The Historical Record on Active vs. Passive Mutual Fund Performance

David Nanigian*

Mihaylo College of Business and Economics at California State University, Fullerton

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Comments are enormously welcome!

* Associate Professor of Finance, Mihaylo College of Business and Economics at California State University, Fullerton, 800 N. State College Blvd., SGMH 5113, Fullerton, CA, 92831, Telephone: (657) 278-4690, Email: dnanigian@fullerton.edu. I am grateful for the insightful comments received from Mehmet Akbulut and Larry Swedroe.

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Abstract

This study examines the risk-adjusted performance of actively managed mutual funds vs. passively managed mutual funds between 1991 and 2018 and finds that the statistical significance of the difference in performance between the two types of funds disappears when the passively managed funds are compared to competitively priced actively managed funds. The practical implication of this study is that, setting tax considerations aside, as long as investors are cost conscious in their fund selection process, investing in passively managed funds does not meaningfully improve investor outcomes.

The Historical Record on Active vs. Passive Mutual Fund Performance

1. Introduction

A plethora of studies have documented that mutual funds with higher expenses have lower performance.[1] This has led to a belief that a passive investment strategy beats an active strategy and the resultant rise in the popularity of index fund investing (French (2008)). The trend towards index fund investing is illustrated in Figure 1. The purpose of this study is to perform an empirical analysis into the risk-adjusted performance of actively managed mutual funds vs. passively managed mutual funds between 1991 and 2018. The central finding of this study is that the statistical significance of the difference in performance between the two types of funds disappears when the passively managed funds are compared to competitively priced actively managed funds. The practical implication of this study is that, setting tax considerations aside, as long as investors are cost conscious in their fund selection process, investing in passively managed funds does not meaningfully impact household portfolio performance.

2. Data and Methodology

To evaluate the historical performance of actively and passively managed mutual funds, monthly net-of-expense returns and share-class level total net assets (TNA), along with annual report net expense ratios are gathered from Morningstar Direct's survivor-bias-free United States Mutual Funds database. In order to measure risk-adjusted performance using the Carhart (1997) Four-Factor Model, the sample is restricted to funds with a Morningstar Category that belongs to the U.S. Category Group of U.S. Equity. The April 2018 Morningstar Methodology Paper on Morningstar category classifications for portfolios available for sale in the United States is used to assign historical Morningstar Categories to broad U.S. Category Groups. Returns and expense ratios are aggregated to the fund portfolio level by weighting them by their TNA at the end of the previous month.

[1] See, for example, Carhart (1997), Chevalier and Ellison (1999), Cremers, Ferreira, Matos, and Starks (2016), Elton, Gruber, Das, and Hlavka (1993), Gil-Bazo and Ruiz-Verdu (2009), Gruber (1996), and Harless and Peterson (1998) for evidence of this.

Funds are sorted into two groups: passive and active. The passive group consists of funds that are classified by Morningstar as index funds. The active group consists of those that are not classified by Morningstar as index funds. The performance of the two groups of funds over the time period from January 1991 to December 2018 is then evaluated based on the alpha from the Carhart Four-Factor Model. Factor data, along with a one-month Treasury bill rate proxy for the risk-free rate, is gathered from Wharton Research Data Services.

3. Main Results

Table 1 displays the annualized Carhart Four-Factor Model alpha on an equally-weighted "passive" portfolio and on an equally-weighted "active" portfolio. The table also displays the annualized Carhart Four-Factor Model alpha on value-weighted portfolios, in which the weights to each fund are based on the value of each fund's TNA at the end of the prior month.

The results involving equally-weighted portfolios indicate that the actively managed funds underperform the passively managed funds by 0.59% per year. The results involving the value-weighted portfolios indicate that the actively managed funds underperform the passively managed funds by 0.90% per year. To determine whether these differences were statistically significant, paired *t*-tests were performed. Interestingly, the results involving the value-weighted portfolios (*t*-value of -2.59) were statistically significant at the conventional 5-percent level yet the results involving the equally-weighted portfolios (*t*-value of -1.36) were not significant at even the 10-percent level.

Table 2 displays the average annualized Carhart Four-Factor Model alpha on passively managed funds and on actively managed funds in each of the 28 years of this study. This year-by-year analysis illuminates how well anchored mutual fund performance is to its Grossman and Stiglitz (1980) equilibrium. There is no discernable trend in the performance of passively managed funds relative to actively managed funds. In the equally-weighted analysis, the passively managed funds outperformed the actively managed funds in 16 of the 28 years of the study. In the value-weighted analysis, the passively managed funds outperformed their actively managed counterparts in 18 of the 28 years of the study. Taken together, this year-by-year analysis indicates that mutual fund performance is strongly anchored to its Grossman and Stiglitz equilibrium.

Numerous studies have documented that mutual funds with higher expenses have lower performance. The very reason for the existence of passively managed funds is to minimize expenses and thereby theoretically improve household wealth accumulation. Table 3 shows that, over the time period of this study, between 67% and 90% of passively managed funds ranked in the bottom quintile of expense ratio amongst the broader set of U.S. Equity Mutual Funds. Table 4 shows that between 93% and 100% of the dollars invested in passively managed funds were invested in funds that ranked in the bottom quintile of expense ratio amongst the broader set of U.S. Equity Mutual Funds. Table 4 also shows that between 30% and 48% of the dollars invested in actively managed funds were also invested in funds that ranked in the bottom quintile of expense ratio amongst the broader set of U.S. Equity Mutual Funds. These observations of the distribution of investor capital across funds indicate that investors are cost conscious in their fund selection process. The prior research on the impact of expenses on fund performance, combined with investors' revealed preference for inexpensive funds, motivates a more "apples to apples comparison" involving only funds that ranked in the bottom quintile of expense ratio.

