ACTIVE MANAGEMENT AMIDST ADVERSITY: A COMPARATIVE STUDY OF ACTIVELY MANAGED ETFS AND THE S&P 500 DURING THE COVID-19 MARKET DISRUPTION

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MADRID | Junio 2024

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ABSTRACT

This thesis examines the performance of actively managed ETFs compared to the S&P 500, their primary benchmark index. The analysis includes a detailed assessment of performance during a five-year period and the COVID-19 crisis, distinguishing between the crash and recovery phases. The analysis reveals that the actively managed ETFs underperformed their benchmark by -56,8% over the long term. This underperformance aligns with previous studies indicating that actively managed funds generally do not outperform passively managed benchmark indices in developed markets. However, during the COVID-19 crisis, the actively managed ETFs outperformed their benchmark, declining by only 19.8% compared to the S&P 500's 33.8% drop. This finding supports the hypothesis that actively managed funds perform better during market downturns. Conversely, in the recovery period following the crash, the actively managed ETFs underperformed, suggesting a lack of responsiveness to market upswings. The study concludes that while actively managed ETFs can offer advantages during periods of market distress, they are less effective in long-term and bullish market conditions. Future research should explore the performance of actively managed ETFs in emerging markets and during other financial crises, as well as compare actively managed ETFs with actively managed mutual funds to provide a comprehensive understanding of their relative merits.

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1 INTRODUCTION

1.1 OBJECTIVES OF THE PAPER

This study investigates the performance of actively managed Exchange-Traded Funds (ETFs) in comparison to their passive benchmarks during the COVID-19 pandemic. The analysis focuses on returns, volatility, and costs of actively managed ETFs to evaluate their ability to provide stability in a highly volatile market environment, potentially offering an advantage over passively managed index funds. The market crisis induced by the coronavirus pandemic serves as the assessment period, encompassing both the market crash and subsequent recovery phases.

The research specifically examines actively managed funds benchmarked against the Standard & Poor's 500 Index (S&P 500), comparing their performance to that of the S&P 500. Following the introduction, the study discusses the rising significance and contemporary relevance of actively managed ETFs. The methodology section then outlines the approach for performance measurement of these ETFs and precisely defines the selected time period for analysis. The analysis methodology proceeds with a macro approach, defining the key terms pertinent to this study. This is supplemented by a comprehensive literature review, which examines the prevailing situation and the current state of research on active management in crisis situations, actively managed ETFs, and stock market performance during the COVID-19 pandemic. The literature review culminates in the analysis section, where the performance, volatility, and costs of actively managed ETFs are compared with those of the S&P 500. Following this, the research findings are summarized and contextualized. The results of this study are then compared with the findings from previous research. The paper concludes with a discussion of potential avenues for future research, aiming to build upon the insights gained from this study.

1.2 THE RELEVANCE OF ACTIVELY MANAGED EXCHANGE-TRADED FUNDS

Numerous studies have been conducted in the past to compare actively managed asset classes with passively managed funds. The question of whether actively managed funds are capable of outperforming passively managed portfolios remains controversial. Mainly due to the high management costs, the majority of actively managed funds perform worse than passively managed ETFs in the long term. Fama and French confirm this thesis in a report published in 2010 (Fama & French, 2010). A more recent study conducted by ESMA also highlights that at EU level, only the top 25% of actively managed funds outperform passively managed funds

(Derenzis, 2019). Research indicates that actively managed mutual funds possess the capability to surpass passive benchmarks in performance during periods of market decline (Moskowitz, 2000). Recent research has called this thesis into question. A detailed examination of the performance of actively managed mutual funds during the COVID-19 pandemic revealed that these funds did not succeed in surpassing the returns of passively managed indices (Nelson, 2020). With growing evidence of the underperformance of actively managed mutual funds and a growing number of private investors, investments in passively managed index funds became increasingly popular in recent years. The increasing shift from actively managed funds to passively managed ETFs appears to reflect an aversion to active management. This reluctance is primarily attributed to the high management fees and lack of transparency associated with actively managed mutual funds. A minimum investment volume might be an additional barrier for retail investors to invest in actively managed funds (Singal & Manrai, 2018). However, there is an asset class that intends to combine the advantages of the flexibility of actively managed funds with the moderate management fees and transparency of passively managed ETFs. This asset class, known as actively managed ETFs, represents a relatively recent development within the financial market. Considering the increasing prevalence of actively managed ETFs in recent years, it is evident that actively managed ETFs are emerging as a significant and rapidly developing asset class. While in 2018 there were more than twice as the number of passively managed ETFs as actively managed ETFs launched, 2020 was the first year with more actively than passively managed ETFs being introduced to the market. In the first quarter of 2020, actively managed ETFs experienced a $3 billion inflow of investor money. A significant number, considering the $265 billion loss of investor money from actively managed funds (Tuckwell, 2020). This strong increase in investor money occurred during the coronavirus crisis, which could indicate that investors are considerably more favorable to actively managed ETFs than actively managed mutual funds in periods of crisis. This raises the question if actively managed ETFs can outperform passively managed ETFs in times of crisis. Potentially, this could be achieved through greater flexibility and the choice of assets without compromising on profits due to high management fees.

2 METHODOLOGY

2.1 TIME PERIOD OF THE MEASUREMENT

The methology for measuring the performance of actively managed ETFs is explained below. The methodology investigates actively managed ETFs in terms of performance, volatility and management fees. To establish the duration of the measurement period, the methodology proposed by Blair and Pastor, which spans a 10-week interval, is utilized as the foundational framework (Pastor & Vorsatz, 2020). They define the measurement period as follows. The length and date of the measurement period is the 10-week period between the 20th of February 2020 and 30th of April 2020. The 20th of February 2020 was selected as the starting point due to the S&P 500 achieving a new historic all-time high of $3393.52 on the 19th of February, before crashing significantly. The 30th of April 2020 is taken as the end point, as the S&P 500 reached a relatively stable level again on the 29th April with a one-day peak of USD 2954.86. Furthermore, the market low of 23 March with a daily minimum of USD 2191.86 is therefore situated roughly in the middle of the start and end points (Factset, 2024). Consequently the measurement period is divided into two periods, the crash period (19.02.2020-23.03.2020) and the recovery period (23.03.2020-30.04.2020) (Blair & Pastor, 2020). The chart of the S&P 500 during the period mentioned can be seen in the following illustration. The start, middle and end points are marked in yellow.

Figure 1: Definition of measured period showing the chart of the S&P 500

Source: FactSet S&P 500 Historical Data, 2024

2.2 SELECTION OF ACTIVELY MANAGED EXCHANGE-TRADED FUNDS

In the process of selecting actively managed ETFs, the Bloomberg platform serves as a fundamental tool. Bloomberg's Fund Screening (FSCR) function is used for this purpose. The following criteria are used to find the appropriate list of actively managed ETFS:

1. *Fund Type: ETF*
2. *Fund actively managed = Yes*
3. *Fund Benchmark Primary = S&P 500 Index (SPX)*

A compilation consisting of 545 actively managed ETFs meeting the specified criteria serves as the focal point of investigation in this study. These criteria specifically pertain to ETFs actively managed and aligned with the S&P 500 as their benchmark index. The filter market status = active is not used as this would not include actively managed ETFS that were active at the time of the crisis but were later closed. Bloomberg is able to use the portfolio function to automatically remove assets that are not active at certain points in time from the portfolio and mathematically adjust the overall portfolio. Moreover, it is evident that a notable distinction exists between the quantity of actively managed ETFs and passively managed ETFs. While 197,578 ETFS are generally found, only 10,328 of them are actively managed (Bloomberg, 2024). It is important to note that this number also refers to ETFs with a passive market status. With the filter market status=active 67,727 ETFs were found, of which 4,608 are actively managed (Bloomberg, 2024). The high number of passively managed ETFs compared to the low number of actively managed ETFs suggests that actively managed ETFs are a relatively new market phenomenon. This observation remains relatively underexplored compared to other asset classes, despite the significant growth in actively managed ETFs in recent years.

2.3 CREATION OF A COMPARISON PORTFOLIO

In order to enable a comparison of all actively managed ETFs with their benchmark index, a portfolio containing all previously filtered actively managed ETFs was constructed. The Portfolio Administration function from Bloomberg is applied for this purpose, which makes it possible to create portfolios with selected portfolio values. The US dollar is specified as the currency of the portfolio.

At present, the previously screened actively managed ETF assets have been incorporated into the portfolio, resulting in a cumulative total of 545 assets, indicative of the presence of 545

actively managed ETFs within the portfolio. In order to weight the individual portfolio shares equally and thus ensure a uniform performance comparison that is valid regardless of the volume of the individual actively managed ETFs, the portfolio is balanced using the equal weights function. The equal weights function makes it possible to weight all assets in the portfolio equally, regardless of their market value. This means that each asset, in this case each actively managed ETF, has the same share in the overall portfolio. The formula presented below is utilized to determine the proportionate allocation of each asset within an equally weighted portfolio.

$$Wi = \frac{1}{n}$$

Equation 1: Asset proportion in an equally weighted portfolio

- w_i *is the weight of the* i-*th asset in the portfolio, representing the proportion of each asset in the portfolio.*
- *n is the number of assets in the portfolio.*

The portfolio capital is subsequently allocated uniformly across all assets in accordance with the specified formula. It is important to mention that Bloomberg automatically rebalances the portfolio if data is not available, for example if the prices of an actively managed ETF are not available for the defined measurement period, using the values of the remaining portfolio contents that are now available. For this reason, some ETFs may exhibit a higher percentage of average weight despite expectations of uniformity. In the context of this study, this discrepancy arose in the 5-year comparison, as certain actively managed ETFs were not operational throughout the entire 5-year period and were subsequently discontinued during this timeframe. The Bloomberg program ensures that the portfolio always reflects an average of the actively managed ETFs on the market with the S&P 500 Index as a benchmark. The formula for the rebalance remains the same, but it is automated by Bloomberg.

2.4 KEY INDICATORS FOR THE EVALUATION OF ACTIVELY MANAGED EXCHANGE-TRADED FUNDS

The actively managed ETFs are analyzed with regard to three different key figures. The total performance, the volatility (risk) and the management fees. The preliminary methodology of the individual parts is explained below but may be adapted for further studies. In order to measure the performance and the volatility of the actively managed ETFs, the daily

performance of the funds is measured during the two periods. The period from 19.02.2020-23.03.2020 to reflect the crash period and the period from 23.03.2020-30.04-2020 to reflect the recovery period. With the intent of comparing short-term performance with long-term performance, the performance of the two portfolios over a 5-year period is also shown.

