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A Comparison of Active and Passive Portfolio
Management

Christopher C. Cox

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Introduction

In today's society, unsophisticated investors are offered more investment options than ever. The financial services and insurance industry accounted for 7.2% of the United States gross domestic product in 2015 and this industry is expected to experience rapid growth due to the retirement of the baby boomer generation ("Financial" 1). It is an extremely important industry that affects all individuals, not only those pursuing careers in finance. With the increase of investment vehicles available to all individuals, it is increasingly important for all working professionals to understand their options when it comes to investing their hard-earned money.

Broadly speaking, there are two basic investment strategies that investors must decide between; active and passive portfolio management. Some individuals choose to invest their capital in actively managed mutual funds, while others invest in passively managed index funds. These strategies are fundamentally different in their views of market efficiency. Active management commonly occurs when an individual gives control of their capital to someone, such as a portfolio manager or financial advisor, who charges a fee to invest their capital and manage the investments. Inherently, investors utilizing such a strategy should view markets as inefficient, as they are paying a fee for managers to find alpha, or excess return compared to the expected return on the market for securities with equal risk. Individuals who passively invest in index funds have a different view of market efficiency. They perceive markets as efficient, and therefore do not believe there is excess return to be found. Because of this, they invest in index funds that mirror specific market indexes, such as the S&P 500 or the Russell

1000. As a result, their return is equal to the return of the market index, and their risk profile mimics that of the market index. This strategy yields a higher return if markets are efficient, as passive investments offer the chance to invest for a minimal cost and receive the return of the market index without encountering the considerable fees and expenses associated with actively managed mutual funds. In this scenario, actively managed funds would have the same average return as index funds, but the net of fees return would be significantly lower for actively managed funds. If markets are inefficient, on the other hand, portfolio managers have the opportunity to deliver alpha by exploiting mispricings and taking advantage of arbitrage opportunities. However, even if portfolio managers are able to outperform their benchmark funds, the alpha of the fund must be greater than the fees and expenses incurred by the investor in order to make the actively managed fund a superior investment.

When deciding between an active and passive investment approach, there are a number of questions that investors must ask themselves. The first and most important of these questions is are markets efficient? As mentioned earlier, investors with an efficient markets view should utilize passive investing strategies, while those who view markets as inefficient should instead consider active management. It may also be important to decide whether you are interested in investing domestically or in foreign markets. Because not all markets are regulated equally, it is possible for markets to be efficient in the United States, but inefficient in emerging markets. Under this assumption, active management would be costly in the United States, but would provide a greater net of fees return in emerging markets. Additionally, investors should consider their ideal asset allocation and whether they are interested in investing in specific market sectors or a broad market index. Those wishing to have specific

asset class and sector weightings may benefit from active management as it gives them control over the portfolio. However, investors who want to easily attain a well-diversified portfolio without regard to asset class and sector weightings would be well suited for a passive investing approach. Finally, you must ask yourself if you have the skillset and time to manage your own money. It is possible that there are other benefits from active management aside from excess return. These could include help with financial planning, achieving target asset allocations, managing risk, and estate planning.

In this paper, I will analyze the role of active and passive investment strategies in the United States. The increased role of passive investments over time and the corresponding decrease in management fees and expenses associated with actively managed mutual funds will also be addressed. Additionally, I will compare the returns and net of fees returns of actively managed mutual funds and their benchmarks, and I will look at the fee structures of these funds to determine which fees and expenses are the most costly to individuals utilizing active investment strategies. The asset allocation of the funds will also be analyzed in order to determine the optimal characteristics for a high performing actively managed mutual fund. Furthermore, I will analyze the degree of market efficiency in the United States compared to EAFE and emerging markets by comparing the benefits of active management in different geographic markets. Finally, through my analysis, I will answer the question that should be most important to all unsophisticated investors: Is it truly more beneficial to pay a fee to an advisor or portfolio manager to invest your capital than it is to invest in index funds and receive the market return?