Table 5 displays the results for the portfolios of funds that ranked in the bottom quintile of expenses. None of these portfolios generated performance that was statistically significant at the conventional 5-percent level. The equally-weighted portfolio of actively managed funds underperformed the equally-weighted portfolio of passively managed funds by a statistically insignificant (*t*-value of -0.67) 0.24% per year, which is less than half the magnitude of that which was observed in the full sample without the expense restriction (0.59%). The value-weighted portfolio of actively managed funds slightly underperformed the value-weighted portfolio of passively managed funds by a statistically insignificant (*t*-value of -0.39) 0.13% per year. This performance differential is merely one-seventh the magnitude of that which was observed in the full sample (0.90%).

Table 6 displays the yearly average annualized Carhart Four-Factor Model alpha of passively managed funds and actively managed funds that ranked in the bottom quintile of expense ratio. Consistent with the year-by-year analysis without the expense restriction, there was no discernable trend in the performance of passively managed funds relative to actively managed funds. However, it is interesting to note that there was somewhat greater equality in performance between the two groups of funds. In the equally-weighted analysis, the passively managed funds

outperformed the actively managed funds in 15 of the 28 years of the study. In the value-weighted analysis, the passively managed funds outperformed their actively managed counterparts in exactly half (14) of the 28 years of the study.

Taken together, the analysis involving the sample of funds that ranked in the bottom quintile of expense ratio suggests the difference in performance between the passively managed funds and the actively managed funds in the full sample is largely attributable to the presence of actively managed funds with excessive fees. To more closely examine this possibility, I pair each passively managed fund with an actively managed "partner". To identify the "partner", for each passively managed fund, I first restrict the sample of actively managed funds to only those that belong to the same Morningstar Category and then choose the one fund that has the expense ratio that is closest to that of the passively managed fund at hand. In the event that multiple actively managed funds are identified as eligible partners, then the passively managed fund is paired with a hypothetical "fund of funds" that allocates capital equally among each of the eligible partners. The mean and median differences in the expense ratios across the fund-months were three basis points and one basis point respectively. This indicates that the passively managed funds are paired with actively managed funds that have very similar expenses.

Table 7 displays the results for the portfolios of passively managed funds and actively managed "partners". The equally-weighted portfolio of passively managed funds underperformed by 0.47% per year and the equally-weighted portfolio of actively managed "partners" underperformed by 0.64% per year. The statistically insignificant (*t*-value of -0.39) 0.17% difference in performance between the two equally-weighted portfolios was less than one-third the magnitude of that which was observed in the full sample (0.59%).

The value-weighted portfolios displayed in Table 7 compare the performance of a value-weighted portfolio of passively managed funds to the performance of a portfolio of actively managed "partners" where the weight given to each "partner" is proportionate to the that of its passively managed counterpart. The purpose of this alternative weighting methodology is to discover what the performance of a representative investor in passively managed funds would have been if he or she invested in comparably priced actively managed funds instead, while leaving his or her asset allocation unchanged. Although the difference in performance between the two value-weighted portfolios was not statistically significant (*t*-value of 0.24), the value-weighted portfolio

of actively managed "partners" outperformed the value-weighted portfolio of passively managed funds by 0.11% per year (-0.03% vs. -0.14%).

Table 8 displays the average annualized alphas of passively managed funds and their actively managed "partners" in each of the 28 years of this study. Consistent with the year-by-year analysis involving the funds that ranked in the bottom quintile of expense ratio, there was no discernable trend in the performance of passively managed funds relative to actively managed funds and great equality in performance between the two groups of funds. In the equally-weighted analysis, the passively managed funds outperformed their actively managed "partners" in 13 of the 28 years of the study. In the value-weighted analysis, where weights are based on those of the passively managed funds, the passively managed funds outperformed their "partners" in 16 of the 28 years of the study. Table 8 also displays the percentage of passive funds that outperformed their "active partners" in each year. This ranged from 22% in 1992 to 80% in 1998. The average annual percentage of passive funds that outperformed their "active partners" was 52%. This further indicates that, when passively managed funds are compared to similarly priced actively managed funds, there is great equality in performance between the two groups of funds.

4. Additional Results

Cremers and Petajisto (2009) and Amihud and Goyenko (2013) illuminate the prevalence of "closet indexing" by U.S. Equity Mutual Funds. "Closet Indexing" is when a fund claims to be actively managed yet fails to demonstrate a distinctive portfolio management strategy. Therefore, when evaluating the historical record on the performance of actively managed vs. passively managed funds, it may be more fair to compare passively managed funds to truly actively managed funds. To perform this analysis, the R^2 value from the Carhart Four-Factor Model that is run over a twelve-month estimation period is used to gauge each fund's level of strategy distinctiveness. Then, in each month, the sample of actively managed funds is truncated to those with an R^2 value that was below the median R^2 value for the month among U.S. Equity Mutual Funds. This subset of funds is referred to as "truly actively managed" funds. It should be noted that, due to sporadic TNA data prior to 1991, the portfolio performance evaluation period for this analysis begins in 1992.

Table 9 displays the annualized alpha on the portfolio of passively managed funds and the portfolio of truly actively managed funds. In the equally-weighted analysis, the truly actively managed funds underperformed the passively managed funds by one basis point (-0.45% vs. -0.43%). In the value-weighted analysis, the truly actively managed funds underperformed the passively managed funds by 50 basis points (-0.57% vs. -0.06%). Table 10 displays the yearly average annualized Carhart Four-Factor Model alpha of passively managed funds and truly actively managed funds. The results corroborated the year-by-year analysis involving the full sample of actively managed U.S. Equity Mutual Funds, demonstrating that mutual fund performance is strongly anchored to its Grossman and Stiglitz equilibrium.