Subsequent to examining the actively managed ETFs, the investigated results are contextualized within the current state of research, elucidating the significance of actively managed ETFs in the realm of financial markets. Furthermore, it is expounded whether actively managed ETFs, based on the analysis conducted, are capable of outperforming passively managed index funds. In closing, a prospective outlook is provided concerning the ETF industry and the performance of passive and actively managed assets.

2.4.1 PERFORMANCE

To measure the performance of the actively managed ETFs, the daily performance of the portfolio containing all ETFs is measured in the two periods 19.02.2020-23.03.2020 (crash period) and 23.02.2020-30.04.2020 (recovery period). For the purpose of an exact performance comparison in the periods, the net asset value of the portfolio and the S&P 500 is standardized to 0 at the beginning of the two periods. This capability facilitates the precise documentation of the percentage-based performance of actively managed ETFs and the S&P 500 index in each instance, thereby enabling direct comparability between the. In the long-term comparison of the portfolio and the S&P 500, both assets are normalized to 0 at the beginning of the measurement period. The percentage daily performance in comparison to the starting point is determined from the selected point in time, typically the commencement of measurement and calculated onwards from that juncture.

2.4.2 VOLATILITY (RISK)

In order to measure the volatility of actively managed funds, the beta factor is to be determined in comparison to the S&P 500. The beta factor is a key figure that measures the sensitivity of the portfolio's return compared to a benchmark. The concept of beta signifies the extent to which the return of a portfolio responds to variations in the return of the benchmark index. A beta coefficient of 1 denotes parity in fluctuations between the portfolio and the index. When the beta coefficient exceeds 1, it implies heightened volatility in the portfolio relative to the index, whereas a beta coefficient below 1 suggests decreased volatility in the portfolio compared to the index. In this study, the daily price movements of the active ETFs and the S&P 500 index are scrutinized across specific time periods. Subsequently, the

resultant returns are computed based on the daily performance prices of the respective assets. (percentage change because of the normalization to 0). First, the covariance is calculated by using the covariance formula with the monthly changes of the actively managed ETF and the S&P 500 as arguments. Then the variance of the S&P 500 is calculated using the variance formula and the monthly variations of the S&P 500 as arguments. The covariance is then divided by the variance of the S&P 500 to obtain the beta. The beta is then put into context depending on the result. The following formulas are used to calculate the beta:

$$Bportfolio = \frac{Cov(Rportfolio, Rbenchmark)}{Var(Rbenchmark)}$$

Equation 2: Calculation of the beta coefficient

- *$Cov(Rportfolio, Rbenchmark)$ is the covariance between the portfolio returns and the benchmark returns.*
- *$Var(Rbenchmark)$ is the variance of the benchmark returns.*

Covariance between portfolio and benchmark (COV P,B):

$$CovP,B = \frac{\sum_{i=1}^{n} (Pi - P^-)(Bi - B^-)}{n-1}$$

Equation 3: Calculation of the covariance between Portfolio and Benchmark

- *Pi and Bi are the individual data points in the portfolio (P) and benchmark (B) datasets, respectively.*
- *P^- and B^- are the means of datasets P and B, respectively.*
- *n is the number of data points*

Variance of the benchmark (VAR B):

$$VAR\ B = \frac{\sum_{i=1}^{n} (Bi - B^-)^2}{n-1}$$

Equation 4: Calculation of the variance of the benchmark

- *Bi is each individual data point in the Benchmark (B) dataset.*
- *B^- is the mean of dataset B.*
- *n is the number of data points.*

2.4.3 MANAGEMENT FEES

The management fees associated with various asset classes are readily accessible through widely utilized platforms such as Bloomberg or FactSet. The key cost figure used for this analysis is the Total Expense Ratio (TER). The Total Expense Ratio is a comprehensive measure of the total costs associated with the management and operation of a portfolio, in this case actively managed ETFs. These costs typically include management fees, administration fees and other operating costs (Hayes, 2024). This metric is crucial for investors as it has a direct impact on the net return of their investment and is a key factor when comparing the cost efficiency of different ETFs. The TER is calculated using the following formula:

$$TER = \frac{Total\ Costs}{Total\ Fund\ Assets} \times 100$$

Equation 5: Calculation of the total expense ratio

Since Bloomberg incorporates management costs directly into the total performance and does not report them separately, the management costs for the specified portfolio are not calculated. The current state of research provides sufficient data regarding the average costs of the investment classes, which can be utilized for cost comparison between active managed ETFs, passive managed ETFs and active managed mutual funds.

3 MACRO METHODOLOGY

In order to enable a classification of the terms and to facilitate the understanding of this scientific work, the most important terms in relation to the research field of this paper are defined further in this section.

Investment funds, also known as mutual funds or collective investment schemes, act as financial intermediaries that aggregate the capital of numerous investors to create a diversified portfolio of assets. These portfolios may comprise a wide range of asset classes, including equities, fixed income instruments, real estate, commodities, and money market securities. The broad spectrum of investment funds can be primarily divided based on their management approach, specifically into actively managed funds and passively managed funds. This division focuses on the methodology of fund management and is independent of the criteria related to investment strategies or asset allocation. Furthermore, investment funds can be categorized according to their investment focus and strategic objectives (Grohowski & Collins, 2015). Actively managed investment funds are characterized by the continuous and discretionary decision-making processes employed by portfolio managers to maximize returns relative to a specific benchmark or market index. This approach necessitates in-depth research, constant market surveillance, dynamic asset allocation, and frequent trading activities undertaken by the fund managers. The principal aim of actively managed funds is to surpass the return of the respective benchmark through judicious and strategic investment choices. Given the extensive analytical and trading efforts involved, this active governance by fund managers typically incurs relatively high management fees for investors. The costs associated with actively managed funds reflect the considerable resources and expertise required to conduct thorough market analysis, identify investment opportunities, and adjust the portfolio in response to market conditions (Sharpe, 1991). In stark contrast, passively managed investment funds, commonly referred to as index funds, adopt a strategy that seeks to replicate the performance of a specified market index. Unlike actively managed funds, passively managed funds do not engage in discretionary stock selection. Instead, they systematically aim to mirror the composition and weighting of assets within the chosen index. The performance of passively managed funds is intrinsically linked to the overall performance of the index they track. The primary objective of these funds is to achieve returns that closely align with the benchmark index, thereby providing investors with broad market exposure. Due to the elimination of complex research methodologies and the minimal need for portfolio adjustments, passively managed funds generally incur lower management costs for investors.

These reduced expenses are a direct result of the simplified management approach, which avoids the intensive research and frequent trading characteristic of actively managed funds (Chen, 2022). The distinction between actively and passively managed investment funds is fundamental and significantly influences both the potential returns and the cost structure associated with each type of fund.

An exchange-traded fund (ETF) is an investment fund that is traded on the stock market, offering investors the ability to buy and sell shares of the fund throughout the trading day at market prices. ETFs are designed to provide liquidity and flexibility, allowing investors to gain exposure to a diversified portfolio of assets, which can include stocks, bonds, commodities, or other securities, without the need to purchase each asset individually (Chen, 2023). In common terminology, the term "ETF" is frequently used interchangeably with "passively managed ETF" or "index ETF." Actively managed exchange-traded funds (ETFs) are a subset of ETFs that implement an active investment strategy. Unlike passive ETFs, which aim to replicate the performance of a specific index by holding a portfolio that mirrors the index's components, actively managed ETFs involve fund managers who make strategic and discretionary decisions about the composition of the portfolio. These managers conduct in-depth research and analysis to select securities they believe will outperform the market, adjusting the portfolio as needed to optimize returns (Aslam, 2021).

Investment funds can also be categorized based on investment strategy and asset allocation, in addition to the management model. Regarding asset composition, there are various types of funds tailored to specific asset classes. For instance, bond funds primarily invest in fixed-income securities, providing regular interest income to investors. Commodity funds focus on investing in physical commodities like oil or gold, offering exposure to raw materials markets. Funds can also be categorized based on the market capitalization of the companies in which they invest. These categories include large-cap, mid-cap, and small-cap funds (Chen, 2022). Regional or country-specific funds invest in markets of specific geographic areas, such as emerging markets or European countries (Kiymaz & Simsek, 2017). ESG funds incorporate environmental, social, and governance criteria into their investment decisions, prioritizing ethical and sustainable investments. Investment strategies within funds vary significantly, reflecting different approaches to asset selection. Value funds, for example, seek to acquire undervalued stocks, aiming to profit from their potential price appreciation. Growth funds target companies with high growth potential, focusing on firms expected to expand rapidly (Cronqvist et al., 2015, p.333). Dividend funds emphasize companies that pay regular

dividends, providing investors with a steady income stream. Each investment strategy has its own risk and return profile, catering to diverse investor preferences and financial goals.

An index is a compilation of selected financial instruments designed to represent the performance of a specific market, sector, or segment of the financial market. Notable examples of indices include the S&P 500, which comprises the 500 largest companies in the US market across various sectors; the Dow Jones Industrial Average, a well-known indicator of US blue-chip stocks; the DAX, representing 30 major German companies; and the FTSE 100, which includes 100 of the largest UK companies. Indices serve as benchmarks for measuring market trends and performance. A benchmark index is a reference point used to evaluate the performance of an investment portfolio, investment fund, or investment strategy. By comparing the returns of the portfolio to those of the benchmark index, investors and fund managers can assess the effectiveness of their investment approach. The selection of a benchmark index is a critical strategic decision made by fund managers, as it significantly influences the fund's positioning and performance evaluation. The appropriate benchmark provides a relevant and accurate comparison, reflecting the market segment in which the fund operates and guiding investment decisions (Zeitoun, 2020).

