)
13	10%		33	-10% (same as 24)
14	0%		34	-20%
21	20% (same as 12)		41	0% (same as 14)
22	10% (same as 13)		42	-10% (same as 24)
23	0%		43	-20% (same as 34)
24	-10%		44	-30%

This table reports the drawdowns used in the model for each of the rankings. We assume that fund inflows linearly respond to a fund's performance in the most recent two-year period. For example, if a fund is in the 1st quartile two years before (t - 2) (i.e., Qi(t-2) = 1), where i, fund number, is between 1 and 4,000, and in the 2nd quartile last year (t - 1) (i.e., Qi(t-1) = 2), then that fund is in 12 bin and gains 20% net inflow. We denote this 20% as Di,t(Qi(t-2), Qi(t-1)) and refer to it as fund i's drawdown, or net inflow, after being in the quartiles, Qi(t-2) and Qi(t-1), during the past two years. A positive Di,t(Qi(t-2), Qi(t-1)) indicates fund inflows, and a negative value indicates fund outflows. Similarly, a fund in 4th quartile for two years in a row (44 bin) loses 30% of assets due to outflows.

The AUM of a fund at t + 1 is denoted as AUM_{t+1} and explained in Equation 2. AUM_{t+1} depends on the AUM at t, return R_{t+1}, and the drawdown at t + 1. In addition, we impose a condition that the sum of all drawdowns is 0, as shown in Equation 3. During the first two years (i.e., t = 1 and

t = 2), since investors do not have the past two year's returns, we assume that $D_{i,t}(Q_i(t\text{-}2), Q_i(t\text{-}1))$ = 0 for all i.

$$AUM_{t+1} = AUM_t \times \left(1 + R_{t+1}\right) \times \left(1 + D_{i,t}(Q_i(t-2), Q_i(t-1))\right) \tag{2}$$

$$\sum_{i=1}^{4}\sum_{j=1}^{4} D_t(Q_i(t-2), Q_j(t-1)) = 0 \tag{3}$$

Sixth, we compute every fund's AUM growth G_{t+1} as shown in Equation 4, rank all 4,000 funds by G_{t+1} each year, and place them in the appropriate quartile (i.e., 1, 2, 3, or 4) for every year.

$$G_{t+1} = \left(\frac{AUM_{t+1}}{AUM_t} - 1\right) = R_{t+1} + D_{i,t}(Q_i(t-2), Q_i(t-1)) + \left(R_{t+1} \times D_{i,t}(Q_i(t-2), Q_i(t-1))\right) \tag{4}$$

Finally, we compute geometric annual growth of AUM, denoted as GR_m, using Equation 5 for each of the 4,000 funds, where m = 1 to 4000, and N is the number of years in the window of analysis. We studied the fund returns for N = 10, 30, and 60 years.

$$GR_m = \left(\frac{AUM_{t=N}}{AUM_{t=0}} - 1\right)^{\frac{1}{N}} - 1 \tag{5}$$

The cumulative ranking is computed based on GR_m at the end of N years. The top 1,000 funds based on this cumulative ranking are classified as 1st-quartile funds (or winners). Likewise, the bottom 1,000 funds based on this cumulative ranking are 4th quartile funds. We observe the strategy followed by all 4,000 funds based on the cumulative rankings.

RESULTS

In this section, we summarize the results for a 10-, 30-, and 60-year analysis window. For lack of space, we eliminate 10- and 30-year analysis results sometimes. We find the average cumulative quartiles for all 4,000 funds in the presence of drawdown. Ranking in the 1st quartile indicates that the fund's cumulative ranking is in the top 1,000 (winners). Likewise, ranking in the 4th quartile indicates that the fund's cumulative ranking is in the bottom 1,000. Similarly, we find the average cumulative quartiles for all 4,000 funds in the absence of drawdown. In the absence of drawdown, the investor is not sensitive to past two-year fund performance (i.e., $D_{i,t}(Q_i(t\text{-}2), Q_i(t\text{-}1))$ = 0 for i).

First, we found, to our surprise, that the fund quartile rankings do not change significantly in the presence of drawdowns. Before running our tests, we expected the rankings to be different because drawdown and return can produce a compounding effect (i.e., $D_{i,t}(Q_i(t\text{-}2),\ Q_i(t\text{-}1))$ x R_{t+1}). However, we find that when drawdown profile is linear, the aggregate quartile rankings are similarly linear. By contrast, a non-linear drawdown profile can achieve any quartile ranking profile.

