

# Expense ratios and net alphas of large cap funds: Do expenses add value?

Abhay Kaushik<sup>a,\*</sup>, Raymond Boisvert<sup>b</sup>

<sup>a</sup>*Department of Accounting, Finance and Business Law, College of Business and Economics, Radford University, 801 East Main Street, Radford, Virginia, 24142, USA*

<sup>b</sup>*Department of Accounting, Finance and Business Law, College of Business and Economics, Radford University, 801 East Main Street, Radford, Virginia, 24142, USA*

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## Abstract

Global equity markets witnessed a tumultuous time-period of decline followed by growth, starting from the early part of 2000 to the beginning of the current period. Investment in actively managed mutual funds also experienced a decent growth over the same period though there were times when investors especially retail investors sat on the sidelines and seemed reluctant to invest in equity funds. This study analyzes the performance of large cap equity funds between January 2000 and December 2013. The main objective is to assess the performance as reflected in the alpha of funds conditioned on expenses. We apply both OLS regression and ranked portfolio approaches to estimate the abnormal performance. Results of this study show that large cap funds underperform against benchmarks after incorporating expenses. Results also suggest that expenses are not the only reason behind their underperformance. © 2018 Academy of Financial Services. All rights reserved.

*Keywords:* Mutual funds; Performance; Expense ratios

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## 1. Introduction

Mutual funds are important vehicles used by retail investors not just to diversify their portfolios, but also to generate higher returns. Within the space of mutual funds, large cap funds tend to be more stable. The question that many participants ask is whether these fees can be justified by the returns, or more importantly, by the net alphas generated by these funds. There is overwhelming support in the existing literature that actively managed funds

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\* Corresponding author. Tel.: +1-540-831-6426; fax: +1-540-831-6209.

E-mail address: akaushik@radford.edu (A. Kaushik)

underperform passive indices especially after incorporating expenses. The rise of low cost exchange traded funds (ETFs) also echoes the same sentiment. However, despite all that noise actively managed funds have been growing at a remarkable rate for the past several decades, which raises the question of how the investment community especially retail investors view actively managed mutual funds. Do they consider them expenses or strategic investments? According to the Investment Company Institute's 2013 Fact Book mutual funds are a \$13.5 trillion industry and are currently held by 47.1 percent of American households. The growth in the number of mutual funds over the last 40 years has been impressive—from 361 in 1970 to 7,596 in 2012. Mutual funds are attractive investment vehicles to novice and sophisticated investors alike because they offer a highly diversified investment and access to professional level management without having to commit to an extensive amount of capital.

Research indicates that the rise in popularity of mutual funds is related to the manner in which they are advertised. The marketing emphasis is placed on past performance versus other funds and the market as a whole, with little discussion of the associated fees. Mutual fund fee structure usually includes some sort of sales charge, or load, administered at the purchase, sale, or during the life of an investment in a mutual fund. Subsequently, the expense ratio of the fund is calculated by the sum of operational and administrative fees (also 12-b1 fees) divided by the average asset base of the fund.

Over the last 20 years, the trend in expense ratios has been in a steady decline. Expense ratios for equity funds decreased more than 20% during the period 1990–2012, from 99 basis points in 1990 to 77 basis points by year-end 2102. Many fund costs are fixed; therefore, as the net asset value of a fund rises the expense ratio tends to fall. According to the Investment Company Institute, at the end of 2012 equity funds with expense ratios in the lowest quartile managed 72% of all equity funds' total net assets. Equity index funds had 80% and target date funds held 79% of total net assets in the lowest quartile. The Investment Company Institute contends that the growth in popularity of index funds has driven down the expense ratios of actively managed funds so that they can remain competitive.

There are quite a number of studies in the existing literature that document the relationship between performance of funds and expenses. This article extends the scope of earlier research. The objective of this research is to determine whether the difference in management fees associated with large cap equity mutual funds should be viewed as an investment or an expense from the perspective of investors. Do funds that charge higher expense ratios offer commensurately higher risk-adjusted returns? Are higher expense ratios “dead costs” that are purely detrimental to portfolio performance, or do they signify that the funds hire and retain better managers who can accurately time the market or otherwise provide greater risk-adjusted returns, therefore allowing them to outperform the market in adverse conditions? This study contributes to the existing literature in a variety of ways. First, we analyze the impact of expenses on funds' performance at a period when expense ratios charged by active funds are far less than they used to be. The major benefit of using the current period is to see whether the impact is still the same or if it does not really matter anymore. Secondly, we are not using the expense ratio as another variable in cross-sectional analysis to see the impact of expenses on a fund's alpha. We are using the rank-portfolio approach to construct portfolios purely based on the expense ratio charged by different funds, and then comparing the alpha of extreme portfolios to analyze whether expenses are really good or bad for fund

investors. We are using a dynamic strategy to capture the impact of expenses on alpha. Our study spans 14 years and funds might change their expense ratio over time; therefore, we rebalanced portfolios every year in order to capture the real-time impact of expenses on the funds' alpha. Since expenses are vastly blamed for the underperformance of actively managed funds and for the growth of low-cost exchange traded funds (ETFs), we believe that the rank-portfolio methodology and more recent time period provide interesting implications and expand the existing research on this topic.

