A Comparative Study of Active and Passive funds; Measuring Risk and Returns Before and During Pandemic

Abstract:

Investing and saving have always been integral aspects of human behavior. Saving essentially represents deferred consumption, as individuals set aside money for future use. In recent years, saving and investing have become more accessible to the general public due to the digitization of banks and the rise of online banking, making financial markets more approachable. Money is a critical resource that enables individuals to meet their needs and achieve their desired lifestyles. By saving, individuals can attain greater security and flexibility. Our society has become increasingly consumer-oriented, with consumption at an all-time high. To sustain current and future consumption, individuals need to save money. This growing demand and interest in investing have prompted financial markets to expand their offerings, making it more challenging to navigate the investment landscape. This study will focus on financial theories and models such as the Sharpe ratio, Treynor ratio, and Jensen's alpha to help guide investors through the complexities of the modern investment climate. A major contribution of this study is to provide insights on how to invest to maximize potential returns while balancing the desired level of risk in financial crises like the Corona pandemic. The goal is to offer a comprehensive understanding of the strategies and considerations involved in making informed investment decisions regarding active managed funds and passive index funds on the Swedish stock market. To accomplish this, 47 active funds and 20 passive funds on the Swedish market have been examined. The performance of these funds in relation to their risk was studied across two periods: before the Corona pandemic, from January 2015 to December 2019, and during the pandemic, which lasted from 2020 to May 5, 2023. The implications of this research are significant, as it equips investors and financial professionals with the tools needed to construct fund portfolios with active and passive fund options that align with their risk tolerance and return expectations. The results of this study indicate that active funds generated higher returns before the pandemic, while passive funds generated higher return during pandemic. When risk metrics were taken into account, active funds managed to achieve better performance. However, passive funds proved to be more resilient against financial crises with lower volatility.

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Key words: Sharpe ratio, Treynor ratio, Jensen's alpha, Active, Passive, Funds, Total return.

Acknowledgement and dedication

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Philip Bälter Philip Zander

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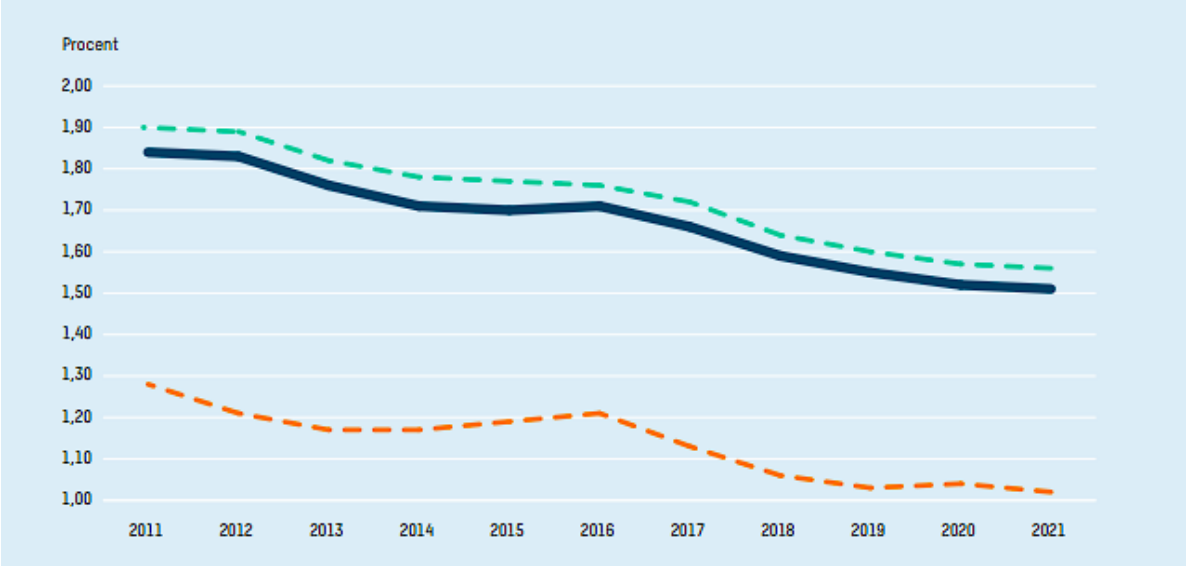
1. Introduction

The management of investment funds has long been a pivotal topic in financial research and investing. Investors are often faced with the choice between passively and actively managed funds, each with its own set of benefits and drawbacks. Passively managed funds aim to mirror the returns of a specific index (Pekin Singer Strauss Asset Management, 2016) while actively managed funds seek to outperform the market through the expertise and strategic decisions of the fund managers. Investors rely on the manager's expertise, which should, in theory, justify higher returns compared to passive investment (FCA, 2016) This paper aims to examine and compare the returns and risks of these two types of funds over two distinct periods: the years 2015-2019 and during the COVID-19 pandemic. When reflecting on the discussion concerning actively versus passively managed funds, previous studies, see for example (Carhart 1997; Chevalier & Ellison 1999; Ferreira et al. 2013) demonstrate that there is no positive relationship between cost (in this case, the management fee) and return for this asset class. Instead, these studies suggest that higher costs tend to lead to lower returns, thereby questioning the viability of active management.

A study made by G. Malkiel in 2003, he contributed that passive indexing or passive management is effective in different markets. With that said he means that even if a financial market is ineffective, passive management is still effective, because markets appear to be efficient and are adjusting to new information for individual stocks, funds and the market as whole. He means that this is reflected in the market prices immediately and with no delay.

This study contributes to the existing literature by providing additional insights that can help investors in making more informed decisions based on their risk tolerance and return expectations. The period from 2015-2019 was characterized by relative stability and growth in the markets, whereas the COVID-19 pandemic introduced a phase of extreme uncertainty and volatility. By comparing these periods, we aim to understand how active and passive management are influenced by market conditions and how they perform relative to each other in both calm and crisis times.

The mutual fund market has undergone rapid transformation in recent years. Swedish investors have increased their fund assets with a value of one billion Swedish crowns in 2000, compared to about seven billion crowns in 2021 (Fondbolagens förening, 2021) The number of equity funds has also increased in Sweden, constituting the largest fund category, and has surged from 889 in 2005 to 4.193 in 2021 (Wiklund, 2021). With this pronounced increase in the availability of funds accessible to private investors. One consequence of this significant increase might be that the fund managers are exposed to tougher competition. We see the signs of increased competition in the decreasing management fees, for example Swedish equity fund fees have gone at a steady downgoing slope from 1.30 % 2011, to the lowest fee a decade later in 2021 where the average fee was 1.02 % (Wiklund, 2021), see figure 1, displaying a chart where (The orange line measure the swedish mutual funds, the green line measures the foreign mutual funds and the blue line is general funds in total).



Source: Per Wiklund Authors' graph based on data from AMF (AMF, 2021).

Fama and French (2010), demonstrates that investing in active funds does not invariably yield profitability for private investors. This phenomenon may foster heightened interest in passive funds, consequently exerting downward pressure on fees for active funds in order to compete with their passive counterparts. Notably, there exists no universally implemented fee structure for all funds; rather, each individual fund determines its fee level autonomously. Moreover, structural disparities exist in the levied fees, potentially resulting in disparate remunerations

for fund managers contingent upon the fund in question. Additionally, other facets necessitate consideration, including administrative overhead.

To address the research question, a quantitative method was employed, analyzing return data and risk measures for both passively and actively managed funds. Data was collected from financial databases and reports such as Morningstar and bloomberg. In order to analyze the data collected, this thesis will use methods such as Sharpe ratios, Jensen's alpha and The Treynor ratio. These models will answer our question about the returns and the risk taken in different time horizons and in comparison with actively managed funds and passive funds. Statistical analyses were conducted to compare the performances between the two time periods and to test the significance with those models.

1.1 Purpose and research question

The objective of this thesis is to offer a basic understanding of investments in mutual funds and to determine which types of funds have historically performed best in relation to the risk associated with them. The thesis also aims to explore the differences between passive funds and actively managed funds, and how these management styles can yield varying returns depending on the period of investment.

The historical data will be examined over two different periods. The first period is intended to represent a more stable market environment, without significant crises or events causing substantial disruptions to the financial markets. The second period focuses on the COVID-19 pandemic, which caused noticeable impacts worldwide, including in the financial and economic sectors.

The research questions to be addressed in this thesis are:

- What are the risk-adjusted returns of actively managed mutual funds compared to passively managed mutual funds, taking into account measures such as Sharpe ratio, Treynor ratio, and Jensen's alpha?
- How do the average annualized returns of actively managed mutual funds compare to those of passively managed mutual funds across different asset classes and investment horizons?

1.2 Background information

In this section, the concepts of active and passive funds, their history, and their significance in today's economy are explained. Furthermore, an explanation of COVID-19 is provided, along with an analysis of how the pandemic affected the economy. These concepts are important to highlight and explain in order to provide the reader with a broader overview of the essay.