Second, we show that, in aggregate, funds that follow most-risky strategy tend to rank in the 1st quartile in the long run. When the window of analysis is only 10 years, the mean quartile for risky and most-risky funds are similar (2.1 vs. 2.04 in the presence of drawdown and 2.11 vs. 2.03 in the absence of drawdown). However, when the window of analysis is expanded to 60 years, the most-risky strategy tends to be a winner. So, as time progresses, the most-risky fund is more likely to be in the 1s[t] quartile. From this result, one can conclude that a fund that is going to adopt a risky strategy needs more time to prove results. Even a 10-year window is insufficient for compelling fund performance for investors. Similarly, as time progresses, the least-risky fund is more likely to be in the 4th quartile as the aggregate cumulative average quartile for least-risky funds changes from 3.48 over a 10-year window to 3.9 over a 60-year window, suggesting that a least-risky fund is almost guaranteed to be in the 4th quartile after 60 years.

Since the introduction of drawdowns has is no significant difference in the results, going forward we show only results in the presence of drawdown. Results without drawdown (which are less realistic) are available upon request from the authors.

Third, we find the annualized geometric return by fund type, with drawdown, after 60 years. The results indicate that the most-risky fund has the highest annual geometric return at 9.68% followed by the risky fund at 9.32%, the less-risky fund at 7.27%, and the least-risky fund, which has the lowest annual geometric return at 3.96%.

Fourth, we find that although, in aggregate, funds that follow a most-risky strategy tend to be in the 1st quartile in the long run, individually, a fund that follows a risky strategy has a higher probability (40.7% without drawdown and 39.7% with drawdown) of staying in the 1st quartile than a fund that that follows a most-risky strategy (35.9% without drawdown and 38.6% with drawdown). This counterintuitive result supports Howard Marks's assertion that a strategy for achieving superior long-term performance by aiming for a run of top-decile years is unlikely to succeed. Instead, a fund needs only to be slightly above average in order to be considered a top performer in the long-run. Interestingly, a fund that follows a risky strategy has almost the same probability of staying in the 4th quartile as a fund that follows a most-risky strategy (23.2% with or without drawdown). Put simply, a fund that aims to be in the top quartile every year by following a most-risky strategy has at the end of 60 years a lesser probability of staying in the 1st quartile, and the same probability of staying in the 4th quartile, as a fund that follows a risky strategy.

Fifth, when funds aim for the 1st quartile, they run the risk falling below average instead. We find that for all fund types, as funds increase risk profile and aim to be in the 1st quartile, the slope, which measures the probability of falling below average, is negative. In addition, a most-risky fund type has a steeper slope than a risky fund type. This result again illustrates the point that, in the long run, aiming for 1st-quartile returns is riskier than aiming for the 2nd quartile. To summarize, a fund that aims for the 2nd quartile every year has a higher probability of eventually ranking in the 1st quartile than a fund that aims to be in the 1st quartile every year. Deterioration of quartile rank over a longer window for most-risky firms can be explained by the findings of [9], who finds that managers of aggressive funds must often invest in smaller, lesser-known firms to achieve their objectives. Finding these "diamonds in the rough" may become more difficult as the fund grows.

Finally, we find that aiming for the 1st quartile has one principal advantage—in aggregate; it results in higher AUM. At the end of 60 years, a fund that aims for the 1st quartile will be able to turn a $1 investment into a median value $258. However, a fund that aims for the 2nd quartile will be able to reach a median value $201. If we use mean values, the difference is even more substantial due to the outsized returns of a few 1st-quartile outliers. We conclude that if a fund's goal is to achieve higher AUM, it should aim to be in the 1st quartile every year. However, if a fund aims to win the quartile race, aiming for the 2nd quartile every year is a safer bet.

Future research can extend this paper's findings by creating equal-weighted portfolios that invest in all four strategies equally to determine if such an equal-weighted portfolio with annual rebalancing method as suggested by [20] may result in better quartile rankings. Future studies might also examine volatility-managed equity portfolio that may lead to higher returns and superior performance [12].

CONCLUSION

There is a general perception that to beat a benchmark, such as the S&P 500, in the long-run, a fund must be in the 1st quartile for several years. In this paper, we explore if funds that take on more risk are more likely to maintain 1st-quartile performance compared with those that assume less risk. We also clarify the confusion that is often observed between a fund manager's two routes to stellar performance—grow AUM or stay in the 1st quartile over a long-time horizon. We show that each goal requires a different strategy.

Assuming that a manager follows one of the four strategies (most risky, risky, less risky, and least risky) to remain in the 1st quartile, we identify an appropriate asset class that mimics the manager's strategy and use monthly historical returns from January 1, 1979 to January 1, 2018 for four strategies: Russell 2000 Price Index (most risky), Russell 1000 Price Index (risky), 10-year constant maturity Treasury bond (less risky), and 3-month Treasury bill (least risky). This model can also use a different set of asset classes in our model as long as they represent four distinct risk-return profiles. Using bootstrap simulation with replacement methodology, we create a matrix of 240,000 annual returns (1,000 funds x 4 strategies x up to 60 years) for further analysis.