Table 11 displays the annualized alpha on the portfolio of passively managed funds that ranked in the bottom quintile of expenses and the portfolio of truly actively managed funds that ranked in the bottom quintile of expenses. Most strikingly, the equally-weighted portfolio of truly actively managed funds outperformed the equally-weighted portfolio of passively managed funds and the value-weighted portfolio of truly actively managed funds outperformed the value-weighted portfolio of passively managed funds. In the equally-weighted analysis, the truly actively managed funds outperformed the passively managed funds by 40 basis points (0.17% vs. -0.23%). In contrast, in the equally-weighted analysis involving the sample of passively managed and truly actively managed funds without the expense restriction, the truly actively managed funds underperformed the passively managed funds by one basis point (-0.45% vs. -0.43%). In the value-weighted analysis with the expense restriction, the truly actively managed funds outperformed the passively managed funds by 5 basis points (-0.02% vs. -0.07%). In contrast, in the value-weighted analysis involving the sample of passively managed and truly actively managed funds without the expense restriction, the truly actively managed funds underperformed the passively managed funds by 50 basis points (-0.57% vs. -0.06%).

Table 12 displays the yearly average annualized Carhart Four-Factor Model alpha of passively managed funds and truly actively managed funds that ranked in the bottom quintile of expense ratio. Consistent with the year-by-year analysis without the expense restriction, there was no discernable trend in the performance of passively managed funds relative to actively managed funds. However, it is interesting to note that there was somewhat greater equality in performance between the two groups of funds. In the equally-weighted analysis, the passively managed funds

outperformed the truly actively managed funds in 12 of 27 years. In contrast, in the analysis without the expense restriction, the passively managed funds outperformed the truly actively managed funds in 16 years. In the value-weighted analysis with the expense restriction, the passively managed funds outperformed their truly actively managed counterparts in 16 of 27 years. In contrast, in the value-weighted analysis without the expense restriction, the passively managed funds outperformed their truly actively managed counterparts in 17 years.

Table 13 displays the results for the portfolios of passively managed funds and "truly active partners". Consistent with the results involving the passively managed funds that ranked in the bottom quintile of expenses and the truly actively managed funds that ranked in the bottom quintile of expenses, the "truly active partners" outperformed their passively managed counterparts. In the equally-weighted analysis, the truly active partners outperformed the passively managed funds by 24 basis points (-0.20% vs. -0.43%). In the value-weighted analysis, in which the weight given to each "truly active partner" is proportionate to the that of its passively managed counterpart, the truly active partners outperformed the passively managed funds by 44 basis points (0.35% vs. -0.09%).

Table 14 displays the yearly average annualized Carhart Four-Factor Model alpha of passively managed funds and "truly active partners". The results further illuminate that there is great equality between the performance of passively managed funds and actively managed funds with similar expenses. Most notably, the average annual percentage of passive funds that outperformed their "truly active partners" was 48%.

5. Conclusion

The purpose of this study was to examine the risk-adjusted performance of actively managed mutual funds vs. passively managed mutual funds between 1991 and 2018. This study finds that the statistical significance of the difference in performance between the two types of funds disappears when the passively managed funds are compared to competitively priced actively managed funds. This study also finds that magnitude of the performance differential between an equally-weighted portfolio of actively managed funds and an equally-weighted portfolio of passively managed funds shrinks from 0.59% to 0.24% per year when the sample is restricted to

only funds that ranked in the bottom quintile of expense ratio, which includes over 98% of the money that is invested in passively managed funds. The magnitude of the performance differential further shrinks to merely 0.17% per year when the passively managed funds are compared to similarly priced actively managed funds within the same Morningstar Category.

This study also examines the performance of value-weighted portfolios and arrives at robust results. For example, in the full sample of funds, the value-weighted portfolio of actively managed funds underperformed the value-weighted portfolio of passively managed funds by a statistically significant 0.90% per year. However, when the sample is restricted to only funds that ranked in the bottom quintile of expense ratio, the value-weighted portfolio of actively managed funds underperformed the value-weighted portfolio of passively managed funds by an economically insignificant 0.13% per year.

There are three "take-away messages" from this study for investors. First, they should be aware that much of the historical outperformance of passively managed funds relative to actively managed funds is simply a result of expenses. Second, they should be aware that, in today's mutual fund market, there are many actively managed funds with expenses that are comparable to those of passively managed funds. Third, they should understand that when passively managed funds are compared to these competitively priced actively managed funds, there is no economically meaningful difference in performance between passively managed funds and actively managed funds. The central practical implication of this study is that, setting tax considerations aside, as long as investors are cost conscious in their mutual fund selection process, investing in passively managed funds does not meaningfully impact the performance of one's portfolio.[2]

[2] Prior research suggests that investors should also incorporate characteristics other than expenses into their mutual fund selection process. See, for example, Nanigian (2012) and Nanigian (2015) for a review of this literature.

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Figure 1: Percentage of Fund Assets that Are Passively Managed