Background

Before proceeding to the analysis, it is important to have an understanding of what past research and studies have shown us regarding this topic. The general consensus reached by past studies is that utilizing an active management strategy does not provide a superior payoff compared to investing passively. A previous study by Eugene Fama and Kenneth French showed that very few portfolio managers are able to consistently produce greater net of fees returns than that of their benchmark indices. They concluded that when fees and expenses were not considered in mutual fund returns, the return is equal to the market return. However, the return to investors is significantly lower than the market return due to fees and expenses (Fama 1921). During this study they discovered that from 1984 to 2006 “mutual fund investors in aggregate realize net returns that underperform CAPM, three-factor, and four-factor benchmarks by about the costs in expense ratios” (Fama 1941). This showed that there is very little alpha delivered by portfolio managers even before fees or expenses are considered. Additionally, they concluded that the few portfolio managers who do beat the market in net of fees returns are overwhelmed by the vast majority of managers who fail to do so. They also showed that many of the portfolio managers who beat the market return do so as a result of chance variation, and very few managers possess enough skill to consistently provide net of fees returns that exceed the return on the market (Fama 1941).

In an earlier research paper titled “Presidential Address: The Cost of Active Investing”, Kenneth French addressed this same topic and provided a theory that explained why active investors receive less return on investment than passive investors and suggested that it is

impossible for portfolio managers in aggregate to produce net of fees returns greater than the return on the market. He refers to this theory as the no net-of-transfer assumption (French 1538). This assumption states that passive investors receive returns equal to that of the market index, and therefore receive no alpha. Additionally, it states that any gain from active investments for one investor must result in an equal loss for other investors. This in turn means that active investors are playing a zero sum game and the aggregate portfolio of all active investors must also have alpha equal to zero before fees and expenses. When you then consider the effects of fees and expenses, active investors are playing a negative sum game and receive net of fees returns that equal the market return minus fees and expenses (French 1538). French is careful to point out that the fact that active investments are a negative sum game does not necessarily mean “that the cost of active investing is a pure loss to society” (French 1538). This is because active investors help to improve the accuracy of financial pricings. He goes on to state that the cost of active investing is equal to society’s cost of price discovery and that this cost allows us to discover the optimal allocation of resources in society (French 1538). Fama and French also discuss the no net-of-transfer assumption in their joint research, but refer to it instead as equilibrium accounting (Fama 1915).

Research such as that provided by Fama and French helps to educate investors and provides evidence of the benefits of passive investing. There are two important consequences that can be expected as a result of such research and evidence. Firstly, one would expect an increase in the use of passive investment vehicles. Secondly, under the theory of market efficiency, fees and expenses for mutual funds should be lowered until they are equal to the alpha provided, so mutual funds provide a return equal to that of passive investments.

French's research provides evidence that this is occurring. He concludes that over time, institutions have increasingly started using passive strategies for more of their U.S. equity holdings and states that "the fees and expenses for mutual funds fall from 2.08% of assets under management in 1980 to 0.95% in 2006" (French 1539). A 2016 study published in the *Journal of Financial Economics* also backs up this evidence. It showed that "much of the recent growth in assets in the mutual fund industry has been in explicitly indexed equity funds [index funds and exchange-traded funds (ETFs)], which have grown from constituting about 14% of assets under management in 2002 to about 22% in 2010" (Cremers 2). However, this paper also shows that there is more passive investing going on than initially meets the eye. They state that many "actively managed mutual funds" are in fact utilizing passive investing strategies by holding a portfolio that is very similar to that of the benchmark index. They refer to this as closet indexing and define "closet indexers as funds with an active share below 60%" (Cremers 3). Portfolio managers utilize this strategy to avoid significantly underperforming their benchmark indices by tying the performance of the mutual fund to that of the benchmark. This strategy also allows managers to keep management expenses down because it does not require them to spend as much time gathering information to find alpha (Cremers 2). Their research showed "that about 20% of the worldwide mutual fund assets are managed by closet indexers" (Cremers 3).

While the overwhelming majority of studies have shown that active management does not provide greater than net of fees return, a paper published by Alexander Dyck, Karl Lins, and Lukas Pomorski offers a different take. Many of the previous studies on this topic focused on U.S. funds that are predominantly made up of U.S. holdings. Their research, on the other hand,

was broader and took on an international perspective. Their results were consistent with previous studies when it comes to U.S. equity markets. They found that “after costs, active management underperforms by 28 bps per year, an amount roughly equal to the difference in active and passive fees of 35 bps per year that the database reports” (Dyck 202). However, they also analyzed the performance of active management in EAFE and emerging markets. Their results showed that there is a benefit to active management in these markets. They stated that the degree of the payoff in international markets varies and is dependent on the efficiency of the market. They found that active management in EAFE markets outperformed their benchmarks by an average of 49 basis points after fees and expense. They also found that in less efficient emerging markets, net of fees returns for active management were a considerable 246 basis points higher than that the returns of their benchmarks (Dyck 211). Their conclusion from their research was “that the value of active management depends on the efficiency of the underlying market and the sophistication of the investor” (Dyck 226).

