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Master Thesis

”The relationship between mutual fund performance and their fees – Are expensive managers worth it?”

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Abstract

This paper aims to investigate the relationship between mutual fund performance and the fees charged by money managers, to address whether expensive managers deliver added value to their investors. To conduct this study, we utilize a sample of U.S. mutual funds spanning twenty years. The sample is categorized into four groups based on fee levels: low/below average fees, average fees, above average fees, and high fees. We evaluate the performance of each group using various metrics, including risk-adjusted returns, alpha, and beta. Furthermore, we explore the potential impact of higher fees on a fund's market timing ability and its subsequent effect on performance during periods of financial turmoil.

The results consistently indicate that actively managed funds underperform the market over time. However, an interesting pattern emerges during financial crises, notably in the 2007-2009 financial crisis and the COVID-19 pandemic. In these crisis periods, funds with higher fees exhibit a significant outperformance compared to those with lower fees. Additionally, we find that managers charging higher fees demonstrate stronger market timing abilities than those charging lower fees. These findings provide valuable insights into the relationship between fees and mutual fund performance, shedding light on whether higher returns justify higher fees.

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Table of contents

List of Tables

List of Graphs

The relationship between mutual fund performance and their fees

1.0 Introduction and Motivation

In January 2017, Ellis published an article in the Financial Times where he ignited a debate that continues to engage the investment world: Is active management on its way out? This question arises from the growing body of research suggesting that actively managed funds often struggle to beat their cheaper passively managed counterparts. With technological advancements and the rise of artificial intelligence reshaping the financial landscape, the dynamics of passive funds have undergone a remarkable transformation. The question of whether active management still holds its ground has therefore become increasingly relevant in recent years. The interplay between human expertise and automated strategies raises critical questions about the future of investing. Are we witnessing a seismic shift in how funds are managed, or is there still a place for active management to thrive?

Due to their consistent underperformance relative to the market and the burden of high fees (Jensen, 1986), actively managed funds in the U.S. have witnessed a steady outflow of capital in recent years. Investors have increasingly turned to passive index funds, attracted by the benefits of diversification and lower management fees, as highlighted by a study conducted by PWC (2020). However, despite this trend, mutual funds still hold an allure for investors. Moskowitz (2000) suggests that the demand for mutual funds stems from their potential to hedge against downside risk. Research by Sun, Wang, and Zheng (2009) discovered that during market downturns, the most active funds outperformed the least active ones by 4.5 percent to 6.1 percent per year after adjusting for risk and fees. Conversely, they observed the opposite during periods of market upturns. This finding aligns with Glode's (2011) proposition that active managers put in greater effort when the utility is higher, as investors are willing to pay for insurance against downside risks.

Dominating economic theories, such as the Efficient Market Hypothesis (EMH), suggest that active management adds no value to investments. According to William Sharpe (1991), the returns of actively managed funds should be equivalent to those of passive index funds before accounting for costs. While numerous studies have concluded that actively managed funds fail to outperform their passive counterparts, few have focused on examining the performance of active management in relation to the fees they charge. Although, on average, active managers generate lower returns after fees, it remains plausible that some superior managers can beat the market. However, this potential outperformance may be offset by inferior managers who struggle to achieve the same level of success.

In our research, we explored the relationship between mutual fund performance and their fees, seeking to provide insights on whether investing in active money managers is worthwhile. Specifically, we have focused on the U.S. mutual fund industry, which accounts for over 40 % of global mutual funds (Mordor Intelligence, 2023). Additionally, we examined whether the performance of actively managed funds is influenced by the business cycle and whether expensive funds outperformed their peers in challenging and evolving market conditions. To ensure the robustness of the analysis, we have utilized data spanning from 2002 to 2022, preferably without survivorship bias, to capture the funds' performance across various market scenarios.

Our findings indicate no positive correlation between the performance of active mutual funds and the fees they charge over the twenty year period. On the contrary, we observe a consistent trend where funds with lower fees tend to outperform their more expensive counterparts. Furthermore, our analysis reveals that active mutual funds underperform the market over time, despite demonstrating notable market timing abilities in the long run. However, an intriguing pattern emerges when evaluating mutual fund performance during periods of financial turmoil. We find that portfolios managed by funds with higher management fees outperform those with lower fees. Additionally, active funds exhibit superior performance compared to the market during these turbulent

periods. Our research also highlights that expensive managers demonstrate stronger market timing abilities than their less costly counterparts. These findings suggest that money managers, particularly those with higher fees, can provide added value to their investors during financial instability.

The first chapter serves as an introduction, providing an overview of the thesis's purpose and motivation. Chapter 2 offers a brief introduction to mutual funds and their fee structures. In Chapter 3, we delve into the existing literature on the topic and discuss the theoretical models used in our research. Moving forward, Chapter 4 focuses on the research design, outlining the framework for our study. Chapter 5 presents the research methodology adopted to address our research questions. In Chapter 6, we describe the dataset used and provide insights into the data collection process. Chapter 7 presents the analysis results and engages in a discussion of the findings. The thesis concludes in Chapter 8, where we summarize the key findings and explore their implications. Finally, Chapter 9 offers concluding remarks, including suggestions for future research directions related to the topic.

2.0 Mutual Funds and Fee Structure

Mutual funds were first introduced in 1924 and have since been crucial in providing households with a liquid, low-cost, and diversified investment option (Engen et al., 2000). Among private investors, mutual funds are particularly popular because they offer access to professionally managed funds. As of 2021, the U.S. mutual fund industry accounted for nearly 40% of global mutual funds, establishing it as the largest in the world (Mordor Intelligence, 2023).

Mutual funds can be categorized as either passive or actively managed. According to William Sharpe, an active fund is one that deviates from the market (Sharpe, 1991). While passive funds aim to replicate the market portfolio's return, active fund managers strive to exploit market mispricing and other frictions to achieve abnormal returns. In exchange for their efforts, active managers charge higher fees compared to managers of passively managed funds. These fees typically consist of two main components: shareholder and operating fees, which can

significantly impact investors' overall returns. Shareholder fees encompass commissions and other costs associated with buying and selling mutual fund shares. In contrast operating fees are generally higher for actively managed funds that aim to outperform the market. Actively managed fund fees usually range from 0.5% to 1.5%, whereas passive index funds charge around 0.2% (Vaughn, 2022).

3.0 Literature Review

In this section, we will provide an overview of relevant literature that can support research on the relationship between mutual fund performance and their fees. The theories discussed below include the Efficient Market Hypothesis (EMH), the Capital Asset Pricing Model (CAPM), Fama and French's three- and five-factor models, and the Henriksson-Merton Market Timing Model.

3.1 Is Capital Markets Efficient?

The Efficient Market Hypothesis (EMH) states that a market is efficient when the price of a security reflects all available information in a timely manner (Fama, 1970). It suggests that active fund managers cannot gain an advantage through technical or fundamental analysis, as market prices already incorporate all relevant information (Ying et al., 2019). Empirical studies have categorized the EMH into three forms: weak, semi-strong, and strong. The weak form implies that current prices only reflect past prices, while the semi-strong form indicates that public information, such as annual reports and stock news, is incorporated into prices. A strong form of efficiency occurs when an investor has exclusive access to all relevant information (Fama, 1970). Although the evidence against the EMH in its strong form is limited, researchers generally agree that markets exhibit at least a semi-strong form of efficiency. Fama (1970) acknowledges that the strong form is an extreme null hypothesis and does not expect it to hold literally.

