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The Future of Actively Managed Funds

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Section 1: Introduction

The United States Equity funds market has been a popular and expanding section of the stock market. As shown in Figure A pulled from Statista, the U.S. mutual funds market has more than tripled in value from 5.54 trillion dollars in 1998 to 17.71 trillion dollars in 2018 (Nace, 2019). U.S. equity funds, also known as U.S. stock funds, accounted for 41% (roughly 7.26 trillion dollars) of the mutual funds market in 2018 and have shown continued growth being valued at 8.6 trillion dollars in June of 2019 (Nace, 2019). The sheer magnitude of the market proves the importance of this research and as to why investors should carefully monitor the changes and trends in the U.S. stock funds market. Also, U.S. equity funds are very promising portfolio choices for both the retail and institutional investor, as they provide diversification with steady returns.

The U.S. mutual funds industry has been around for almost a century. The creation of this industry started in 1929 with the formation of MIT, Massachusetts Investors Trust, which was the first open-end fund (Hubbard 2010). Soon after, many more came into existence and these funds started to gain lots of popularity very quickly. By 1950, total assets under management in the industry had grown to $2.5 billion and to $17 billion by 1960 (Hubbard 2010). Also, according to literature written by Glenn Hubbard from the Columbia University Press, U.S. mutual funds became the “bedrock foundation for retirement saving in the United States” (Hubbard 2010). This further proves the quality and importance of investing in mutual funds, as they provide enough diversification with steady returns and low volatility to investors leading these securities to become the cornerstone of retirement investing.

Returning to the present day and taking a closer look into this massive market, viewers can quickly find that U.S. stock funds can be split into two main categories that compete against one another. These include actively managed funds and passively managed funds. Throughout the remainder of this paper, actively managed funds, active funds and actives will be used

interchangeably, as well as the use of passively managed funds, passive funds, passives, indexed funds and ETF's. The competition between these two types of funds has helped propel the market forward, along with macroeconomic events and the intense innovation of technology. All these factors have led to large amounts of changes and trends in this market that have shown great impact on many aspects of both actively managed and indexed funds. This research looks at many of these aspects such as fluctuating stock fund returns and asset retention, investor preferences, fund management style and expense ratios to explain the changes and trends that were present in this market over the past twenty years. This analysis also aims to help explain the complex relationship between actively managed and passively managed funds as well as provide insight on where this market will be headed in the future.

To best illustrate the relationship between actively managed and passive funds, a sample of sixty funds are used throughout the remainder of this research. More specifically, thirty actively managed funds are introduced along with thirty passively managed funds. Included with these funds are data fields that provide the most applicable information. Overall, more than 6,000 data points are tested. Therefore, this research holds strong testing power and is a relevant source of support to any and all findings that will be discussed later.

Section 2: Related Literature and Hypothesis Development

Asset Fluctuation Over the Past Twenty Years

Over the past twenty years, the stock market, along with U.S. equity funds, have seen incredible growth. According to a Morningstar article written by Tom Lauricella and Gabrielle DiBenedetto, actively managed U.S. stock funds had 6.5 times more assets than indexed funds in 1998 (Lauricella and DiBenedetto, 2019). With the enormous size of this industry, even twenty years ago, the 6.5 times difference in assets between the actives and passives is massive. The article then goes on to state that actively managed funds have been consistently losing assets and popularity to passively managed ones. As a result, the amount of assets that are kept in actively

managed funds is currently equal to the amount of assets in indexed funds. With this massive gap in the difference of assets being closed in just twenty years, it effectively outlines the alarming growth rate that indexed funds are experiencing along with the concerning slowdown of active funds. This issue grabs a lot of attention and will be discussed later in the section as a research question of this study. Also, as shown in Figure B, actively managed funds have seen outflows of assets to passively managed funds in the past eleven out of twelve years (Lauricella and DiBenedetto, 2019). Not only have actively managed funds been losing popularity and assets over the past twenty years, this data proves that it is not a fluke or some arbitrary pattern but a consistent fluctuation of assets from actives to passives.

To provide a more in-depth look at the fluctuation of assets between these two types of funds and the overall relationships between active funds and indexed funds, the twenty-year time period is split up into three subperiod sections. The three time periods include the Dot.COM bubble burst from 2000 to 2004, the 2008 Financial Crisis from 2005 to 2013 and the rapid recovery and rise of the market from 2014 to 2019. This allows the study to examine and identify any outliers in the data, as well as display the time periods where actives outperformed passives and vice versa, as well as many other relationships.

Dot.COM Burst from 2000 to 2004

Starting with the Dot.COM burst of 2000, this historical event dealt with the building of a bubble due to the rise of the Internet and its relationship with businesses. According to an article written by Ben Geier from Time Magazine, the bubble began with the growth of Internet users. As more and more people begin to access the Internet, more and more businesses started implementing online retail. This drove companies' growth rates through the roof and resulted in the NASDAQ growing "from around 1,000 points in 1995 to more than 5,000 in 2000" (Geier 2015). However, the volatility of this growth was alarming and not sustainable, causing huge losses to lots of online retailer companies. Due to this, the NASDAQ lost almost $1 trillion in stock value in less than a month, causing a huge collapse in online retailing, while also adding

lots of skepticism to the market concerning that area. The effects of this burst were present in the economy from 2000 to 2002, until the market was able to make a comeback and continue to grow in 2003.

This time period seems suitable for this research for several reasons. The first and most obvious one is that it is at the start of the twenty-year time period. Also, the DOT.COM bubble was a short-lived event, resulting in fewer outliers in the data points of the sample. Therefore, 2000 to 2004 is a suitable five-year time period to best present relationships between active and passive funds in the past twenty years.

2008 Financial Crisis from 2005 to 2013

The 2008 Financial Crisis is one of the most well-known financial collapses. Referring to Professor Zhaozhao He's (UNH) lectures, the 2008 Financial Crisis resulted from the bursting of a bubble in the real estate market due to the collapse of mortgage-backed securities (MBS), along with many other reasons such as loosened regulations on bank lending and faulty credit ratings from agencies. The result of this event led to the Federal Government implementing rounds of quantitative easing (QE) in hopes of jump-starting financial markets by pumping capital into the economy.