Methodology and Expectations of the Data

All data used for the analysis section of this paper has been gathered from the Bloomberg Professional Service via the Bloomberg terminal and the 2017 Investment Company Fact Book. I will be analyzing the results of the performance of a random sample of 10 U.S. based, mixed allocation, large-cap mutual funds compared to their benchmark funds. In the case where multiple benchmarks are given, I will combine the benchmarks according to the weightings described in the prospectus to compute the return of the blended benchmark. When no benchmark weightings are given in the prospectus, I will assign weightings to the

benchmarks that cause the blended benchmark to mirror the asset allocation of the original fund as closely as possible.

Daily historical return data has been pulled for each of the funds and their benchmarks from 3/1/2007 to 3/1/2017 along with their fee structures. Fee structures used for this paper will be the current fee structure of the fund as of 3/1/2017. For the benchmark funds, I will assume an expense ratio of 0.25%, as this is the average expense ratio associated with index funds (Schwartz 1). The annualized fund returns will be calculated using the geometric average approach in order to accurately reflect the returns of the funds over the 10 year period. Net of fees returns will be calculated as the return an investor would have received had they invested in the fund or its benchmark on 3/1/2007 and pulled their money out of the fund on 3/1/2017. It is important to note that this will be slightly different than the actual net of fees return an investor would have realized because fee structures change over time, and I am using the current fee structure as of 3/1/2017.

After calculating the returns of the funds, I will quantify the value delivered by each of the fund managers by computing the alpha that was delivered. I will compute alpha using the capital asset pricing model. Because the holding period for this research is 10 years, I will use the 10 year Treasury bond rate as the risk-free rate. The market risk premium for each fund will be calculated as the rate of return of the fund's benchmark minus the risk-free rate, and alpha will be defined as the actual annualized return realized by the fund minus the expected annualized return computed from the capital asset pricing model.

I will also determine the risk associated with both active and passive investment strategies by determining the volatility of returns for the funds and their benchmarks using the standard deviation method. In order to make the standard deviations comparable for funds with drastically different net asset values, I will divide the standard deviation by the average closing price in the period. The result of this will be the annualized volatility associated with each fund. The impact of specific fees will be determined as well by running a regression on each of the funds' fee structures and determining the impact of different fees on total returns. I have also pulled the asset allocation for each of the funds and will develop a regression model to determine the optimal asset allocation for maximizing return on investment. Furthermore, I will look at the percentage of the investments from each fund in U.S. markets, EAFE markets, and emerging markets and perform a regression analysis to determine whether funds that have a greater percentage of their investments in EAFE or emerging markets realize greater returns.

Due to the limited scope of this paper, I expect the power of the tests performed to be low. However, using this methodology my analysis could easily be scaled to include a greater number and wider variety of funds besides just U.S. based, mixed allocation, large-cap mutual funds. This would strengthen the power of the tests and yield more significant results than the analysis in this paper.

Results and Analysis

As mentioned in the methodology section, I have taken a random sample of 10 U.S. based, mixed allocation, large-cap mutual funds and assessed their performance compared to

their passive benchmarks. The returns of these funds and their annualized volatility, along with the returns and volatility of their corresponding benchmarks, can be found below in Figure 1.