1.2.1 Active investing

To understand the origins of active investing, it is essential to examine its development over the past 50 years, highlighting significant changes in investment strategies and the emergence of new market participants, as detailed by Ellis (2014). Initially, institutional investing was dominated by insurance companies and bank trust departments, focusing on long term investments in established bluechip companies. However, as mutual fund managers like Fidelity demonstrated superior performance, mutual fund sales expanded, drawing attention from pension funds. This resulted in the rapid growth of money center banks as investment managers and the establishment of new investment firms competing for pension business by offering active management services. Despite challenges such as limited trading capabilities and high brokerage commissions, early practitioners of performance investing achieved impressive results, shifting investor focus from preserving capital to outperforming the market. The emergence of performance measurement services like those offered by A.G. Becker and Merrill Lynch further highlighted the superior performance of new investment firms compared to traditional banks. As pension funds increasingly pursued superior performance, they shifted their investments away from banks towards these new firms, leading to their rapid growth rate and success in the market.

Furthermore, discussion was held regarding the evolution of investment management fees and the changing landscape of active investing. Historically, investment management fees were relatively low, with some institutions charging fees as low as 0.1% of assets. However, with the rise of performance investing in the 1960s, a shift occurred from cost driven to value driven markets, where fees were viewed as indicators of expected superior performance.

Consequently, fees for active investment management significantly increased over time, despite expectations that competition would lower fees. This trend persisted even as assets under management multiplied, resulting in increased profitability in the investment business. It is worth mentioning that while fees are deducted automatically as a percentage of assets, they have a significant impact on investment returns. Despite the perception of fees as minor, even a small percentage can have substantial implications for investors' overall returns.

There were also some challenges faced by active investment managers and the high fees associated with their services, particularly compared to low fee indexing. It argues that the true cost of active management should be measured as the gradual fee as a percentage of progressive returns after adjusting for risk, which can often be excessively high. Moreover, it suggests that the increasing efficiency of security markets makes performance rankings of investment managers largely meaningless, as deviations from equilibrium prices become unpredictable, (Ellis 2014).

1.2.2 Passive investing

The world's first mutual fund was introduced in the USA in 1976 by the fund company Vanguard, which is an index fund created by fund manager John Bogle. The interest in passive funds has gradually increased over time, and today, more and more Swedish investors are choosing to invest in passive funds. A significant reason for this is the low fee that investors pay for their capital compared to active funds, where they pay a larger fee to the fund companies. The common passive funds are index funds and ETFs (Exchange-Traded Funds). The primary difference between these two is that you can buy and sell an ETF as long as the stock exchange is open. However, it is worth mentioning that in this study, we will primarily focus on index funds (Vanguard, 2024).

Passive funds, also known as index funds, carefully follow a specific index in their investment strategy. For example, fund managers managing index funds follow the OMXS30, an index representing the 30 most traded stocks on the Stockholm Stock Exchange. The goal for these funds is to mirror exactly the same composition as the index they follow, which means they invest in the companies included in this index in proportion to their weight in it.

One of the main advantages of passive funds is their lower management fees compared to active funds. This is because the management of these funds is less complex as they do not require continuous analysis and active trading in the same way as active funds do. Instead of trying to select individual stocks to invest in, the managers of passive funds simply buy the stocks included in the chosen index.

Statistics from Morningstar show that only a minority of actively managed funds in the USA have managed to outperform their benchmark index in recent years. Only 21 percent of these funds beat their index over the past 5 years, while only 10 percent succeeded over a ten-year period (Avanza, 2020). This data supports Erola's hypothesis of the efficient market hypothesis, which argues that it is difficult to systematically beat the market in the long run.

1.2.3 Corona pandemic

Originating in China, COVID-19 rapidly spread worldwide, necessitating the closure of schools, restaurants, workplaces, and various other establishments. Policymakers imposed stringent restrictions on movement, instilling fears of uncontrolled transmission and prompting widespread lockdown measures. Consequently, companies faced substantial challenges in generating revenue, leading to numerous business closures or the need for government financial assistance to sustain operations (*Oliveira et al., 2021)*

The COVID-19 pandemic has had a substantial impact on global financial markets. M. Ali, N. Alam, and S. Rizvi conducted an analysis in 2020 of the global financial market within 100 days following the COVID-19 outbreak. Nearly 30% of global wealth investment had disappeared. The authors also argue that uncertainty and very high volatility have put pressure on the market. Financial markets were deeply affected by pervasive fear and uncertainty. Investors grappled with insecurity regarding both their investments and the broader societal trajectory. This climate of apprehension precipitated a reduction in global economic activity, as evidenced by decreased production levels amid uncertainty over demand and disruptions in supply chains. Moreover, the pandemic wrought havoc on the tourism industry, trade, and local food prices, exerting immense pressure on stock prices and precipitating market crashes worldwide.

Studies, such as those conducted by *Selmi & Bouoiyour, 2020*, illustrate how global financial markets plummeted, exacerbating market volatility as panicked reactions ensued. In response, major central banks intervened by implementing expansive asset purchase programs in a bid to stabilize markets. The involvement of these influential institutions helped catalyze swift reversals in market sentiment, propelling markets from the depths of despair to significant upward surges.

According to data from Statistics Sweden (SCB, 2021), equity wealth on the Swedish stock exchange declined by 365 billion Swedish crowns during the first half of the year. SCB also highlights a notable increase in foreign ownership during this period, particularly in the United States. Swedish investors divested from domestic equities and funds, reallocating capital to the perceived safety of the US market, often regarded as a "safe harbor" within the financial realm. This reallocation stemmed from fears and convictions regarding the comparative financial resilience of the United States versus Sweden. Swedish households reduced their equity holdings by over 18 billion crowns during the first half of 2020 (SCB, 2021)

1.3 Disposition

The outline and disposition of the thesis appears as follows; In Chapter 2, we will review previous research, examining and analyzing prior findings. Furthermore, in Chapter 3, we explore theoretical aspects, including discussions on active management and risk measurement, which provide the reader with a more fundamental understanding of the subject. Chapter 4 highlights the methods we have used in our work, and Chapter 5 describes our data selection and the reliability of this data. Chapter 6 presents the results we have obtained using Excel and Stata. Chapter 7 discusses the limitations of our thesis, and finally, in Chapter 8, we present our conclusions and discuss our findings.

2. Previous research

Karlsson and Svanberg (2018) investigated whether there is a correlation between fund fees and returns in relation to the risk taken by the investor. The primary focus was on whether it is worth investing in actively managed funds with higher fees compared to passive funds with lower fees. This study examined periods before the financial crisis, during the financial crisis from 2007 to 2009, and after the crisis. A total of 38 different Swedish funds were used in this study, of which 33 were active funds and the remaining were passive funds. To test the hypothesis, Jensen's alpha, Treynor ratio, and Sharpe ratio were used to measure risk in relation to returns. The results of this study indicated that there is no clear correlation between fund fees and returns in relation to risk. Thus, in financial crises, active funds have the highest return compared to passive funds in relation to performance measures and correlation analysis. When evaluating the Treynor ratio, passive funds exhibited a higher ratio than active funds. Furthermore, the results revealed that active funds possessed a higher Jensen's alpha compared to passive funds (Karlsson, Svanberg 2018).

In a study by Moradi and Fransson (2022), the performance of sustainable active and passive funds was examined with respect to given risk. The funds were selected using Morningstar, with the criteria that each fund must have at least three globes to be included in the study and at least 85% of holdings needed to be in Sweden. A total of 50 funds were analyzed, comprising 35 active funds and 15 passive funds, over the period from 2016 to the third quarter of 2021. To assess the funds' performance, statistical tests, Jensen's alpha, the Capital Asset Pricing Model, Sharpe ratio, and Treynor ratio were used. The study found that actively managed funds did not outperform passively managed funds. Thus, no significant difference in performance between active and passive funds was found (Moradi, Fransson 2022).

According to Ljungberg and Halonen (2012), the examination was conducted to determine whether active funds yield higher returns compared to passive funds. The study also analyzed the predictability of future returns based on historical data. This analysis employed methodologies such as the Capital Asset Pricing Model, the Three-Factor Model (Fama and

French), the Treynor Ratio, and Jensen's Alpha. The research encompassed a total of 28 active funds and 11 passive funds, examined over the period from 2000 to 2011 in the Swedish market. The findings revealed that active funds do not generate unusually high returns, indicating that investors should rather consider passive funds (Ljungberg, Halonen 2012).