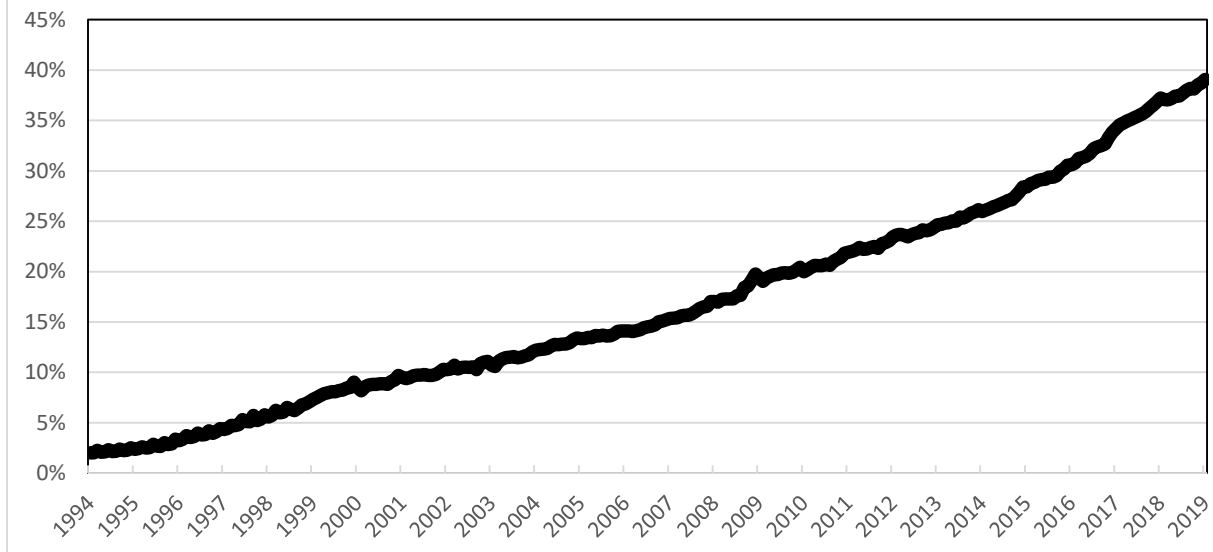

Table 1: Annualized Alphas of Passive and Active Portfolios		
	Equally-Weighted	Value-Weighted
Passive	-0.47%*	-0.11%
t-value	-1.83	-0.54
Active	-1.05%***	-1.02%***
t-value	-2.86	-3.41
Difference in Alphas	-0.59%	-0.90%**
t-value alphas are equal	-1.36	-2.59

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 2: Yearly Annualized Alphas of Passive and Active Mutual Funds

	Equally-Weighted			Value-Weighted		
	Passive	Active	*t*-value alphas are equal	Passive	Active	*t*-value alphas are equal
1991	-1.41%	-0.14%	2.30	-1.01%	-0.37%	2.04
1992	-1.35%	-0.59%	2.00	-1.04%	-1.86%	-3.44
1993	0.47%	1.51%	3.03	0.57%	2.56%	7.60
1994	0.31%	-1.09%	-4.47	1.01%	-0.50%	-8.40
1995	-3.44%	-3.11%	0.39	-2.93%	-4.45%	-3.19
1996	-0.19%	0.26%	0.99	0.26%	-1.24%	-7.45
1997	0.29%	-4.66%	-7.92	0.80%	-5.34%	-17.49
1998	-0.76%	-3.55%	-3.62	-0.82%	-4.20%	-9.88
1999	-0.72%	0.65%	3.15	-0.15%	-0.41%	-1.05
2000	4.75%	9.10%	7.40	4.25%	6.44%	6.73
2001	-0.21%	-1.28%	-3.55	-0.02%	-2.66%	-10.50
2002	-0.66%	-4.76%	-13.10	-0.17%	-3.28%	-15.39
2003	-2.00%	-3.47%	-3.23	0.39%	-1.81%	-8.56
2004	0.49%	0.56%	0.26	0.02%	0.47%	2.72
2005	-0.11%	-0.14%	-0.09	-0.74%	0.93%	7.26
2006	0.11%	-2.63%	-9.42	0.29%	-2.86%	-17.41
2007	0.14%	1.68%	3.88	0.12%	1.43%	4.80
2008	1.70%	-0.46%	-4.74	1.00%	-0.60%	-5.97
2009	-0.88%	0.37%	2.73	-0.12%	1.16%	5.84
2010	-0.30%	-0.88%	-2.44	-0.16%	-1.41%	-8.35
2011	0.31%	-2.50%	-10.36	0.44%	-3.80%	-24.34
2012	1.11%	0.32%	-2.33	0.31%	1.65%	6.09
2013	-2.44%	-1.42%	2.92	-1.40%	-0.54%	4.80
2014	0.39%	-2.03%	-10.79	1.04%	-1.46%	-23.41
2015	-1.13%	-1.92%	-3.55	-0.17%	-0.60%	-3.16
2016	-0.02%	-3.14%	-13.39	0.31%	-2.89%	-22.19
2017	-3.28%	-0.42%	6.59	-1.49%	-0.21%	6.22
2018	-0.63%	-1.85%	-4.60	0.16%	-0.49%	-4.98
Average	-0.34%	-0.91%		0.03%	-0.94%	
Difference		-0.58%			-0.97%	