4 LITERATURE REVIEW

In this section, the current academic state of research is explained and important works relating to the performance comparison of actively and passively managed funds and ETFs are presented. Actively and passively managed funds are repeatedly compared in terms of costs and performance. This leads to the fundamental question of an actively managed fund's ability to outperform the market, passively managed funds or benchmark indices. In order to justify the high management costs of actively managed funds, actively managed funds would need to consistently outperform the market or offer some other decisive benefit over passively managed funds. As this is a highly significant subject in the financial environment, it has been examined in numerous scientific publications and reports. Academic publications on different fields often come to varying results, in this case, the situation is evident regarding the long-term performance of actively managed funds in comparison to passive managed funds. Burton G. Malkiel illustrates that 71% of actively managed funds with the S&P 500 as their benchmark index were unable to outperform the index over a 10-year period up to 31 December 2001 (Malkiel, 2003, p. 3-4). In 2010, Fama and French also showed that the overall portfolio of actively managed US equity funds is close to the market portfolio, but that the high costs of active management are reflected in lower returns for investors (Fama & French, 2010). Considering the fact that actively managed funds only rarely outperform their benchmark index and do not do so consistently, the inquiry emerges regarding the comparative advantages that actively managed funds possess in contrast to passively managed funds or indices. In instances where an actively managed fund fails to surpass its benchmark index and consequently subjects the investor to elevated expenses attributable to the fund manager's administrative overheads, the actively managed fund must demonstrate supplementary value to the investor, even in cases of equal performance. The preference of investors for active management over passively managed portfolios is a complex question, partly justified by a combination of a competitive environment and a multifaceted mix of behavioral, operational, organizational, and cultural factors (Bird et al., 2013). However, there are additional quantitative explanations that could account for investors' affinity for actively managed funds despite their relatively poorer long-term performance.

Based on the hypothesis of Moskowitz (Moskowitz, 2000), an analysis conducted in 2011 shows the discrepancy of active managed funds in performance during recessionary and expansionary market phases. This risk-adjusted difference in the performance of actively managed funds is statistically and economically significant at 3% to 5 % per year (Kosowski

2011). Another study conducted in 2011 on the potential drivers of investments in actively managed funds concludes, that the performance of active mutual funds in times of crisis can be a motivation for shareholders to invest (Glode, 2011).

A study published in December 2020 examines the performance of actively managed funds compared to benchmark indices during the coronavirus crisis. Contrary to previous studies, this study concludes that most actively managed funds did not outperform their benchmark index during the coronavirus crisis. The average underperformance of the active funds compared to the S&P 500 was -5.6% during the 10 Week period with strongest volatility during the corona crisis. On an annualized basis it was even -29.1%. The research also determined that funds with a high ESG rating outperform in market crisis situations (Pástor & Vorsatz, 2020). The situation regarding the success of actively managed funds in crisis situations is therefore not entirely clear. It appears to depend on the financial crisis situation being analyzed. There is no doubt that certain actively managed funds can offer advantages, at particular market situations. Passively managed funds undoubtedly offer a cost advantage over actively managed funds. In the aforementioned study by Fama and French, it was the high management fees of actively managed funds that caused them to consistently underperform (Fama & French, 2010).

Actively managed ETFs are a relatively new financial product that seeks to combine the advantages of both sides. These are aiming to combine low management costs with the flexibility of actively managed funds (Curry & Marquit, 2022). In a 2011 study, Rompotis examined the performance of actively managed ETFs and came to the conclusion that they do not have a significant performance advantage over the market (Rompotis, 2011). However, further studies conducted in 2014 have revealed that performance metrics based on relative risk (e.g. information and Treynor metrics) suggest that active managed ETFs represent a potentially advantageous inclusion within extant investment portfolios. due to their diversification benefits (Dolvin, 2014). The trend is shifting in the direction of actively managed ETFs. According to morningstar, they have raised at least $25 billion and achieved an organic growth rate of over 30% in each calendar year since 2018. Furthermore, actively managed ETFs had assets of USD 444 billion at the end of October 2023. This is almost three times the amount in October 2020 (Jackson, 2023). In light of the potential suitability of actively managed ETFs as an augmentative element within portfolios, predicated upon their discernible relative risk indicators and assimilation of specific attributes akin to actively managed funds, an inquiry naturally emerges concerning the comparative advantages inherent

in actively managed funds in comparison to passively managed ETFs. Previous studies show that actively managed ETFs cannot outperform the market/passive ETFs over a longer period of time. The assessment of whether actively managed ETFs, as opposed to actively managed funds, demonstrate the capacity to surpass market performance/passive ETFs during crisis scenarios remains undetermined. Throughout historical records, the stock market has encountered recurrent upheavals precipitated by crisis scenarios, exemplified notably by the dot-com crash of 2000. This event, characterized by the collapse of a speculative bubble engendered by exuberant valuations of technology and internet enterprises, underscored the ramifications of over-optimism within financial markets. The 2008 financial crisis, the Flash Crash 2010 and the Brexit Crash 2016 were also events that had a strong negative impact on the stock market. The most recent event to shake the stock market was undoubtedly the corona pandemic. As a result of the coronavirus pandemic, the stock market experienced its sharpest decline since the 2008 economic crisis. The crash of the corona pandemic was selected as the measurement period not only because of its topicality. In addition to the topicality, the results of other correlating scientific studies, such as the performance of actively managed funds in the corona crisis, also provide a good basis for work.

Despite the initially extremely significant decline, the stock markets rebounded rapidly. A slight time difference exists between crash and recovery. The S&P 500 fell by more than 34% between its peak in February 2020 and its trough in March 2020, but recovered to new all-time highs by the end of 2020 (Watts, 2022). The pandemic also led to significant sectoral shifts on the stock markets. Some industries, such as technology, healthcare and e-commerce, benefited from the pandemic as consumer behavior changed and more people preferred online pharmacies, home diagnostics and online shopping over traditional stores. This led to significantly increasing share prices in these sectors. Sectors such as retail, hospitality and travel suffered greatly during the pandemic. This led to declining revenues for these companies, resulting in decreasing stock prices, employee layoffs or even bankruptcy (Mehrotra, 2023). Managers of actively managed ETFs may have taken advantage of these shifts in the industry through adjustments to asset allocation, therefore an analysis is needed to determine whether actively managed ETFs suffered less of a decline in value than passive indices during this period. Furthermore, active portfolio managers have more opportunities to hedge against emerging crises through their selection of assets. Consequently, it is particularly interesting to analyze the performance of actively managed ETFs during the crash period. In

the following section, the data of actively managed ETFs during the Corona Pandemics equity crash is analyzed and compared with the S&P 500 Index.

5 ANALYSIS

To analyze the behavior of actively managed ETFs in the Corona crisis, the portfolio of actively managed ETFs is compared with their benchmark index, the S&P 500. First, the 5-year performance of the total return is compared, which shows that the S&P 500 outperforms the portfolio of actively managed ETFs almost constantly. Then the period of the crash (19.02.2020-23.03.2020) is analyzed to find out the behavior in crash situations. Then the portfolio of actively managed ETFs is analyzed in the recovery period (23.03.2020-30.04.2020). It is important to note that the S&P 500 and the portfolio of actively managed ETFs are normalized to 0 at the beginning of each measurement period. Due to the fact that not all of the actively managed ETFs filtered out by Bloomberg were active at every measurement period and therefore a price development is not always given, actively managed ETFs that cannot provide data for the given measurement period are excluded from the portfolio and the portfolio is automatically rebalanced with the remaining values. With regard to the graphs used in the subsequent sections, the graph of the total return of the S&P 500 is always shown in orange, on the other hand the graph of the portfolio with the actively managed ETFs is shown in white. For the various measurement periods, the total return is analyzed first and then the volatility of the portfolio for the same period. The volatility of the portfolio is measured by the beta factor. The beta factor is used to analyze the volatility and consequently the risk of actively managed ETFs. The beta factor is calculated for the portfolio of actively managed ETFs in relation to the S&P 500 as their benchmark. The beta factor is often used to measure the systematic risk of a portfolio, i.e. the risk associated with general market movements.

5.1 LONG-TERM PERFORMANCE COMPARISON OF ACTIVELY MANAGED EXCHANGE-TRADED FUNDS TO THEIR BENCHMARK

For the long-term comparison of the actively managed ETFs and their benchmark, the S&P 500, the period from 02.01.2019 to 02.01.2024 is applied, which allows a 5-year period to be considered, enabling minor market fluctuations to be neutralized. The two portfolios were normalized to zero on 02.01.2019, ensuring that performance is compared from this point onwards. Initially, the total return of the S&P 500 and the portfolio of actively managed ETFs is compared. Subsequently, the volatility of the actively managed ETFs compared to the S&P 500 is determined using the beta factor.

5.1.1 LONG-TERM TOTAL RETURN

The following graph shows the total return of the two portfolios over the 5-year measurement period:

Figure 2: 5-year total return of the S&P 500 and the portfolio of active managed ETFs

Source: Bloomberg Portfolio & Risk Analytics, 2024

The outcome of the comparison is barely unexpected and is consistent with the studies mentioned in the literature review. The actively managed ETFs are not able to outperform their benchmark index over an extended period of time. Despite a limited number of short-term deviations, the S&P 500 consistently outperforms the portfolio of actively managed ETFs and achieves a significantly higher return over the 5-year horizon. The portfolio of actively managed ETFs achieved a 5-year return of 48.9%. Meanwhile, the benchmark index of actively managed ETFs, the S&P 500, achieved a 5-year return of 105.8%. The average actively managed ETF therefore underperformed its benchmark index by -56,8%.

Of particular interest is the fact that the actively managed funds outperformed the S&P 500 in only one period. From 07.01.2021-04.03.2021. In this period the actively managed ETFs managed to outperform the S&P 500 constantly for nearly two months. On January 6, 2021, the U.S. Capitol was stormed by supporters of then-President Donald Trump (The New York Times, 2021). Although it is plausible to link this event with the observed market outperformance, an analysis of the S&P 500 chart does not reveal any significant anomalies (FactSet, 2024). Similarly, the MSCI World Index chart, which represents 1,500 stocks from 23 developed countries and serves as an indicator of the international market beyond the United States, shows no notable irregularities (FactSet, 2024). Furthermore, in this period, the

market continued recovering rapidly and substantially from the coronavirus pandemic. The stock market experienced heightened volatility, with major indices like the S&P 500 fluctuating significantly. Also there could be seen a stock rotation, certain sectors, such as technology and consumer cyclical stocks, outperformed during this period. Actively managed funds that had positioned themselves well in these sectors could have benefited. On December 11, 2020, the Pfizer-BionTech vaccine against Covid-19 was approved by the U.S. Food and Drug Administration (FDA) (FDA, 2020). On 14.12.2020, the first vaccination campaign against Covid-19 was launched in the USA, marking the start of the largest US immunization campaign in history. This vaccine success provided optimism about the development and termination of the coronavirus pandemic and the markets reacted highly favorably.

As a result, it can be conclude that actively managed ETFs were able to outperform their benchmark index during this period of strong recovery. Despite this one period actively managed ETFs were not able to outperform the S&P 500, the S&P 500 consistently outperformed and achieved a significantly higher return than actively managed ETFs. In comparison with actively managed mutual funds, a parallel can be identified here, although the management costs for actively managed ETFs are significantly lower than the management costs of conventional actively managed funds.