Mohideen and Lopes (2022) recently investigated the relationship between active and passive funds, specifically examining whether Swedish active funds succeed in creating more value for investors compared to passive funds. The study analyzed the period from 2012 to 2022, encompassing a total of 36 active funds and 15 passive funds. The Sharpe Ratio, Treynor Ratio, and Jensen's Alpha were utilized in this study to evaluate which funds perform best relative to the associated investment risk. The empirical results indicated that active funds outperformed passive funds, although the difference was marginal. When risk-adjusted metrics were considered, active funds yielded a higher Sharpe ratio, Treynor ratio and Jensen's alpha compared to passive funds. (Mohideen, Lopes 2022).

Wayanos and Wolley (2016) investigated the choice between passive in comparison to an actively managed fund for an investor. They meant that investors can have a higher return if choosing an actively managed fund, but to identify the right one will be more hard and it all depends on ex ante information about the incentives, and also how skilled the manager is. To have a more strict index-based investment strategy there is a higher chance to reduce the risk of having information problems and decisions problems connected to the fund manager.

According to Glossner, Matos, Ramelli, and Wagner (2020), institutional investors played a significant role in the financial crash precipitated by the COVID-19 pandemic. The study found that institutional investment groups did not actively reallocate their portfolios during this period, effectively relying on private investors as a source of liquidity. Furthermore, the research indicated that mutual funds showed a preference for stocks characterized by high liquidity and low debt ratios. In summary, the authors suggest that in times of heightened market pressure and risk, institutional investors tend to prioritize firm resilience based on tangible financial metrics, rather than the intangible aspects that influence how a company operates and how employees experience their workplace.

The balance between risk and return in constructing investment portfolios has long been a primary focus in finance, prompting extensive research that has led to key theories and their practical applications. In the mid-20th century, Harry Markowitz's seminal work on Modern Portfolio Theory (MPT) emphasized the importance of diversification and efficient asset allocation to optimize returns while managing risk, as detailed in Markowitz (1952). MPT introduced the idea of the efficient frontier, offering a strategic guide for creating portfolios that achieve the best returns at different risk levels.

In the 1960s, the development of the Capital Asset Pricing Model (CAPM) clarified the complex relationship between risk and expected returns. William Sharpe's book "Portfolio Theory and Capital Markets" (1970) further explored portfolio construction using CAPM principles. However, empirical studies highlighted the limitations of CAPM, as asset returns often significantly deviated from its predictions. This led to the recognition of the need to address a broader range of factors influencing asset pricing and portfolio performance.

The Sharpe ratio is a metric aimed at measuring the desirability of a risky investment strategy or instrument by dividing the average period return above the risk-free rate by the standard deviation of the return-generating process. Originally devised in the mid 1960's as a performance measure for investment funds, it undeniably holds some value as an indicator of strategy quality, albeit with certain limitations. Notably, the Sharpe ratio fails to differentiate between upside and downside volatility. Indeed, high outlier returns, deviating from the norm, have the effect of disproportionately increasing the denominator (standard deviation) relative to the numerator, consequently reducing the ratio's value.

During the early 1960s, Jack Treynor conducted research aimed at improving the measurement of risk-adjusted returns such as in his paper "Toward a Theory of Market Value of Risky Assets,". According to Craig. W. French, the Treynor ratio can be equated in many ways with the Sharpe ratio. This is because both theories rely on seven main assumptions: no taxes, no market frictions, trading does not affect prices, agents maximize utility in the sense of Markowitz, investors are risk-averse, a perfect lending market is available, and finally, all investors have identical knowledge of the financial market and have the same forecasts for the future (W. French, 2003). The Treynor ratio is an extension of the CAPM, with the

difference being that the ratio focuses on systematic risk, also known as market risk.While Dr. Sharpe explicitly permits the covariance matrix of the risky assets to be singular, Dr. Lintner and Dr. Mossin insist that it must be positive definite and therefore non-singular. Treynor (1962) also assumes that the matrix is non-singular, although this is not as explicitly stated.

Jensen’s Alpha is predicted by the CAPM as well, but in order to measure risk Jensen’s Alpha assesses whether an investment has out- or under performed its expected return based on the level of risk. Jensen's alpha is an extension of CAPM designed to address the criticisms leveled against certain aspects of CAPM.

Fama and French developed an offshoot of the Capital Asset Pricing Model to refine and expand the framework for asset analysis. In 1992, they introduced their 3-factor model, which incorporated size of firms, book-to-book market values and excess return on the market. They later extended this model in 2014 to broaden its scope and improve its robustness for asset analysis. The model introduced in 2014 became known as the Fama-French 5-factor model, which, to the first three factors, also included the profitability factor and the investment factor. The profitability factor is described as the company reports that higher future earnings have a higher future return on the stock. The fifth factor, commonly known as "investment," connects the concept of internal capital allocation with stock market returns. This factor postulates that firms that commit a significant portion of their profits to large-scale growth projects tend to underperform in terms of stock returns. This relationship suggests a potential negative correlation between aggressive internal investment and subsequent stock market performance

Fama and French (2010) conducted an analysis to ascertain whether American fund managers exhibited sufficient skill to cover their costs based on net returns, and also explored variations in expected returns among fund managers, utilizing gross returns as a metric. The majority of net returns were found to be negative for investors over the long term. Gross alphas revealed the presence of both inferior managers, who decreased expected returns, and superior managers, who enhanced them. Their study employed both Jensen's Alpha and Carhart's Four Factor model as performance metrics. Gross returns were estimated to exhibit approximate

symmetry around zero. Instances of extreme skill or lack thereof were determined to be rare. Consequently, gross returns could be conceptualized as following a normal distribution.

This literature review forms the foundation for our research, which is focused on investigating the application of some of these theories in constructing efficient investments in funds. Our goal is to bridge the gap between theoretical frameworks and real-world challenges on how to properly invest between an active managed fund and a passive or addressing real-world complexities and providing investors and professionals with valuable insights for optimizing fund outcomes.

3. Theoretical framework

In this section, we delve deeper into the theories that contribute to a greater understanding of the structure of the thesis used for data analysis in this work. We commence by elucidating the efficient market hypothesis and behavioral finance, which aid in comprehending how funds promptly adjust to new information and how our decision-making regarding available information remains rational. Subsequently, we expound on active management, laying the groundwork for understanding how active funds are managed. Finally, we elaborate on risk measurement, delineating how risk is quantified and elucidating the various types of risk measurement employed in this thesis and their interpretation.

3.1 Efficient market hypothesis

The Efficient Market Hypothesis (EMH) explains that the financial market is efficient in reflecting all available information. In an efficient market, asset prices adjust quickly to new information, making it nearly impossible for an investor to achieve returns above average market returns. EMH suggests that it is difficult to 'beat the market' over the long term by identifying undervalued or overvalued securities because all information affecting value is already reflected in their price.

EMH can be classified into three groups. These groups are weak, semi-strong, and strong. In weak efficiency, all prices already reflect previous trading information, such as historical prices and trading volumes. Technical analysis, which attempts to predict future prices and their patterns based on past price data, is ineffective when investors try to beat market returns. Semi-strong efficiency reflects all available information to the public, such as financial reports or news. According to semi-strong efficient market theory, one cannot beat the market in the long run because all relevant information is already integrated into asset prices. In strong efficiency, prices reflect all available information, including private and public information. Strong form efficiency argues that even groups with monopolistic access to information, such as information not yet published, cannot achieve higher returns in the long run because this information also reflects asset prices (Fama, 1970).

Efficient market hypothesis is an important theory as it provides understanding of the relationship between active and passive funds and their returns in relation to risk. With a deeper understanding of EMH, it becomes easier to analyze why differences arise in returns between active and passive funds, both before the pandemic and during financial crises.

3.2 Behavioral finance

Traditional finance theory posits that individuals always act rationally and make decisions based on all available information. Behavioral finance challenges this theory by simultaneously considering other factors, such as the notion that individuals do not solely make rational decisions based on all available information. Human behavior often entails following herd instincts and conforming to the actions of others, thereby influencing investment behavior in financial markets. By not only considering rational decision-making but also incorporating psychology into the analysis, the interpretation of human decision-making becomes subject to scrutiny. This can be exemplified by Harry Markowitz's theory of Modern Portfolio Theory (MPT), wherein he suggests that individuals will allocate funds to the mean-variance portfolio, aiming for the highest possible return with the least amount of risk. While this may seem plausible, incorporating behavioral finance reveals that reality diverges from this expectation.

Russo and shoemaker (1989) made a study about the conflict between the Efficient market hypothesis and The behavioral finance perspective. Their study showed that people in general were overconfident about their own knowledge and thought they could make a better investment than just try to mirror the market or benchmark. The behavioral bias might be dangerous in case of risk-management when constructing a portfolio with risky assets (Andrew W. 2005) Behaviorists think that quantitative models such as CAPM are wrong as well, because financial markets are not perfectly efficient. Grossman and Stirglitz (1980) said that perfectly informative markets are impossible, because if a market is perfectly efficient they thought that there is no profit to gain (Andrew W. 2005).