Table 3: Annual Distribution of Funds Across Quintiles of Expense Ratio

	Passive					Active				
	Low	2	3	4	High	Low	2	3	4	High
1991	66.67%	14.29%	4.76%	4.76%	9.52%	18.26%	20.52%	20.36%	20.84%	20.03%
1992	76.92%	7.69%	7.69%	7.69%	0.00%	17.28%	20.80%	21.25%	20.34%	20.34%
1993	80.56%	8.33%	2.78%	2.78%	5.56%	17.28%	20.17%	22.22%	19.62%	20.71%
1994	89.80%	2.04%	2.04%	2.04%	4.08%	16.25%	21.19%	19.87%	21.84%	20.86%
1995	88.68%	3.77%	1.89%	5.66%	0.00%	15.89%	21.49%	19.86%	22.00%	20.77%
1996	87.27%	3.64%	7.27%	1.82%	0.00%	16.29%	21.26%	20.88%	20.69%	20.88%
1997	86.89%	3.28%	1.64%	6.56%	1.64%	16.56%	21.41%	20.49%	20.65%	20.90%
1998	89.19%	2.70%	1.35%	6.76%	0.00%	16.05%	21.18%	20.97%	20.76%	21.04%
1999	87.50%	2.27%	4.55%	3.41%	2.27%	15.98%	21.07%	21.01%	21.01%	20.94%
2000	82.83%	5.05%	4.04%	5.05%	3.03%	16.16%	20.93%	20.56%	21.36%	20.99%
2001	84.21%	4.39%	5.26%	3.51%	2.63%	15.50%	21.10%	21.46%	20.73%	21.22%
2002	79.14%	6.14%	4.29%	5.52%	4.91%	15.30%	20.85%	21.40%	21.20%	21.25%
2003	80.59%	7.65%	2.94%	3.53%	5.29%	15.09%	20.90%	21.48%	21.34%	21.19%
2004	83.80%	4.47%	3.35%	4.47%	3.91%	14.70%	21.29%	21.38%	21.29%	21.34%
2005	80.65%	4.30%	3.76%	5.91%	5.38%	15.05%	21.23%	21.36%	21.18%	21.18%
2006	80.90%	5.62%	3.37%	1.69%	8.43%	15.34%	21.20%	21.24%	21.36%	20.87%
2007	83.43%	6.29%	2.29%	1.14%	6.86%	15.53%	20.96%	21.28%	21.24%	21.00%
2008	82.87%	4.97%	1.11%	2.21%	8.84%	15.45%	21.09%	21.37%	21.29%	20.81%
2009	82.08%	5.20%	1.16%	1.16%	10.41%	15.46%	21.08%	21.80%	20.96%	20.70%
2010	83.23%	4.19%	1.80%	0.60%	10.18%	15.33%	21.16%	21.38%	21.42%	20.72%
2011	84.27%	2.25%	1.69%	2.25%	9.55%	14.82%	21.71%	21.22%	21.67%	20.59%
2012	81.67%	2.22%	2.78%	3.33%	10.00%	14.72%	21.88%	21.18%	21.41%	20.81%
2013	80.22%	1.65%	0.55%	4.95%	12.64%	14.80%	21.56%	21.70%	21.32%	20.62%
2014	80.11%	1.08%	1.08%	2.15%	15.59%	14.78%	21.66%	21.62%	21.57%	20.36%
2015	78.61%	1.60%	0.54%	3.21%	16.04%	15.05%	21.48%	21.67%	21.48%	20.32%
2016	80.31%	2.59%	0.52%	3.11%	13.47%	14.44%	21.83%	21.83%	21.31%	20.59%
2017	81.44%	2.06%	2.06%	14.43%	0.00%	14.11%	21.69%	21.93%	21.74%	20.54%
2018	75.00%	2.86%	0.71%	21.43%	0.00%	13.89%	21.91%	22.22%	22.14%	19.84%
Avg.	82.10%	4.38%	2.76%	4.68%	6.08%	15.55%	21.23%	21.25%	21.20%	20.76%

Table 4: Annual Distribution of Fund Dollars Across Quintiles of Expense Ratio

	Passive					Active				
	Low	2	3	4	High	Low	2	3	4	High
1991	93.03%	3.37%	0.41%	0.70%	2.48%	47.78%	31.33%	10.58%	6.55%	3.76%
1992	95.43%	2.41%	0.67%	1.50%	0.00%	40.09%	34.44%	14.10%	7.19%	4.17%
1993	96.35%	1.73%	0.18%	0.31%	1.43%	36.13%	34.19%	16.11%	8.38%	5.18%
1994	98.09%	0.25%	0.16%	0.04%	1.46%	31.39%	33.38%	19.32%	8.96%	6.95%
1995	97.69%	0.35%	0.18%	1.78%	0.00%	33.55%	32.99%	16.32%	11.14%	6.00%
1996	97.54%	0.76%	1.69%	0.01%	0.00%	36.07%	28.89%	17.05%	12.12%	5.87%
1997	97.76%	0.56%	0.13%	1.55%	0.00%	44.95%	19.77%	18.97%	10.55%	5.77%
1998	97.85%	0.30%	0.14%	1.71%	0.00%	42.96%	20.81%	19.95%	10.98%	5.30%
1999	97.80%	0.39%	1.03%	0.78%	0.01%	43.16%	19.12%	21.81%	10.40%	5.50%
2000	96.35%	1.11%	1.30%	1.24%	0.01%	40.82%	25.46%	18.12%	9.22%	6.38%
2001	97.64%	0.43%	0.78%	1.14%	0.01%	29.50%	33.19%	17.23%	12.62%	7.46%
2002	97.34%	0.82%	0.56%	1.24%	0.04%	35.73%	26.69%	16.96%	13.73%	6.89%
2003	97.48%	0.48%	1.37%	0.61%	0.07%	37.90%	26.48%	16.70%	12.64%	6.29%
2004	97.39%	0.56%	1.26%	0.69%	0.12%	36.85%	27.25%	17.43%	13.21%	5.27%
2005	97.30%	0.65%	1.56%	0.25%	0.23%	39.54%	25.88%	15.38%	14.19%	5.01%
2006	97.77%	1.39%	0.58%	0.06%	0.20%	41.45%	24.52%	16.23%	13.46%	4.34%
2007	98.29%	1.38%	0.09%	0.15%	0.08%	41.31%	26.47%	15.68%	12.64%	3.90%
2008	98.96%	0.77%	0.04%	0.18%	0.06%	39.69%	27.70%	16.11%	12.77%	3.73%
2009	99.18%	0.51%	0.03%	0.11%	0.17%	40.75%	26.91%	15.82%	12.22%	4.30%
2010	99.48%	0.26%	0.03%	0.11%	0.12%	39.19%	28.25%	16.53%	11.91%	4.11%
2011	99.64%	0.03%	0.02%	0.11%	0.19%	38.14%	29.10%	18.77%	9.81%	4.18%
2012	99.59%	0.12%	0.02%	0.12%	0.15%	41.69%	28.17%	16.41%	9.78%	3.95%
2013	99.69%	0.04%	0.01%	0.09%	0.16%	41.45%	29.89%	15.62%	9.16%	3.88%
2014	99.53%	0.02%	0.01%	0.02%	0.41%	42.95%	28.70%	15.33%	9.57%	3.45%
2015	99.51%	0.07%	0.00%	0.02%	0.40%	45.24%	27.46%	15.03%	8.67%	3.60%
2016	99.53%	0.16%	0.00%	0.04%	0.27%	44.09%	29.02%	14.44%	8.46%	4.00%
2017	99.54%	0.21%	0.02%	0.22%	0.00%	46.19%	27.11%	15.07%	8.18%	3.47%
2018	98.78%	0.35%	0.00%	0.87%	0.00%	43.13%	28.02%	15.80%	9.92%	3.13%
Avg.	98.02%	0.70%	0.44%	0.56%	0.29%	40.06%	27.90%	16.53%	10.66%	4.85%