We show that if a fund aims to achieve higher AUM, it should aim to be in the 1st quartile every year. However, if a fund aims to win the quartile race, then aiming for the 2nd quartile every year is a safer bet. This finding supports the Howard Marks's (1990) claim that a fund needs only to be slightly above average in order to be considered a top performer in the long-run.

REFERENCES

[1] Agarwal, V. and Naik, N.Y. Multi-period performance persistence analysis of hedge funds. *Journal of Financial and Quantitative Analysis*, 2000, *35* (3), 327-342.

[2] Baquero, G., Ter Horst, J. and Verbeek, M. Survival, look-ahead bias, and persistence in hedge fund performance. *Journal of Financial and Quantitative Analysis*, 2005, *40* (3), 493-517.

[3] Berk, J.B. and Green, R.C. Mutual fund flows and performance in rational markets. *Journal of Political Economy*, 2004, *112* (6), 1269-1295.

[4] Bikker, J.A., Broeders, D.W. and De Dreu, J. Stock market performance and pension fund investment policy: rebalancing, free float, or market timing. *Discussion Paper Series/Tjalling C. Koopmans Research Institute*, 2007, *7* (27).

[5] Bollen, N.P. and Busse, J.A. Short-term persistence in mutual fund performance. *The Review of Financial Studies*, 2004, *18* (2), 569-597.

[6] Brown, G., Draper, P. and McKenzie, E. Consistency of UK pension fund investment performance. *Journal of Business Finance & Accounting*, 1997, *24* (2), 155-178.

[7] Brown, S.J. and Goetzmann, W.N. Performance persistence. *The Journal of Finance*, 1995, *50* (2), 679-698.

[8] Chevalier, J. and Ellison, G. Risk taking by mutual funds as a response to incentives. *Journal of Political Economy*, 1997, *105* (6), 1167-1200.

[9] Ciccotello, C.S. and Grant, C.T. Equity fund size and growth: Implications for performance and selection. *Financial Services Review*, 1996, *5* (1), 1-12.

[10] Elton, E.J., Gruber, M.J. and Blake, C.R. The persistence of risk-adjusted mutual fund performance. *Journal of Business*, 1996, 133-157.

[11] Goetzmann, W.N. and Ibbotson, R.G. Do winners repeat? *Journal of Portfolio Management*, 1994, *20* (2), 9-18.

[12] Harvey, C.R., Hoyle, E., Korgaonkar, R., Rattray, S., Sargaison, M., Van Hemert, O.The Impact of Volatility Targeting. *The Journal of Portfolio Management*, 2018, 45, 14-33.

[13] Hendricks, D., Patel, J. and Zeckhauser, R. Hot hands in mutual funds: Short-run persistence of relative performance, 1974–1988. *The Journal of Finance*, 1993, *48*(1), 93-130.

[14] Huang, J., Wei, K.D. and Yan, H. Participation costs and the sensitivity of fund flows to past performance. *The Journal of Finance*, 2007, *62* (3), 1273-1311.

[15] Huij, J. and Verbeek, M. Cross-sectional learning and short-run persistence in mutual fund performance. *Journal of Banking & Finance*, 2007, *31* (3), 973-997.

[16] Ippolito, R.A. Consumer reaction to measures of poor quality: Evidence from the mutual fund industry. *The Journal of Law and Economics*, 1992, *35* (1), 45-70.

[17] Ivković, Z. and Weisbenner, S., 'Individual investor mutual fund flows'. *Journal of Financial Economics*, 2009, *92* (2), 223-237.

[18] Kouwenberg, R. and Ziemba, W.T. Incentives and risk taking in hedge funds. *Journal of Banking & Finance*, 2007, *31* (11), 3291-3310.

[19] Lynch, A.W. and Musto, D.K. How investors interpret past fund returns. *The Journal of Finance*, 2003, *58* (5), 2033-2058.

[20] Malladi, R. and Fabozzi, F.J. Equal-weighted strategy: Why it outperforms value-weighted strategies? Theory and evidence. *Journal of Asset Management*, 2017, *18* (3), 188-208.

[21] Marks, H. The Route to Performance. Oak Tree Capital, 1990. available at https://www.oaktreecapital.com/docs/default-source/memos/1990-10-12-the-route-to-performance.pdf. (accessed November 4, 2018).

[22] Morningstar Analyst Insights and Definitions, 2018, available at https://goo.gl/2bwQNX (accessed November 4, 2018).

[23] Sirri, E.R. and Tufano, P. Costly search and mutual fund flows. *The Journal of Finance*, 1998, *53* (5), 1589-1622.

[24] Wermers, R.R. "Is Money Really 'Smart'? New Evidence on the Relation between Mutual Fund Flows, Manager Behavior, and Performance Persistence, 2003, available at SSRN: https://ssrn.com/abstract=414420 or http://dx.doi.org/10.2139/ssrn.414420 (accessed November 4, 2018).