The first generation of behavioral finance, often considered to emerge in the early 1980s, is frequently described as individuals who believed that standard finance was the correct approach, emphasizing the pursuit of greater wealth through rational thinking and willingness. These rational decisions were believed to lead to increased wealth. Investors during this era were characterized as irrational and misled by emotional errors in their quest for greater wealth and their rational mindset. These perceptions of investors began to shift with the emergence of the second generation (Finance for Normal People: How Investors and Markets Behave, 2017)

The second generation of behavioral finance, instead, describes the investor as neither rational nor irrational. Instead, the investor is viewed as normal. This perspective is characterized by the notion that we all strive to fit in and conform to societal norms. Like the protagonist in the story, everyone desires freedom coupled with a stable income and the ability to live life on their own terms with financial security. The second generation of behavioral finance, as outlined in the 2017 book *"Finance for Normal People: How Investors and Markets Behave,"* depicts this mindset as an unstructured framework with elements of standard finance, theories that replace other classic financial models, bridges between various theories, as well as elements of facts and real-world practice. Instead of emphasizing normal rational needs and emotional factors that influence the investor, it is argued that the second generation investor relies on guidance and seeks to avoid emotional errors to achieve success in their investments.

3.3 Active management

Actively managed funds are overseen by a manager whose primary objective is to surpass the market's return by selectively choosing various funds and assets. Generally, the fees charged for these funds vary depending on their performance relative to the market. An actively managed fund's success is contingent upon its performance, which is evaluated based on its returns. Investors in actively managed funds delegate full responsibility to the fund manager, relying on their expertise and research to guide investment decisions. Essentially, investors opt for actively managed funds to entrust the management of their assets to individuals likely possessing greater knowledge and expertise than themselves. It's worth noting that investing in actively managed funds typically entails higher costs compared to passive or index funds.

To assess a manager's performance, one can employ metrics such as Jensen's alpha. Jensen's alpha quantifies the manager's ability to forecast returns and provides insights into their skill level. This model represents an advancement of the Capital Asset Pricing Model (CAPM).

3.4 Risk measurement

When choosing between investing in active or passive funds, one almost always prefers to invest in the fund with the lowest risk. This is because we are almost always risk-averse for natural reasons, meaning we want to avoid risk and prefer security. We aim to minimize volatility in our investment portfolio and require as high a return as possible to compensate for the risk taken (Markowitz, 1959). If an active and passive fund have the same return over time, there is thus no reason to choose the fund with the highest risk as it risks capital loss. Therefore, it is interesting to investigate which funds perform best given their risk.

When assessing an investment's potential and risk, it is crucial to use various financial tools and measures to conduct a thorough analysis. Among these tools are beta values, standard deviation, Sharpe ratio, Jensen's alpha, and Treynor's ratio, all of which play different roles in understanding and assessing investment performance.

The beta value is a measure of an investment's sensitivity to market changes. A beta value of 1 means the investment moves in line with the market, while a value above 1 indicates higher sensitivity and vice versa. This tool provides investors insight into how an investment may react to market fluctuations. Standard deviation is a measure of the spread of values in a data set and is used to measure the risk or volatility of an investment. A higher standard deviation indicates greater variation in returns and thus higher risk, while a lower standard deviation signals less variation and therefore greater stability over time (HDFC mutual fund, 2024).

The Sharpe ratio is a well-known risk measure used to assess the return on an investment per unit of risk. By comparing the expected return to the risk-free return divided by the investment's standard deviation, investors can gauge how well the return compensates for the risk taken. Jensen's alpha measures how an investment and its return over or underperform based on its systematic risk. A positive alpha value indicates the investment outperforms expectations, while a negative value indicates underperformance.

Treynor's ratio measures the return per unit of systematic risk, i.e., the risk that cannot be diversified away by spreading the investment. By calculating the difference between the actual return and the risk-free return divided by the investment's beta, Treynor's ratio provides investors insight into how well the return compensates for systematic risk (Analystprep 2020).

In summary, these financial tools and measures are crucial for investors to understand and assess both the return potential and risk of an investment. By using a combination of these tools, investors can make more informed decisions and minimize risks in their portfolio.

4. Methodology

In the methodology section, we begin by explaining our statistical background. Furthermore, we elucidate beta and standard deviation, which are two risk metrics, where one of these metrics is used in the Sharpe ratio, Treynor ratio, or Jensen's alpha. Consequently, in the methodology section, we will provide a more detailed insight into how we have utilized the data we have collected. Finally, we will have a separate section, performance measurement, where we explain the metrics and models we will use, and how these are applied to our collected data.

4.1 Statistical background

In this thesis, we will primarily employ various formulas and methods to calculate returns and risk measurements. To facilitate this, hypothesis testing will be conducted between samples of active and passive data. Calculations have been performed in Excel, while all other statistical analyses and regressions have been carried out in STATA.

Hypothesis testing is utilized to resolve conflicts between two competing hypotheses regarding a specific population parameter of interest. One hypothesis is referred to as the null hypothesis, denoted H0, and the other as the alternative hypothesis, denoted HA. The null hypothesis represents a presumed default state of nature or status quo, while the alternative hypothesis contradicts this default or status quo. To conclude from the test results, we stick to certain limitations. A common significance level is 95%, corresponding to an alpha level of 5%. When conducting a hypothesis test with an alpha level of 5%, if the p-value or critical value exceeds the alpha level, the null hypothesis is not rejected. However, if the p-value or critical value falls within the alpha level, the null hypothesis can be rejected in favor of the alternative hypothesis (Jaggia, Kelly 2019).

4.2 Beta

A beta coefficient measures the volatility of an individual stock relative to the systematic risk of the entire market. Statistically, beta represents the slope of the regression line through a series of data points, where each point corresponds to the returns of an individual stock compared to the returns of the market.

Beta effectively describes how a security's returns respond to market movements. To calculate a security's beta, the covariance between the security's returns and the market's returns is divided by the variance of the market's returns over a specified period. This calculation provides insight into the stock's sensitivity to market fluctuations and helps to assess its risk in comparison to the overall market.

$$Beta\ coefficient: \frac{covariance(R_{e,}\ R_{m)}}{Variance(R_{m)}} \qquad (1)$$

The variables Re and Rm represent the return on an asset and the return on the overall market, respectively. As previously indicated, the overall market serves as the benchmark; in the case of Sweden, the OMXSBPI Index is utilized to represent the market. Covariance quantifies the extent to which fluctuations in asset returns are correlated with fluctuations in the benchmark returns. Variance, on the other hand, signifies the dispersion of the benchmark's data points around its mean.

4.3 Standard deviation

Standard deviation is a statistic used to measure the dispersion of a dataset relative to its mean and is calculated as the square root of the variance. To calculate the standard deviation, the deviation of each data point from the mean is determined, then these deviations are squared, summed, and averaged. The square root of this average provides the standard deviation, indicating the extent to which data points vary around the mean.

Sample Standard deviation: $\sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}}$ *(2)*

The standard deviation is the sum of the square root of the mean of the sample, subtracted by the common mean of all datasets, squared and divided by the number of data points n, subtracted by one as you can see in the formula above.

4.3.1 Performance measurement

In this section, we will delve deeper into the performance measurement used in this study and demonstrate how we have arrived at our conclusions. We will begin by explaining the Sharpe ratio, which measures total risk, then proceed to discuss Jensen's alpha, which is a useful method for assessing whether an investment has outperformed or underperformed relative to the given risk. Subsequently, we will elucidate the Treynor ratio, which measures systematic risk. We will also clarify the t-test of the Sharpe ratio, used to investigate whether our results are statistically significant relative to a given level of significance and our stated hypothesis. Finally, we will explain the significance of the calculated net asset value, a method we have employed to calculate the annual returns for each fund.

4.3.2 Sharpe ratio

The Sharpe ratio compares an investment's excess return relative to a benchmark with the standard deviation of its returns. A higher Sharpe ratio indicates a better historical risk-adjusted performance of the investment (Morningstar, 2024)

Sharp ratios formula are defined as:

$$Sharpe\ Ratio: \frac{E(r_p)-r_f}{\sigma_p} \qquad (3)$$

Here $E(r_p)$ is the expected return of the fund, r_f is the risk free rate and σ_p denotes the volatility of the fund. The Sharpe Ratio measures the risk adjusted return of a fund. It shows you how well the returns compensate for the level of risk taken.

4.3.3 Jensen's Alpha

As earlier mentioned in the theory part Jensen's Alpha In this study is also utilized, as predicted by the Capital Asset Pricing Model (CAPM). Jensen's Alpha evaluates an investment's performance by measuring whether it has outperformed or underperformed its expected return based on its level of risk. This metric extends the CAPM framework to address criticisms directed at certain aspects of CAPM, providing a more nuanced assessment of risk-adjusted returns.

$$\textit{Jensen's Alpha}: \alpha_p = R_p - (r_f + \beta_p(E(r_m) - r_f) \qquad (4)$$

Here R_p is the actual return of the fund and $(r_f + \beta_p(E(r_m) - r_f)$ is the expected return of the fund where r_f is the risk free rate, β_p the Beta of the fund and $E(r_m)$ the expected return of the market. Jensen's Alpha assesses whether an investment has out- or underperformed its expected return based on the level of risk.