Based off the sheer size of this event, a much longer time period has been selected when compared to the other two events. The event led to a peak in 2006, with the crash taking place in 2008 and the quick recovery of the economy in 2009 led by rounds of QE. The volatility that takes place during this time period could have very interesting effects on the data and likely provide many outliers. However, this information would still be useful as it provides results and outlooks to both the relationship between active and passive funds when the market is rising and falling.

Rapid Recovery and Rise of the Market from 2014 to 2019

As seen over the past six years, the market has been rapidly recovering from the 2008 Financial Crisis and rising ever since. According to an article written by Erin Duffin on Statista, U.S. real GDP has experienced an average growth rate of roughly 2.43% since 2014. Taken from Yahoo Finance, the Dow Jones Industrial Average (DJIA) rose from roughly 16,300 points in the beginning of 2014 to more than 28,500 points at the end of 2019. The immense growth the U.S. economy has experienced in these past six years creates an interesting, positive environment to compare active funds to ETFs.

From the literature above, it is very clear that the asset fluctuation active and passive funds have experienced in the past twenty years is no fluke or coincidence. There seems to be underlying reasons as to why this has occurred. Using these three specific time periods helps breakdown the data even further to gather more specific evidence as to why this is occurring. Also, it provides interesting results when comparing active funds to passive ones in general. Each environment is different in terms of recession or expansion. By being able to use specific time periods, it allows the tests to provide greater accuracy when describing relationships between active and passive funds when specific macro-events are occurring, such as growth or decline. This adds another layer of data to the results of testing, which would provide for a clearer prediction to the future of the U.S. equity funds markets.

The Downwards Trend of Actively Managed Funds

Based on passed data and studies, it is quite clear that actively managed funds have been losing the battle with indexed funds. Risks and returns are a main factor that has caused the rise of indexed funds; however, they are not the sole influence of this trend. As stated in the name, actively managed funds are maintained by fund managers that develop strategies in hopes of generating a higher return than the market. This daunting service brings a lot of uncertainty into the realm of these types of funds, as fewer than 8% of fund managers over the past fifteen years have beaten the market (Soe and Liu, 2018). To better explain the opposite trends of actively

managed and passively managed funds, four other main factors of influence will be introduced in the upcoming section.

Attractiveness of Indexed Funds

An efficient method of understanding why actively managed funds are losing the battle to indexed funds is to investigate why passively managed funds have become so popular. The definition of an indexed fund is a fund that mirrors the composition of an index, for example the S&P 500. If only 8% of actively managed funds beat the market per year, that means the other 92% of those funds were outperformed by the market and indexed funds, which mimic the market (Soe and Liu, 2018). This greatly boosts the attractiveness of passively managed funds, as they have a 92% chance to provide a higher return than that of actively managed funds. The consistency and diversification that passively managed funds offer is extremely attractive to investors as it allows mitigating risk while keeping an acceptable return.

Referring to the 2018 SPIVA U.S. Scorecard, the research revealed over a "15-year investment horizon, 92.43% of large-cap managers, 95.13% of mid-cap managers, and 97.70% of small-cap managers failed to outperform on a relative basis" (Soe and Liu, 2018). This research further supports the growing popularity and asset retention that indexed funds are attaining. Investors understand the extremely low probability of selecting stocks that can outperform the market and feel much safer investing their money into indexed funds. Low fees, ample amounts of diversification while offering steady returns are the main factors that have pushed passively managed funds to the forefront of the U.S. equity funds market.

Fund Manager Style

Fund manager style is the type of stock selections that a fund manager makes based on a strategy. There are nine different management styles to choose from by mixing investment styles (growth, core and value) with capitalization levels (large, mid and small) (Soe and Liu, 2018). Out of the nine investment styles, "large-cap value was the best-performing category over the 10-

and 15-year horizons, with 23.79% and 16.95% of managers outperforming the benchmark, the S&P 500 Value". These metrics give a very weak reputation to actively managed funds as the best performing fund manager style over a fifteen-year time period was only able to beat their benchmark of the S&P 500 value index 17% of the time (Soe and Liu, 2018).

The SPIVA U.S. Scorecard also goes into metrics such as style consistency and survivorship. Survivorship is a measure that "represents the percentage of funds in existence at the beginning of the time period that is still active at the end of the time period" and style consistency is a "calculation shows the percentage of funds that had the same style classification at the end of the time period as at the beginning of the time period" (Soe and Liu, 2018). For the sake of consistency, the large-cap value fund manager style will be used again, since it is the best performing strategy over the fifteen-year time period that was provided. This strategy posted a 46.6% survivorship rate and a 32.58% style consistency rate. For survivorship, this means that around 53% of large-cap value funds present at the beginning of the fifteen-year time period had either been liquidated or merged. From this metric alone, it is quite clear that the reliability of the best performing fund manager style is very low, which can prove to be very risky to investors looking for safe and consistent returns. In terms of style consistency, roughly 68% of all large-cap value funds at the beginning of the fifteen-year time period were classified as a different investment strategy. This is very unattractive to investors as it shows that fund managers are desperately trying to find better ways to generate returns by switching their fund styles. All in all, fund manager styles play a big role in the downward trend of actively managed funds.

Expense Ratio

Expense ratios are a fee placed upon both actively managed and indexed funds. They are a necessary cost, as they cut into the return of the investor, but also keep the fund functioning. However, actively managed funds impose a much higher fee, as the service they provide is much more intensive than passively managed funds. Looking to the sample of thirty actively managed funds and thirty indexed funds, the average expense fee for both types of funds are 0.72% and

0.18% respectively. This 54-basis point spread can make or break a return and also influence an investment decision to select indexed funds over actively managed funds.

According to an article written by Aaron Back of the Wall Street Journal, T. Rowe Price saw a $63 million outflow of assets from actively managed funds in just the fourth quarter of 2016 alone (Back, 2017). T. Rowe Price's expense ratios were floating around 0.70% while Vanguard passive funds was as low as 0.15%. According to an article from The Journal of Business published by the University of Chicago Press, investors are more drawn to equity funds with lower expense ratios and high diversification. "Academic finance advises investors that low fees are preferable to high fees, that past returns are poor predictors of future returns in the long run, and that there is little, or no, evidence that active managers can outperform indices. Thus, investors would be best off choosing any well-diversified mutual fund with low fees" (Barber, Zheng, and Odean, 2005). With thousands of U.S. stock funds from which investors can choose, the majority are drawn to indexed funds with low fees, setting actively managed funds on the downward trend they have and currently are experiencing.