The answers to these questions could make a huge difference in an investor's choice in fund and bottom-line. What if higher expenses also generate better returns and not just returns but better alpha? If that is the case, then higher expenses should not be viewed as expenses but as strategic investments, especially in the case of portfolio management, where alpha is more relevant than raw return.

Existing literature is divided on the implications of expenses on the net alpha. For example, a recent research study conducted by Barber, Odean, and Zheng (2005) indicates a negative correlation between expense ratios and fund performance; enhancing the notion that lower expense ratio funds are the best choice for investors. Gruber (1996) and Carhart (1997) also show that a fund's net return is negatively affected by the expense ratio. Sirri and Tufano (1998) further suggest that expenses are not only bad for existing investors, but they also act as deterrents for new investors. Many other studies also concluded that higher expenses are not justified by fund managers and that the net performance depreciates significantly for funds with higher expenses (e.g., Bogle, 1998; Bollen and Busse, 2006; Chalmers, Edelen, and Kadlec 1999; Edelen, Evans, and Kadlec, 2013; Hooks, 1996; Ippolito, 1989; Wermers, 2000; among others). However, not all studies view expenses negatively. Funds that charge higher expenses may generate higher net of cost returns, help existing shareholders by deterring those investors who are not in for the long haul, or attracting and retaining managers that have the potential to outperform regardless of economic conditions. For example, Droms and Walker (1995) analyzed equity mutual funds by using a pooled cross-section/time series regression methodology to evaluate the impact of fund characteristics on fund performance. Nanigian (2012) suggests that the adverse relationship between expenses and performance tends to dissipate, specifically for funds that serve sophisticated investors. These findings support the notion that higher expenses might be able to attract managers who can outperform passive indices based on risk-adjusted performance. Higher expenses offer incentives to portfolio managers to use that extra cash to invest for superior research, retain quality managers, generate better investment ideas, and screen out short-term investors; thus, giving higher net returns to shareholders (e.g., Golec, 1996; Grinblatt and Titman, 1994; among others). Chordia (1996) and Nanda, Narayanan, and Warther (2000) find support for the theory that higher loads should accompany better performances because this helps managers screen out investors, especially those who are motivated by short-term gains, and limits the fund managers' unnecessary trading activities; thus, reducing the trading and transaction costs significantly. Lin (2014) advocates that sector specific actively managed funds not only achieve higher returns, but also higher risk adjusted returns; thus, supporting the value added component of actively managed funds. Tufano and Sevick (1997) suggest that expense ratio declines with fund size. Their findings are interesting for our research because we are specifically analyzing the interplay between expenses

and performance of large cap funds. Moreover, given the excessive volatility experienced in the last 15 years, more current research is needed to determine whether fund managers that charge higher expense ratios have “earned their keep” in the face of large market fluctuations.

We select January 2000 through December 2013 for this research because this period witnessed some of the most volatile and important events in the U.S. economy. Global markets suffered several cataclysmic events. In particular, the U.S. economy suffered two recessions during this time. On October 31, 2002, the S&P 500 bottomed at 768.63 and then on March 31, 2009 it bottomed even lower at an ominous 666.79. This time period also felt the lingering effects of the .com bubble, the September 11 attack on the World Trade Center and Pentagon, Hurricane Katrina in 2005, the collapse of the mortgage industry in 2007 and the subsequent shift in the Fed’s monetary policy, the highest unemployment since 1983, and the May 6, 2010 flash crash, among many other market moving occurrences. Specifically, in this study, we analyze large cap equity funds because we believe that large cap equity fund managers of high expense funds would have used their superior market timing and stock picking abilities to navigate their investors through adverse market conditions compared with their low-fee counterparts thus justifying the premium they charge investors.

This paper analyzes U.S. domiciled large cap actively managed equity funds across all three Morningstar classifications: value, growth, and blend. The funds are sorted based on their expense ratios and then compared on the basis of their risk-adjusted return during the period January 2000 to December 2013 in an effort to determine if there is any value to investing in funds with higher expense ratios or if they are just a means to take advantage of unsophisticated investors. This paper is organized as follows: Section 2 reviews the existing literature on equity mutual funds; Section 3 describes the data; Section 4 describes the methodology; Section 5 summarizes the empirical results; and Section 6 concludes the paper.