5.1.2 LONG-TERM VOLATILITY

The beta factor for the 5-year period is calculated in the following. The calculation is based on the daily performances of the portfolio of actively managed ETFs and the S&P 500 for the entire observation period. With a covariance of the portfolios of 559.80 and the variance of the S&P 500 of 860.20 the beta value is 0.65. This beta value implies that the actively managed ETFs have a lower volatility than the overall market or the benchmark index, in this case the S&P 500. A lower beta than 1 indicates a lower systematic risk than the market, but this lower risk also means reduced potential returns. This initial observation is intended to demonstrate that actively managed ETFs perform better than the S&P 500 in times of crisis in relation to the subsequent analysis of the corona crisis. However, due to the low beta, the portfolio does not benefit as much from a strongly growing market. The veracity of this assertion will be unveiled during the examination of both the crash and subsequent recovery phase.

5.2 PERFORMANCE COMPARISON IN THE CRASH PERIOD OF THE COVID-19 MARKET DISRUPTION

In order to enable a comparison of actively managed ETFs with their benchmark index in a crisis situation, the first of two measurement periods during the coronavirus crisis is analyzed outlined in the following. The crash period is set from 19.02.2020-23.03.2020. The termination point of the crash period marks the bottom of the S&P 500 during the corona crisis. Consequently, the subsequent day after the bottom also represents the start of the recovery period, which is analyzed afterward this section.

5.2.1 TOTAL RETURN DURING THE CRASH PERIOD

In order to show the total return during the crahs period, the S&P 500 and the portfolio of actively managed ETFs are compared as in the previous section. The comparison graph can be seen below.

Figure 3: Total return of the S&P 500 and the portfolio of active managed ETFs during the crash period
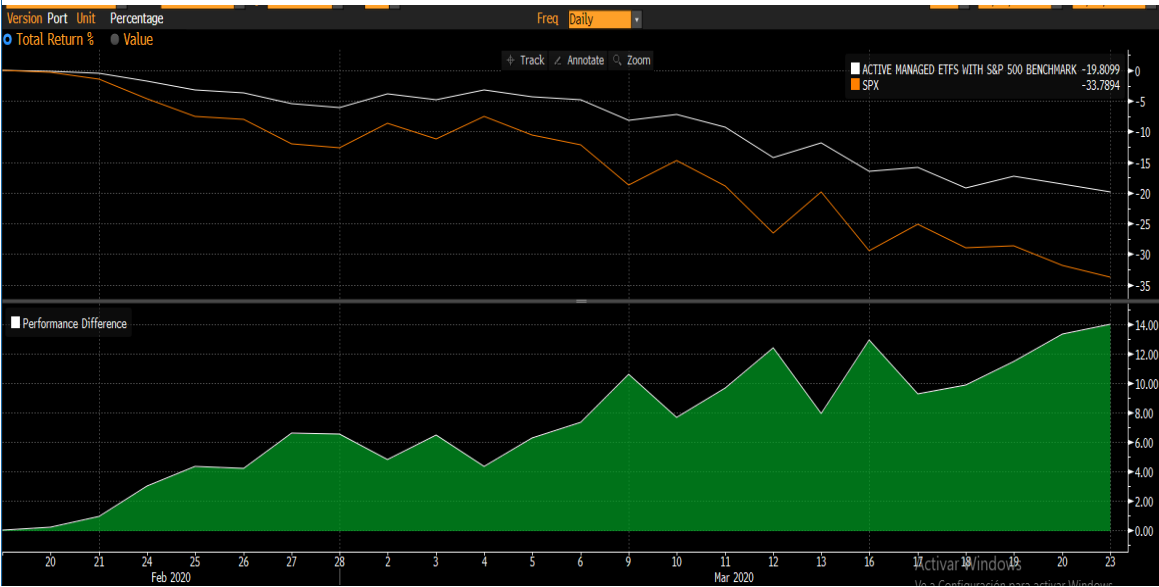
Source: Bloomberg Portfolio & Risk Analytics, 2024

A noteworthy observation arises upon examination of this graph. This graph shows how the portfolio of actively managed ETFs managed to consistently outperform the S&P 500 as their benchmark index during the crisis phase of the coronavirus pandemic. The portfolio of actively managed ETFs outperformed its benchmark index each day of the monitored period. The total return across the 33-day tracking period for the actively managed ETF portfolio was -19.8%. In contrast, the total return for the measured period for the S&P 500 was -33.8%. The portfolio of actively managed ETFs consequently outperformed its benchmark by 13.97% over the measurement period. The returns shown imply that actively managed ETFs are

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certainly capable of outperforming their benchmarks during crisis situations. This stands in sharp contrast to the research results relating to actively managed mutual funds. In contrast to the performance presented here, previous studies of actively managed mutual funds indicated that they are unable to outperform their benchmark index in crisis situations. This insight might provide investors a reason to invest in actively managed ETFs, which may offer reduced profits in the long term, but might also be able to record significantly more limited losses in crisis situations. It is also not disclosed whether the investment strategy or asset allocation was changed in the course of the crisis situation in order to react actively to market events.

5.2.2 VOLATILITY DURING THE CRASH PERIOD

The beta factor for the crash period is calculated in the following. The calculation is based on the daily performances of the portfolio of actively managed ETFs and the S&P 500 for the entire observation period. With a covariance of the portfolios of 61.83 and the variance of the S&P 500 of 97. 60 a beta value of 0.633 can be calculated. This beta value implies that the actively managed ETFs have a lower volatility than the overall market or the benchmark index, in this case the S&P 500. The Beta is even lower than the Beta of the 5-Year period calculated in advanced. This beta indicates a lower systematic risk than the market, but this lower risk also means reduced potential returns. The beta indicated is consistent with the return of the portfolios shown in the chart. The portfolio of actively managed ETFs experiences significantly lower declines than the S&P 500. This phenomenon arises due to the relatively subdued response of the actively managed ETF portfolio to market fluctuations. From an investor's perspective, it would have been prudent to allocate investments to the actively managed ETF portfolio, given that losses were significantly mitigated during the crisis period.

5.3 PERFORMANCE COMPARISON IN THE RECOVERY PERIOD OF THE COVID-19 MARKET DISRUPTION

Following the analysis of the crash period, the subsequent recovery period is now analyzed. This period is characterized by a significant market recovery in a short period of time. The recovery period is set from 23.03.2020-30.04.2020. Based on the realization that actively managed ETFs outperformed the S&P 500 during the corona crash and considering the low beta during the crash period, this part is particularly relevant.

5.3.1 TOTAL RETURN DURING THE RECOVERY PERIOD

order to show the total return during the recovery period, the S&P 500 and the portfolio of actively managed ETFs are compared as in the previous section. The comparison graph can be seen below.

Figure 4: Total return of the S&P 500 and the portfolio of active managed ETFs during the recovery period
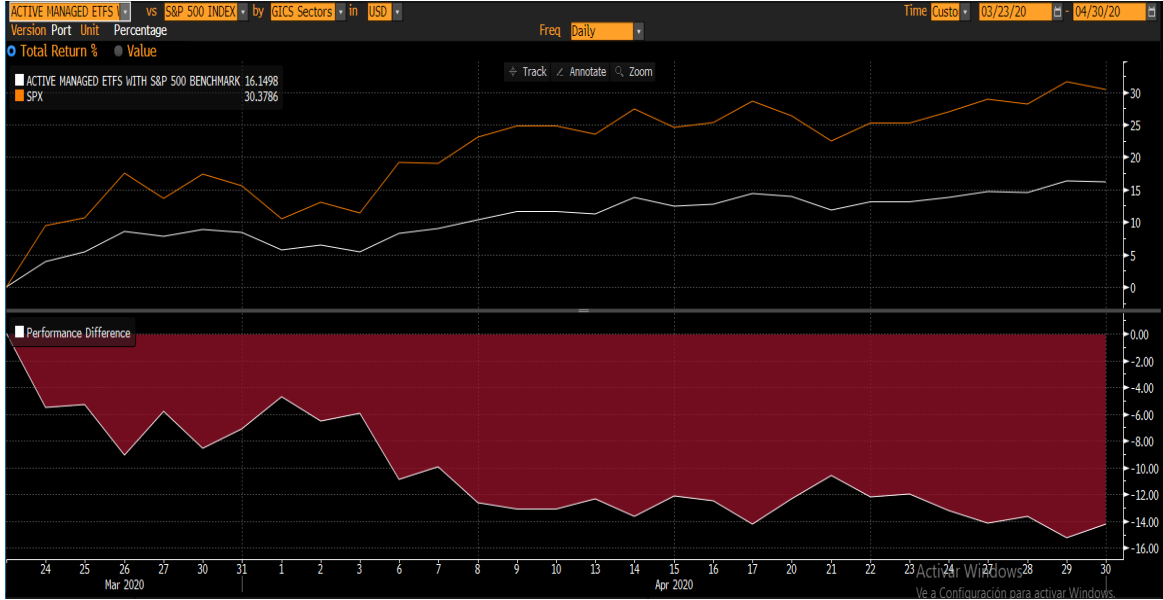
Source: Bloomberg Portfolio & Risk Analytics, 2024

In accordance with the investigation conducted in the previous part, the findings are consistent with the projected expectations. The S&P 500 consistently outperformed the portfolio of actively managed ETFs during the recovery phase and recovered considerably faster. The total return of the actively managed ETFS portfolio amounted to 16.14% over the entire recovery period. In contrast, the return of the S&P 500 amounted to 30.37% in the same period. The actively managed ETFS portfolio underperformed the S&P 500 by a significant -14.22%.

5.3.2 VOLATILITY DURING THE RECOVERY PERIOD

The beta factor for the crash period is calculated in the following. The calculation is based on the daily performances of the portfolio of actively managed ETFs and the S&P 500 for the entire observation period. With a covariance of the portfolios of 22.36 and the variance of the S&P 500 of 42.97 a beta value of 0.520 can be calculated. This is a comparatively low beta and is significantly lower than the beta during the crash period. The beta is consistent with the demonstrated performance of actively managed ETFs during the recovery phase. While the S&P 500 recovers quite sharply, the actively managed ETFs recover significantly more

slower, since they react less sensitively than the S&P 500. This beta implies a relatively moderate system risk, but also slower growth in market growth phases. From investor's perspective, concerning the crisis under analysis herein, the investor seeks to acquire assets with minimized losses during the downturn phase, while also exhibiting slower recuperation and gains during the bullish market phase. The beta in the recovery phase is, nevertheless, significantly lower than the beta during the crash phase. The assumption can be made that the portfolio managers of actively managed funds intended to further minimize their dependence on the market in order to avoid substantial losses. The recovery phase of the market, came earlier than anticipated and as a result the low beta and the resulting reduced dependence on the market caused a substantially slower recovery.