Fund Manager Compensation

Similar to fund manager style, fund manager compensation and performance is an area that is difficult to research, as most fund manager compensation packages are not released to the public. However, in an article posted by the Harvard Law School Forum on Corporate Governance and Financial Regulation, a lot of important and interesting information was brought to the surface.

"First, almost all funds report that their portfolio managers receive variable bonus-type compensation as opposed to fixed salary. Second, the bonus component of compensation is explicitly tied to the fund's investment performance for 79.0% of sample funds. The performance evaluation window ranges from one quarter to ten years, and the average evaluation window is three years. Third, for about half the sample, the manager's bonus is directly linked to the overall profitability of the advisor. Fourth, only 19.6% of sample funds explicitly mention that the

advisor considers the fund's AUM when deciding manager bonuses. Finally, deferred compensation is present in almost 30% of the sample funds" (Ma, Tang, and Gomez, 2018).

From this, it can be concluded that fund manager performance is a key driver in fund manager compensation. With this type of incentive, one would think that fund mangers would be doing everything they can to outperform the market and be successful in doing so, especially with their own compensation on the line. However, as previously mentioned, the research shows that less than 8% of funds outperform the market. This further proves how difficult it is to outperform the market, providing even more influence to pick indexed funds over actively managed ones.

Also, as stated by Ma, Tang, and Gomez, it is very uncommon to see a fund manager's compensation being linked to assets under management. This means that fund managers' main incentive is based off fund performance, yet that metric is normally below benchmark. It is very interesting to see how fund manager compensation is determined and how it has affected management style and incentives over the past twenty years. As time progresses, actively managed funds have noticed that one of their top unattractive features is higher fees, which is supposed to be offset by superior returns compared to the market. With this feature only being true for less than 8% of funds per year, the attractiveness of actively managed funds drops significantly.

Decline or Normalization?

The actively managed funds market seems as though it has been in decline for quite some time as it continuously sees outflows to passively managed funds. However, there is a lot of evidence supporting the case that this market is simply returning to the mean or being normalized. A study conducted by Lubos Pastor and Robert F. Stambaugh of The National Bureau of Economic Research investigates reasons as to why the active management industry is still popular even with regards to its very poor track record. In their study, they find that the "large size of the active management industry can be rationalized by decreasing returns to scale in the industry" (Pastor and Stambaugh, 2012). To understand this, the phrase return to scale must be explained.

As stated in the Encyclopedia Britannica, this phrase refers to the quantitative change in output resulting from a proportional increase in inputs. Therefore, decreasing returns to scale means the more inputs are increased, the more the return of the output is decreased.

In terms of the actively managed funds market, the inputs would consist of the amount of assets being allocated to the market while the output would be the funds performance. Thus, as the active management market expanded, the returns the funds generated were decreasing. However, as the size of the market proportionally shrinks compared the indexed funds market, as it is currently, the returns actively managed funds generate are expected to increase. This results in the normalization of the market as returns of these funds revert to the mean.

In analyzing the downward trend of actively managed funds, it is very clear that there are four non-quantitative factors that have shown major influence upon this market. These include the attractiveness of indexed funds, fund manager styles, expense ratios and the normalization of the market. Identifying and understanding these factors allows investors to better understand the inner workings of this market, which can help create safer and more reliable portfolios. Also, it helps explain the drastic rise of passively managed funds.

Research Questions

As provided by the title, this sub section is devoted to the formulation of research questions drawn from the related literature above. This paper conducts tests that attempt to answer the following questions:

- *What causes the major asset fluctuations from active to passive funds over the past 20 years?*
    - *Does this conclusion differ for the three subperiods?*
- *Is there data that supports the attractiveness of indexed funds?*
    - *Does this conclusion differ for the three subperiods?*
- *Does fund management style play a significant role in performance, popularity or asset retention of U.S. equity funds?*

- *What role does expense ratios serve in terms of performance, popularity or asset retention in U.S. equity funds?*
- *Is the actively managed funds market in decline or simply reverting to the mean?*

These research questions encompass most of the questions that arise from the above literature. However, the combination of these questions and their results help answer the main, overarching question that this research is aimed toward solving. That question is "Where is the future of the actively managed funds market headed in conjunction to indexed funds and is this move significant?". From the related literature above, a hypothesis can be formulated which concludes that with the advance of technology and availability and readiness of information, actively managed funds will continue to revert to the mean by taking advantage of decreasing economies of scale in terms of funds performance and moving into emerging markets where information is scarce and where fund managers can generate abnormal profits from mispriced securities. Thus, actively managed funds will move into a riskier asset class, while indexed funds will continue to grow as the main source of safe, retirement saving investments. Using the sample that will be discussed in Section 3, this hypothesis will be tested in Section 4 and concluded in Section 5.

Section 3: Sample and Data

As stated in Section 1, a sample of sixty U.S. equity funds are used to run tests against the hypothesis. These funds can be found in Figure C in the appendix. The sixty funds collected are evenly split into two categories where thirty are actively managed funds with the other thirty being passively managed funds. Also, the funds are selected to cover the main eleven sectors and nine management styles. The sectors include consumer discretionary, consumer staples, communication services, financials, technology, industrials, health care, real estate, materials, energy and utilities, while the management styles include large-cap growth, value and blend, mid-cap growth, value and blend and small-cap growth, value and blend. Encompassing this wide

variety of funds adds to the testing power of the sample and helps eliminate any style or management biases that may be present.

Moving on to the data of each fund, there are six data fields that were collected over the twenty-year time period. These include yearly gross returns, total fund assets in millions, beta, net asset value, Sharpe ratio and expense ratio. Figure D provides an example of what this would look like. There are a total of 101 data points for each firm, resulting in roughly 6,060 data points. Also, the range of data points that total fund assets creates is massive, ranging from below $1 million all the way to over $400 billion. To shrink this range and make it more suitable for testing, the natural log (LN) is taken of each total fund asset data point. Therefore, all references to this data field are logged total fund assets in millions, unless specifically noted.