## 2. Literature review

Prior research shows mixed results on the performance of actively managed mutual funds. In a seminal paper, Jensen (1968) shows that fund managers do not possess any superior forecasting abilities to outperform the market and any abnormal performance by an individual fund is merely by chance. Jensen’s (1968) findings are further strengthened by Grossman and Stiglitz (1980), who examine the mutual funds’ performance and propose that the funds’ excess gross return is zero because the costs associated with obtaining that superior information cancel out any benefits earned from getting that information. Malkiel (1995) echoes the similar sentiments that markets are efficient. However, Grinblatt and Titman (1989 and 1993) show that not all but some managers do possess superior skills and ability to beat the passive benchmark on a gross return basis. Gruber (1996) and Wermers (2000) show that funds underperform corresponding benchmarks after considering expenses; Wermers (2000) findings show that funds outperform corresponding benchmarks by 1.3%; however, the same funds on a net return basis underperform corresponding benchmarks by 1%. However, Ciccotello and Grant (1996) analyze performance based on size and show that large funds, especially those that increase in assets because of their past performance, might not be the right choice for individual investors.

Mutual fund literature on actively managed funds has extensively examined the performance against passive benchmarks either inclusive of expenses or net of expenses, and, as previously noted, generally finds that actively managed funds underperform the benchmarks on a net basis. Wermers (2000) advocates that even though funds with higher turnover ratios experience higher transaction costs, managers tend to rebalance their portfolios with stocks with substantially higher returns compared to those with fewer turnover funds. The higher return is more than enough to offset any additional expenses these higher turnover funds might experience because of trading costs. On the other hand, a sizeable number of studies such as those conducted by Carhart (1997), Chalmers, Edelen, and Kadlec (2000), among others, find the opposite effect: turnover ratios have a significantly negative impact on the funds' performance. Carhart (1997) shows a negative relationship between a fund's expenses and performance. Similar to Carhart (1997), Gruber (1996) and Wermers (2000) find that funds underperform passive indices after considering expenses.

Droms and Walker (1995) analyzed 150 equity funds. They constructed portfolios based on riskiness of funds' returns. Their research shows that funds with higher expenses tend to have higher risk, but the findings also suggest that funds with higher expense ratios also tend to generate higher risk-adjusted returns. Their results find support in the notion that funds that charge higher expense ratios are able to allocate more money into quality research and, thus, are able to generate superior returns. In short, their research suggests that higher expenses are not really bad for investors. Detzel and Weigand (1998) analyze equity funds and conclude that persistence of performance is very much dependent on size. Chordia (1996) advocates that funds that are less susceptible to redemptions tend to be more profitable. His research findings indicate that higher expenses can be used as tools by funds to dissuade short-term investors who redeem their investments quickly, thus adding costs to other shareholders.

### 3. Data and descriptive statistics

We use the Morningstar Direct database to collect data points related to our sample funds during the period January 2000–December 2013. Any fund that is classified as U.S. large cap value/growth/blend by Morningstar's Global Category is selected as a sample fund. Since we are interested in analyzing domestic retail funds, any fund that is classified as an international or institutional fund is removed from the selection process. We also ensured that all funds are U.S. domiciled and have at least 90 percent of money invested in stocks. Consistent with the existing literature, our final sample consists of only those funds that have at least 36 monthly observations. Many times funds are sold with multiple share classes. However, all different classes have the same claims and holdings, and they only differ in terms of their fee structure. Therefore, if a fund has multiple share classes, we select the oldest share class for empirical purposes. Our final sample consists of 431 unique funds. Out of 431 funds, 230 are large cap growth funds, while 149 are large cap value funds and 146 are large cap blend funds.

Descriptive statistics of sample funds are reported in Table 1 Panel A. On average, sample funds invest nearly 96 percent in stocks and 3 percent in cash holdings. Average fund size is around \$1.2 billion over the 14-year period. The highest average net assets are observed in 2000, whereas the lowest are observed in 2009. The U.S. equity market saw a steep decline

Table 1 Panel A: Descriptive statistics for sample funds  
 This table shows the fund specific variables for sample funds in existence between the years 2000 and 2013. Ret is the average monthly return for the given year. Turn is the average turnover ratio, calculated as purchases or sales (whichever is less) divided by average monthly net assets. Cash is the average percentage of portfolios that are allocated to cash. Equity represents the average percentage of portfolios that are allocated to equity. TTOP is the average portion of portfolios allocated to the top 10 holdings. EXP is the average expense ratio charged by the fund. TNA is the average assets under management. Holdings show the average number of holdings the funds contain. Ranking is the average score (out of 5) assigned to the funds by Morningstar. Tenure is the average time in years that managers have been with their respective funds. RASS is the risk adjusted success ratio. *N* is the number of funds in existence per year.