Fund Ticker Symbol	Gross Returns		Gross Net of Fees Returns		Annualized Returns		Annualized Net of Fees Returns		Annualized Volatility	
	Active Fund	Benchmark	Active Fund	Benchmark	Active Fund	Benchmark	Active Fund	Benchmark	Active Fund	Benchmark
FPURX	9.13%	62.93%	-7.11%	58.91%	0.88%	4.99%	-0.73%	4.72%	13.66%	21.01%
IIIFBX	0.06%	70.75%	-20.65%	66.53%	0.01%	5.50%	-2.29%	5.23%	15.09%	26.48%
ITTAX	31.01%	65.11%	11.52%	61.03%	2.74%	5.13%	1.10%	4.87%	19.72%	22.47%
AMECX	11.29%	64.89%	-0.84%	60.81%	1.08%	5.11%	-0.08%	4.85%	15.19%	22.38%
TINCX	3.40%	31.12%	-10.59%	27.87%	0.34%	2.73%	-1.11%	2.47%	11.13%	14.28%
SEBLX	17.93%	63.91%	3.60%	59.86%	1.66%	5.05%	0.35%	4.79%	11.81%	21.69%
SSIAX	-16.79%	62.93%	-27.19%	58.91%	-1.82%	4.99%	-3.12%	4.72%	14.03%	21.01%
ACEIX	21.63%	46.85%	8.23%	43.22%	1.98%	3.91%	0.79%	3.65%	15.00%	19.89%
CVLOX	-17.22%	25.30%	-26.35%	22.20%	-1.87%	2.28%	-3.01%	2.03%	13.15%	19.13%
SBALX	10.51%	33.93%	0.57%	30.62%	1.00%	2.91%	0.06%	2.66%	13.45%	15.70%
Average	7.10%	52.77%	-6.88%	49.00%	0.60%	4.26%	-0.81%	4.00%	14.23%	20.40%

Figure 1

The average gross return before fees and expenses for the actively managed funds in the random sample is only 7.10% over the 10 year period. This gives us an average annualized return of 0.60%. The performance of these funds was extremely poor compared to the benchmark index funds, which realized an average gross return of 52.77% and average annualized return of 4.26% before fees and expenses. When I add in fees and expenses, the actively managed mutual funds underperform to an even greater degree. The average net of fees gross return and the average net of fees annualized return for the active funds were - 6.86% and -0.81% respectively. An investor who holds all of these funds in their portfolio for the 10 year period would have been better off not investing their money in the first place. In fact, only 40% of the active funds realized positive net of fees returns over the sample period. The passively managed benchmark funds, however, realized an average net of fees gross return of 49.00% over the 10 year period and an average annualized net of fees return of 4.00%.

Because the returns of the benchmark funds unanimously exceeded the returns of their actively managed counterparts, as shown in Figure 1, it is clear that there was no positive alpha delivered by the portfolio managers. In fact, the average value of alpha for these funds was - 0.0378. This means that on average, each actively managed fund underperformed its expected return by 3.78% before expenses and fees were even included. The computation of alpha for each of the funds in the sample data can be found below in Figure 2. Using this information, it is easy to conclude that the portfolio managers of the active funds in this sample data were not able to generate enough excess return to compensate for the fees they charge, and investors will realize a greater net of fees return if they instead invest in low cost index funds.

Actively Managed Mutual Funds	Risk-free rate	Beta	Market Return	Expected Return	Actual Annualized Returns	Alpha
FPURX	2.32%	1.07	4.99%	5.17%	0.88%	-0.0430
IIFBX	2.32%	0.96	5.50%	5.37%	0.01%	-0.0536
ITTAX	2.32%	1.17	5.13%	5.61%	2.74%	-0.0287
AMECX	2.32%	1.08	5.11%	5.34%	1.08%	-0.0426
TINCX	2.32%	1.20	2.73%	2.81%	0.34%	-0.0247
SEBLX	2.32%	1.00	5.05%	5.05%	1.66%	-0.0339
SSIAX	2.32%	1.08	4.99%	5.20%	-1.82%	-0.0702
ACEIX	2.32%	1.10	3.91%	4.07%	1.98%	-0.0210
CVLOX	2.32%	1.19	2.28%	2.27%	-1.87%	-0.0415
SBALX	2.32%	1.02	2.91%	2.93%	1.00%	-0.0192
Average	2.32%	1.09	4.26%	4.38%	0.60%	-0.0378

Figure 2

In addition to determining the returns of the funds and the alpha, or lack thereof, discovered by each manager, I also calculated the annualized volatility, which can be found in Figure 1, of the active funds and their benchmarks to determine the risk of the funds. I discovered the volatility to be fairly consistent between the active funds, resulting in an average of 14.23%. For the passively managed benchmarks, the volatility was also relatively consistent and resulted in an average of 20.40%. This appears to show that there is greater variation in the benchmark index funds, meaning that an investor who invests in such a fund faces greater risks than an investor who invests in an actively managed mutual fund. This could be a sign that portfolio managers are able to effectively mitigate risk. However, the low volatility associated with the active funds could also be a result of the extremely low returns realized by the funds.