As with any financial research, a market benchmark must be provided. For this study, the S&P 500 is used as it best exemplifies the funds that are chosen for the research. The ticker, "SPY", which is an index that completely tracks the S&P 500, is used to obtain the necessary data fields. As seen in Figure E, these data fields include total yearly returns, beta and Sharpe ratio, which adds on another thirty data points to the testing power. Obtaining all these data points concludes the sample that will be used throughout Sections 4 and 5.

Section 4: Empirical Tests and Results

Simple Tests

This section provides the tests, the details and conditions of a specific test, followed by the results. A visual in the form of a graph or table is provided when applicable. Also, this section starts with broad tests that help convey the central ideas and move into more specific tests as the paper continues.

The first test is reported in Figure F. This test is simple as it takes the average and median of all yearly returns for active and passive funds. The figure shows that on average, the sample of active funds outperformed indexed funds by 0.94%. However, this test has a *p*-value that is

greater than 10%, showing that it is insignificant. Also, as seen in Figure G, active funds, on average, implement an expense ratio that is 0.54% higher than passive funds. The test results from Figures F and G prove that the difference in fund performance between active and passive funds is not significant, which shows that investors should not make decisions based on the performance of other funds and instead look for other underlying factors. This happens to be a common theme throughout the rest of the tests in this study.

The next test deals with logged total fund assets in millions, which can be found in Figure H. The chart shows that, on average, passive funds have roughly $1.2 million more assets than active funds when total fund assets are logged. This test aligns with the Morningstar article written by Tom Lauricella and Gabrielle DiBenedetto as previously mentioned in this paper. Active funds have seen eleven years of outflows over the past twelve years, while passive funds have only increased in assets under management. This test also has a *p*-value smaller than 1%, showing that it is extremely significant and that there is a concrete difference between the total fund assets of active and passive funds.

Style and Sector Specific Tests

This next test looks for relationships between active and passive funds that reside in the same management style or sector. However, this test does not hold much testing power, as there are sixty funds total with eleven different sectors and nine different management styles. Nonetheless, the results of this test are still worth inspecting as they can provide a different perspective on the topic.

Starting with management style, active funds, on average, outperform passive funds in large-cap growth, large-cap value and small-cap growth management styles. Passive funds, on average, only outperform active funds in the mid-cap growth management style. The remaining five categories are not tested as the sample did not provide funds of the specific management style in active and/or passive funds. However, out of all the available information, the *p*-values of the tests show no statistical significance. Aligning with the results from Figure F, this shows that,

on average, there is no significant difference between active and passive fund performance, even when considering the specificity of management style.

Sector specific fund performance yields similar results to the previous test. On average, active funds outperform passive funds in the following sectors: communication services, consumer staples, energy, financials, health care, industrials, technology, real estate and materials. On the contrary, passive funds, on average, outperform active funds in both the consumer discretionary and utilities sectors. However, all eleven sectors resulted in *p*-values that are greater than 10%, showing no statistical significance. Aligning with the results from both Figure F and the management style test, this shows that, on average, there is no significant difference between active and passive fund performance, even when considering the specificity of sector specific funds.

Regression Analysis

Utilizing regression analysis generates some interesting and useful findings in terms of the relationships between active and passive funds, amongst other variables. A total of two main tests are conducted for this section. However, to add specificity, there are many "sub-tests" that make use of the three time periods that break up the twenty-year span.

The first overarching test is based off the following equation: R(e) = constant + passive fund + market return + total fund asset. Plugging in the numbers from Figure J, the regression result is R(e) = 4.7122 – 0.7251x + 0.9969Rm – 0.3693a, where "x" is the passive indicator, "Rm" is the return of the market benchmark and "a" is total logged assets in millions. Setting the passive indicator to 0, the market return to 0 and averaged total logged assets to one million yields an average active fund gross return of 4.35%. The average passive fund gross return is 3.62% when setting the passive indicator to one and keeping the other variables the same as before. This shows that on average, actives outperform passives by 0.73% when holding the market and total fund assets constant. This gap widens when realistic numbers are used in the equation. The average market return over the past twenty years is 7.68% and averaged total

logged assets in millions for active funds are 7.35 and 8.55 for passive funds. The equation outputs an average expected return of 9.96% for active funds and 8.53% for passive funds, showing an outperformance of 1.16% by active funds.

The market beta has a *p*-value of less than 1%, showing that it is highly significant. The relationship is positive, meaning an active or passive funds' performance is directly linked to market performance, which is to be expected. Looking to asset beta, this variable is significant as well, holding a *p*-value of less than 5%. This aligns perfectly with the study conducted by Lubos Pastor and Robert F. Stambaugh, stating that the relationship between fund performance and assets undermanagement is decreasing in economies of scale. On average, as total fund assets increase, returns go down. Lastly, the *p*-value for the passive indicator is greater than 10%, showing that there is no direct relationship between the performance of one fund compared to another. Therefore, it is more useful to consider, as an investor or advisor, variables such as the conditions of the market and fund asset fluctuations when selecting a fund, instead of looking at the performance of the fund's competition.

Diving into more specific settings, this test is also run on the three time periods, as seen in Figure K. Due to the shortening of the time periods, the data points that are available for testing dramatically decrease, lowering testing power. However, these tests still provide an interesting perspective on any eye-catching data or outliers. Looking at the passive and market betas, it is quite clear that they perfectly align with the test results for the overall time period. However, the asset beta holds no significance in the three separate time periods but holds significance in the overall time period. This would suggest that the idea of funds having a decreasing economies of scales effect in terms of fund performance related to total funds assets is only present in the long run. This is further supported by the positive asset beta from 2014 to 2019. A massive influx of assets into funds caused by the rapid rise of the market has the potential to benefit fund performance. However, the tests show that this is only in the short run and that a decreasing economies of scale relationship between the two variables will likely surface in the future. To

conclude, in the first regression test, this information would allow investors to be even more strategic in the selection of funds, especially when considering short- or long-term financial goals.

The next regression test closely follows the conditions and data of the first time, except that it replaces average fund return with average fund Sharpe ratio. This metric is a popular financial ratio that helps investors to better evaluate a security's returns when compared to its risk. The formatting of this test is similar to the above, starting with the overall time period followed by specific measures from the three time periods.