4.3.4 Treynor ratio

In this study, the Treynor ratio, also known as the reward-to-volatility ratio, is used as a performance metric to determine how much excess return is generated for each unit of risk taken by a portfolio.

Risk in the Treynor ratio refers to systematic risk, measured by a portfolio's beta. Beta measures the tendency of a portfolio's return to change in response to changes in the overall market's return.

$$Treynor\ Ratio: \frac{E(r_p)-r_f}{\beta_p} \quad (5)$$

Here $E(r_p)$ is the expected return of the portfolio, r_f is the risk free rate and β_p is the Beta of the fund. Like the Sharpe Ratio, the Treynor Ratio measures the risk-adjusted return on a fund but specifically focuses on the systematic risk (Beta).

4.3.5 T-test of sharpe ratios

We employ a t-test to assess the significance of the results. There are two types of t-tests, one-tailed and two-tailed. We will use it for a one-tailed test as we are solely interested in examining whether the ratios are greater than just zero. This provides an indication of whether the funds outperform the risk-free rate or not. Our hypotheses are formulated as follows:

$$H_0: SR_i = 0$$
$$H_A: SR_i > 0$$

Here, H0 states that the funds' Sharpe ratios, which represent their risk-adjusted returns, are equal to the risk-free rate, while H1 suggests that the funds' Sharpe ratios are higher than the risk-free rate. The t-values for this test are calculated using the following formula, where SRi represents the fund's Sharpe ratio and σ is the calculated standard deviation:

$$t - test\ result = \frac{SR_i}{\sigma_{SRi}} \quad (6)$$

The t-test results are measured as the sharpe ratio divided with the standard deviation of the sharpe ratio, as you can see in the formula.

4.3.6 Calculated Net Asset Values

Net asset value (NAV) is defined as the value of the fund's assets minus the value of the fund's liabilities divided by total shares outstanding. Liabilities represent the fund's expenses such as employee salaries, operational costs, and management expenses (Corporate financial institution). To calculate the returns of the funds, we obtained data from Eikon where all amounts have been converted from SEK to USD. To compute the returns of the funds, we use the formula;

$$R_t = \frac{(NAV_t - NAV_{1-t})}{NAV_{t-1}} \cdot 100 \qquad (7)$$

Here, R_t represents the net return for period t, NAV_t is the net asset value today, and NAV_{t-1} is the initial net asset value at the beginning of the measurement period (Bank of baroda, 2023). This ultimately provides us with the net return of the fund.

5. Data

In this segment, we will outline the sources of our data and elucidate the rationale behind our investigation of particular dates. Additionally, we will clarify the methodology employed in utilizing the data to construct our regressions and statistical approaches. Finally, we will also assess the credibility of the data.

5.1 Sample selection

The funds that we have chosen to examine in our paper have been sourced from Morningstar's website. The fund fees for each fund have also been retrieved from this website. We have chosen to analyze the funds that meet the following criteria; the funds are registered in Sweden and categorized as Sweden in Morningstar's category. The funds also need to be active between January 2015 and December 2019, as well as between January 2020 and May 5th, 2023. This results in a total of 47 active funds and 20 passive funds. The reason we have chosen to examine active versus passive funds during these periods is because we want to compare which fund provides the highest return before and during the pandemic. We chose May 5th because it was then the World Health Organization (WHO) declared that the coronavirus pandemic is no longer considered a global emergency.

5.2 Data reliability

Given that our study focuses on past events, we have utilized data from well-known and established databases. In this thesis, we have carefully selected sources that are widely recognized and frequently used. We have also employed a variety of sources, integrating information and literature to comprehensively describe the different components upon which this thesis is based. These sources are also well-regarded and popular, often authored by reputable writers or scholars.

Since we are using historical data, there is no reason to suspect any alterations in the data, which we therefore consider reliable. The abundance of data in this field also facilitates verification through other sources and literature.

If this study were to be replicated with the same funds selected and similar models applied, the results would be consistent. Additionally, other studies using data from the same databases and sources corroborate our findings. Furthermore, we have utilized well-established analytical tools such as STATA and Excel. This combination of resources and methodologies ensures the reliability of our final results.

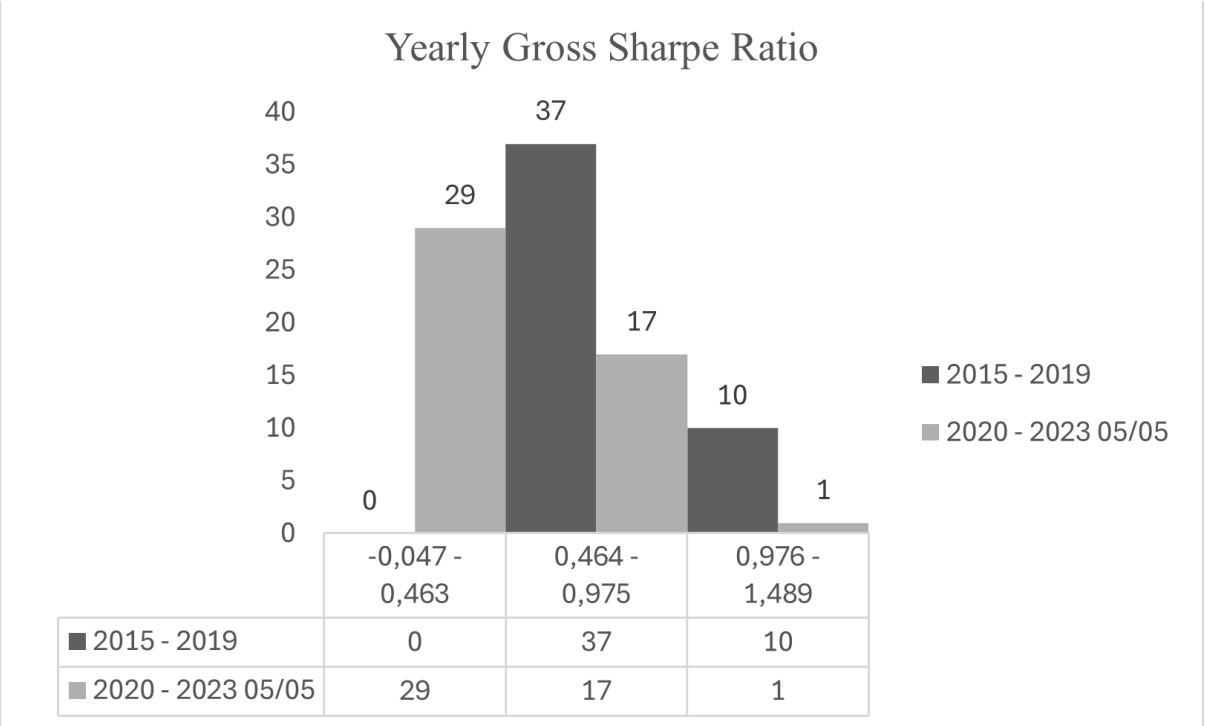
6. Empirical results

In this section of the thesis, we will present the results from our calculations. Using histograms, charts and appendices, we will demonstrate the differences we found between active and passive funds when calculating the Sharpe ratio, t-test of Sharpe ratio, Treynor ratio, and Jensen's alpha.

6.1 Sharpe ratio

In the diagrams below, we can observe histograms, showing the annual Sharpe ratios values for different periods before and during the COVID-19 pandemic. Figure 2 and 3 display gross values while figure 4 and 5 represent net values. Net values are calculated with fees included, which reduces the total return, hence the net values are slightly lower compared to the gross ones. Notably, all Sharpe ratio values are positive except for a few, which can be seen in the appendix 3-6.

Figure 2. Yearly gross Sharpe ratios for active funds for period 2015-2019 and period 2020-2023 5:e May.



	-0,047 - 0,463	0,464 - 0,975	0,976 - 1,489
2015 - 2019	0	37	10
2020 - 2023 05/05	29	17	1

Figure 3. Yearly gross Sharpe ratios for passive funds for period 2015-2019 and period 2020-2023 5:e May.