Year	Ret	Turn	Cash	Equity	TTOP	EXP	TNA (in million)	Holdings	Ranking	Tenure	RASS	<i>N</i>
2000	-1.44%	83.76%	4.01%	94.54%	35.76%	1.20%	\$ 2,267.35	98.37	3.50	8.40	43.01	379
2001	-10.92%	87.00%	3.82%	95.24%	34.89%	1.20%	\$ 1,614.20	100.15	3.34	8.28	43.15	306
2002	-22.80%	86.76%	3.41%	94.81%	33.27%	1.32%	\$ 1,210.47	107.43	3.14	8.28	43.34	318
2003	26.28%	75.84%	3.43%	95.43%	33.34%	1.20%	\$ 1,072.64	105.01	3.17	8.23	43.20	330
2004	11.28%	127.56%	3.02%	96.11%	31.84%	1.20%	\$ 1,215.63	109.41	3.17	8.23	43.30	339
2005	7.20%	71.16%	2.92%	96.32%	31.96%	1.20%	\$ 1,223.27	104.97	3.08	8.19	43.08	360
2006	11.88%	75.36%	2.92%	96.32%	31.42%	1.20%	\$ 1,210.53	98.90	3.04	8.10	43.10	376
2007	8.88%	73.08%	2.61%	96.68%	31.38%	1.20%	\$ 1,299.31	97.04	3.01	8.07	42.95	391
2008	-44.16%	82.68%	3.03%	96.22%	31.77%	1.20%	\$ 1,071.73	102.46	3.07	8.00	42.87	402
2009	28.20%	85.80%	2.64%	96.62%	30.90%	1.20%	\$ 721.51	103.94	3.05	7.94	42.76	413
2010	15.72%	73.56%	2.21%	97.21%	30.19%	1.20%	\$ 828.10	104.61	2.96	7.83	42.94	430
2011	0.60%	68.64%	2.25%	97.23%	30.58%	1.20%	\$ 910.47	102.26	2.95	7.80	42.77	431
2012	14.52%	65.40%	2.07%	97.57%	32.16%	1.20%	\$ 893.59	100.44	2.94	7.80	42.77	431
2013	29.40%	63.36%	1.95%	97.80%	30.81%	1.08%	\$ 980.42	99.73	2.88	7.80	42.77	431
Average	5.33%	80.00%	2.88%	96.29%	32.16%	1.20%	\$ 1,179.94	102.48	3.09	8.07	43.00	381

Table 1 Panel B: Descriptive statistics of individual categories of large cap funds

The table shows the mean values of large cap value/growth/blend funds over the 14-year period (01/2000 to 12/2013). Ret is annual return generated by sample funds. Exp is the annual expense ratio. Turn is the turnover ratio. TTOP is the funds' investment in their top 10 assets. Cash is the annual cash holdings. Equity is the funds' investments in stocks. Holdings is the number of holdings in an average fund. Tenure is the average managerial tenure with a funds.

	Large cap value	Large cap growth	Large cap blend
Ret	7.37%	5.50%	6.20%
Exp	1.11%	1.24%	1.15%
Turn	62.55%	79.76%	73.63%
TTOP	31.50%	33.10%	28.73%
Cash	2.49%	2.48%	2.30%
Equity	96.57%	97.19%	96.41%
Holdings	91.13	87.49	136.22
Tenure	7.96	8.24	7.69

in the mid-2000s, and we believe that is reflected in the lowest TNA under management in 2009. Most of these funds seem to be well-diversified as reflected in the average number of holdings during the 14-year long period. On average, sample funds manage 102 holdings per year and this number is nearly consistent every year from 2000 to 2014. Large cap funds are supposed to be stable funds and it is further strengthened from the fact that, on average, managers stayed with the fund for eight years when we look at the average managerial tenure of all 431 funds over the 14 years of this study. The data further suggest that large cap funds charge less fees from their investors. On average, the monthly expense ratio is 0.10 percent

Table 1 Panel C: Descriptive statistics for market factors

This table shows the return on the market, risk free rate, small minus big, high minus low, and momentum factors. RM is the average monthly return of the CRSP Value Weighted Index. RF is the average monthly yield for a one-month treasury bill. SMB is the difference in returns between small and large cap stocks. HML is the difference in returns between high and low book-to-market stocks. MOM is the difference in returns between stocks with high and low past returns.  $N$  is the number of monthly observations.