This test utilizes the same regression equation as the first regression test, R(e) = constant + passive fund + market Sharpe ratio + total fund asset. Using Figure L as a reference, the equation in its base form reads R(Sharpe) = 0.1992 – 0.0355x + 0.7828Sm – 0.0070a, where "x" is the passive indicator, "Sm" is the average market Sharpe ratio and "a" is total logged assets in millions. Setting the passive indicator to zero, the market Sharpe ratio to zero and averaged total logged assets to one million yields an average active fund Sharpe ratio of 0.6721. The average passive fund Sharpe ratio is 0.6254 when setting the passive indicator to one and keeping the other variables the same as before. With a higher Sharpe ratio by 0.0467, active funds boast slightly higher returns with lower risk when compared to passive funds. This gap also widens when realistic numbers are used in the equation. The average market Sharpe ratio over the past twenty years is 0.6759 and averaged total logged assets in millions for active funds are 7.35 and 8.55 for passive funds. The equation outputs an average expected Sharpe ratio of 0.6766 for active funds and 0.6326 for passive funds, showing an outperformance of 0.044 by active funds.

The market beta, with a *p*-value less than 1%, is highly significant. Like the previous regression test, this shows that the market directly affects the performance and risk of both active and passive funds in a linear fashion. As expected, an increase in the market Sharpe ratio would result in an increase in fund Sharpe ratio. Also, the asset beta is significant with the *p*-value being less than 5%. With the asset beta being negative, this shows that fund Sharpe ratio is related to

total fund assets by decreasing economies of scale, which coincides with the results from the above regression. However, the passive indicator shows no significance. Aligning with the above tests results from the first regression, this shows that fund Sharpe ratio has no clear relationship with competing funds and are not affected by those funds' performance.

Moving into a more specific timeline, these next tests revolve around any discrepancies or striking results from the three time periods. Referring to Figure M, the only consistent variable is the market beta, which is to be expected. Starting with the passive beta, the *p*-value shows significance exclusively in the 2008 Financial Crisis time period. However, given the unprecedented circumstances of the time, it is safe to say that this result can be labeled as an outlier. The crash of the market led to a huge downturn for many passive funds, which explains the size of the passive beta. This would cause the active-passive relationship to be significant because active fund managers could simply take money out of the market and not suffer the downside, while passive funds had to simply ride the market. Thus, the competition directly affects fund performance. The asset beta sees a positive metric from 2005 to 2013 and from 2014 to 2019, while also gaining significance in the latter. However, there is evidence that the above explanation is still valid. An unusual and strong stimulus in the market in the short run would reverse the decreasing economies of scale relationship between total fund assets and fund Sharpe ratio. However, as seen in Figure M, this significance can be labeled as a special occasion caused by volatility in the market. Therefore, it is safe to say that fund Sharpe ratio, like fund return, experiences decreasing economies of scale in relation to total fund assets. Overall, this a lot to take away from these two regression equations. However, the majority of the results yielded by the equations are consistent with one another, adding to the credibility of the test results.

Section 5: Conclusion

Throughout the course of this paper, there has been a plethora of data and information that has been discussed and analyzed. There has been many different findings and results brought

into the mix as well. Despite having a few outliers, most of the data seems to be pointing to one overarching theme about active and passive funds. That theme is that there seems to be no significant difference between active and passive funds. Therefore, the performance of an active fund has no direct relationship with the performance of an otherwise similar index fund and vice versa. However, the major factors that contribute to performance fluctuations are the market and total fund assets. The market, as to be expected by investors, has a positive relationship with fund performance for both active and passive funds. Total fund assets have a relationship of decreasing economies of scales with fund performance over the long run. As more investors put assets into a fund, fund performance, on average, decreases. By taking advantage of market metrics and fund asset fluctuations, investors can develop an investment strategy that is more likely to have higher, steadier profits with lower risk exposure.

Referring to the original point of the previous paragraph, the theme that is found in the sample of funds provides some insight as to why there have been so many outflows in active funds, while passive funds continue to grow more and more popular. As stated in Section 4, active funds, on average, have an expected return of 9.69%, outperforming passive funds by 1.16%. The questions as to why passive funds are gaining popularity over actives despite having a lower return on average resides in this theme. With no clear-cut difference between these two types of funds, investor will naturally look at which fund is returning higher profits with lower risk. At a first glance, this would still mean that active funds should be more popular than passive ones. However, when factoring in the data from Figure G, that advantage gap of 1.16% that active funds boast is reduced to 0.62% by expense ratios. Also, there is always the risk of human error. Investing in an active fund puts faith in the skillset of the fund manager, but no one can predict the market. Thus, having a fund manager elevates that risk of that fund due to human error, which elevates active fund risk and roughly leveling the advantage gap between these two types of funds. This is a viable explanation as to why there have been so many asset fluctuations from actives to passives over the last twenty years. Investors feel they are earning consistent profits

with less risk when invested in a passive fund that mimics an index instead of relying on a fellow human being to outperform an unpredictable market.

Fund Managers Becoming Obsolete

As technology advances, the use of automation has become more and more common in everyday life. This brings up the question as to whether the job of fund managers is becoming obsolete. In a study conducted by Frank J. Fabozzi, Sergio Focardi and Caroline Jonas, it is found that "the growing automation of the equity investment process indicates that that there is no missing link in the technology chain that leads to automatic quantitative management" (Fabozzi, Focardi, and Jonas, 2009). It goes on to describe how the quantitative models used for the management of indexed funds is now being edited so it contains optimization algorithms. Then, the newly formed quantitative model is used to maintain actively managed funds with no human management.

This breakthrough in technology could serve as a big problem to fund managers who would be at risk of losing their jobs. However, there has been one problem that seems to be consistent with each automated actively managed fund. "The wide use of models has created a number of challenges: survey respondents say that differentiating quantitative products and improving on performance are a challenge" (Fabozzi, Focardi, and Jonas, 2009). Since the algorithms for optimization are fundamentally similar, they tend to pick the same stock selections, resulting in minimal ways to differentiate between products and allowing for very little improvement of performance. The sole fact that optimization has allowed for the automation of actively managed funds is still a threat to fund managers. However, with the introduction of emerging markets, there are potentially new ways to generate better returns than automated funds with human fund managers.