It is reasonable to assume that funds that realize a larger return will experience greater variation in returns than that of a mutual fund whose net asset value experiences little change over time. For this reason it is difficult to precisely determine the cause of the difference in volatility between the active and benchmark funds.

Although none of the portfolio managers of the funds in the sample data were able to discover alpha and realize greater than expected returns, it is not uncommon for mutual funds to outperform their benchmark index. In this scenario, it is the extent of the fees and expenses associated with the fund that determines whether the fund's net of fees return will exceed the net of fees return of the benchmark index. There are several types of fees and expenses that are commonly associated with mutual funds such as front loads, back loads, management fees, and 12b1 fees. The funds in the sample data encounter these fees, which bring down the return the investor actually receives. To determine which fees and expenses are most costly to investors, I have performed a regression analysis on the funds in the sample data. The summary output of this analysis can be found below in Figure 3.

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R		0.518678			
R Square		0.269027			
Adjusted R Square		-0.31575			
Standard Error		0.017653			
Observations		10			
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	0.000573	0.000143	0.460049	0.764077

Residual	5	0.001558	0.000312					
Total	9	0.002131						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0.008952	0.13128	0.068189	0.948278	-0.32851	0.346417	-0.32851	0.346417
Front Load	0.043222	1.594147	0.027113	0.979418	-4.05466	4.141107	-4.05466	4.141107
Back Load	0.125977	1.477403	0.085269	0.935356	-3.67181	3.923762	-3.67181	3.923762
Current Mgmt Fee	-2.82309	3.755173	-0.75179	0.486039	-12.4761	6.829885	-12.4761	6.829885
12b1 Fee	-1.57636	16.58028	-0.09507	0.927949	-44.1973	41.0446	-44.1973	41.0446

Figure 3

This analysis shows that front and back loads do not significantly impact the annualized net of fees return realized by a fund. The coefficient for 12b1 fees indicates that these fees have a negative impact on fund returns. However, the p-value is 0.928, well above the cutoff of 0.05, and therefore indicates that 12b1 fees are not statistically significant in this regression model. The coefficient for management fees indicates that these fees have an even greater negative effect on fund returns. The p-value for management expenses is 0.486, meaning that management expenses are also not statistically significant in determining fund returns in this regression model. It is worth noting, however, that this is the lowest p-value of any of the variables. Due to the limited number of funds used in this analysis, this regression model has very low power. The R Square value is .269, which indicates that only 26.9% of the variation in annualized net of fees returns can be explained by differences in fee structures. However, this analysis could easily be scaled to include more funds which would give us more accurate and statistically significant results. If more fund data had been included, I find it likely that management fees would have been statistically significant in determining annualized net of fees returns.

In addition to performing a regression analysis to determine the impact of different fee structures on annualized net of fees returns, I have built two more regression models. The first analyzes the effects of different asset allocation mixes on annualized net of fees returns. The second model considers the correlation between the percentage of investments in US, EAFE, and emerging markets and annualized net of fees returns. These models have R Square values of 0.345 and 0.273 respectively, meaning that they explain only a small part of the variation in annualized net of fees returns. Additionally, none of the variables in either of these regressions have p-values below 0.05, indicating that none of the variables are statistically significant in these models. If I were to add data from more funds to this model, I would likely receive a result that explains a greater percentage of the variation in annualized net of fees returns and yields more statistically significant results.

Using the results from my analysis above and information from the 2017 Investment Company Fact Book, I will now focus on the increasing prevalence of passive investing, and its effects on the mutual fund industry. Based on the results of the analysis I have conducted on the sample funds and their benchmarks, I would expect that because index funds have outperformed active funds, there has been an increase in the use of passive investment vehicles during the sample time period, 3/1/2007 to 3/1/2017, that is accompanied by a decrease in the use of actively managed mutual funds and lower expense ratios for active funds. When examining the data, I find that cash inflows to index mutual funds have significantly increased from 2007 to 2016 (no available data for 2017). In fact, in 2016 cash inflows to index mutual funds reached a new record high of \$197 billion ("2017" 27). Figure 4 below shows the new cash inflows to index mutual funds from 2007 to 2016.