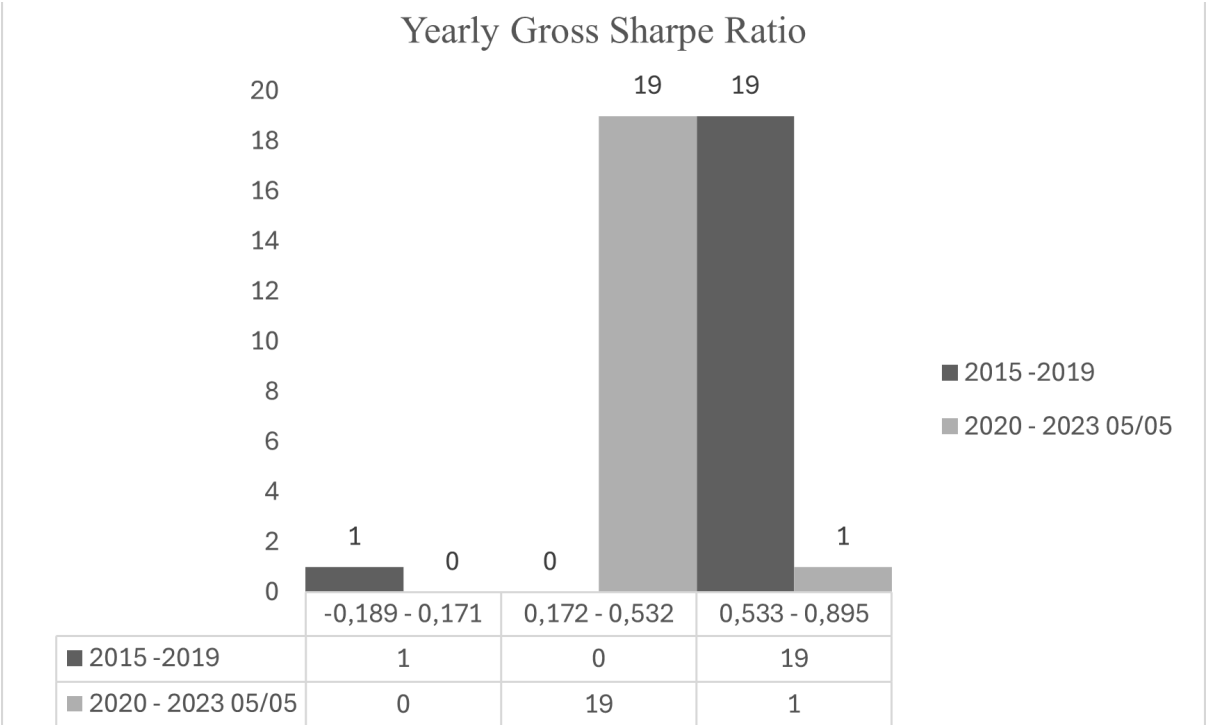


Figure 4. Yearly net Sharpe ratios for active funds for period 2015-2019 and period 2020 - 2023 5:e May.

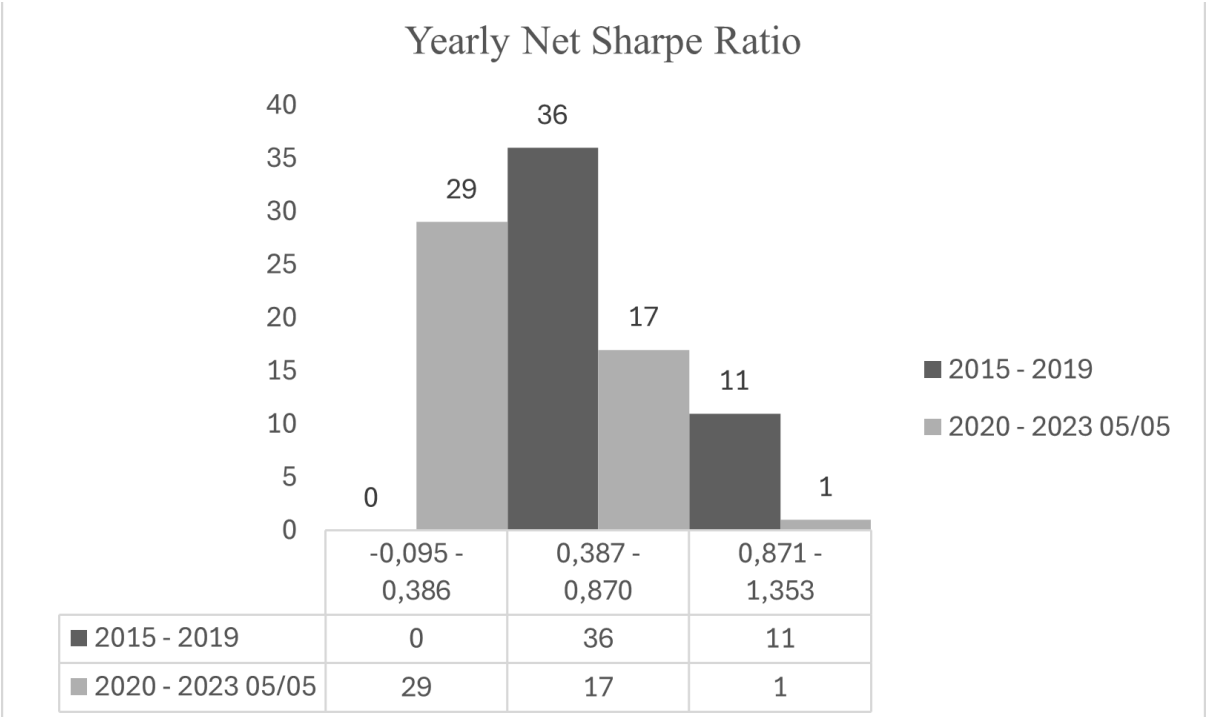
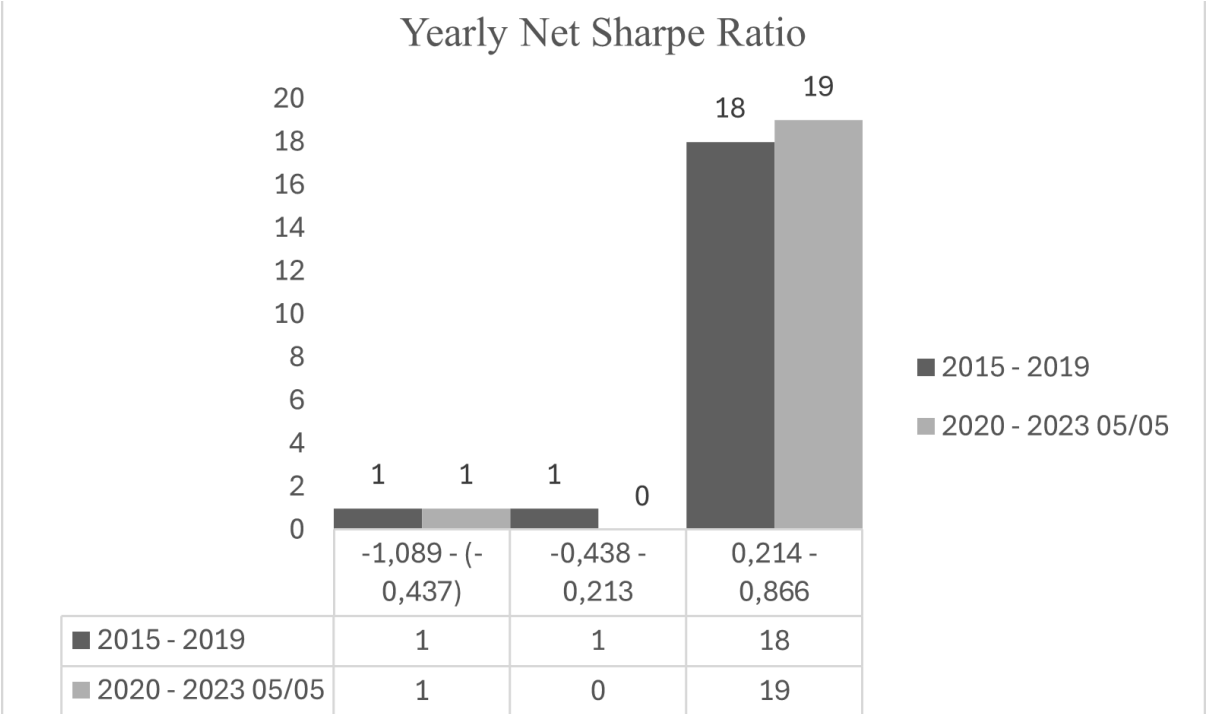


Figure 5. Yearly net Sharpe ratios for passive funds for period 2015-2019 and period 2020 - 2023 5:e May.



	-1,089 - (-0,437)	-0,438 - 0,213	0,214 - 0,866
2015 - 2019	1	1	18
2020 - 2023 05/05	1	0	19

The data results showed that the peak value is 1.489, as displayed in figure 2, indicating a high-performing fund relative to its risk. Funds with a Sharpe ratio above 1.0 demonstrate very good performance, where the return exceeds the risk. A Sharpe ratio above zero indicates a positive return relative to the risk taken, and the higher the Sharpe ratio, the better. The active funds have an average gross Sharpe ratio of 0.8655 during 2015-2019, whereas during the COVID-19 pandemic, the gross average Sharpe ratio was measured at 0.4274. The passive funds have an average of 0.7561 during 2015-2019 and 0.3863 during the COVID-19 period, see appendix 3-4. This suggests that active funds perform better in relation to their risk compared to passive funds in both periods, as they have higher average Sharpe ratios. These findings are in line with previous research by Mohideen and Lopes. Although they didn't find any significant difference, they found that active funds yielded a higher Sharpe ratio compared to passive funds.