Year	RM	RF	SMB	HML	MOM	$N$
2000	-0.93%	0.48%	-0.02%	3.06%	1.64%	168
2001	-0.82%	0.31%	1.64%	1.29%	-0.27%	168
2002	-1.79%	0.13%	0.37%	1.03%	2.33%	168
2003	2.38%	0.08%	1.69%	0.30%	-1.51%	168
2004	0.97%	0.10%	0.44%	0.71%	0.03%	168
2005	0.53%	0.25%	-0.12%	0.69%	1.16%	168
2006	1.22%	0.39%	0.06%	1.02%	-0.53%	168
2007	0.49%	0.38%	-0.68%	-1.02%	1.78%	168
2008	-3.56%	0.13%	0.60%	0.18%	1.59%	168
2009	2.30%	0.01%	0.68%	-0.02%	-5.33%	168
2010	1.52%	0.01%	1.05%	-0.15%	0.50%	168
2011	0.14%	0.00%	-0.42%	-0.54%	0.69%	168
2012	1.31%	0.01%	0.05%	0.56%	-0.05%	168
2013	2.57%	0.00%	0.50%	0.03%	0.53%	168
Average	0.45%	0.16%	0.42%	0.51%	0.18%	168

(1.2 percent annually) and this average is almost constant per year from 2000 to year-end 2013. Although most of these funds manage a good number of holdings, it appears that fund managers tend to invest a large portion in their top picks. The data show that, on average, almost one-third (32 percent) of investment is made in the top 10 percent holdings. Turnover ratio is less than 100 percent over the 14-year period. Highest turnover ratio of 127 percent is seen in 2004, whereas the lowest of 64 percent is observed in year-end 2013. The highest number of funds (431) exist in each year from 2010 to 2013 whereas the lowest number of 306 funds is observed in 2001. On average, 381 funds are observed per year over the 14-year period. Table 1 Panel B shows a few key descriptive statistics for individual categories. On average, large cap growth funds earn 5.50 percent return per year over the 14-year period. On average, during the 14-year period, large cap growth funds combined charge an expense ratio of approximately 1.23 percent per year, manage 88 holdings worth \$1.445 billion in assets, and use roughly 2.5 percent of assets as cash holdings. Similar statistics are given in Table 1 Panel B for large cap blend and value funds. For example, on average per year, a large cap blend fund earns 6.20 percent return, managing 136 holdings with over \$833 million in assets and charges 1.15 percent expense ratio during the 14-year period, whereas the annual statistics for value funds are 7.37 percent return, 63 percent turnover, 91 holdings, and \$680 million in assets per fund and charge an expense ratio of 1.11 percent over the same period. These statistics offer good insight into each category. Growth funds manage higher dollar amount in assets and lowest return, whereas value funds manage lower amount with highest return. Also, the value category charge lowest expenses and the growth charge the highest. These descriptive statistics show sharp differences among all these different categories and support the idea of this study to evaluate all of these categories as one group and also separately.

Table 1 Panel C shows a few key statistics of the market and market related portfolios. The average return of market portfolio (the CRSP Value Weighted Index) is 0.45 percent per month (5.40 percent annual equivalent) whereas the average annual return on the U.S 1-month T-bills rate is 1.92 percent. Proxy portfolios returns that mimic risk premium generated from small stocks, value stocks, and momentum are 5.04 percent, 6.12 percent, and 2.16 percent, respectively. Returns on the CRSP Value Weighted Index, the one month U.S. Treasury bills, and market mimicking portfolios SMB, HML, and MOM are taken from Kenneth French's website. The highest monthly market return is 2.57 percent observed in year-end 2013. The lowest of -3.56 percent is seen in the 2008. Interestingly, during 2008, risk premium generated by small and value stocks are positive and so is the risk premium generated by the momentum effect. A simple comparison of returns between sample funds and the market index shows that in 2013, sample funds generate 2.45 percent return and -3.68 percent in 2008. This comparative analysis clearly shows a direct relationship between sample funds and the market.

#### 4. Methodology

The Sharpe (1964) – Lintner (1965) Capital Asset Pricing Model (CAPM) is the primary and most often used tool to price assets. The CAPM states that in equilibrium, expected returns are linearly related to their level of risk, more specifically, their beta or systematic



risk. Many tests and models have been developed over the years to measure performance of the mutual funds' managers. Jensen's (1968) alpha is perhaps the best known primary model.

$$r_{it} - r_{ft} = \alpha_i + \beta_i * RMRF_t \quad (1)$$

Where:

$r_{it} - r_{ft}$  is the excess return on fund i over the 1-month T-bill rate,  
 $\alpha_i$  is the measure of the portfolio's performance (Jensen's alpha),  
 $RMRF_t = RM_t - RF_t$  is the excess return on the market, and  
 $\beta_i$  is the unconditional measure of risk.