Previous studies have found support for the EMH in its semi-strong form. According to this theory, active mutual funds with higher fees should not outperform passive funds with lower fees, as they lack proprietary information to

generate superior returns. Therefore, the EMH suggests a zero or negative correlation between mutual fund fees and performance.

3.2 The Performance of Mutual Funds and Asset Managers

William Sharpe (1991) expressed skepticism regarding the role of active management and argued that active funds would have a lower after-cost return compared to passive funds. According to Sharpe, active and passive funds would have equal returns before costs. He outlined four reasons investors and investment professionals argue they can outperform the market. Firstly, passive managers may not be truly passive, as they may not hold all securities in the correct proportions. Secondly, the non-passive component in the market may not be fully represented by active managers, as there could be other active holders of securities, such as individual investors. For example, an active manager may hold securities outside the market being considered, such as cash holdings. In such cases, the performance of actively managed mutual funds can sometimes surpass that of passive index funds.

A third example is survivorship bias, where active investors exclude companies that have gone out of business, leading to better performance results. The final and perhaps most crucial reason is that statistics for active managers may not accurately reflect the actual performance of the average actively managed dollar. Sharpe emphasizes that analyses refuting his statement, which claims that the average actively managed dollar underperforms the average passive managed dollar, net of costs, are subject to measurement errors and, therefore, invalid. However, he also acknowledges that certain active managers are capable of outperforming passively managed funds, even after accounting for costs (Sharpe, 1991).

Pedersen (2018) challenges Sharpe's assertion that "before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar." Sharpe argues that gains for one active investor come at the expense of another, resulting in a net zero when aggregating returns across active investors. This holds true when the set of securities remains fixed over a single

period. However, in reality, the securities in the market change over time. As the market portfolio evolves, passive investors must regularly trade to maintain their passive stance, which may lead to less favorable prices compared to active managers. The turnover of the market portfolio has two implications. Firstly, the changes in the market portfolio can be significant enough that active managers can generate abnormal returns relative to passive investors. Secondly, altering the market portfolio is integral to a market-based economy, facilitating capital allocation when and where it is needed. The tradeoff between active managers' fees and their role in maintaining the economy's equilibrium is worthwhile. Pedersen further emphasizes that his analysis opens up the possibility of active managers creating abnormal returns.

Treynor and Mazuy (1966) were pioneers in investigating whether fund managers can predict market movements successfully. Only one of the 57 managed funds analyzed in their study demonstrated statistically significant evidence of successfully outguessing the market. These findings suggest that the ability of fund managers to generate abnormal returns stems from something other than their capacity to beat the market but rather from their skill in identifying undervalued industries and companies. In line with Treynor and Mazuy's findings, recent research reaffirms the well-established empirical evidence that active mutual funds underperform passive mutual funds after accounting for fees. Fama and French's (2010) research indicates that, on average, active mutual funds perform similarly to the market before fees but underperform after considering fees. Berk and van Binsbergen's (2015) study reveals that active managers outperform before fees but perform in line with the market after fees, suggesting that the fees of active mutual funds, on average, absorb all or more of the abnormal returns generated by the managers. Supporting this, a study by Sheng et al. (2022) also explains this phenomenon. Contrary to previous assumptions that active funds, on average, do not generate abnormal returns, the study argues that active high-fee funds tend to invest in low-profitability stocks with high investment rates.

3.3 Recent Studies

The Financial Times article titled "Active funds can beat passive if fees are low enough, study shows" discusses a recent study conducted by S&P Dow Jones Indices that examined the performance of U.S. mutual funds over the past 20 years (Moisson, 2022). According to the study, actively managed funds can outperform passive index trackers if their fees are sufficiently low (Baltussen et al., 2022).

The article emphasizes that passive funds have gained popularity in recent years due to their low fees and ease of use. However, the study suggests that actively managed funds can still provide value to investors. It reveals that many active funds have outperformed their benchmarks over the past two decades, particularly in sectors like emerging markets and small-cap stocks. Nonetheless, the study underscores the crucial role of fees in determining the performance of active funds. It demonstrates that active funds with the lowest fees are likely to outperform their benchmarks. The article highlights the significance of this finding, especially in the current environment where low interest rates pose challenges for active managers to generate returns.

In summary, the article advises investors to carefully consider the fees active funds charge when making investment decisions. It also suggests that the study's findings have implications for the ongoing debate surrounding the value of active versus passive investment strategies.

3.4 Asset Pricing

3.4.1 The Capital Asset Pricing Model

Markowitz's portfolio selection model is a fundamental contribution to asset pricing theory (Markowitz, 1952). It assumes that investors seek to minimize the variance of portfolio returns while maximizing expected return, leading to the development of the mean-variance model and the efficient frontier concept.

The Capital Asset Pricing Model (CAPM), formulated by William Sharpe and John Lintner (Fama & French, 2004), builds upon the mean-variance model.

CAPM introduces two key assumptions: 1) individuals have access to risk-free borrowing and lending, and 2) investors share a consensus on the joint distribution of asset returns based on market equilibrium at a previous time. CAPM establishes a positive relationship between expected return and risk, implying that higher expected returns necessitate accepting higher levels of risk. Moreover, the model suggests that mutual funds with identical betas should exhibit higher expected returns if they charge lower fees. Thus, the theory proposes a negative association between mutual fund fees and performance.

3.4.2 Fama-French Factor Models

Fama and French (1996) made significant contributions to the asset pricing model by expanding it to include two-factor models: the three-factor and the five-factor model. The three-factor model incorporates size and value factors, which capture the relationship between return and company size and return and price ratios (Fama & French, 2015). The five-factor model goes even further by incorporating profitability and investment factors. These models reveal that value stocks tend to outperform growth stocks, and small-cap stocks tend to outperform large-cap stocks.

However, the three-factor model has faced criticism for not fully accounting for other sources of variation in average returns, which led to the inclusion of the two additional factors. The Fama-French Factor Models provide a framework for examining the impact of factors on mutual fund returns, particularly those with value and size biases. However, it is important to acknowledge that other factors, such as fund management, can still influence mutual fund performance, and the Fama-French Factor Models do not capture these factors.

3.5 Henriksson-Merton Market Timing Model

A money manager's ability to generate returns largely depends on the timing of entering or exiting securities. The Henriksson-Merton Market Timing Model (1981), developed by Merton and Henriksson, is a financial model used to assess the market timing skills of a mutual fund or portfolio manager. This model employs regression analysis to compare the portfolio's returns with a benchmark

index, evaluating the manager's timing abilities based on the relationship between the portfolio's excess returns and the market's excess returns. The model assumes a positive correlation between the two, indicating effective market timing. It also considers the portfolio's risk-adjusted returns using beta.