5.4 COMPARISON OF MANAGEMENT COSTS

In addition to the performance of equity portfolios, the management costs of a portfolio are also important in determining its overall attractiveness. The costs of ETFS are analyzed using the TER, which indicates the total costs of the portfolio as a percentage and therefore enables good comparability. The general theory is that actively managed mutual funds have the highest costs and passively managed index ETFS have relatively low costs. Actively managed ETFS are positioned between these two asset classes in terms of costs. According to Forbs advisor, actively managed ETFS have an average management cost of 0.69%, while passively managed index ETFS have an average management cost of 0.18% (Curry & Marquit, 2022). The difference of 0.5% in management costs seems only marginal but might be significant for long-term investments. It was more challenging to ascertain the costs of actively managed funds that are not listed on the stock exchange, as these funds are often significantly less transparent than those listed on the stock exchange. Furthermore, the total costs stated by the funds often differ from the actual total costs. At the end of 2004, the average active expense ratio for the large-cap equity funds tracked by Morningstar was 7%, more than six times their published expense ratio of 1.15%. In general, funds in the Morningstar universe had an average active expense ratio of 5.2%, while the largest funds averaged one or two percent less (Miller, 2005). Nevertheless, it is important to recognize that the costs associated with actively managed funds have significantly decreased in recent years due to heightened competition from index funds and actively managed ETFs. According to Giuseppe Galloppo in his book "Asset Allocation Strategies for Mutual Funds," the expense ratios for actively managed funds are generally estimated to range between 1% and 3% (Galloppo, 2021, p.13).

If the actual costs of actively managed ETFS are in fact so significantly over the reported costs cannot be validated, nevertheless, assuming that the total costs for actively managed ETFS are between 1% and 3%, these costs are considerably higher than the costs of actively managed ETFS and passively managed index ETFS. Actively managed funds, in aggregate, incur the highest costs but it is evident that the costs associated with actively managed ETFs surpass those of passively managed index funds significantly.

6 SUMMARY AND CONTEXTUALIZATION OF THE RESULTS

In conclusion, the actively managed ETFS portfolio did not outperform its benchmark over a 5-year horizon. Over a 5-year horizon, the actively managed ETFS portfolio underperformed its benchmark index by -56,8%. In the long term, actively managed ETFS therefore do not manage to outperform their benchmark index. This observation is consistent with previous studies comparing actively managed funds with passively managed benchmark ETFs. There are practically infrequent studies that support the opposing hypothesis that actively managed funds outperform passively managed funds in markets of developed countries. In a study conducted over the period 1998-2018, for instances, actively managed mutual funds underperformed passively managed funds by -0.59% per year in an equally weighted portfolio. The results for the value-weighted portfolios indicate that the actively managed funds are inferior to the passively managed funds by -0.90 % per year (Nanigian, 2019). In contrast to the current state of expertise in industrialized countries, research on the performance of actively managed funds in emerging markets indicates that actively managed funds in developing countries outperform passively managed funds and benchmark indices under normal market conditions and in bear market phases, while passive investment portfolios outperform actively managed funds in bull market phases (Gopane, et al., 2023).

The analysis of the crash period is consistent with the assumptions initially made about the performance of actively managed funds and actively managed ETFs in times of crisis. Since passively managed index funds perform better in the long term and involve significantly lower costs, actively managed funds/ ETFS are required to provide certain different arguments. In this scenario, the advantage may represent the outperformance during times of crisis. Over the crash period, the portfolio of actively managed ETFs succeeded in outperforming its benchmark index. During this period, the S&P 500 declined by 33.8%, while the actively managed ETFs declined by only 19.8%, outperforming their benchmark index by 13.97%. This outcome of the investigation is in alignment with prior studies on actively managed funds, confirming that actively managed funds outperform passively managed index funds in times of crisis. Moskowitz's hypothesis, posited in 2000, that actively managed funds perform better during market downturns (Moskowitz, 2000), was subsequently tested through the estimation of a model for time-varying betas in conditional factor pricing models. This study also concluded that actively managed funds have the potential to outperform during periods of market decline (Staal, 2006, p.75). In contrast to the academic situation concerning long-term investments, the evidence is less consistent. Indeed,

several studies have disproved the outperformance of actively managed funds in times of crisis. A study examining actively managed funds during the COVID-19 crisis concluded that actively managed mutual funds were unable to outperform the passive benchmark index. (Blair & Pastor, 2020). This academic paper is able to refute these claims, particularly regarding actively managed ETFs. In principle, prior studies mostly refer to actively managed funds in total and not exclusively to actively managed ETFs to the extent presented in this paper. Concerning forthcoming studies, it might be of interest to compare actively managed ETFs with actively managed mutual funds in general to see the extent of the outperformance of actively managed ETFs over actively managed mutual funds. A study conducted in 2018, which investigated the relationship between actively managed ETFS and actively managed mutual funds, determined that actively managed ETFS and actively managed mutual funds are substitute products, although not perfect substitutes. Given the tax advantages of actively managed ETFS, they will gain considerable market share (Sherrill & Upton, 2018). This analysis is consistent with the strong growth in the number of newly issued actively managed ETFS in recent years as outlined in this paper.

The recovery period immediately succeeding the crash illustrates that the portfolio of actively managed ETFS is not able to outperform the benchmark index beyond the crash phase. In this recovery period, the return of the S&P 500 was 30.37% while the portfolio of actively managed ETFS only registered a return of 16.14%. The actively managed ETFs consequently performed significantly below and underperformed the benchmark index by -14.22%. Presumably, actively managed ETFS are not able to outperform the benchmark index during bullish market phases, as well as in terms of the long-term comparison. This result is unexpected, given that actively managed ETFS should be able to react to changing market situations through the flexibility and responsiveness of the fund managers. It is plausible that fund managers anticipated a protracted crash phase with a sustained downward trend, and consequently, their investment strategies were not calibrated for the recovery phase. A study examining the asset allocation of mutual funds during the COVID-19 crisis demonstrates that, in the initial months of the crisis, funds predominantly favored companies characterized by lower risk, high financial flexibility, and larger asset size (Jacob et al., 2020). This preference of fund managers towards low-risk companies might be applicable to the area of actively managed ETFs and could be one of the reasons for the lack of growth opportunities in the recovery phase.

The beta of actively managed ETFs relative to their benchmark index, the S&P 500, is 0.65 over a long-term horizon of five years, 0.63 during the crash period, and 0.52 during the recovery period. These betas consistently indicate lower volatility than the overall market, suggesting a reduced level of systematic risk as these ETFs exhibit less pronounced reactions to market fluctuations. Consequently, actively managed ETFs are characterized as more defensive investments, associated with lower risk profiles and correspondingly lower expected returns compared to the broader market. One would anticipate a higher beta during the recovery phase, given that a high beta could potentially leverage a growing market during this period. This deviation might be attributed to the aforementioned strategies of fund managers, who presumed a continued market decline and thus were not adequately positioned for a recovery phase marked by a significant market upsurge.

In general, this study demonstrates an underperformance of actively managed ETFs compared to their benchmark over the long term as well as during the recovery period. However, during market crashes, the portfolio of actively managed ETFs succeeds in outperforming its benchmark index, the S&P 500. Consequently, actively managed ETFs can offer advantages for risk-averse investors seeking to hedge against significant losses during market downturns. Nonetheless, long-term investors should increasingly opt for passively managed index funds, given their higher returns and lower costs. To further explore the phenomenon of actively managed ETFs, it is advisable to analyze their performance against alternative benchmark indices during the Covid-19 crisis. Additionally, assessing the performance of actively managed ETFs in emerging markets during the Covid-19 crisis would contribute to a deeper understanding of this phenomenon. Furthermore, the performance of actively managed ETFs compared to their benchmark indices should be analyzed in future crisis markets to ascertain whether there is concordance with the analytical findings presented in this study. The COVID-19 crisis was an unprecedented event, both socially and in terms of the financial market. It is imperative to consider whether actively managed funds can project the outperformance observed during the COVID-19 crisis crash onto other financial crises. This study identifies an outperformance of actively managed ETFs during the crash period of the COVID-19 crisis, although the reasons behind this outperformance are only superficially addressed due to the scope of this work. To explore the reasons for the outperformance, highly performing actively managed ETFs within the portfolio should be examined and tested for commonalities. Actively managed ETFs with specific investment strategies or actively managed funds within certain industries may favor disproportionately strong or weak

performance. Additionally, investigating changes in the composition of the investment portfolios of actively managed ETFs during the crisis compared to pre-crisis levels could provide insights. Furthermore, examining changes in portfolio composition made after the significant crash, which may reflect fund manager responses to the crash, could offer valuable insights. Following the comparison of actively managed ETFs with passive benchmark indices, a comparison with actively managed mutual funds should be conducted. Various studies indicate that actively managed mutual funds can also outperform passively managed index ETFs during times of crisis. Whether risk-averse investors should opt for actively managed ETFs or actively managed mutual funds during crises remains uncertain. Furthermore, the question arises as to whether actively managed mutual funds can justify their costs compared to actively managed ETFs, which typically have lower expenses.