We use monthly observations over the period January 2000 to December 2013. It is argued that the market model alone does not reflect true risk inherent in the funds' performance and therefore, in order to control the funds' selectivity performance for investment style, we also use the four-factor model of Carhart (1997), which adjusts fund excess return for the Fama-French (FF) factors SMB, HML, and Carhart's momentum in addition to difference in returns between small and large capitalization stocks and the difference in returns between high and low book-to-market stocks.

$$r_{it} - r_{ft} = \alpha_i + \beta_{1i} * RMRF_t + \beta_{2i} * SMB_t + \beta_{3i} * HML_t + \beta_{4i} * MOM_t + \varepsilon_{i,t} \quad (2)$$

Where:

$RMRF_t$  is the excess monthly return (market return net of monthly T-bill return) on the CRSP Value Weighted Index,  
 $SMB_t$  is the difference in returns between small and large capitalization stocks and  $HML_t$  is the difference in returns between high and low book-to-market stocks.  
 $MOM_t$  is the difference in returns between stocks with high and low past returns.

Monthly  $SMB_t$ ,  $HML_t$ , and  $MOM_t$  factors are taken from the Kenneth French Web site.

A positive alpha in equation (2) shows the positive stock picking abilities or selectivity of the fund managers, whereas a negative alpha corresponds to negative selectivity of fund managers. A zero alpha means that fund managers have no selectivity ability and they are not able to either underperform or overperform the comparative benchmark.

Since funds may differ from each other, first we estimate alpha for each fund separately using equation (2) and then estimate asset-weighted average alpha of the entire portfolio. Further, we use Newy-West regression methodology to control for any heteroscedasticity and auto-correlation in error terms. We estimate alphas overall and separately across each large cap category.

#### 4.2. Abnormal performance based on expense ratio

The main objective of this study is to evaluate abnormal performance conditioned on expenses; therefore, we use portfolio approach to estimate expense ratio conditioned alpha.

Table 2 Alphas overall and across categories

The following table shows number of funds that participated in the four-factor model and the number of funds that exhibited positive, negative, significant, and insignificant alphas.

	Overall	Value	Growth	Blend
<i>N</i>	431	134	179	118
Positive	187	75	67	45
Negative	244	59	112	73
Significant	71	17	23	24
Insignificant	360	117	156	94
Positive and significant	19	10	3	6
Negative and significant	52	7	20	18
Significant @ 1%	15	1	3	7
Significant @ 5%	25	10	7	10
Significant @ 10%	31	6	13	7

We form quintiles each year based on the expense ratio in the previous year. In other words, we rank funds based on expense ratio<sup>1</sup>; for example, year 2000 is the first formation year. At year-end 2000, we sort funds based on expense ratios and form quintiles. Q1 portfolio consists of funds that belong to the lowest 25 percent of funds based on expense ratio whereas Q5 contains funds with highest expense ratio. Since expense ratio may change overtime, we follow dynamic strategy and repeat the step at the end of each year. Doing so gives us a time series of funds based on their expense ratios. We estimate alpha of Q1 and Q5 using four-factor Carhart Model (equation 2) mentioned above. The main idea is to estimate different alphas for funds with the highest and lowest expense ratios. In order to have an even better understating of those alphas, we also estimate statistically the difference between those extreme alphas.<sup>2</sup> Finally, to get an even clearer understanding of large cap funds and expenses charged, we re-estimate expense ratio conditioned alphas for value, growth, and blend categories separately.

## 5. Results

Results are reported in Tables 2, 3, and 4. Interesting results are obtained when we run the four-factor model across all 431 large cap funds. Funds in our sample differ in terms of assets under management; therefore, we estimate asset-weighted alpha for each fund. Out of 431 funds, 244 funds exhibit negative abnormal performance, whereas 187 funds have positive alpha estimates. Out of these funds, 71 funds (16.47 percent of sample funds) have alphas that are statistically significant. Out of 71 statistically significant funds, 19 funds generate positive abnormal performance and 52 funds (73 percent) are poorly performing funds. We run the same model across each individual category. Table 2 reports these statistics overall and across individual categories. Maximum number of funds, 179, is available in growth category; 13 percent of funds (17 funds) show significant alphas. Out of 17 funds, 10 funds outperform, and 7 funds underperform the passive index statistically. These numbers vary across categories. In the large cap growth category, 23 out of 179 funds exhibit statistically significant alphas whereas a majority, 156 funds, fail to earn alpha statistically different from

zero. Three funds outperform whereas 20 funds show negative performance. In the large cap blend category, all together 118 funds participated in regressions and only 6 outperform the market whereas 18 underperform against the passive index.