The Henriksson-Merton Market Timing Model provides valuable insights into a manager's market timing abilities and risk management. However, it is important to recognize the model's limitations. Firstly, the model relies on the Capital Asset Pricing Model (Henriksson & Merton, 1981), and limitations associated with this underlying model, such as assumptions of market efficiency, are also applicable to the market timing model. Furthermore, the model assumes managers can freely trade without market imperfections, such as transaction costs and liquidity constraints. These factors play a significant role when trading large quantities of funds under management. Lastly, the model does not account for non-market factors, such as macroeconomic variables and sector-specific trends, which can influence investment decisions for the funds. Therefore, the model should be used in conjunction with other evaluation methods, such as the Fama French Factor Models, to obtain a comprehensive understanding of a fund's performance.

4.0 Research Design

Based on previous research, a general consensus is that funds with higher management fees do not typically yield higher returns. However, recent studies have uncovered that active funds with lower fees have the potential to outperform their benchmarks, especially during periods of financial turmoil when generating returns becomes more challenging.

In this study, our objective is to examine whether expensive active managers outperform their benchmarks. Additionally, we will explore whether the financial climate influences the performance of money managers, specifically investigating if active mutual funds can surpass their benchmarks during financial crises like the global financial crisis or the unforeseen impact of the COVID-19 pandemic. Ultimately, this paper aims to identify the optimal investment strategy for mitigating risks in volatile markets.

4.1 Research Questions

Based on prior research, we aim to address the following questions:

1. Is there a positive correlation between the performance of mutual funds and their fee levels?

2. Can actively managed funds provide stability to investors during financial turmoil?

4.2 Testable Hypothesis

To answer the research questions defined above, we have identified the following testable hypothesis:

4.2.1 Hypothesis I

H_0: There is no positive relationship between mutual funds and their fee levels.

H_1: There is a positive relationship between mutual funds and their fee levels.

4.2.2 Hypothesis II

H_0: Actively managed mutual funds do not outperform passively managed index funds during financial turmoil.

H_1: Actively managed mutual funds outperform passively managed index funds during financial turmoil.

5.0 Research Methodology

In this section, we describe the financial models utilized to address the research questions. The relevant theoretical framework was discussed in sections 3.4 and 3.5. The models presented in this chapter include the Capital Asset Pricing Model (CAPM) and Jensen's Alpha, the Fama-French Three-Factor and Five-Factor models, and the Henriksson-Merton Market Timing Model.

5.1 Model Selection

5.1.1 Jensen's Alpha and Capital Asset Pricing Model (CAPM)

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \varepsilon$$

Where,

- R_i is the return on asset *i*
- R_f is the risk-free rate
- R_m is the return on the market portfolio
- β_i is the systematic risk of asset *i*
- α_i is the risk-adjusted performance measure of an asset.

5.1.2 Fama-French Three-Factor Model

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \beta_{i,2}SMB + \beta_{i,3}HML + \varepsilon$$

Where,

- R_i is the return on asset *i*
- R_f is the risk-free rate
- R_m is the return on the market portfolio
- β_i is the systematic risk of asset *i*
- α_i is the risk-adjusted performance measure of an asset.
- SMB is the size premium
- HML is the value premium

5.1.3 Fama-French Five-Factor Model

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \beta_{i,2}SMB + \beta_{i,3}HML + \beta_{i,4}RMW + \beta_{i,5}CMA + \varepsilon$$

Where,

- R_i is the return on asset *i*
- R_f is the risk-free rate

- R_m is the return on the market portfolio
- β_i is the systematic risk of asset *i*
- α_i is the risk-adjusted performance measure of an asset.
- SMB is the size premium
- HML is the value premium
- RMW is the profitability premium/factor
- CMA is the investment premium/factor

5.1.4 Henriksson-Merton Market Timing Model

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + y_i(R_m - R_f)D + \varepsilon$$

Where,

- D is a dummy variable that equals 1 when $R_m > R_f$ and zero otherwise
- y_i is the market timing ability

5.2 Dealing with Sub-periods

We conduct two regression analysis for each of the models described in this chapter. Firstly, we perform the regression on the full sample period from 2002 to 2022. Secondly, we introduce three sub-periods as dummy variables to investigate the potential impact of active fund managers on investor stability during periods of financial turmoil. These sub-periods, which represent market instability, are described in detail in Chapter 6.1. The dummy variables are assigned a value of 1 during the corresponding sub-periods and 0 otherwise.

5.3 Model Diagnostics

We will conduct an ordinary least squares regression (OLS) analysis using cross-sectional time series data to test our hypothesis. Linear regression is a valuable tool for investigating the relationship between mutual funds' performance and their fees while accounting for other factors that can impact performance, such as size, value, momentum, and volatility. In order to avoid spurious regressions, we

will also conduct a validity test for linear regression, which involves assessing the fulfillment of the five classical OLS assumptions:

1. Linearity: The relationship between the dependent and independent variables should be linear.

2. Independence: The errors (the differences between the actual and predicted values) should be independent of each other.

3. Homoscedasticity: The variance of the errors should be constant for all values of the independent variables.

4. Normality: The errors should be normally distributed, with a zero mean.

5. No multicollinearity: There should be no high correlation between the independent variables.

Failure to meet these assumptions can lead to biased and inefficient OLS estimates, potentially resulting in incorrect conclusions. Therefore, before conducting OLS regression, we examine violations of these assumptions. We employ the White and Breusch-Godfrey tests to identify potential heteroskedasticity and serial correlations in our data. Additionally, we assess the normality assumption using the Jarque-Bera test. The results of these tests are presented in Table A.2.1, A.3.1 & A.4.1 in the appendix section 3.

To address any identified heteroskedasticity and serial correlations, we utilize the Newey-West (1987) procedures to correct the affected regression models. It is important to note that our regression analysis does not exhibit normality, which can impact the validity of statistical tests. However, we can rely on the principles of the central limit theorem and the law of large numbers. These principles state that, under certain conditions, the distribution of the sum of a large sample size will approximate a normal distribution regardless of the underlying distribution

(Ganti, 2023). Given that our sample size is assumed to be sufficiently large, we can expect the statistical inferences to be reliable and accurate.

6.0 Data

6.1 Data Collection

6.1.1 Fund Selection

When constructing our research portfolio, we limit the funds to domestic U.S. equity, excluding such asset classes as global equity or fixed income. We want to concentrate primarily on a single economy to avoid any potential local bias. By focusing on the United States mutual funds, we can take advantage of the size of the financial market, particularly the substantial market for mutual funds. The U.S. stock market also has a significant impact on the European stock market, with over 50% of developments in the U.S. market being reflected in euro area stock prices (Lozada, 2005).

We gather financial data from various sources, including Morningstar Direct and Professor Kenneth R. French's online data library[1]. Morningstar Direct offers extensive information on open-ended mutual funds, including monthly returns. The dataset used in our analysis consists of 806 open-ended United States funds that have been assigned a fee rating in Morningstar, along with their corresponding returns, cash flows, and fee levels. We categorize these funds into four groups based on their fee levels, which are discussed in detail in section 6.2.