It is of great importance and high relevance to include the net Sharpe ratio, as the difference between net and gross can be significant due to fund fees, as mentioned in the beginning. Due to the high fees for active funds, the difference for net Sharpe ratio between active and passive funds decreases in both periods. Active funds achieve a net Sharpe ratio in both

periods of 0.77 and 0.36, respectively. Meanwhile, passive funds performed with a net Sharpe ratio of 0.63 and 0.31. The difference is thus reduced between active and passive funds, especially during the COVID-19 period. This can be explained by the fact that passive funds, which follow market indices, have lower volatility during uncertain times, and therefore greater standard deviation in the denominator, which measures the dispersion or variability of a set of values from their mean. Another explanation is, of course, the high fees charged by fund managers for active funds, see appendix 1 and 2 for current fund fees for respective funds. Finally, this contradicts the assertions by Carhart (1997), Chevalier & Ellison (1999), and Ferreira et al. (2013) that higher costs lead to lower returns. These results could be due to the specific funds selected and the unique characteristics of the two periods analyzed, which may show different outcomes than their hypotheses.

6.2 T-test of sharpe ratios

By conducting a one sided t-test to compare the Gross and Net Sharpe ratios against the risk-free rate, we examine whether the Sharpe ratio, which measures risk-adjusted return, is significantly greater than zero. If the t-value is higher than the critical value, we will reject the null hypothesis that says that the Sharpe ratio is equal to zero. The results from the t-test show that all active funds between the years 2015-2019 had higher gross and net values compared to the critical value of 1.676, at a confidence level of 95%, see Appendix 7. This indicates that the risk-adjusted return is significantly greater than zero, and we can reject the null hypothesis. However, the investigation for the second period shows a different result. Out of 47 funds, 16 funds showed a gross t-value lower than the critical value of 1.676, and when examining the net value, the result showed that a total of 21 funds were below the critical value. This means that we cannot conclude that the funds' Sharpe ratios are significantly better than zero, and we cannot reject the null hypothesis.

The result for passive funds between 2015-2019 showed that only 1 fund had a gross t-value below the critical value of 1.729, and only 2 funds had a net t-value below the critical value, see Appendix 8. However, during the corona period from 2020 to May 5, 2023, a significantly larger number of values changed. Out of 20 passive funds, 12 funds showed a gross value below the critical value, and 13 funds showed a net value below the critical value,

and we therefore cannot reject the null hypothesis since we cannot say with certainty that these funds have a value significantly higher than zero.

6.3 Treynor Ratio

The histogram in Figure 6 below shows the annual average Treynor ratio for all 47 active funds across each period. In the years before the COVID-19 pandemic, the Treynor ratio exhibited better performance, with 42 funds having a ratio between 0.069 and 0.148, while 34 funds fell within the same range during the pandemic. The Treynor ratio, which measures risk-adjusted return and heavily focuses on systematic risks, had a higher average in the pre-pandemic years at 0.1102 compared to 0.0796 during the pandemic, as shown in Appendix 9. The difference between the periods can be explained by the impacts the pandemic had on the economy. Financial markets were significantly affected by the COVID-19 pandemic, resulting in high market volatility. This led to large fluctuations in the value of funds and their beta, which directly influences the Treynor ratio that measures risk-adjusted return based on systematic risk.

Figure 6. Yearly Treynor Ratio for active funds for periods 2015-2019 and 2020-2023 5:e may.

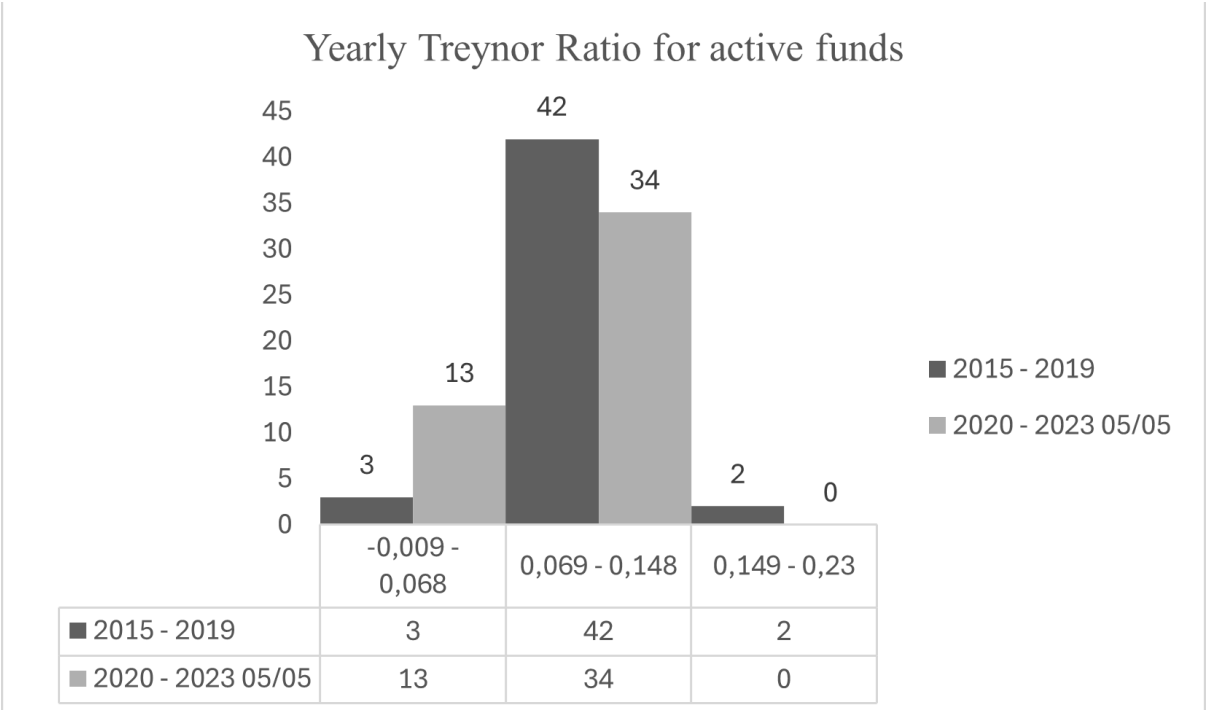
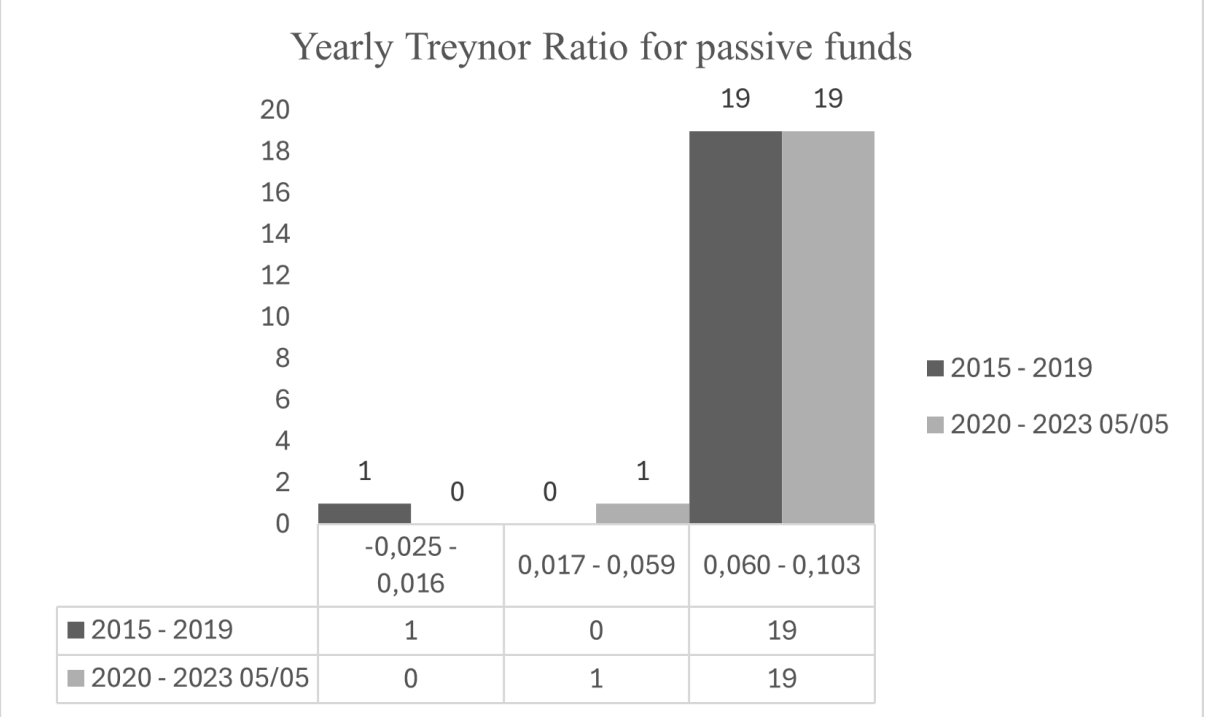


Figure 7. Yearly Treynor Ratio for passive funds for periods 2015-2019 and 2020-2023 5:e may.