Next, we estimate the average alpha and beta coefficients for the four-factor model. On average, large cap funds generate  $-0.007$  percent alpha per month ( $-0.084$  percent annually), however, the alpha coefficient is statistically insignificant. Regression analysis shows positive and significant association between the excess market returns and sample funds' returns. Looking at the premium attached to various groups, the sample funds' returns are negatively related to small stocks and positively related to excess market returns, value stocks, and momentum effects. All these coefficients are statistically significant. We are not surprised by these results because our sample funds are large cap stocks so their inverse relationship to the premium attached to small stocks is quite obvious and the positive relationship to market and value stocks is also very apparent. We run the same regressions for individual categories. Startling differences are observed when we run the same regressions across individual categories. Alpha of large cap value funds is positive ( $0.0503$  percent per month or  $0.603$  percent annually) and it is statistically significant. Sample funds' returns are positively and statistically significant related to market returns and value stocks and negatively (and statistically significant) related to small stocks premium and momentum effects. These results are also very obvious given that we are analyzing large cap value stocks. The coefficients of RMRF and HML are not really surprising because existing literature also suggests a positive and significant association between funds and market returns and since we are analyzing the value funds; therefore, it is obvious to have a positive relationship between value premium and returns. In the growth category, alpha estimate is negative. RMRF and MOM effects are positively related to funds' returns and HML coefficient is negatively attached to funds' returns. A negative relationship between value premium and growth stocks is quite expected. Table 3 Panel D reports the same statistics for large cap blend funds. The alpha estimate is insignificant whereas RMRF, SMB, HML, and MOM parameter estimates are statistically highly significant. Results are reported in Table 3 Panel A to D.

Finally, we estimate the performance of funds based on the expense ratios they charge their customers. We use ranked portfolio approach to estimate the performance conditioned on expenses. At the beginning of each year, we rank the entire portfolio based on the annual expense ratio and construct quintiles. The sorting is done based on prospectus based expense ratio. Q1 is the quintile (group of funds) that charges the lowest expense ratio and Q5 is the group of funds that charges the highest expenses. Since funds' expense ratio may change over time, we use dynamic rebalancing as opposed to static approach and repeat the same step at the beginning of each year. Year-end 2000 is our first formation period whereas year-end 2012 is the last formation period. Results are tabulated in Table 4. Findings show a good difference between the extreme portfolios. On average, funds that charge lower expenses deliver higher alphas overall and across individual categories except value category. However, results also show that, on average, funds in these two extreme groups underperform against the passive index. Another interesting observation is the difference in alphas between two extreme groups. Results are interesting because they seem to suggest that the difference in alpha is not just because of expenses. For example, the average monthly

Table 3 Panel A: Abnormal performance of funds

The following table shows the abnormal performance of the sample funds over the period 1/2000 to 12/2013. The abnormal performance ( $\alpha$ ) is based on the four-factor model.  $r_{it}$  is the excess monthly return of fund  $i$  over one month U.S. T-Bill return. RMRF is the excess monthly return of the CRSP Value Weighted Index over the one month U.S. T-Bill return. SMB, HML, and MOM are monthly returns of size (the difference in returns between small and large cap stocks), book to market (the difference in returns between high and low book-to-market stocks), and momentum (the difference in returns between stocks with high and low past returns) portfolios, respectively. The dependent variable is the individual fund's monthly excess return over the corresponding one month T-Bill rate. Alpha is expressed in percentage per month. Regression estimates are based on Newey-West adjusted standard errors.  $N$  is the number of fund month observations.

$$\text{Model: } r_{it} - r_{ft} = \alpha_i + \beta_{1i} * \text{RMRF}_t + \beta_{2i} * \text{SMB}_t + \beta_{3i} * \text{HML}_t + \beta_{4i} * \text{MOM}_t + \varepsilon_{i,t}$$

Variable name	Mean	Standard error	$t$ -Value	$p$ -Value
Alpha	-.007	0.000082	-0.89	0.3732
RMRF	0.983155***	0.00319	308	0.0000
SMB	-0.04745***	0.00775	-6.12	0.0000
HML	0.011741*	0.00667	1.76	0.0782
MOM	0.014201***	0.00311	4.57	0.0000
$N$	62,497			

\*\*\*, \*\*, and \* show the significance at 1%, 5%, and 10% level, respectively.

alpha difference between funds that charge higher expenses and lower expenses is  $-0.067$  percent ( $-0.804$  percent annually) statistically significant, whereas the average annual difference in their expense ratio is just 30 basis points. In other words, the majority of the difference (50 basis points difference) is coming from factors other than expense ratio. Results further strengthen the notion that many times performance deteriorates not because of expenses charged by funds, but by over-diversification or managers' behavior of taking more risk in anticipation of better alpha.