Following the methodology outlined by Fama and French (2010), we implement several exclusion criteria to ensure the robustness of our analysis. Firstly, funds that do not meet the minimum asset under management (AUM) threshold of $5 million throughout their lifetime are excluded to mitigate the impact of incubation bias, which occurs when pre-release returns are incorporated into mutual fund databases upon the fund's public launch. These returns typically exhibit positive performance, introducing an upward bias in historical returns. Similarly, to align with Fama and French (2010), only funds with a minimum of 5 years of activity

[1] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

(60 months of returns) are included to avoid a substantial number of funds with limited return history.

Fixed-income securities like ETFs are also excluded from the sample. To prevent the inclusion of passively managed funds that may be mistakenly labeled as actively managed, any fund with a name variation containing the term "index" is excluded. We manually evaluate each questionable fund to determine its investment strategy. Any funds exhibiting anomalies in their return patterns are eliminated from the sample. Lastly, only the primary fund is retained if a fund appears multiple times under different share classes, such as A/B or I/II. This is done to avoid double counting, as some funds will have the same rating, despite being in separate share classes. (Kinnel, 2019).

6.1.2 Time Period

The sample period for this study spans from 01.01.2002 to 31.12.2022. This gives us 240 months of data that cover over two decades and provides a comprehensive view of various economic and financial conditions. It allows for a thorough analysis of mutual fund performance across different market environments, including bullish and bearish markets, periods of economic expansion and contraction, and different business cycle stages.

To identify significant financial crises in the U.S. stock market, we rely on data from the Federal Reserve Economic Data (FRED) (n.d). This data source lets us determine the dates corresponding to major financial crises. In order to address the research question of whether actively managed mutual funds outperform passively managed index funds during crisis periods, we will construct three distinct sub-periods. These sub-periods capture the financial crisis, the COVID-19 pandemic, and other significant U.S. stock market crashes. The three sub-periods are as follows:

Sub period 1 = 2007-12 → 2009-06	(Global financial crisis)
Sub period 2 = 2015-06 → 2016-06	(Stock market sell-off)
Sub period 3 = 2020-02 → 2020-04	(COVID-19 Pandemic)

The global financial crisis, which originated in 2007, profoundly impacted the global financial system and the real economy. During this period, the S&P 500 experienced a significant decline, losing 51.9% of its value (First Trust, n.d.). Another notable market event occurred between June 2015 and June 2016, known as the stock market sell-off. This period saw a global decline in stock prices, initially triggered by China's market volatility. The sell-off was further fueled by various factors, including falling petroleum prices, the default of Greek debt, a sharp rise in bond yields, and the Brexit vote (Williams, 2023). The Dow Jones Industrial Average in the United States experienced a significant drop of 530.95 basis points on August 21, 2015 (Yahoo Finance, 2015). Furthermore, it is worth examining the impact of the COVID-19 pandemic on the global economy and financial markets. The outbreak of the pandemic in early 2020 caused widespread disruptions across industries, leading to a global economic downturn. Stock markets experienced heightened volatility and uncertainty. The effect of the pandemic was most prominent in the financial markets during the first three months, and we therefore limit the analysis to this period. These events underscore the interconnectedness of the global financial system and how economic and geopolitical factors can significantly affect stock markets and investor sentiment.

6.1.3 Market Benchmarks

The objective of this study is to evaluate the performance of U.S. mutual funds collectively. Instead of using each fund's individual benchmark, we employ a market proxy due to the nature of this analysis. Typically, regional or global stock market indices are utilized as proxies for the market portfolio. Given our specific focus on investments in the U.S. equity market, we initially tested the publicly available S&P 500 index obtained from Morningstar Direct. During the process of testing for outliers and examining each fund's individual benchmark, we found that the S&P 500 is not suitable as a benchmark for most of the funds in our portfolio. One possible explanation for this is that the S&P 500 primarily comprises large-cap organizations, resulting in a bias towards large-cap stocks.

Fama and French (1992, 1993) proposed an alternative approach to address this bias. They suggested replacing the S&P 500 with a value-weighted portfolio of all common stocks listed on NYSE, AMEX, and NASDAQ. This expanded stock universe helps mitigate the large-cap bias by including a wider range of stocks. Compared to proxies based on single indexes, this portfolio provides a more unbiased representation of the market portfolio. Since the true market portfolio is not directly observable, we have chosen to adopt the Fama and French market portfolio proxy for this study.

	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4
Average return	0.625%	0.615%	0.635%	0.634%

Table 1: Return of the four portfolios

The table displays the average monthly return for the respective portfolios.

Graph 1: Cumulative return of the four portfolios

The graph depicts the cumulative return for the four different equally weighted portfolios.

The graph provides a clear visual representation of the remarkably similar cumulative return patterns observed in the four portfolios. From 2002 to 2011, the portfolios exhibited a generally aligned trajectory with minor fluctuations. However, slight differences in cumulative returns become apparent during and after the financial crisis, and a more distinct separation emerges between the low-fee funds and those with higher fees.

	Average	Std.dev	Min	Max	Median
Portfolio	0.722%	4.654%	-18.594%	13.670%	1.255%
Market	0.768%	4.483%	-17.150%	13.650%	1.290%

Table 2: Descriptive statistics for the full sample portfolio and the market

The table exhibits descriptive statistics, such as the average, standard deviation, minimum, maximum, and median returns for the portfolio consisting of all funds and the proxy for the market portfolio.

Graph 2: Cumulative of the market portfolio and the full sample portfolio.

The graph displays a plot of the cumulative return of the proxy for the market portfolio, designed by Fama and French, and an equally weighted portfolio of all the funds in our dataset.

The graph provides a visual representation of the comparative performance between an equally weighted portfolio of the funds in our sample and the proxy

for the market portfolio over a 20-year time period. Notably, the returns of the portfolio and the market portfolio exhibit a close linkage, moving almost identically. As depicted in the graph, the market portfolio's return surpasses the funds. It is worth highlighting that at the onset of the financial crisis, both the portfolio and the market portfolio exhibit a convergence of cumulative returns.

6.1.4 Fama-French Factors and Risk-free Rate

We initiate our analysis by conducting the CAPM model, which requires data on the excess returns of the market portfolio over the 1-month risk-free rate. Subsequently, we proceed to the Fama-French Three-Factor model, which requires additional data on the small minus big (SMB) and high minus low (HML) factors. Lastly, we employ the Fama-French Five-Factor model, which calls for data on the profitability (RMW) and investment (CMA) factors. All the requisite data for these models were sourced from the online data library of Professor Kenneth R. French (French, n.d.).

6.1.5 Survivorship and Incubation Bias

Survivorship bias arises when only the performance of existing funds in the market is considered, without considering those that have been liquidated (Chen et al., 2021). Funds that underperform or have a low market value may be liquidated, leading to a biased sample of only successful funds. This bias can result in an overestimation of performance, highlighting the importance of including surviving and non-surviving funds in the sample to obtain unbiased results. To mitigate survivorship bias, it is crucial to incorporate a broader range of funds and ensure that the sample is not skewed towards successful funds. Therefore, the dataset includes funds that are no longer active today, as long as they offered a return at some point between 2002 and 2022 and were active for at least five years.