Table 5: Annualized Alphas of Passive and Active Portfolios in the Bottom Quintile of Expenses		
	Equally-Weighted	Value-Weighted
Passive	-0.27%	-0.11%
t-value	-1.08	-0.50
Active	-0.51%*	-0.25%
t-value	-1.88	-0.88
Difference in Alphas	-0.24%	-0.13%
t-value alphas are equal	-0.67	-0.39

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Yearly Annualized Alphas of Passive and Active Mutual Funds in the Bottom Quintile of Expenses

	Equally-Weighted			Value-Weighted		
	Passive	Active	*t*-value alphas are equal	Passive	Active	*t*-value alphas are equal
1991	-1.28%	0.43%	1.98	-0.94%	-0.16%	1.44
1992	-1.07%	-1.39%	-0.62	-1.00%	-1.81%	-1.92
1993	0.51%	2.27%	3.10	0.58%	1.84%	3.16
1994	0.36%	0.16%	-0.46	1.01%	1.08%	0.25
1995	-3.57%	-3.37%	0.24	-2.95%	-4.33%	-2.06
1996	-0.24%	0.13%	0.96	0.32%	0.08%	-0.88
1997	0.25%	-3.78%	-6.01	0.88%	-4.49%	-10.88
1998	-1.24%	-2.74%	-2.30	-0.81%	-3.04%	-4.33
1999	-0.68%	0.06%	1.16	-0.17%	0.55%	1.51
2000	4.79%	7.33%	2.83	4.19%	6.44%	3.49
2001	0.02%	-0.36%	-0.82	0.01%	-1.07%	-2.66
2002	-0.64%	-1.95%	-2.80	-0.15%	-0.90%	-2.18
2003	-1.88%	-0.68%	2.16	0.50%	0.27%	-0.71
2004	0.66%	0.67%	0.04	-0.01%	0.75%	3.24
2005	-0.28%	0.16%	0.99	-0.82%	1.19%	5.31
2006	0.41%	-1.98%	-6.67	0.36%	-2.74%	-10.61
2007	0.51%	0.58%	0.14	0.14%	1.23%	3.31
2008	1.93%	0.27%	-3.03	1.00%	-0.80%	-5.73
2009	-0.38%	0.30%	1.41	-0.11%	1.24%	4.33
2010	-0.10%	-1.27%	-3.81	-0.15%	-2.33%	-10.28
2011	0.40%	-1.65%	-5.22	0.43%	-3.83%	-12.73
2012	1.05%	0.99%	-0.15	0.30%	2.19%	5.67
2013	-2.37%	-1.10%	2.76	-1.40%	0.80%	9.03
2014	0.95%	-0.76%	-7.63	1.07%	-0.95%	-12.04
2015	-0.61%	-0.88%	-1.07	-0.16%	0.32%	2.35
2016	0.39%	-1.70%	-7.07	0.31%	-1.80%	-8.61
2017	-2.95%	-0.41%	4.74	-1.47%	1.22%	7.54
2018	-0.04%	-1.30%	-3.31	0.10%	0.73%	1.93
Average	-0.18%	-0.43%		0.04%	-0.30%	
Difference		-0.25%			-0.34%	

Table 7: Annualized Alphas of Passive and "Active Partner" Portfolios		
	Equally-Weighted	Value-Weighted
Passive	-0.47%*	-0.14%
t-value	-1.74	-0.65
"Active Partner"	-0.64%*	-0.03%
t-value	-1.80	-0.08
Difference in Alphas	-0.17%	0.11%
t-value alphas are equal	-0.39	0.24

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Yearly Annualized Alphas of Passive and "Active Partner" Mutual Funds