## 6. Conclusion

Mutual funds are supposed to offer low-cost diversification and consistent returns to retail investors and it is perhaps one of the main reasons of steep growth of mutual funds year by year for the past several decades. The question of expenses and alphas has taken center stage in academic and practitioner research. One of the main questions investors want to know is

Table 3 Panel B: Abnormal performance of value funds

Variable name	Mean	Standard error	$t$ -Value	$p$ -Value
Alpha	0.0503***	0.000147	3.41	0.0006
RMRF	0.919338***	0.00526	174.69	0.000
SMB	-0.13051***	0.00889	-14.68	0.0000
HML	0.285684***	0.00995	28.71	0.0000
MOM	-0.01315**	0.0053	-2.48	0.0131
$N$	15,465			

\*\*\*, \*\*, and \* show the significance at 1%, 5%, and 10% level, respectively.

Table 3 Panel C: Abnormal performance of growth funds

Variable name	Mean	Standard error	<i>t</i> -Value	<i>p</i> -Value
Alpha	-0.024*	0.000129	-1.84	0.0661
RMRF	1.029688***	0.00495	208.07	0.000
SMB	0.003744	0.0131	0.29	0.7755
HML	-0.16509***	0.01	-16.44	0.000
MOM	0.024633***	0.00485	5.08	0.000
<i>N</i>	24,678			

\*\*\*, \*\*, and \* show the significance at 1%, 5%, and 10% level, respectively.

whether expenses charged by these funds are justified by their performance. While there is overwhelming support in the existing literature that actively managed funds underperform passive indices and the underperformance is more visible after incorporating expenses, still, there are studies that documented positivity of expenses. Their arguments include from dissuading short-term investors to using extra cash for better research to attracting and retaining quality portfolio managers. Equity markets have seen a roller coaster ride since the beginning of 2000 and the global markets have tested a tumultuous time-period in the past decade. Based on all of these circumstances, we realize that a thorough analysis of expense-based performance is warranted. We use only large cap funds in our research because they tend to be more stable and are supposed to withstand the market volatility. In this study, we analyze large cap funds from January 2000–December 2013. We analyze large cap funds as one group and reexamine the performance across individual categories, namely: value, growth, and blend categories. We document that not all types of large cap funds underperform against the passive index. Our results indicate superior performance by value funds. In our study, they earn on average, 600 basis points alpha over the 14-year period whereas, on average, large cap growth funds underperform by nearly 240 basis points during the same period. We divide the entire portfolio into quintiles based on the expense ratio they charge from investors and our results show amazing differences in their performance across those divisions. Generally, expenses are blamed for lower net returns to investors, but our results suggest that expenses are not the only reasons behind the underperformance of funds. Expense ratio does decrease the net alpha earned by a fund's investor, however, a lot of other fund-specific factors contribute to the majority of negative alpha.

Table 3 Panel D: Abnormal performance of blend funds

Variable name	Mean	Standard error	<i>t</i> -Value	<i>p</i> -Value
Alpha	-0.018	0.000127	-1.44	0.1486
RMRF	0.953652***	0.00469	203.21	0.0000
SMB	-0.09858***	0.00832	-11.84	0.0000
HML	0.082804***	0.00856	9.67	0.0000
MOM	0.012906***	0.0044	2.94	0.0033
<i>N</i>	14,463			

\*\*\*, \*\*, and \* show the significance at 1%, 5%, and 10% level, respectively.

Table 4 Performance of funds based on expense based quintiles

The table reports the fund's abnormal performance conditioned on expense ratio over the period 01/2000 to 12/2013 with year-end 2000 as the first formation period. Quintiles are formed at the beginning of each year based on previous year's annual expense ratio. Quintile 5 consists of funds that belong to top 20% expense ratio level in the formation year and Quintile 1 consists of funds that are at the bottom of the 20% of the group based on annual expense ratio in the formation year. Alpha is the *average alpha* (in percentage per month) of each series. Regression estimates are based on Newey-West adjusted standard errors. RMRF is the excess monthly return of the CRSP Value weighted index over the corresponding one month risk free (T-bill rate). The table provides the mean alphas for the quintiles and the difference in the mean alpha in percentage per month between the extreme portfolios Q1 and Q5.

Model:  $r_{it} - r_{ft} = \alpha_i + \beta_{1i} * RMRF_t + \beta_{2i} * SMB_t + \beta_{3i} * HML_t + \beta_{4i} * MOM_t + \varepsilon_{i,t}$

	Quintile 1	Quintile 5	Quintile 1 to Quintile 5
Overall	-0.036**	-0.087***	0.051
Value	-0.049*	-0.020	-0.029
Growth	-0.056**	-0.123***	0.067
Blend	-0.035*	-0.074**	0.039

\*\*\*, \*\*, and \* show the significance at 1%, 5%, and 10% level, respectively.

## Notes

- 1 We use raw expense ratio of each fund in the sorting process.
- 2 We estimate the difference in returns of the two series and use it as the dependent variable to run the four-factor regression.

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