During the incubation period, funds are subjected to internal testing using fund capital before being made available to the public. Evans (2010) demonstrated that incubated funds tend to exhibit better risk-adjusted performance, which can introduce an upward bias in the performance of the funds in our sample during

their early stages. Additionally, only the top-performing funds are released to the public after the incubation period, potentially biasing the sample upward as poorly performing funds are excluded. It is important to acknowledge that this study solely examines publicly available funds and does not account for the possibility of funds not surviving the incubation period.

6.2 Portfolio Construction

6.2.1 Portfolio Fee Levels

We apply the Morningstar Fee Level Methodology to construct portfolios with different fee levels. This methodology serves as a framework for assessing the cost of investing in a mutual fund relative to similar funds and involves comparing a fund's expense ratio to the expense ratios of other funds within the same category. We categorize the funds based on their investment objective and holdings to form the portfolios. Morningstar calculates the average expense ratio of all funds within each category, known as the "category norm." (Morningstar, 2017). Next, we assign each fund to one of five fee level groups based on how its expense ratio compares to the category norm. These five fee levels are:

Range	Quintile	Category
0 < Percentile Rank <= 20	1	Low
20 < Percentile Rank <= 40	2	Below Average
40 < Percentile Rank <= 60	3	Average
60 < Percentile Rank <= 80	4	Above Average
80 < Percentile Rank <= 100	5	High

A fund with an expense ratio lower than the category norm is classified as having a low fee level, whereas a fund with an expense ratio higher than the category norm is categorized as having a high fee level. Morningstar's fee level assessment also considers a fund's performance and other relevant factors.

Upon completing the data cleansing process, we refined our sample to include only four funds categorized as "Low." As a result, we merged the "Low" and "Below Average" categories into a single category.

7.0 Results and Analysis

7. 1 Asset Pricing Models

7.1.1 Capital Asset Pricing Model

Table 3 and 4 illustrate the Capital Asset Pricing Model (CAPM) regression results for all five portfolios across four sample periods.

2002-2022	Alpha	Mkt-rf
Below Average/Low	-0.632***	0.942***
Average	-0.655***	0.977***
Above Average	-0.709***	1.004***
High	-0.749***	1.022***
All	-0.695***	0.995***

Table 3: CAPM regression for all portfolios on the full sample period

The table presents the result of the Capital Asset Pricing Model (CAPM) regression for the four portfolios of U.S. mutual funds categorized as High, Above Average, Average, Below Average/Low as well as the full portfolio for the full period 2002 - 2022. The dependent variable in the regression is the excess return of each portfolio, which is calculated as the return of each fund minus the risk-free rate. The regression results are reported with coefficients and their corresponding significance codes. The table displays the intercept (alpha), the slope coefficient for the explanatory variable Mkt-rf (Market premium). The estimation method used is Ordinary Least Squares (OLS), and the standard errors have been adjusted for heteroscedasticity and autocorrelation using the Newey and West [1987] method.

	Estimate	t-value
Below Average/Low		
Alpha	-1.091***	-7.346
Mkt-rf	0.996***	23.089
2007-2009	3.401***	3.956
2015-2006	0.918	1.436
2022	8.290***	4.560
Average		
Alpha	-1.119***	-15.717
Mkt-rf	1.032***	47.387
2007-2009	3.500***	8.611
2015-2006	0.891**	3.086
2022	8.511***	8.133
Above Average		
Alpha	-1.190***	-25.294
Mkt-rf	1.061***	74.703
2007-2009	3.642***	13.093
2015-2006	0.947***	5.391
2022	8.921***	13.556
High		
Alpha	-1.234***	-11.117
Mkt-rf	1.080***	33.102

2007-2009	3.718***	5.377
2015-2006	0.984*	2.327
2022	8.695***	6.797
All		
Alpha	-1.171***	-32.269
Mkt-rf	1.052***	95.963
2007-2009	3.599***	16.955
2015-2006	0.933***	6.697
2022	8.763***	17.319

Table 4: CAPM regression with sub-periods

The table presents the result of the Capital Asset Pricing Model (CAPM) regression for the four portfolios of U.S. mutual funds categorized as High, Above Average, Average, Below Average/Low as well as the full portfolio. We now introduce three dummy variables for each sub-period and report their corresponding coefficients and significance codes.

In the full period, all alpha values are negative and statistically significant at all significance levels, indicating that all portfolios underperformed their expected CAPM returns during this period. While there are no statistical differences between the portfolios, it is worth noting that the Below Average/Low portfolio, which has the lowest fees, exhibits the highest alpha, while the High portfolio, characterized by the highest fees, displays the lowest alpha.

However, when we examine the results from the global financial crisis (2007-2009), we observe that the alpha increased by 3.4 to 3.7 units for each portfolio. As a result, all portfolio alphas are now positive, indicating that they outperformed the market portfolio during this period of high instability. Additionally, the alphas are significantly different from zero at all levels of significance for all portfolios. In contrast to the full period, the High and Above

Average portfolios demonstrate the highest increase in alphas, while the Below Average/Low portfolio now exhibits the lowest alpha. Therefore, we can conclude that all portfolios outperformed the market during the financial crisis at all levels, with higher fee funds outperforming lower fee funds.

Similar to the financial crisis, the sample period 2015-2016 analysis, characterized by the stock market sell-off, reveals positive alphas for all five portfolios. However, the increase in alphas compared to the full period is substantially lower than during the financial crisis. The full sample portfolio and the Above Average portfolios show alphas that are significantly different from zero across all levels of significance. The High portfolio is significant at the 5% level, and the Average portfolio is significant at the 1% level, while the Below Average/Low portfolio is not statistically significant. Therefore, we can conclude that all portfolios, except for the low fee portfolio, outperformed the market during the stock market sell-off. Furthermore, the portfolios with the highest fees also demonstrate the highest abnormal returns during this period.

The smallest sample, containing only the year 2020, which witnessed significant economic repercussions due to the global COVID-19 pandemic, also exhibits a similar trend with all positive alphas and a substantial increase compared to the full period. Similarly, the Below Average/Low category displays the lowest alpha, while the high fee portfolios, Above Average and High, have the highest alphas. Furthermore, all alphas demonstrate statistical significance across all levels of significance. This implies that all five portfolios outperformed the market performance, leading us to conclude that the actively managed funds performed better than the market during this period. Additionally, we can infer that the higher fee portfolios outperformed the low fee portfolios.

7.1.2 Fama-French Three-Factor Model

Table 5 and 6 present the results of regressing the five portfolios on the Fama-French Three-Factor Model, which includes the variables Mkt-rf (market premium), HML (value premium), and SMB (size premium). Similar to the CAPM regression, we observe consistent findings across each period.