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APPENDICES

APPENDIX 1 ATTRIBUTION DETAILS LONG TERM

Attribution Detail long term (2019-2024) (All Securities, Including Buckets)		
Active managed ETF with S&P 500 Benchmark:	% Average Weight	Total Return (%)
BETASHARES US EQ STR BEAR-CH	0,86	-87,64
ARK INNOVATION ETF	0,86	26,66
HULL TACTICAL US ETF	0,86	39,26
ADVISORSHARES RANGER EQ BEAR	0,86	-74,77
AGF US MARKET NEUTRAL ANTI-B	0,86	-14,65
ADVISORSHARES RANGER EQ BEAR	0,86	-71,09
FIRST TRUST NORTH AMERICAN E	0,86	58,39
ADVISORSHARES RANGER EQ BEAR	0,86	-73,60
CAMBRIA SHAREHOLDER YIELD ET	0,86	132,68
WBI BULLBEAR VALUE 3000 ETF	0,86	7,15
ARK AUTONOMOUS TECH & ROBOT	0,86	94,11
ARK NEXT GENERATION INTERNET	0,86	78,86
ARROW DWA TACTICAL ETF	0,86	42,43
ARK INNOVATION ETF	0,86	38,83
ARK GENOMIC REVOLUTION ETF	0,86	39,56
PRINCIPAL VALUE ETF	0,86	80,16
RIVERFRONT DYNAMIC US DV ETF	0,86	89,67
FT HORIZON MNGD VOL DOM ETF	0,86	65,90
ADVISORSHARES EQUITY FOCUSED	0,86	107,11
SABA CLOSED END FUNDS ETF	0,86	74,19
CLEARBRIDG DIV STRGY ESG ETF	0,86	85,79
PRINCIPAL US MEGA-CAP ETF	0,86	103,53
ADVISORSHARES VICE ETF	0,86	35,78
ARK INNOVATION ETF	0,86	28,41
ARK GENOMIC REVOLUTION ETF	0,86	8,42
ARK INNOVATION ETF	0,86	24,77
ADVISORSHARES DORSEY WS ETF	0,86	-74,39
WISDOMTREE US EFFICIENT CORE	0,86	81,11
DISTILLATE US FUNDAMENTAL ST	0,86	127,44
ARK GENOMIC REVOLUTION ETF	0,86	36,22
INNOVATOR U.S. EQUITY BUFFER	0,86	68,98
INNOVATOR U.S. EQUITY POWER	0,86	46,99
CORE ALTERNATIVE ETF	0,86	10,20
PACER PACIFIC ASSET FLOATING	0,86	29,39
HARBOR DIVIDEND GROWTH LEADE	0,86	97,85
HULL TACTICAL US ETF	0,86	90,32
PRINCIPAL VALUE ETF	0,86	96,59
PRINCIPAL US MEGA-CAP ETF	0,86	91,24
CAMBRIA SHAREHOLDER YIELD ET	0,86	138,57
WBI BULLBEAR VALUE 3000 ETF	0,86	8,43
ADVISORSHARES RANGER EQ BEAR	0,86	-76,05
FIRST TRUST NORTH AMERICAN E	0,86	57,93

ARK NEXT GENERATION INTERNET	0,85	68,72
SABA CLOSED END FUNDS ETF	0,83	56,42
ARK FINTECH INNOVATION ETF	0,83	31,46
INVESCO BALANCED MULTI-ASSET	0,82	36,54
INVESCO GROWTH MULTI-ASSET A	0,82	46,88
HULL TACTICAL US ETF	0,81	70,66
ARK FINTECH INNOVATION ETF	0,81	29,34
ARK FINTECH INNOVATION ETF	0,81	34,53
ADVISORSHARES VICE ETF	0,80	-27,82
INNOVATOR U.S. EQUITY BUFFER	0,77	50,53
INNOVATOR U.S. EQUITY ULTRA	0,77	11,25
ARK GENOMIC REVOLUTION ETF	0,76	-3,50
ARK AUTONOMOUS TECH & ROBOT	0,74	62,50
QRAFT AI-ENH US LRG CAP ETF	0,73	90,29
QRAFT AI-ENH US LRG CAP MTM	0,73	77,82
ARK NEXT GENERATION INTERNET	0,73	6,82
INNOVATOR U.S. EQUITY ULTRA	0,72	22,71
INNOVATOR U.S. EQUITY POWER	0,72	31,09
WBI BULLBEAR VALUE 3000 ETF	0,71	16,45
ARK NEXT GENERATION INTERNET	0,71	-54,57
AMPLIFY SEYMOUR CANNABIS ETF	0,68	-82,48
CAMBRIA CANNABIS ETF	0,67	-72,40
SPDR MFS SYSTEMATIC EQUITY	0,60	51,84
ARK GENOMIC REVOLUTION ETF	0,58	12,59
FIRST TRUST ACTIVE FACTOR LA	0,57	43,84
ARK INNOVATION ETF	0,55	6,42
LEUTHOLD CORE ETF	0,54	31,71
DAY HAGAN/NED DAVIS RESEARCH	0,53	45,45
ETC 6 MERIDIAN LOW BETA EQUI	0,44	35,44
ETC 6 MERIDIAN MEGA CAP EQUI	0,44	55,15
ARK FINTECH INNOVATION ETF	0,44	-0,64
JPMORGAN EQUITY PREMIUM INCO	0,43	53,05
ALLIANZIM US LG CAP BUFFER20	0,43	20,78
ALLIANZIM US LG CAP BUFFER10	0,43	39,05
ALLIANZIM US LRG CAP BU 20 J	0,40	27,14
ALLIANZIM US LRG CAP BU10 JU	0,40	38,14
ARK INNOVATION ETF	0,40	-33,45
T ROWE PRICE BLUE CHIP GROWT	0,38	20,81
T ROWE PRICE GROWTH STOCK ET	0,38	19,84
T ROWE PRICE DIVIDEND GROWTH	0,38	45,70
ARK GENOMIC REVOLUTION ETF	0,38	-43,40
ARK INNOVATION ETF	0,38	-38,33
GUARDIAN US QUAL GROWTH HDG	0,38	20,64
ARK INNOVATION ETF	0,38	-37,21
GUARD US QUAL GROWTH B UNHDG	0,38	25,55
ARK GENOMIC REVOLUTION ETF	0,37	-47,07
ADVISORSHARES PURE US CANN	0,36	-72,52
NATIXIS VAUGHN NELSON SELECT	0,35	56,69

LHA MARKET STATE TACTICAL	0,34	20,07
ALLIANZIM US LARGE CAP BUFFE	0,34	36,26
ALLIANZIM US LARGE CAP BUFFE	0,34	30,84
ARK INNOVATION ETF	0,34	-45,25
ARK NEXT GENERATION INTERNET	0,34	-47,15
LEADERSHARES ALPHAFACT TACT	0,33	50,69
LEADERSHARES ACTIVIST LEADER	0,33	48,05
AMERICAN CONSERVATIVE VALUES	0,33	52,22
NATIXIS US EQUITY OPPORT ETF	0,32	47,79
ARK AUTONOMOUS TECH & ROBOT	0,32	4,85
QRAFT AI-ENH US NEXT VALUE	0,31	37,71
CAMBRIA CORE EQUITY ETF	0,30	5,75
PACER SWAN SOS MODERATE JANU	0,30	25,51
PACER SWAN SOS CONSERVATIVE	0,30	18,09
PACER SWAN SOS FLEX JANUARY	0,30	40,03
ADVISORSHARES Q DYN GROWTH	0,30	20,74
GOTHAM ENHANCED 500 ETF	0,30	33,37
SIMPLIFY VOLT ROBOCAR DISRUP	0,30	-24,42
UPHOLDINGS COMPOUND KINGS ET	0,29	-21,40
SOUND EQUITY DIVIDEND INCOME	0,29	46,42
ALLIANZIM US LRG CAP BUFF20	0,29	21,24
ALLIANZ US LRG CAP BUFF10 JA	0,29	24,47
ARK GENOMIC REVOLUTION ETF	0,29	-64,10
ARK NEXT GENERATION INTERNET	0,29	-54,58
ARK AUTONOMOUS TECH & ROBOT	0,29	-44,88
ARK AUTONOMOUS TECH & ROBOT	0,29	-44,65
ARK INNOVATION ETF	0,29	-65,15
ARK NEXT GENERATION INTERNET	0,29	-51,36
AMERICAN CENTURY LOW VOL ETF	0,29	25,36
ARK FINTECH INNOVATION ETF	0,29	-48,71
ARK FINTECH INNOVATION ETF	0,29	-48,97
ARK FINTECH INNOVATION ETF	0,29	-51,11
Gabelli Love Our Planet & Pe	0,28	5,98
FIDELITY MAGELLAN ETF	0,28	18,81
ARK INNOVATION ETF	0,28	-65,84
ARK AUTONOMOUS TECH & ROBOT	0,28	-43,43
ARK NEXT GENERATION INTERNET	0,28	-56,92
NBI ACTIVE USA EQUITY ETF	0,27	41,71
CORBETT ROAD TACTICAL OPP	0,27	1,59
ADVISORSHARES PURE US CANN	0,27	-84,46
ADVISORSHARES PURE US CANN	0,26	-86,43
ARK FINTECH INNOVATION ETF	0,26	-63,72
HENNESSY STANCE ESG ETF	0,26	13,14
ARK AUTONOMOUS TECH & ROBOT	0,26	-44,60
ARK SPACE EXPLORATION & INNO	0,26	-25,91
PACER SWAN SOS MODERATE APR	0,25	19,62
PACER SWAN SOS CONSERV APR	0,25	11,68
PACER SWAN SOS FLEX APRIL	0,25	24,78

AMPLIFY SEYMOUR CANNABIS ETF	0,25	-82,02
ARK SPACE EXPLORATION & INNO	0,25	-34,66
ARK SPACE EXPLORATION & INNO	0,25	-30,56
ADVISORSHARES HOTEL ETF	0,25	13,68
ADVISORSHARES RESTAURANT ETF	0,25	-7,32
ACRUENCE ACTIVE HEDGE US ETF	0,25	-4,19
ALGER 35 ETF	0,24	-13,94
ADVSRSHRS NEW TECH AND MEDIA	0,24	-33,69
INVESCO US LARGE CAP CORE ES	0,24	7,43
ARK SPACE EXPLORATION & INNO	0,24	-21,33
SIMPLIFY US EQ PLUS GBTC ETF	0,23	23,18
PUTNAM SUSTAINABLE LEADERS	0,23	9,08
ARK FINTECH INNOVATION ETF	0,23	-44,75
ARK SPACE EXPLORATION & INNO	0,23	-34,72
ARK GENOMIC REVOLUTION ETF	0,23	-57,43
T ROWE PRICE US EQY RESEARCH	0,23	19,30
ARK GENOMIC REVOLUTION ETF	0,23	19,93
INN US EQ ACCEL PLUS JULY	0,22	13,47
PACER SWAN SOS CONSERVATIVE	0,22	12,85
PACER SWAN SOS FLEX JULY ETF	0,22	21,57
PACER SWAN SOS MODERATE JULY	0,22	20,82
ALEXIS PRACTICAL TACTICAL ET	0,22	7,29
ADVISORSHARES GERBER KAWASAK	0,22	-28,08
ZEGA BUY AND HEDGE ETF	0,22	-6,22
JACOB FORWARD ETF	0,22	-46,75
FORMIDABLE FORTRESS ETF	0,21	7,22
CAMBRIA SHAREHOLDER YIELD ET	0,21	6,22
ADVISORSHARES RANGER EQ BEAR	0,21	-14,79
SPEAR ALPHA ETF	0,21	7,75
NUVEEN DIVIDEND GROWTH ETF	0,21	15,53
ADVISORSHARES PURE US CANN	0,21	-6,67
ADVISORSHARES PSYCHEDELICS	0,20	-85,05
JPM ACTBUILD US LRG CAP EQ	0,20	7,66
HULL TACTICAL US ETF	0,20	4,94
INNOVATOR US EQUITY ACCEL OC	0,19	11,93
INNOVATOR US EQY ACCEL PL-OC	0,19	9,14
PACER SWAN SOS CONS OCT ETF	0,19	16,85
PACER SWAN SOS FLEX OCT ETF	0,19	24,97
PACER SWAN SOS MOD OCT ETF	0,19	21,87
ALPHA DOG ETF	0,19	-11,16
VALKYRIE BITCOIN AND ETHER S	0,19	-32,68
SIMPLIFY HEDGED EQUITY ETF	0,18	9,34
STANCE EQUITY ESG LRG CAP CO	0,18	2,38
MOHR GROWTH ETF	0,18	-20,53
ADAPTIVE CORE ETF	0,18	-18,52
ASSETPLUS GLOBAL PLTFM ACETF	0,18	-30,85
CIBC QX US LOW VOL DVD ETF	0,18	5,86
VALKYRIE BITCOIN AND ETHER S	0,18	-60,95