	Equally-Weighted				Value-Weighted		
	Passive	"Active Partner"	*t*-value alphas are equal	% that outperform "Active Partner"	Passive	"Active Partner"	*t*-value alphas are equal
1991	-1.41%	-0.91%	0.61	35.71%	-1.01%	-1.25%	-0.38
1992	-1.35%	-0.89%	0.44	22.22%	-1.04%	-0.26%	1.31
1993	0.47%	1.66%	1.44	30.77%	0.57%	1.56%	2.30
1994	0.42%	0.54%	0.19	63.64%	1.02%	0.64%	-0.62
1995	-3.25%	0.80%	2.92	29.17%	-2.91%	1.83%	5.65
1996	-0.10%	0.20%	0.46	37.74%	0.27%	1.29%	2.77
1997	0.52%	-3.20%	-2.37	60.35%	0.80%	-0.83%	-2.09
1998	-0.66%	-4.54%	-3.58	79.69%	-0.81%	-3.44%	-6.31
1999	-0.53%	-0.07%	0.57	58.62%	-0.14%	-1.88%	-5.49
2000	4.59%	4.19%	-0.41	53.26%	4.25%	1.55%	-3.93
2001	-0.14%	-1.75%	-2.92	63.21%	0.00%	0.46%	1.14
2002	-0.65%	-1.65%	-2.02	59.31%	-0.16%	0.54%	2.18
2003	-1.98%	-0.76%	1.91	44.90%	0.42%	0.54%	0.32
2004	0.49%	0.60%	0.28	47.06%	0.02%	-0.76%	-2.85
2005	-0.11%	-0.36%	-0.54	49.42%	-0.74%	-0.25%	1.83
2006	0.16%	-1.73%	-4.35	65.22%	0.29%	-2.00%	-9.66
2007	0.14%	1.24%	2.06	36.75%	0.12%	1.89%	5.08
2008	1.70%	2.02%	0.48	47.67%	1.00%	1.55%	1.43
2009	-0.87%	-0.45%	0.69	42.26%	-0.11%	0.28%	1.30
2010	-0.30%	-0.98%	-2.06	61.08%	-0.16%	-0.75%	-3.71
2011	0.31%	-2.46%	-5.19	66.29%	0.44%	-4.43%	-17.20
2012	1.11%	1.14%	0.05	49.16%	0.31%	0.62%	1.24
2013	-2.44%	-1.69%	1.64	44.51%	-1.40%	-1.77%	-1.43
2014	0.39%	-0.82%	-3.54	66.67%	1.04%	-0.07%	-4.70
2015	-1.14%	-1.49%	-1.04	53.76%	-0.17%	-0.22%	-0.25
2016	0.02%	-2.02%	-3.94	62.90%	0.31%	0.29%	-0.06
2017	-3.13%	-0.84%	2.90	44.39%	-1.49%	-1.89%	-1.34
2018	-0.51%	-3.68%	-4.98	77.14%	0.07%	-2.10%	-6.14
Average	-0.29%	-0.64%		51.89%	0.03%	-0.32%	
Difference		-0.35%				-0.34%	

Table 9: Annualized Alphas of Passive and "Truly Active" Portfolios		
	Equally-Weighted	Value-Weighted
Passive	-0.43%*	-0.06%
t-value	-1.65	-0.30
"Truly Active"	-0.45%	-0.57%
t-value	-0.82	-1.12
Difference in Alphas	-0.01%	-0.50%
t-value alphas are equal	-0.03	-0.95

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 10: Yearly Annualized Alphas of Passive and "Truly Active" Mutual Funds

	Equally-Weighted			Value-Weighted		
	Passive	"Truly Active"	*t*-value alphas are equal	Passive	"Truly Active"	*t*-value alphas are equal
1992	-1.35%	-0.35%	1.34	-1.04%	0.02%	1.44
1993	0.47%	4.30%	4.01	0.57%	4.46%	5.23
1994	0.31%	-0.90%	-1.40	1.01%	-1.06%	-3.41
1995	-3.44%	-1.68%	1.11	-2.93%	-3.79%	-0.58
1996	-0.19%	-0.74%	-0.80	0.26%	-2.96%	-7.98
1997	0.29%	-5.63%	-6.51	0.80%	-7.17%	-14.25
1998	-0.76%	-2.58%	-1.32	-0.82%	-4.81%	-4.45
1999	-0.72%	1.77%	2.60	-0.15%	-0.21%	-0.09
2000	4.75%	10.44%	4.97	4.25%	7.44%	3.62
2001	-0.21%	-0.57%	-0.57	-0.02%	-5.44%	-10.70
2002	-0.66%	-4.24%	-4.74	-0.17%	-3.04%	-4.76
2003	-2.00%	-4.17%	-3.24	0.39%	-4.57%	-10.94
2004	0.49%	2.69%	4.69	0.02%	3.89%	11.18
2005	-0.11%	-0.83%	-1.25	-0.74%	0.71%	3.47
2006	0.11%	-4.09%	-7.20	0.29%	-4.88%	-15.16
2007	0.14%	3.62%	5.56	0.12%	4.24%	7.56
2008	1.70%	-1.96%	-5.17	1.00%	-1.27%	-4.38
2009	-0.88%	2.34%	5.23	-0.12%	2.55%	6.86
2010	-0.30%	0.14%	1.19	-0.16%	-0.17%	-0.05
2011	0.31%	-4.01%	-7.71	0.44%	-6.10%	-13.84
2012	1.11%	-0.37%	-3.26	0.31%	0.96%	2.09
2013	-2.44%	-0.77%	2.80	-1.40%	-0.97%	1.08
2014	0.39%	-3.72%	-10.12	1.04%	-2.45%	-12.02
2015	-1.13%	-3.32%	-5.91	-0.17%	-3.39%	-10.23
2016	-0.02%	-2.64%	-5.29	0.31%	-3.38%	-8.50
2017	-3.28%	2.02%	6.46	-1.49%	-0.85%	1.56
2018	-0.63%	-2.72%	-4.59	0.16%	-0.74%	-3.14
Average	-0.30%	-0.67%		0.07%	-1.22%	
Difference		-0.37%			-1.29%	

Table 11: Annualized Alphas of Passive and "Truly Active" Portfolios in the Bottom Quintile of Expenses

	Equally-Weighted	Value-Weighted
Passive	-0.23%	-0.07%
t-value	-0.89	-0.29
"Truly Active"	0.17%	-0.02%
t-value	0.36	-0.03
Difference in Alphas	0.40%	0.05%
t-value alphas are equal	0.77	0.08

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 12: Yearly Annualized Alphas of Passive and "Truly Active" Mutual Funds in the Bottom Quintile of Expenses