Emerging Markets

As actively managed fund performance struggles to beat the market while continuing to impose elevated expense ratios when compared to indexed funds, fund managers must look to different strategies in hopes of turning asset outflows into inflows. One article pulled from the Wall Street Journal written by Eleanor Laise describes a strategy that involves emerging markets. She explains that fund managers should investigate "asset classes like small-company stocks, where a stock picker's research can sniff out undervalued companies overlooked by the market" (Laise, 2007). The reasoning behind this is that "it can be tough for active managers to uncover information that gives them an edge on the market" for companies that are well established and matured. Mispriced assets are more likely to be found in emerging markets with little company information, which can lead to more consistent and higher performance by actively managed funds. This added risk would also help explain higher expense ratios in these funds.

The Future of Actively Managed Funds

At a brief glance, the actively managed funds market may seem that it is headed in a downward direction. However, when taking a more in-depth look, this market has a lot of potential to make a comeback against passively managed funds. As previously shown, there is no real difference between these two types of competing funds. Also, when accounting for expense ratios and risk, passive funds will likely return the same profits as active funds with slightly lower risk, leading investors to pour money into ETF's. This also helps explain Glen Hubbard's statement, "passive funds have become the bedrock foundation for retirement saving in the United States".

With passive funds slowly taking over the "safe, reliable equity funds" section of the market, this leaves a potentially profitable section of the market open. This study predicts that fund managers of active funds will move into this section of the market, which happens to be emerging markets. With less available information, emerging markets can be taken advantage of in terms of finding mispriced assets, which can lead to higher profits. Fund managers will utilize their skillsets in selecting securities that have been mispriced. However, active funds will

naturally become riskier, which can help explain the elevated expense ratios that these funds charge. Also, active funds will retain less assets, since they will become riskier, which benefits returns from the decreasing economies of scale relationship to total fund assets. Therefore, passively managed funds will continue to grow in popularity and asset size and serve as a staple of the retirement saving as a safe, low risk, low expense, consistent security. Active funds will become a riskier asset that revolves around security selection strategies dealing with mispriced assets in emerging markets. This prediction appears to be most viable and most supported by the data and information from this study. Both sides of the market spectrum (high return/high risk vs. low return/low risk) will be covered and fund managers will slowly turn the active funds industry around, reinstating themselves as an essential part of the market.

Appendix

Figure A: Total net assets of the U.S. mutual funds market from 1998 to 2018 (Lauricella and DiBenedetto, 2019)

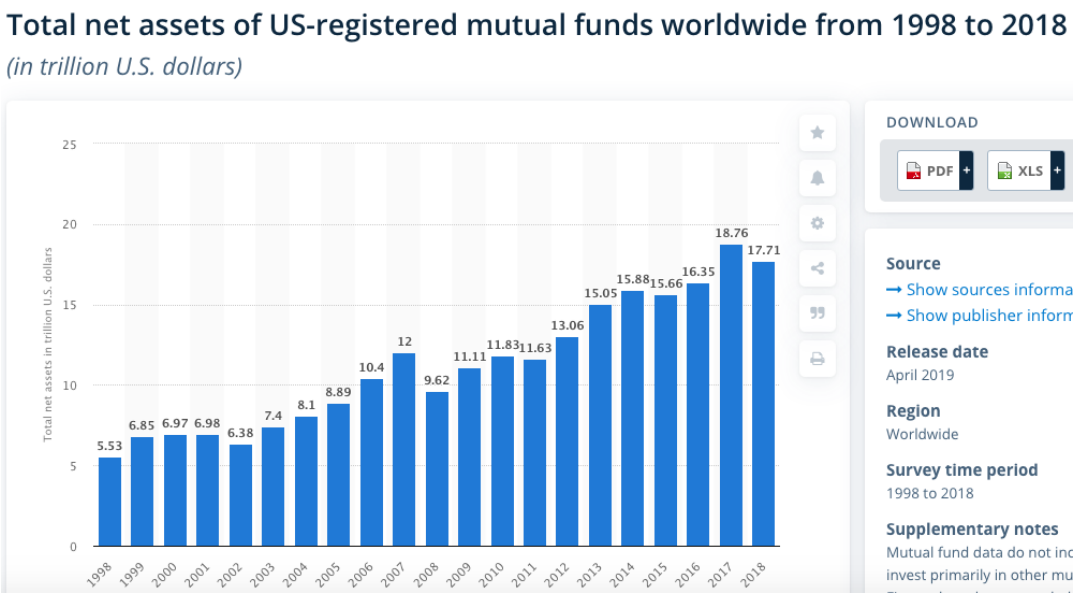

Figure B: U.S. equity fund flows (Lauricella and DiBenedetto, 2019)