HARBOR DISRUPTIVE INNOVATION	0,17	-29,84
WEALTHTRUST DBS LONG TERM GR	0,17	-9,45
REVERE SECTOR OPPORTUNITY ET	0,17	1,83
FT VEST US EQUITY ENHANCE &	0,17	12,55
ALINZ US LRG 6 MT BUF JANJUL	0,17	7,28
INNOVATOR US EQ ACCELERATE-J	0,17	-1,93
VALKYRIE BITCOIN AND ETHER S	0,16	-8,36
ARK INNOVATION ETF - CEDEAR	0,16	-61,16
ARK INNOVATION ETF - CEDEAR	0,16	-37,53
VALKYRIE BITCOIN AND ETHER S	0,16	-8,90
VALKYRIE BITCOIN AND ETHER S	0,16	-46,90
STRATEGAS MACRO THEM OPPS	0,16	-5,92
ARK GENOMIC REVOLUTION ETF	0,16	-61,30
AMPLIFY INFLATION FIGHTER	0,16	11,27
VALKYRIE BITCOIN MINERS ETF	0,16	-37,16
IBET SPORTS BETTING & GAMING	0,16	-30,22
HARVEST DIV MONTHLY INCOME	0,15	-8,85
ADVISORSHARES POS DYN CANNAB	0,15	-90,01
VALKYRIE BITCOIN MINERS ETF	0,15	-28,99
ARK GENOMIC REVOLUTION ETF	0,15	-15,52
ARK INNOVATION ETF	0,15	-25,06
CAPITAL GROUP CORE EQUITY	0,15	16,66
CAPITAL GROUP GROWTH	0,15	14,47
CAPITAL GROUP DIVIDEND VALUE	0,15	24,45
INNOVATOR BUFF SU STRAT ETF	0,15	11,87
INNOVATOR PWR BUFF SU ST ETF	0,15	10,26
GRIZZLE GROWTH ETF	0,14	0,10
REGENTS PARK HEDGED MARKET	0,14	-4,73
DOUBLELINE SHILLER CAPE US	0,14	7,71
HARBOR DISRUPTIVE INNOVATION	0,14	-12,45
VALKYRIE BITCOIN MINERS ETF	0,14	-7,94
ADVISOR LET BOB AI POWERED	0,14	-8,15
WISDOMTREE US EFFICIENT CORE	0,14	-11,73
TIMEFOLIO US S&P500 ACTV ETF	0,13	33,06
ARK FINTECH INNOVATION ETF	0,13	-69,95
NEWDAY OCEAN HEALTH ETF	0,13	7,82
ASSETPLUS GL BLACKSMITH ACTV	0,12	20,20
AXS TSLA BEAR DAILY ETF	0,12	-34,53
AXS 1.25X NVDA BEAR DAILY	0,12	-85,20
AXS TSLA BEAR DAILY ETF	0,11	-24,68
TOUCHSTONE US LRG CAP	0,11	19,00
VOLT CRYPTO INDUSTRY AND EQU	0,11	-76,57
GRANITESHARES 1.25 LONG TSLA	0,11	-29,12
INNOVATOR UNCAPPED ACC US EQ	0,11	13,37
AGF US MARKET NEUTRAL ANTI-B	0,11	-2,87
ADVISORSSHARES MSOS 2X DAILY	0,11	-88,09
JPMORGAN EQUITY PREMIUM INCO	0,10	7,83
AGF US MARKET NEUTRAL ANTI-B	0,10	-5,80

ETF SLTNS-CRBN STRATEGY ETF	0,10	19,38
KODEX US DVD PRM S&P ACV ETF	0,10	18,45
PUTNAM BIOREVOLUTION ETF	0,10	17,27
FIRST TRUST NORTH AMERICAN E	0,10	18,58
ADVISORSHARES DRONE TECH ETF	0,10	-5,17
VICTORYSHARES WESTEND US SEC	0,09	32,32
EA BRIDGEWAY BLUE CHIP ETF	0,09	37,91
FUNDX AGGRESSIVE ETF	0,09	22,27
FUNDX ETF	0,09	20,66
ALLIANZIM US LRG CP BUF10 NV	0,09	16,26
ALLIANZIM US LRG CP BUF20 NV	0,09	13,12
JPMORGAN EQUITY PREMIUM INCO	0,09	6,14
ADAPTIV SELECT ETF	0,09	-2,84
FED HERMES US STRAT DIV ETF	0,09	1,18
INNOVATOR GRAD TACT ROTATION	0,09	-2,96
AXS 1.5X PYPL BULL DAILY	0,09	-25,06
ALLIANZIM US LRG CAP BU20 DE	0,08	12,60
ALLIANZIM US LRG CAP BU10 DE	0,08	13,70
ARK NEXT GENERATION INTERNET	0,08	-38,95
ARK GENOMIC REVOLUTION ETF	0,08	0,00
GRANITESH 2XLNG BABA ETF-USD	0,08	-42,41
GRANITESH 2XLNG META ETF-USD	0,08	321,06
BTD CAPITAL FUND	0,08	5,75
ADVISORSHARES RANGER EQ BEAR	0,08	5,72
SUBVERSIVE DECARBONIZATION	0,08	-0,42
SUBVERSIVE FOOD SECURITY ETF	0,08	-10,09
SUBVERSIVE MENTAL HEALTH ETF	0,08	-8,16
GABELLI COMMERCIAL AEROSPACE	0,08	13,00
AXS 2X NKE BEAR DAILY	0,07	-32,94
AXS 2X PFE BULL DAILY ETF	0,07	-43,39
GS DEFENSIVE EQUITY ETF	0,07	4,76
ASSETPLUS YOUNG AGE ACTV ETF	0,07	11,87
HORIZON KINETICS MEDICAL ETF	0,07	-3,41
ALLIANZIM US LCAP BUFFER10	0,07	14,20
ALLIANZIM US LC B20 FEB ETF	0,07	10,65
UNUSUAL SUBVERSIVE DT ETF	0,07	19,56
UNUSUAL WHALES SUB REPUB ETF	0,07	10,00
ALLIANZIM US LC BUFFER10 MAR	0,06	16,69
ALLIANZIM US LC BUFFER20 MAR	0,06	11,77
JPMORGAN EQUITY PREMIUM INCO	0,06	6,64
SGI US LARGE CAP CORE ETF	0,06	18,48
ARK AUTONOMOUS TECH & ROBOT	0,06	-10,25
INNOV PREM INC 30 BARR-APRIL	0,06	5,63
JPMORGAN EQUITY PREMIUM INCO	0,06	3,21
ADVISORSHARES PURE US CANN	0,05	95,86
ALLIANZIM US LC BUFFER20 MAY	0,05	7,86
ALLIANZIM US LC BUFFER10 MAY	0,05	11,70
BNY MELLON WOMEN'S OPPOR ETF	0,05	12,18

ALLIANZIM US LC BUFFER20 JUN	0,04	7,09
ALLIANZIM US LC BUFFER10 JUN	0,04	10,36
HULL TACTICAL US ETF	0,04	14,86
RUNNING OAK EFFICIENT GR ETF	0,04	11,25
T ROWE PRC CAP APPRECIATION	0,04	7,50
ISHARES LG CAP DEEP BUFF ETF	0,04	2,20
ISHARES LG CAP MOD BUFF ETF	0,04	4,82
IMGP BERKSHIRE DIVIDEND GR	0,04	3,48
FUTURE FUND LONG/SHORT ETF	0,04	1,31
AGF US MARKET NEUTRAL ANTI-B	0,04	-2,19
ARK SPACE EXPLORATION & INNO	0,03	-8,62
ASSETPLUS GD SEN ACT ETF	0,03	1,45
ALLIANZIM US LC BUFFER20 AUG	0,03	3,10
ALLIANZIM US LC BUFFER10 AUG	0,03	3,44
SPEAR ALPHA ETF	0,03	-2,58
ADVISORSHARES PURE US CANN	0,03	-45,74
SIMPLIFY MULTI-QIS ALT ETF	0,03	0,57
ARK NEXT GENERATION INTERNET	0,03	5,49
ALLIANZIM US LC BUFFER10 SEP	0,02	4,41
ALLIANZIM US LC BUFFER20 SEP	0,02	3,45
ADVISORSHARES EQUITY FOCUSED	0,02	2,62
FT VEST US EQUITY BUFFER & P	0,02	3,03
FT VEST US EQUITY MODERATE B	0,02	4,37
DEFIANCE S&P 500 ENH OPT INC	0,02	5,15
AB US LC STRATEGIC EQ ETF	0,02	8,68
BLACKROCK ADV LGE CAP IN ETF	0,02	9,34
JPMORGAN HEDGED EQUITY ETF	0,02	6,06
BFEB US EQUITY	0,02	6,13
JPMORGAN US TECH LEADERS	0,02	14,56
PURPOSE TACTICAL THEMATIC	0,02	12,28
PURPOSE TACTICAL THEMA-A CAD	0,02	12,24
PARAMETRIC HEDGED EQUITY ETF	0,02	6,98
STRATEGAS MACRO THEM OPPS	0,01	-4,85
CORE ALTERNATIVE ETF	0,01	-4,50
GMO U.S. QUALITY ETF	0,01	5,16
FIDELITY ENHAN LARG CAP CORE	0,01	4,88
CAMBRIA SHAREHOLDER YIELD ET	0,00	-1,71
AB CONSERVATIVE BUFFER ETF	0,00	0,31
NATIXIS GATEWAY QUALITY INC	0,00	0,02
ARK SPACE EXPLORATION & INNO	0,00	4,91
T ROWE PRC CAP APPRECIATION	0,00	-0,16