2002-2022	Alpha	Mkt-rf	SMB	HML
Below Average/Low	-0.636***	0.957***	-0.017	-0.113.
Average	-0.661***	0.985***	0.021	-0.111***
Above Average	-0.714***	0.995***	0.095***	-0.073***
High	-0.753***	1.021***	0.047	-0.070
All	-0.701***	0.992***	0.066***	-0.084***

Table 5: Three-factor regression for all portfolios on the full sample period

The table presents the result of the Fama French Three-Factor regression for the four portfolios of U.S. mutual funds categorized as High, Above Average, Average, Below Average/Low, as well as the full portfolio for the full period 2002 - 2022. The dependent variable in the regression is the excess return of each portfolio, which is calculated as the return of each fund minus the risk-free rate. The regression results are reported with coefficients and their corresponding significance codes. The table displays the intercept (alpha), and the slope for the explanatory variables: Mkt-rf (Market premium), SMB (Size premium), and HML (Value premium). The estimation method used is Ordinary Least Squares (OLS), and the standard errors have been adjusted for heteroscedasticity and autocorrelation using the Newey and West [1987] method.

	Estimate	t-value
Below Average/Low		
Alpha	-1.090***	-7.315
Mkt-rf	1.012***	23.282
SMB	-0.066	-0.980
HML	-0.043	-0.688
2007-2009	3.447***	3.971

2015-2006	0.881	1.399
2022	8.031***	4.218
Average		
Alpha	-1.117***	-15.627
Mkt-rf	1.041***	47.581
SMB	-0.029	-0.906
HML	-0.043	-1.380
2007-2009	3.511***	8.558
2015-2006	0.868**	3.021
2022	8.251***	7.559
Above Average		
Alpha	-1.188***	-25.190
Mkt-rf	1.052***	73.332
SMB	0.047*	2.212
HML	0.007	0.359
2007-2009	3.598***	12.747
2015-2006	0.967***	5.411
2022	8.960***	13.051
High		
Alpha	-1.235***	-11.087
Mkt-rf	1.078***	32.695
SMB	0.001	0.014

HML	0.016	0.0371
2007-2009	3.725***	5.317
2015-2006	0.988*	2.323
2022	8.796***	6.559
All		
Alpha	-1.169***	-32.132
Mkt-rf	1.049***	94.821
SMB	0.018	1.119
HML	-0.006	-0.425
2007-2009	3.578***	16.638
2015-2006	0.939***	6.673
2022	8.722***	16.520

Table 6: Three-Factor regression with sub-periods

The table presents the result of the Fama French Three-Factor regression for the four portfolios of U.S. mutual funds categorized as High, Above Average, Average, Below Average/Low as well as the full portfolio. We now introduce three dummy variables for each sub-period and report their corresponding coefficients and significance codes.

In the full period, the portfolio with the lowest fees exhibits the highest alpha, while the high-fee portfolios display lower alphas. Furthermore, by testing the difference between the alphas (presented in Appendix 1), we find that the High and Low portfolios show statistically significant differences. However, during the financial turmoil of the financial crisis and the COVID-19 period, there was a notable shift in performance. The portfolios with the highest fees, which previously experienced significant underperformance in the full period, now outperform during these periods of financial instability. We also note a noticeable

increase in alphas during the stock-market sell-off, although the increase is less significant than during the financial crisis and COVID-19. Compared to the full period, we observe a significant change in the alphas across all portfolios. In contrast to the full period, the alphas are now positive for all portfolios, indicating that all portfolios underperformed the market in the long run but outperformed during financial instability.

When comparing the alphas derived from the Fama-French Three-Factor regression to those obtained from the CAPM regression, it becomes apparent that the former generally yields slightly higher alpha values in absolute terms. For the full period, SMB (size premium) is significant for the full and Above Average portfolios. In contrast, HML (value premium) is significant for the full, Above Average, and Average portfolios. This indicates that the inclusion of these additional variables has contributed to the enhanced explanatory power of the model.

Similar to the CAPM regression, all alphas in the full period significantly differ from zero across all significance levels. Additionally, the statistical significance of the dummy coefficients associated with both the financial crisis and COVID-19 indicates that these events had a significant impact on the performance of the funds. In the sample period characterized by the stock market sell-off, the alphas for the full period and the Above Average portfolios are significantly different from zero at all levels of significance. The High portfolio's alpha is statistically significant at the 5% level, while the Average portfolio's alpha is statistically significant at the 1% level. As a result, we can conclude that all five portfolios underperformed the market during the full period and outperformed it during financial instability in 2007-2009 and 2022. Furthermore, similar to the CAPM regression, we can infer that the portfolios with higher fees outperformed the low fee portfolios in generating abnormal returns during the crisis periods.

7.1.3 Fama-French Five-Factor Model

Table 7 and 8 present the results of the Fama-French Five-Factor regression for all five portfolios across four sample periods. The Fama-French Five-Factor model expands on the Fama-French Three-Factor model by incorporating two additional

factors: RMW (the return spread between the most profitable and least profitable firms) and CMA (the return spread between firms with conservative and aggressive investment strategies).

2002-2022	Alpha	Mkt-rf	SMB	HML	RMW	CMA
Below Average/Low	-0.811***	0.962***	-0.019	-0.108	-0.003	1.700.
Average	-0.832***	0.987***	0.018	-0.096*	-0.054	1.788***
Above Average	-0.894***	0.997***	0.092***	-0.071**	-0.050	1.949***
High	-0.939***	1.024***	0.042	-0.060	-0.046	2.057**
All	-0.879***	0.994***	0.064***	-0.077***	-0.049	1.906***

Table 7: Five-factor regression for all portfolios on the full sample period

The table presents the result of the Fama French Five-Factor regression for the four portfolios of U.S. mutual funds categorized as High, Above Average, Average, Below Average/Low, as well as the full portfolio for the full period 2002 - 2022. The dependent variable in the regression is the excess return of each portfolio, which is calculated as the return of each fund minus the risk free rate. The regression results are reported with coefficients and their corresponding significance codes. The table displays the intercept (alpha), and the slope for the explanatory variables: Mkt-rf (Market premium), SMB (Size premium), HML (Value premium), RMW (Profitability factor), CMA (Investment factor), and the standard errors have been adjusted for heteroscedasticity and autocorrelation using the Newey and West [1987] method.

	Estimate	t-value
Below Average/Low		
Alpha	-1.340***	-6.730
Mkt-rf	1.020***	23.797

SMB	-0.065	-0.981
HML	-0.031	-0.390
RMW	0.000	0.003
CMA	2.285*	2.365
2007-2009	3.490***	4.010
2015-2006	1.111.	1.724
2022	8.094***	4.151
Average		
Alpha	-1.360***	-14.466
Mkt-rf	1.046***	48.411
SMB	-0.028	-0.883
HML	-0.020	-0.518
RMW	-0.049	-0.837
CMA	2.368***	5.091
2007-2009	3.535***	8.558
2015-2006	1.108***	3.753
2022	8.376***	7.519
Above Average		
Alpha	-1.441***	-23.633
Mkt-rf	1.055***	74.151
SMB	0.0493*	2.367
HML	0.021	0.852

RMW	-0.060	-1.569
CMA	2.555***	8.006
2007-2009	3.602***	12.637
2015-2006	1.218***	6.635
2022	9.125***	13.038
High		
Alpha	-1.497***	-10.424
Mkt-rf	1.081***	32.935
SMB	0.002	0.045
HML	0.042	0.751
RMW	-0.066	-0.760
CMA	2.705***	3.471
2007-2009	3.726***	5.267
2015-2006	1.247**	2.851
2022	8.958***	6.494
All		
Alpha	-1.421***	-30.054
Mkt-rf	1.052***	96.043
SMB	0.020**	1.262
HML	0.011	0.573
RMW	-0.055.	-1.882
CMA	2.588***	10.266

2007-2009	3.588***	16.538
2015-2006	1.187***	8.214
2022	8.872***	16.487

Table 8: Five-Factor regression with sub-periods

The table presents the result of the Fama French Five-Factor regression for the four portfolios of U.S. mutual funds categorized as High, Above Average, Average, Below Average/Low, as well as the full portfolio. We now introduce three dummy variables for each sub-period and report their corresponding coefficients and significance codes.