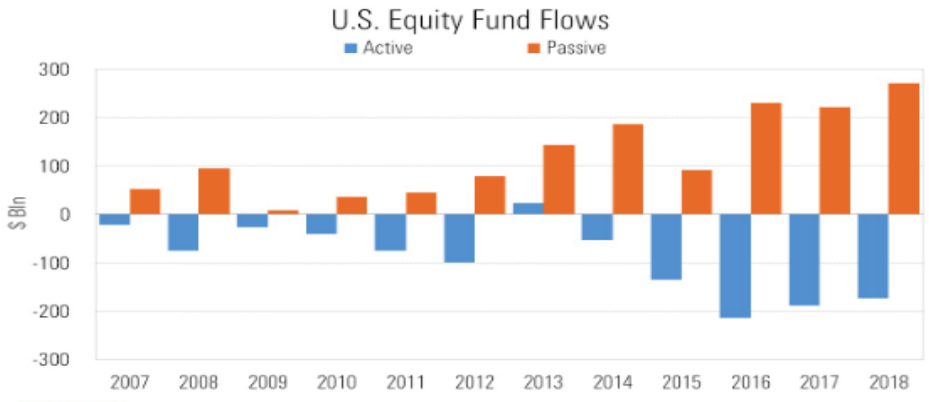

Figure C: Sample of U.S. equity funds

Active			Passive		
Name	Ticker	Sector	Name	Ticker	Sector
Vanguard Equity-Income Fund	VEIPX	Large-cap Value	Vanguard 500 Index Fund	VFIAX	Large-cap Blend
Vanguard Dividend Growth Fund	VDIGX	Large-cap Growth	Vanguard Growth Index Fund	VIGAX	Large-cap Growth
Vanguard Growth and Income Fund	VQNPX	Large-cap Growth	Rydex NASDAQ-100 Fund	RYOCX	Large-cap Growth
Vanguard Mid-Cap Growth Fund	VMGRX	Mid-cap Growth	Vanguard Value Index Fund	VVIAX	Large-cap Value
Loomis Sayles Small Cap Growth Fund	LSSIX	Small-cap Growth	Vanguard Extended Market Index Fund	VEXAX	Mid-cap Growth
Fidelity Blue Chip Growth Fund	FBGRX	Large-cap Growth	Vanguard Small-Cap Index Fund	VSMAX	Small-cap Blend
Fidelity Small Cap Stock Fund	FSLCX	Small-cap Growth	Vanguard Small Capitalization Index Fund	NAESX	Small-cap Blend
Fidelity Mid-Cap Stock Fund	FMCSX	Mid-cap Blend	Schwab Total Stock Market Index Fund	SWTSX	Large-cap Blend
Fidelity Large Cap Stock Fund	FLCSX	Large-cap Value	Fidelity 500 Index Fund	FXAIX	Large-cap Blend
Fidelity Growth Strategies Fund	FDEGX	Large-cap Growth	PowerShares QQQ Fund	QQQ	Large-cap Growth
Laudus U.S. Large Cap Growth Fund	LGILX	Large-cap Growth	Schwab S&P 500 Index Fund	SWPPX	Large-cap Blend
T. Rowe Price Blue Chip Growth Fund	TRBCX	Large-cap Growth	Schwab Small Cap Index Fund	SWSSX	Small-cap Growth
Morgan Stanley Institutional Growth Fund	MSEGX	Large-cap Growth	SPDR S&P 500 ETF	SPY	Large-cap Blend
Commerce MidCap Growth Fund	CFAGX	Mid-cap Growth	iShares S&P 500 Index ETF	IVV	Large-cap Blend
Wasatch Ultra Growth Fund	WAMCX	Small-cap Growth	iShares S&P SmallCap ETF	IJR	Small-cap Blend
Vanguard Energy Fund	VGENX	Energy	Vanguard Real Estate Index Fund	VGSLX	Real Estate
Vanguard Health Care Fund	VGHCX	Health Care	SPDR Materials Select Sector ETF	XLB	Materials
Fidelity Select Communication Services Fund	FBMPX	Communications Services	Utilities SPDR ETF	XLU	Utility
Fidelity Select Consumer Discretionary Fund	FSCPX	Consumer Discretionary	DFA Real Estate Securities ETF	DFREX	Real Estate
Fidelity Select Consumer Staples Fund	FDFAX	Consumer Staples	iShares Dow Jones US Telecom	IYZ	Communications Services
Fidelity Select Financial Services Fund	FIDSX	Financial	Consumer Discretionary SPDR ETF	XLY	Consumer Discretionary
Fidelity Select Industrials Fund	FCYIX	Industrials	Consumer Staples Select Sector SPDR ETF	XLP	Consumer Staples
T. Rowe Price Global Technology Fund	PRGTX	Technology	iShares S&P Global Energy Sector ETF	IXC	Energy
T. Rowe Price Real Estate Fund	TRREX	Real Estate	Financial Select Sector SPDR ETF	XLF	Financial
Wells Fargo Utility and Telecommunications Fund	EVUAX	Utility	Health Care SPDR ETF	XLV	Health Care
Fidelity Select Gold Portfolio	FSAGX	Materials	Industrial Select Sector SPDR ETF	XLI	Industrials
BlackRock Technology Opportunities Fund	BGSAX	Technology	Technology Select Sector SPDR ETF	XLK	Technology
T. Rowe Price Financial Services Fund	PRISX	Financial	iShares Expanded Tech-Software ETF	IGV	Technology
Cohen & Steers Institutional Realty Fund	CSRIX	Real Estate	iShares Dow Jones US Financial ETF	IYF	Financial
Dodge & Cox Stock Fund	DODGX	Large-cap Value	Energy Select Sector SPDR ETF	XLE	Energy

Figure D: Example of a fund's data points

VEIPX - Vanguard Equity-Income Fund						
Date	Gross yearly return	Total fund assets (in millions)	Beta	Sharpe ratio	Net Asset Value	Expense ratio
12/29/2000	13.5268	2561.41	-0.3974	0.45025863	24.44	0.27%
12/31/2001	-2.3448	2491.41	4.3257	-0.322402907	22.71	
12/31/2002	-15.6512	2235.8	1.0248	-0.726508724	18.7	
12/31/2003	25.1389	3070.62	0.743	1.597417763	22.31	
12/31/2004	13.5745	3843.25	0.8035	1.180926016	23.5	
12/30/2005	4.3709	4289.8	1.3943	0.11701475	22.79	
12/29/2006	20.6228	5292.71	1.3217	1.603881896	25.3	
12/31/2007	4.8561	5375.25	1.4363	0.02587743	24.42	
12/31/2008	-30.9547	3604.63	0.7242	-0.818790469	16.14	
12/31/2009	17.1013	4040.81	0.7585	0.616075311	18.25	
12/31/2010	14.8813	4898.4	0.1314	0.906300607	20.38	
12/30/2011	10.6049	6619.95	0.3295	0.529237678	21.9	
12/31/2012	13.4867	9690.3	0.21	1.070413859	24.15	
12/31/2013	30.0713	15546.46	0.7999	2.878854122	29.76	
12/31/2014	11.2898	18794.24	1.0081	1.088312687	31.21	
12/31/2015	0.7739	18978.61	0.8384	0.049194883	29.56	
12/30/2016	14.7004	25360.81	1.524	1.163268975	32.62	
12/29/2017	18.3841	31341.21	0.3701	2.648174726	37.19	
12/31/2018	-5.716	30085.02	1.1214	-0.554717907	31.7	
12/31/2019	25.2163	39249.6	0.9828	2.149629784	37.96	

Figure E: Market benchmark data points

Dates	SPX	Beta	Sharpe Ratio
12/29/2000	-9.1014	0.94	-0.677680275
12/31/2001	-11.8904	3.16	-0.598599425
12/31/2002	-22.0975	1.07	-0.910965545
12/31/2003	28.6652	1.18	1.619974579
12/31/2004	10.8757	0.78	0.852774649
12/30/2005	4.9069	1.6	0.166666628
12/29/2006	15.7767	0.63	0.913132986
12/31/2007	5.5713	1.02	0.076442366
12/31/2008	-36.9999	1.04	-0.934783348
12/31/2009	26.4481	1.18	0.964710959
12/31/2010	15.0587	1.37	0.826794064
12/30/2011	2.1055	2.33	0.088598613
12/31/2012	15.9932	7.76	1.111456077
12/31/2013	32.3742	0.84	2.919203614
12/31/2014	13.6783	0.96	1.199758176
12/31/2015	1.3749	1.24	0.08615032
12/30/2016	11.9524	0.66	0.886601043
12/29/2017	21.8228	0.85	2.987881848
12/31/2018	-4.3918	0.84	-0.417995525
12/31/2019	31.4777	1.26	2.357940352