APPENDIX 2 ATTRIBUTION DETAILS CRASH PERIOD

Attribution Detail Crash-Period (All Securities, Including Buckets)		
Active managed ETF with S&P 500 Benchmark:	**% Average Weight:**	**Total Return (%):**
ARK FINTECH INNOVATION ETF	1,43	-14,16
ARK FINTECH INNOVATION ETF	1,43	-14,16
FIRST TRUST NORTH AMERICAN E	1,43	-0,30
WBI BULLBEAR VALUE 3000 ETF	1,43	-0,30
WBI BULLBEAR VALUE 3000 ETF	1,43	-0,30
PRINCIPAL US MEGA-CAP ETF	1,43	-25,61
ARK GENOMIC REVOLUTION ETF	1,43	-34,01
ADVISORSHARES RANGER EQ BEAR	1,43	47,27
AGF US MARKET NEUTRAL ANTI-B	1,43	8,93
FIRST TRUST NORTH AMERICAN E	1,43	-43,46
CAMBRIA SHAREHOLDER YIELD ET	1,43	-44,09
SPDR MFS SYSTEMATIC EQUITY	1,43	-34,86
WBI BULLBEAR VALUE 3000 ETF	1,43	-10,77
ARK AUTONOMOUS TECH & ROBOT	1,43	-33,43
ARK NEXT GENERATION INTERNET	1,43	-34,49
ARROW DWA TACTICAL ETF	1,43	-32,93
ARK INNOVATION ETF	1,43	-36,48
ARK GENOMIC REVOLUTION ETF	1,43	-28,30
HULL TACTICAL US ETF	1,43	-37,64
PRINCIPAL VALUE ETF	1,43	-43,65
RIVERFRONT DYNAMIC US DV ETF	1,43	-34,56
FT HORIZON MNGD VOL DOM ETF	1,43	-35,61
ADVISORSHARES EQUITY FOCUSED	1,43	-33,82
INVESCO BALANCED MULTI-ASSET	1,43	-27,55
INVESCO GROWTH MULTI-ASSET A	1,43	-31,08
SABA CLOSED END FUNDS ETF	1,43	-38,97
CLEARBRIDG DIV STRGY ESG ETF	1,43	-33,23
HULL TACTICAL US ETF	1,43	-37,82
PRINCIPAL US MEGA-CAP ETF	1,43	-30,24
ADVISORSHARES VICE ETF	1,43	-36,56
ARK INNOVATION ETF	1,43	0,00
ARK NEXT GENERATION INTERNET	1,43	0,00
ARK GENOMIC REVOLUTION ETF	1,43	-12,87
ARK INNOVATION ETF	1,43	0,00
ARK NEXT GENERATION INTERNET	1,43	0,00
ADVISORSHARES DORSEY WS ETF	1,43	73,88
WISDOMTREE US EFFICIENT CORE	1,43	-28,32
DISTILLATE US FUNDAMENTAL ST	1,43	-32,84
ARK GENOMIC REVOLUTION ETF	1,43	-12,43
INNOVATOR U.S. EQUITY BUFFER	1,43	-26,86
INNOVATOR U.S. EQUITY POWER	1,43	-21,25
ARK FINTECH INNOVATION ETF	1,43	-33,97

INNOVATOR U.S. EQUITY BUFFER	1,43	-23,60
INNOVATOR U.S. EQUITY ULTRA	1,43	-13,43
QRAFT AI-ENH US LRG CAP ETF	1,43	-30,19
QRAFT AI-ENH US LRG CAP MTM	1,43	-28,64
INNOVATOR U.S. EQUITY ULTRA	1,43	-13,73
INNOVATOR U.S. EQUITY POWER	1,43	-14,87
CAMBRIA CANNABIS ETF	1,43	-39,25
AMPLIFY SEYMOUR CANNABIS ETF	1,43	-40,19
ARK GENOMIC REVOLUTION ETF	1,43	0,00
FIRST TRUST ACTIVE FACTOR LA	1,43	-35,80
CORE ALTERNATIVE ETF	1,43	-5,77
ARK INNOVATION ETF	1,43	0,00
LEUTHOLD CORE ETF	1,43	-17,42
DAY HAGAN/NED DAVIS RESEARCH	1,43	-23,75
PACER PACIFIC ASSET FLOATING	1,43	-19,14
HARBOR DIVIDEND GROWTH LEADE	1,43	-32,66
HULL TACTICAL US ETF	1,43	-37,64
ARK NEXT GENERATION INTERNET	1,43	-34,79
ADVISORSHARES RANGER EQ BEAR	1,43	-17,24
ADVISORSHARES RANGER EQ BEAR	1,43	-17,24
SABA CLOSED END FUNDS ETF	1,43	-0,09
ARK INNOVATION ETF	1,43	-36,27
BETASHARES US EQ STR BEAR-CH	1,43	113,30
ARK AUTONOMOUS TECH & ROBOT	1,43	-33,90
CAMBRIA SHAREHOLDER YIELD ET	1,43	-0,30
PRINCIPAL VALUE ETF	1,43	-25,96
ADVISORSHARES RANGER EQ BEAR	1,43	-0,30
ADVISORSHARES VICE ETF	1,43	-0,30

APPENDIX 3 ATTRIBUTION DETAILS RECOVERY PERIOD

Attribution Detail (All Securities, Including Buckets)		
Active managed ETFS with S&P 500 Benchmark:	**% Average Weight:**	**Total Return (%):**
SABA CLOSED END FUNDS ETF	1,43	1,86
ARK GENOMIC REVOLUTION ETF	1,43	59,86
CAMBRIA SHAREHOLDER YIELD ET	1,43	-20,48
WBI BULLBEAR VALUE 3000 ETF	1,43	1,75
WBI BULLBEAR VALUE 3000 ETF	1,43	1,75
ARK FINTECH INNOVATION ETF	1,43	1,75
ARK FINTECH INNOVATION ETF	1,43	1,75
ARK INNOVATION ETF	1,43	46,74
ADVISORSHARES RANGER EQ BEAR	1,43	-22,68
AGF US MARKET NEUTRAL ANTI-B	1,43	-1,23
FIRST TRUST NORTH AMERICAN E	1,43	38,85
CAMBRIA SHAREHOLDER YIELD ET	1,43	36,02
SPDR MFS SYSTEMATIC EQUITY	1,43	31,63
WBI BULLBEAR VALUE 3000 ETF	1,43	0,52
ARK AUTONOMOUS TECH & ROBOT	1,43	36,27
ARK NEXT GENERATION INTERNET	1,43	39,32
ARROW DWA TACTICAL ETF	1,43	24,34
ARK INNOVATION ETF	1,43	44,28
ARK GENOMIC REVOLUTION ETF	1,43	50,82
HULL TACTICAL US ETF	1,43	28,38
PRINCIPAL VALUE ETF	1,43	35,58
RIVERFRONT DYNAMIC US DV ETF	1,43	28,94
FT HORIZON MNGD VOL DOM ETF	1,43	28,60
ADVISORSHARES EQUITY FOCUSED	1,43	31,44
INVESCO BALANCED MULTI-ASSET	1,43	21,22
INVESCO GROWTH MULTI-ASSET A	1,43	22,88
SABA CLOSED END FUNDS ETF	1,43	28,80
CLEARBRIDG DIV STRGY ESG ETF	1,43	28,19
HULL TACTICAL US ETF	1,43	30,63
PRINCIPAL US MEGA-CAP ETF	1,43	26,76
ADVISORSHARES VICE ETF	1,43	33,20
ARK INNOVATION ETF	1,43	0,00
ARK NEXT GENERATION INTERNET	1,43	0,00
ARK GENOMIC REVOLUTION ETF	1,43	0,00
ARK INNOVATION ETF	1,43	15,08
ARK NEXT GENERATION INTERNET	1,43	0,00
ADVISORSHARES DORSEY WS ETF	1,43	-38,98
WISDOMTREE US EFFICIENT CORE	1,43	27,47
DISTILLATE US FUNDAMENTAL ST	1,43	31,97
ARK GENOMIC REVOLUTION ETF	1,43	0,00
INNOVATOR U.S. EQUITY BUFFER	1,43	22,87

INNOVATOR U.S. EQUITY POWER	1,43	17,58
ARK FINTECH INNOVATION ETF	1,43	33,96
INNOVATOR U.S. EQUITY BUFFER	1,43	21,31
INNOVATOR U.S. EQUITY ULTRA	1,43	2,79
QRAFT AI-ENH US LRG CAP ETF	1,43	29,96
QRAFT AI-ENH US LRG CAP MTM	1,43	28,75
INNOVATOR U.S. EQUITY ULTRA	1,43	12,07
INNOVATOR U.S. EQUITY POWER	1,43	13,52
CAMBRIA CANNABIS ETF	1,43	31,02
AMPLIFY SEYMOUR CANNABIS ETF	1,43	30,21
ARK GENOMIC REVOLUTION ETF	1,43	0,00
FIRST TRUST ACTIVE FACTOR LA	1,43	31,04
CORE ALTERNATIVE ETF	1,43	10,93
ARK INNOVATION ETF	1,43	0,00
LEUTHOLD CORE ETF	1,43	13,21
DAY HAGAN/NED DAVIS RESEARCH	1,43	14,12
PACER PACIFIC ASSET FLOATING	1,43	13,77
HARBOR DIVIDEND GROWTH LEADE	1,43	27,92
HULL TACTICAL US ETF	1,43	28,38
BETASHARES US EQ STR BEAR-CH	1,43	-46,63
ARK AUTONOMOUS TECH & ROBOT	1,43	44,97
PRINCIPAL VALUE ETF	1,43	6,14
ARK NEXT GENERATION INTERNET	1,43	38,10
ADVISORSHARES RANGER EQ BEAR	1,43	1,75
ADVISORSHARES RANGER EQ BEAR	1,43	1,75
PRINCIPAL US MEGA-CAP ETF	1,43	6,22
ADVISORSHARES RANGER EQ BEAR	1,43	1,75
FIRST TRUST NORTH AMERICAN E	1,43	1,75
ADVISORSHARES VICE ETF	1,43	1,75