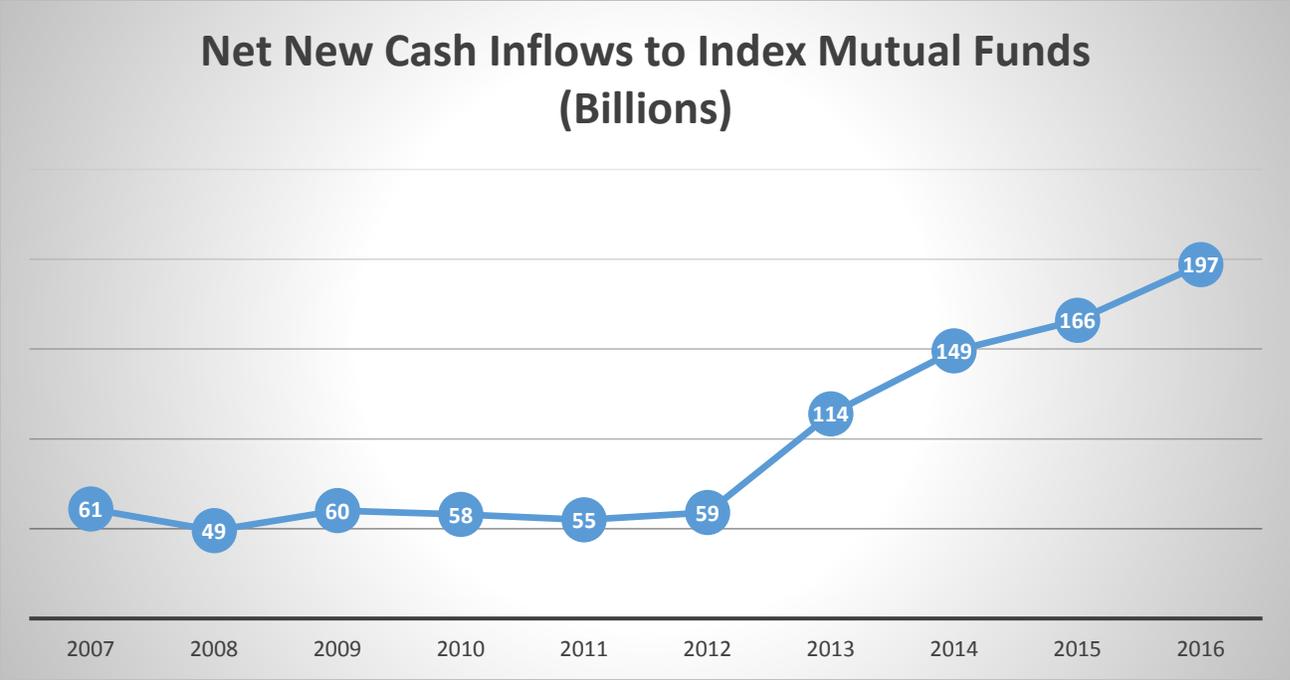


Figure 4

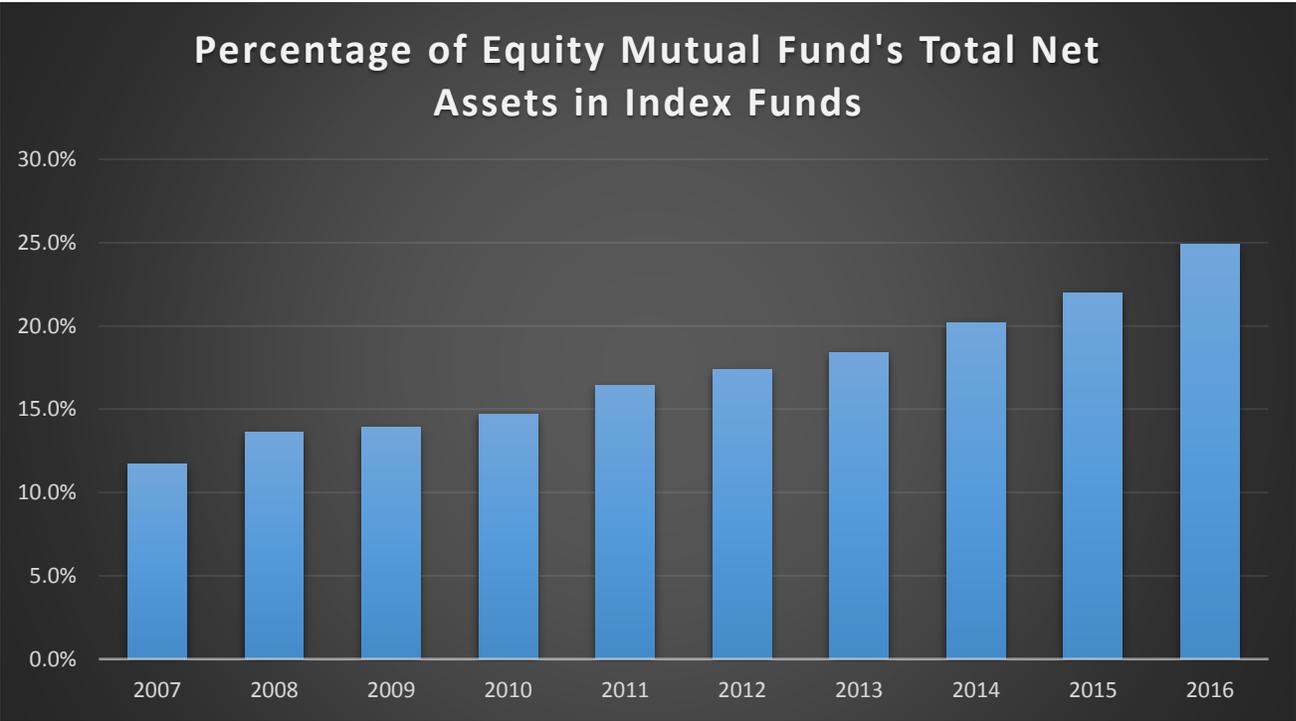


Figure 5

Index equity mutual funds have gained market share especially quickly, as shown by Figure 5 above, and have gone from accounting for only 11.7% of equity mutual funds' total net assets in 2007 to 24.9% in 2016. In addition to the increase in the use of index equity mutual funds, we have seen a large increase in the use of index ETFs. With the increase in the use of these passive investment vehicles comes a decrease in the use of actively managed mutual funds. This change in investment strategy is clear when you examine the cash flows associated with domestic equity funds. Data from the Investment Company Fact Book shows that "from 2007 through 2016, index domestic equity mutual funds and ETFs received \$1.4 trillion in net new cash and reinvested dividends, while actively managed domestic equity mutual funds experienced a net outflow of \$1.1 trillion (including reinvested dividends)" ("2017" 46).

The combination of the effectiveness and increased use of passive investment vehicles coupled with the net cash outflows experienced by active funds has put considerable downward pressure on the expense ratios of actively managed mutual funds. Because of this we see that expense ratios have steadily declined during our sample time period. For equity mutual funds, we find that on an asset-weighted basis expense ratios have fallen from 0.86% in 2007 to 0.63% in 2016, a decline of 26.44%. Expense ratios for hybrid mutual funds have declined by a more modest 3.90%, while expense ratios for bond mutual funds have declined by 20.31% ("2017" 88). Average expense ratios for mutual funds over the sample period can be found below in Figure 6.