Figure F: Active and passive return comparison

Active Returns		Passive Returns		2tail P-value
Mean	Median	Mean	Median	0.44111625
9.962	11.22	9.02	12.23	

Figure G: Expense ratio comparison

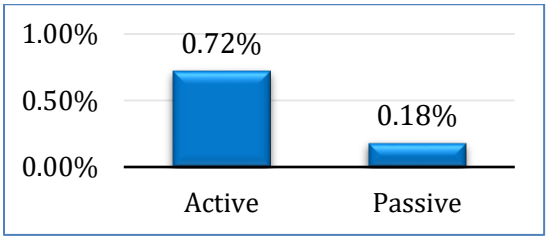

Figure H: Active and passive logged total assets comparison (in millions)

Active Fund Assets		Passive Fund Assets		2tail P-value
Mean	Median	Mean	Median	4.62242E-25
7.34634	7.40126	8.55127	8.80442	

Figure I: Style and sector specific fund performance comparison

Style/Sector	Mean Active Return	Mean Passive Return	2tail P-value
Large-cap Growth	8.307708571	8.613830508	0.935272265
Large-cap Value	9.254998333	8.371394737	0.853762489
Large-cap Blend	#N/A N/A	8.028926496	#N/A N/A
Mid-cap Growth	8.6894475	10.56483684	0.751943011
Mid-cap Value	#N/A N/A	#N/A N/A	#N/A N/A
Mid-cap Blend	10.45379	#N/A N/A	#N/A N/A
Small-cap Growth	10.4458	9.73783	0.897606255
Small-cap Value	#N/A N/A	#N/A N/A	#N/A N/A
Small-cap Blend	#N/A N/A	10.86767414	#N/A N/A
Communications Services	10.11551	3.562894737	0.369310223
Consumer Discretionary	8.72356	10.550255	0.773218129
Consumer Staples	10.387315	8.420245	0.648109309
Energy	11.47492	8.499994737	0.643812855
Financial	8.71906	7.079684615	0.735693449
Health Care	13.17015	8.601695	0.386191504
Industrials	11.73656	9.133095	0.687948936
Technology	12.93343158	10.21822368	0.674676545
Real Estate	12.97185128	12.73573158	0.957491809
Materials	10.45589	8.974355	0.858419393
Utility	8.91839	9.49887	0.91849336

Figure J: Comparison of active to passive performance holding the market and total fund assets constant

constant	4.712182
t-stat	3.386588
p-value (stars)	***
passive beta	-0.725114
passive t-stat	-1.029367
p-value (stars)	none
market beta	0.996902
market t-stat	51.20011
p-value (stars)	***
asset beta	-0.363881
asset t-stat	-2.021405
p-value (stars)	**
number of observations	1105
adjusted R squared	0.706955

Figure K: Comparison of active to passive performance holding the market and total fund assets constant amongst the 3 time periods

constant	9.208667813	constant	2.215759777	constant	-3.57573717
t-stat	2.686220087	t-stat	1.065930985	t-stat	-1.512554608
p-value (stars)	***	p-value (stars)	none	p-value (stars)	none
passive beta	-3.016057094	passive beta	-1.23461887	passive beta	-0.918538667
passive t-stat	-1.584219284	passive t-stat	-1.211474325	passive t-stat	-0.899424109
p-value (stars)	none	p-value (stars)	none	p-value (stars)	none
market beta	0.973055573	market beta	1.053124614	market beta	0.95835585
market t-stat	20.38290702	market t-stat	41.25510574	market t-stat	24.92625727
p-value (stars)	***	p-value (stars)	***	p-value (stars)	***
asset beta	-0.306560254	asset beta	-0.062458605	asset beta	0.386217158
asset t-stat	-0.656633819	asset t-stat	-0.224924604	asset t-stat	1.371069892
p-value (stars)	none	p-value (stars)	none	p-value (stars)	none
number of observations	214	number of observations	531	number of observations	360
adjusted R squared	0.66336746	adjusted R squared	0.765188702	adjusted R squared	0.635641336

Figure L: Comparison of active to passive Sharpe ratio holding the market and total fund assets constant

	active
constant	0.199221
t-stat	2.362602
p-value (stars)	**
passive beta	-0.035503
passive t-stat	-0.826448
p-value (stars)	none
market beta	0.782845
market t-stat	42.25311
p-value (stars)	***
asset beta	-0.007043
asset t-stat	-0.641304
p-value (stars)	none
number of observations	1114
adjusted R squared	0.624693

Figure M: Comparison of active to passive Sharpe ratio holding the market and total fund assets constant amongst the 3 time periods

	active		active		active
constant	0.528967953	constant	-0.002334607	constant	-0.507606949
t-stat	2.648525686	t-stat	-0.021441715	t-stat	-2.864819491
p-value (stars)	***	p-value (stars)	none	p-value (stars)	***
passive beta	-0.058233174	passive beta	-0.11182891	passive beta	-0.097868034
passive t-stat	-0.514948516	passive t-stat	-2.093167764	passive t-stat	-1.2769771
p-value (stars)	none	p-value (stars)	**	p-value (stars)	none
market beta	0.889396814	market beta	0.867007143	market beta	0.741950075
market t-stat	16.67002037	market t-stat	34.45416142	market t-stat	25.59160097
p-value (stars)	***	p-value (stars)	***	p-value (stars)	***
asset beta	-0.020628495	asset beta	0.018506921	asset beta	0.062003518
asset t-stat	-0.763319556	asset t-stat	1.265956741	asset t-stat	2.933537636
p-value (stars)	none	p-value (stars)	none	p-value (stars)	***
number of observations	223	number of observations	531	number of observations	360
adjusted R squared	0.557450664	adjusted R squared	0.699872177	adjusted R squared	0.651294927

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