Looking at the model results, we observe a consistent pattern in the CAPM regression and the Fama-French Three factor model, with all portfolios underperforming the market in the long term and outperforming during financial turmoil. Although there is no statistical difference between the portfolios for the full period, the low-fee portfolios outperform the high-fee portfolios. The opposite is true for the financial crisis, stock market sell-off, and COVID-19, where the higher fee portfolios generate higher abnormal returns than the low fee portfolios. All the portfolio alphas are statistically significant for all significance levels in the full period, financial crisis, and COVID-19. All alphas are statistically significant from zero at the 10% level for the stock market sell-off.

By incorporating the two additional factors, RMW and CMA, into the model, we observe a significant increase in the absolute values of the alphas during the full period compared to the Fama-French Three-Factor model. Specifically, we find that CMA exhibits statistical significance at the 5% level for all portfolios, indicating that the inclusion of the return spread between firms with conservative and aggressive investment strategies enhances the model's explanatory power.

7. 2 Market Timing Ability

7.2.1 Henriksson-Merton Market Timing Model

To evaluate the market timing abilities of the mutual funds, we utilize the Henriksson-Merton (1981) model. The results are presented in Table 9. Across all

periods, we consistently observe positive market timing abilities for all five portfolios, except during the financial crisis, where negative market timing abilities ranging from -0.137 to -0.191 are observed. However, it is important to note that the market timing ability coefficients during this period display low significance.

	Alpha	Mkt-rf	Market timing
2002-2022			
Below Average/Low	-2.242***	0.511***	0.906***
Average	-2.340***	0.521***	0.957***
Above Average	-2.450***	0.529***	0.990***
High	-2.509***	0.542***	0.998***
All	-2.417***	0.527***	0.978***
2007-2009			
Below Average/Low	2.103*	0.723***	-0.191
Average	1.989***	0.711***	-0.142
Above Average	2.162***	0.740***	-0.196.
High	2.007*	0.722***	-0.137
All	2.094***	0.728***	-0.175*
2015-2016			
Below Average/Low	-1.355	0.501.	0.807.
Average	-1.462**	0.518***	0.842***
Above Average	-1.568***	0.476***	0.905***
High	-1.621*	0.453*	0.944**

All	-1.542***	0.483***	0.892***
2020			
Below Average/Low	-6.761***	0.014	2.502**
Average	-6.190***	0.145.	2.474***
Above Average	-4.643***	0.315***	2.294***
High	-6.516***	0.126	2.522***
All	-5.308***	0.241***	2.371***

Table 9: Henriksson-Merton market timing model with sub-periods

The table presents the result of the CAPM regression and the Henriksson-Merton market timing model for the four portfolios of U.S. mutual funds' categorized as High, Above Average, Average, Below Average/Low, as well as the full portfolio. The analysis covers the entire period as well as three sub-periods. The dependent variable in the regression is the excess return of each portfolio, which is calculated as the return of each fund minus the risk free rate. The regression results are reported with coefficients and their corresponding significance codes. The table displays the intercept, alpha, and slope coefficient for the explanatory variable Mkt-rf (Market premium) and a measure of the market timing factor, which is a dummy variable that equals 1 when the market gives a higher return than the risk-free rate, RMt > RFt, and zero otherwise, RMt < RFt. The standard errors have been adjusted for heteroscedasticity and autocorrelation using the Newey and West [1987] method.

Interestingly, the High portfolio, comprising funds with higher fees, consistently demonstrates the highest market timing abilities across all sub-periods. This suggests that managers charging higher fees outperform the market timing abilities of their counterparts charging lower fees. Conversely, the Below Average/Low portfolio consistently exhibits the lowest market timing ability in all sub-periods except for 2020.

Most market timing ability coefficients are statistically significant at all significance levels for the sub-periods of 2002-2022, 2015-2016, and 2020. This leads us to conclude that actively managed mutual funds in the U.S. exhibit signs of market timing ability during these specific periods. This finding diverges from the conclusions drawn by Henriksson and Merton (1981) and Bollen and Busse (2005), who found no evidence of market timing in monthly data.

7. 3 Discussion

For the full period from 2002 to 2022, all the models employed consistently show negative alphas for all five portfolios. This indicates that actively managed mutual funds underperform the market regardless of their fee level. Furthermore, although there is little statistical difference between the portfolios, funds with higher fees tend to underperform compared to those with lower fees. However, these findings change when we examine periods of financial turmoil. During financial instability, positive alphas are observed for all five portfolios, suggesting that actively managed mutual funds outperform the market in such periods. Contrary to the full period, funds with the highest fees outperform those with low fees across all three sub-periods. Additionally, the funds with higher fees demonstrate higher market timing abilities throughout all the sub-periods and the full period.

The regression results exhibit high statistical significance for the full period, financial crisis, and COVID-19. However, the results for the stock market sell-off sample period are less significant. It is important to note that the stock market sell-off period is considerably shorter, consisting of only 12 months of data, which may impact the robustness of the analysis. Moreover, unlike the financial crisis, the stock market sell-off is characterized by a series of downturns in the stock market rather than an economic recession. Additionally, a notable observation is a substantially higher increase in alphas during COVID-19 compared to the financial crisis and the stock market sell-off. This discrepancy could be influenced by the length of the period, as the analysis is based on only three months of data.

It is also important to acknowledge the limitations of our research. Firstly, we did not consider the inflow and outflow of capital into the funds, which could impact their returns. Secondly, our application of the Morningstar Fee Level Methodology did not account for portfolio rebalancing to accommodate changes in fund fee levels within the portfolios. Additionally, our study focused solely on monthly returns, possibly overlooking the fund managers' abilities to time the market and generate abnormal returns by capitalizing on short-term market events.

In summary, our research has discovered that actively managed funds tend to underperform in the long term. However, investing in these funds can benefit investors during periods of financial instability. Additionally, we found that paying a higher fee for a mutual fund can be advantageous in such times. Therefore, if you are a short-term investor or seeking to minimize risk in unstable markets, our results suggest that paying a higher fee can be worthwhile. On the other hand, it is more advantageous for long-term investors to invest in passive funds with low fees that track the market index. While our analysis primarily focuses on the U.S. Mutual Fund market, its size and impact on the world economy makes it reasonable to expect that the results may apply to some extent in other markets as well. This is because over 50% of US market developments are reflected in euro area stock prices (Lozada, 2005). However, it is important to note that different stock markets have distinct regulatory environments, which will impact the performance of mutual funds.