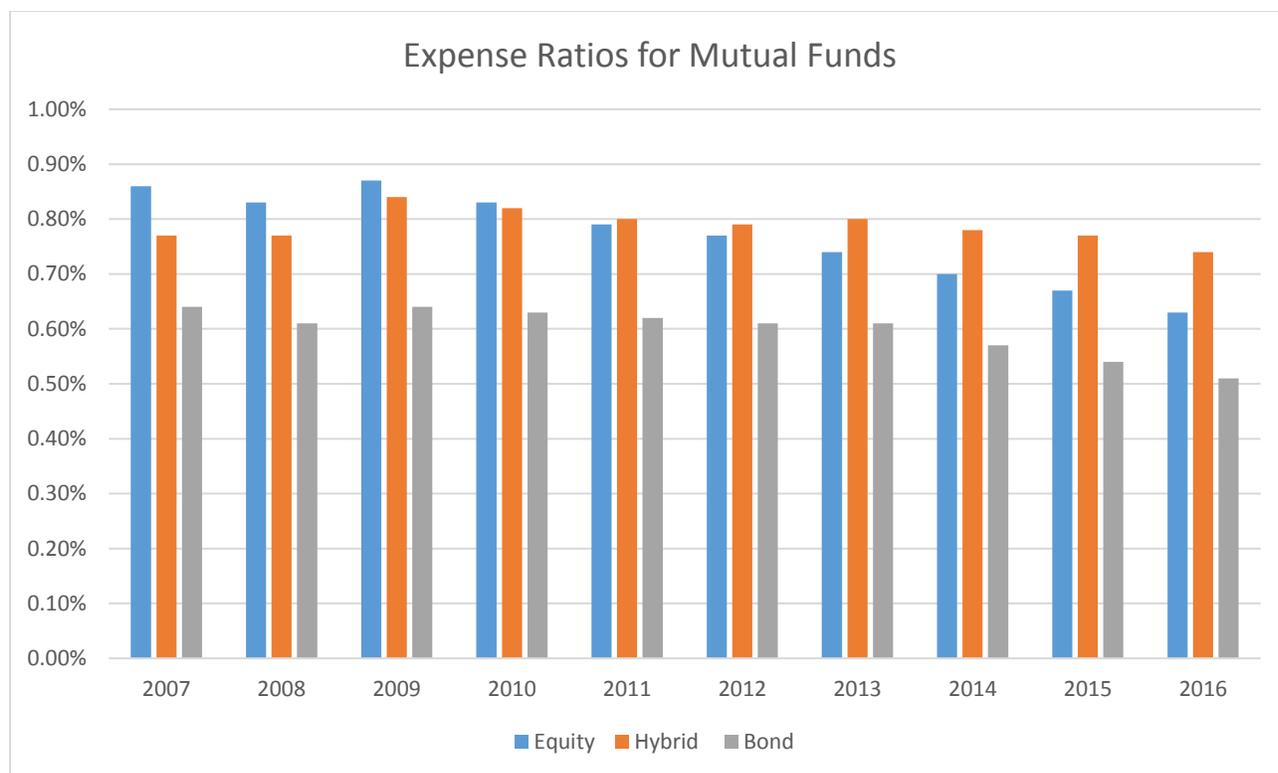


Figure 6

Conclusion and Recommendations

In the beginning of this paper, I laid out several questions that investors must ask themselves when deciding between active and passive portfolio management. The first of these is, are markets efficient and which market am I interested in investing in? Past research has consistently shown U.S. markets to be efficient, and the results of my analysis support this conclusion. Actively managed U.S. funds significantly underperformed compared to their benchmarks, indicating that there is no benefit to active management in the U.S.

Fees and expenses have a negative impact on net of fees return, which is detrimental to the investor. I attempted to determine the impact of specific fees on annualized net of fees

returns in my analysis, but did not receive a result that was statistically significant. Because of this I recommend that further research be done to determine which fees are most detrimental to net of fees returns.

The fact that no benefit to active management has been found in U.S. markets does not mean that there is no benefit to active management in EAFE and emerging markets. In my analysis I performed a regression analysis to attempt to determine if there is a benefit to active management in these markets, as past research has shown. The results of this analysis were not statistically significant and were therefore inconclusive. Based on this, I recommend the use of passive investment vehicles in U.S. markets, and recommend that further research be done to determine the merits of active management in EAFE and emerging markets. I expect the use of passively managed index funds to continue to increase in U.S. markets. I also predict that expense ratios for actively managed funds and cash inflows to active funds will continue to decline until the expense ratio equals the average alpha provided by portfolio managers. This will allow the returns for active funds to increase until they are in equilibrium with the return of index funds.

Other questions investors may ask themselves that could impact their choice of investment strategy include: how much control do I want over my portfolio, and do I have the time and skillset to manage my own investments? Depending on the answer to these questions it may be beneficial to consider active management even in U.S. markets. This is because there are benefits to active management besides excess return. This includes having a greater deal of control over the asset allocation of your portfolio and the portfolio as a whole. Additionally, the use of a portfolio manager or financial advisor allows individuals to use their time for things

other than investing. Finally, advisors can offer other benefits such as financial planning and improved risk management. Because of this, I conclude that investors who are interested in maximizing their long term return on investment in U.S. markets should pursue a passive investing strategy, while those searching for other benefits should consider pursuing an active investing strategy.

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