	Equally-Weighted			Value-Weighted		
	Passive	"Truly Active"	*t*-value alphas are equal	Passive	"Truly Active"	*t*-value alphas are equal
1992	-1.07%	-3.89%	-1.42	-1.00%	-5.28%	-2.19
1993	0.51%	6.70%	4.30	0.58%	4.99%	4.18
1994	0.36%	0.60%	0.10	1.01%	-2.07%	-3.31
1995	-3.57%	-0.87%	0.59	-2.95%	-3.53%	-0.15
1996	-0.24%	-1.08%	-0.81	0.32%	-1.93%	-3.20
1997	0.25%	-5.83%	-2.17	0.88%	-5.72%	-4.94
1998	-1.24%	-2.72%	-0.74	-0.81%	-5.28%	-1.68
1999	-0.68%	2.51%	1.13	-0.17%	8.87%	6.88
2000	4.79%	7.36%	0.63	4.19%	14.10%	3.44
2001	0.02%	1.07%	0.78	0.01%	-5.66%	-4.69
2002	-0.64%	0.27%	0.44	-0.15%	-1.93%	-1.00
2003	-1.88%	-0.76%	0.46	0.50%	-2.75%	-2.06
2004	0.66%	2.56%	1.19	-0.01%	3.63%	2.22
2005	-0.28%	-2.69%	-1.51	-0.82%	-0.45%	0.31
2006	0.41%	-4.50%	-3.15	0.36%	-5.60%	-8.36
2007	0.51%	2.56%	0.79	0.14%	7.87%	3.53
2008	1.93%	-0.36%	-0.95	1.00%	-0.17%	-0.99
2009	-0.38%	3.24%	2.45	-0.11%	3.66%	2.99
2010	-0.10%	-0.84%	-0.49	-0.15%	1.80%	1.49
2011	0.40%	-3.22%	-2.07	0.43%	-3.62%	-2.70
2012	1.05%	1.91%	0.77	0.30%	1.43%	1.84
2013	-2.37%	-1.05%	0.41	-1.40%	2.42%	3.46
2014	0.95%	-2.88%	-2.35	1.07%	-1.01%	-2.71
2015	-0.61%	-3.88%	-2.24	-0.16%	-2.66%	-1.96
2016	0.39%	1.20%	0.47	0.31%	0.17%	-0.12
2017	-2.95%	-0.16%	1.48	-1.47%	-0.43%	0.95
2018	-0.04%	-0.73%	-0.32	0.10%	-0.90%	-1.84
Average	-0.14%	-0.20%		0.07%	0.00%	
Difference		-0.06%			-0.08%	

Table 13: Annualized Alphas of Passive and "Truly Active Partner" Portfolios		
	Equally-Weighted	Value-Weighted
Passive	-0.43%	-0.09%
t-value	-1.56	-0.42
"Truly Active Partner"	-0.20%	0.35%
t-value	-0.38	0.45
Difference in Alphas	0.24%	0.44%
t-value alphas are equal	0.42	0.57

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 14: Yearly Annualized Alphas of Passive and "Truly Active Partner" Mutual Funds

	Equally-Weighted				Value-Weighted		
	Passive	"Truly Active Partner"	*t*-value alphas are equal	% that outperform "Truly Active Partner"	Passive	"Truly Active Partner"	*t*-value alphas are equal
1992	-1.35%	-1.36%	-0.02	66.67%	-1.04%	-3.06%	-5.39
1993	0.47%	4.37%	5.94	3.85%	0.57%	4.00%	5.05
1994	0.42%	0.39%	-0.03	38.64%	1.02%	3.54%	3.69
1995	-3.25%	4.08%	5.01	18.75%	-2.91%	4.82%	9.34
1996	-0.10%	1.87%	2.17	7.55%	0.27%	2.12%	2.47
1997	0.52%	-7.68%	-5.91	86.21%	0.80%	-5.25%	-5.53
1998	-0.66%	-4.35%	-2.23	53.13%	-0.81%	4.19%	5.46
1999	-0.53%	-0.71%	-0.23	34.48%	-0.14%	0.45%	1.38
2000	4.59%	22.14%	11.64	16.30%	4.25%	32.19%	28.26
2001	-0.14%	-9.93%	-7.51	70.76%	0.00%	-18.20%	-16.92
2002	-0.65%	4.56%	8.85	23.45%	-0.16%	6.60%	20.24
2003	-1.98%	-1.75%	0.33	61.22%	0.42%	-4.66%	-11.97
2004	0.49%	2.16%	3.79	33.53%	0.02%	0.00%	-0.06
2005	-0.11%	-0.10%	0.01	57.56%	-0.74%	-1.21%	-1.30
2006	0.16%	-5.83%	-8.14	72.05%	0.29%	-5.27%	-12.05
2007	0.14%	-1.52%	-3.27	71.08%	0.12%	-1.56%	-5.37
2008	1.70%	2.05%	0.47	38.95%	1.00%	5.16%	8.10
2009	-0.87%	0.02%	0.82	38.69%	-0.11%	1.67%	3.54
2010	-0.30%	0.67%	1.94	47.31%	-0.16%	-1.15%	-2.99
2011	0.31%	-1.82%	-2.48	44.00%	0.44%	0.55%	0.18
2012	1.11%	-0.04%	-1.59	71.51%	0.31%	-4.38%	-8.79
2013	-2.44%	-3.06%	-0.84	54.95%	-1.40%	-4.83%	-7.20
2014	0.39%	-2.19%	-6.08	65.05%	1.04%	-4.00%	-21.27
2015	-1.14%	-3.17%	-5.42	75.81%	-0.17%	-1.85%	-8.05
2016	0.02%	-2.34%	-4.11	59.14%	0.31%	-0.08%	-1.20
2017	-3.13%	-1.24%	1.88	47.06%	-1.49%	-3.97%	-4.20
2018	-0.51%	-1.45%	-1.18	45.71%	0.07%	0.30%	0.32
Average	-0.25%	-0.23%		48.27%	0.07%	0.23%	
Difference		0.02%				0.16%	