8.0 Conclusion

The above analysis addresses two key questions: 1) Whether there is a positive relationship between mutual fund performance and the size of their fees, and 2) Whether actively managed funds can offer stability to investors during financial turmoil. Based on the results discussed above, the following conclusions can be drawn:

1. There is no consistent positive relationship between mutual funds' performance and the size of their fees over time

Based on our results, we cannot observe a significant relationship between the fees charged by mutual funds and their performance over time. However, while we found little significant difference between the portfolios when considering the full sample period of 20 years, it is worth noting that portfolios with lower fees outperformed those with higher fees, despite the latter demonstrating higher market-timing abilities. This suggests a negative relationship between mutual funds' performance and their fees. Additionally, our study confirms the findings of previous research conducted by among others Fama (1970) and Sharpe (1991), indicating that actively managed funds tend to generate lower returns compared to the market. These results support their proposition that active management does not provide additional value in investment management.

2. Higher-fee active managers outperform lower-cost counterparts and provide stability during financial turmoil

Upon examining the results during periods of financial turmoil, particularly evident in the financial crisis of 2007-2009 and the COVID-19 pandemic, it becomes apparent that active managers not only provide stability to their investors by outperforming the market but also outperform their lower-cost counterparts, indicating a correlation between higher fees and superior performance during financial turmoil. These findings consistently hold true across all sub-periods of financial instability, with greater significance observed during the financial crisis and COVID-19. Additionally, the study reveals a substantial increase in the alphas of actively managed funds during these periods, particularly evident in the COVID-19 crisis. During this period, actively managed funds also demonstrated significantly higher market-timing abilities compared to the full sample period. These results align with previous research conducted by Sun, Wang, and Zheng (2009), who found that the most active funds outperformed the least active ones by 4.5 percent to 6.1 percent annually, considering risk and fees, during market downturns, with the opposite trend during market upturns. This perspective is also supported by Glode (2011), who suggests that investors are willing to pay a premium for financial stability during market downturns.

9.0 Comments and Future Research

This research paper provides valuable insights into the U.S. mutual fund market, contributing to the existing body of research and aligning with previous studies. Our analysis reveals that actively managed funds do not consistently outperform the market over a long period. However, our study uncovers that active mutual funds, particularly those with higher management fees, demonstrate outperformance during periods of financial turmoil, such as the global financial crisis. These findings are consistent with the research conducted by Sun, Wang and Zheng (2009) and Moskowitz (2000), who suggest that active managers can generate value when markets experience downturns. Furthermore, our study found that funds charging higher fees exhibit higher market-timing abilities and outperform those charging lower fees during financial instability.

However, it is important to acknowledge the limitations of our research. For future research, conducting a similar analysis using weekly or daily returns would be beneficial. This would allow us to evaluate whether money managers provide added value to investors during volatile markets and accurately assess the impact of costs associated with active managers on their performance. Additionally, it would be advantageous to include more factors that could influence returns, such as the inflow and outflow of capital into the funds, and to rebalance the portfolios after each period to accommodate changes in fund fee levels within the portfolios. Moreover, it would be interesting to expand the analysis to different markets, such as Asia and Europe. This would enable a comparison of mutual fund performance across markets and an investigation into how different regulatory environments affect the relationship between fees and performance.

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Appendices

Appendix 1: Comparison of Alphas for the Full Period

CAPM	Low	Average	Above Average	High
Low				
Average	Do not reject			
Above Average	Do not reject	Do not reject		
High	Do not reject	Do not reject	Do not reject	

Table A.1.1: The table presents the comparison of alphas obtained from the t-tests of the four portfolios of the U.S. Mutual Funds in the full period 2002-2020 under the CAPM regression. The null hypothesis for each test states that the value of the intercept is not significantly different from the comparable one. The alternative hypothesis states that the value of the intercept is significantly different from the comparable one.

FF3	Low	Average	Above Average	High
Low				
Average	Do not reject			
Above Average	Reject**	Do not reject		

High	Do not reject	Reject.	Do not reject	

Table A.1.2: The table presents the comparison of alphas obtained from the t-tests of the four portfolios of the U.S. Mutual Funds in the full period 2002-2020 under the FF3 regression. The null hypothesis for each test states that the value of the intercept is not significantly different from the comparable one. The alternative hypothesis states that the value of the intercept is significantly different from the comparable one.

FF5	Low	Average	Above Average	High
Low				
Average	Do not reject			
Above Average	Do not reject	Do not reject		
High	Do not reject	Do not reject	Do not reject	

Table A.1.3: The table presents the comparison of alphas obtained from the t-tests of the four portfolios of the U.S. Mutual Funds in the full period 2002-2020 under the FF5 regression. The null hypothesis for each test states that the value of the intercept is not significantly different from the comparable one. The alternative hypothesis states that the value of the intercept is significantly different from the comparable one.

Market timing	Low	Average	Above Average	High
Low				
Average	Reject***			
Above Average	Reject.	Reject***		

High	Reject*	Reject***	Do not reject

Table A.1.4: The table presents the comparison of alphas obtained from the t-tests of the four portfolios of the U.S. Mutual Funds in the full period 2002-2020 under the Henriksson-Merton Market Timing Model. The null hypothesis for each test states that the value of the intercept is not significantly different from the comparable one. The alternative hypothesis states that the value of the intercept is significantly different from the comparable one.

Appendix 2: CLRM Assumption 2 - Variance if the Residual is Constant

	Heteroskedasticity
Test stat	141,963.7
Critical stat	18.3
Significance level	0.05
Result	Reject H0

Table A.2.1: The table presents the results from the White's test for heteroscedasticity of the full portfolio using the F-test framework. The null hypothesis is rejected at a 5% significance level, and the second CLRM assumption is violated. We therefore conclude that the residuals are heteroscedastic.

Appendix 3: CLRM Assumption 3 – Autocorrelation

	Autocorrelation
Test stat	148,923.1
Critical stat	18.3
Significance level	0.05
Result	Reject H0

Table A.3.1: The table presents the results from the Breusch-Godfrey test of the full portfolio. The null hypothesis is rejected at a 5% significance level, and the second CLRM assumption is violated. We therefore conclude that the residuals are heteroscedastic.

Appendix 4: CLRM Assumption 5 - Normality

	Normality
Test stat	148,908.1
Critical stat	18.3
Significance level	0.05
Result	Reject H0

Table A.4.1: The table presents the results from the Bera-Jarque for normal distribution in the residual of the full portfolio. The null hypothesis is rejected at a

5% significance level, and the second CLRM assumption is violated. We therefore conclude that the residuals are heteroscedastic.

Appendix 5: Summary statistics

	# of funds	Stdev.	Max	Min	Mean
Below Average/Low	42	4.793%	25.451%	-27.185%	0.625%
Average	202	4.958%	23.796%	-35.476%	0.615%
Above Average	478	5.039%	33.074%	-42.644%	0.635%
High	84	5.193%	25.763%	-31.399%	0.634%
All	806	5.024%	33.074%	-41.644%	0.630%

Table A.5.1: The table represents the number of funds, standard deviations, maximum, minimum, and mean values for the four portfolios and the full sample portfolio.