The results for the Treynor ratio from the histogram in Figure 7 above indicate that the difference between the pre-pandemic period and the pandemic period for passive funds was considerably smaller compared to active funds. The average Treynor ratio between the two periods was 0.086 and 0.0738, respectively, as shown in Appendix 10. This marginal difference can be explained by the fact that passive funds mirror the market's beta. Treynor ratio uses beta, which is a measure of an investment's systematic risk and is measured by its correlation with market returns, unlike the Sharpe ratio which measures total risk. The higher the Treynor ratio a fund achieves, the better. Because passive funds mirror the market's beta, they will be less affected by financial crises since passive funds do not attempt to outperform by taking unnecessary risks. This makes passive funds tend to be more predictable in relation to total market risk. This can thus be explained by the efficient market hypothesis, which posits that it is not possible to consistently outperform the market in the long run (Fama, 1970).

Active funds thus showed better results compared to passive funds in both periods. When compared to a previous article, we can conclude that we have not arrived at the same conclusion. In the article written by Karlsson and Svanberg, which compared active and passive funds before, during, and after the financial crisis that lasted between 2007 and 2009, their results showed that passive funds performed marginally better in the Treynor ratio compared to our results. However, this can be explained by the fact that we analyzed different funds, but mainly that we examined different time periods, which may lead to different outcomes.

6.4 Jensen's Alpha

The diagrams in Figures 8 and 9 below illustrate how Jensen's alpha differs between the periods before and during the COVID-19 pandemic for active and passive funds. Jensen's alpha differs from previously used risk measures such as the Sharpe ratio and the Treynor ratio, where Jensen's alpha measures how well the investment outperforms or underperforms compared to expected returns based on its systematic risk. A positive Jensen's alpha indicates that the investment has exceeded expectations given the level of risk.

Figure 8. Distribution of yearly Jensen's alpha for active funds for period 2015-2019 and 2020-2023 5:e May.

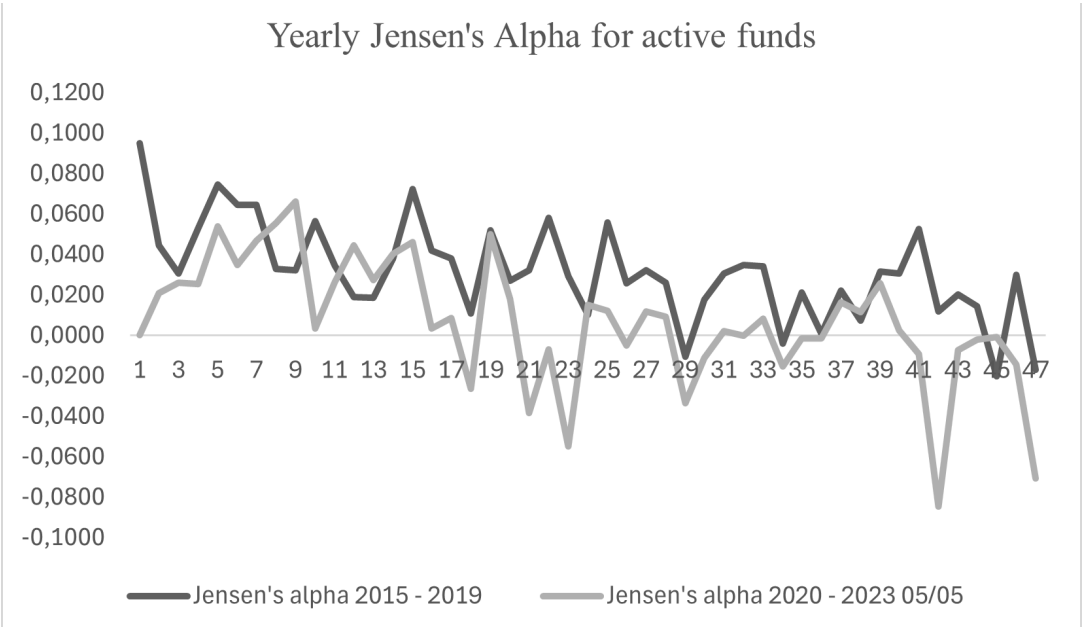
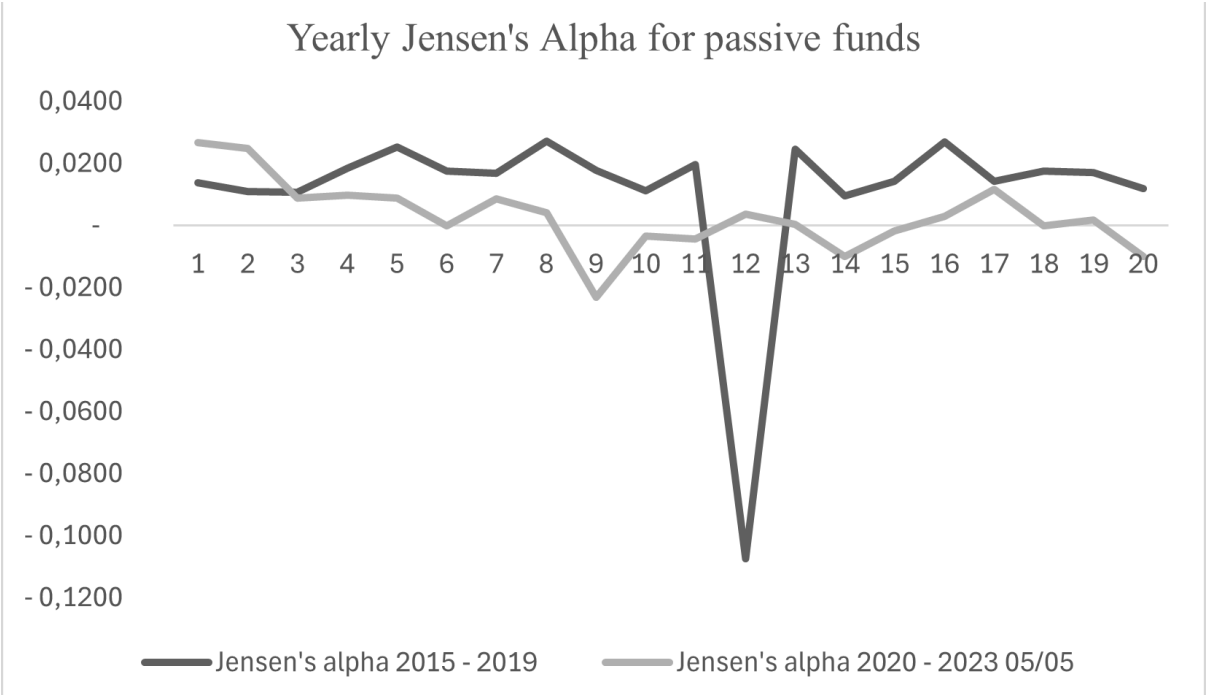


Figure 9. Distribution of yearly Jensen's alpha for passive funds for period 2015-2019 and 2020-2023 5:e May.



Prior to the pandemic, active funds had a higher alpha value, with an average of 0.0314. During the pandemic, the average alpha for all 47 active funds dropped to 0.007, as shown in Appendix 11. This difference between the periods can be partly explained by market volatility and the high uncertainty brought about by COVID-19. Rapid and unpredictable market movements made it difficult for active managers to anticipate trends and make well-informed decisions, thus making it challenging to achieve the expected returns given the portfolio risk. Higher market volatility during the pandemic also led to lower returns for active funds, with an average of 8.66% compared to 11.25% before the pandemic, as indicated in Appendix 13. This suggests that fund managers were more successful in achieving expected returns before the pandemic, thanks to lower market volatility, which made it easier for the fund managers to predict future trends.

For passive funds, Jensen's alpha before the pandemic was consistently around 0.01 to 0.02, with the exception of one fund that achieved an alpha of -0.1075, as shown in Figure 8. The average alpha for passive funds before and during the pandemic was 0.0109 and 0.0030, respectively, as detailed in Appendix 12. Passive funds performed better before the pandemic compared to during COVID-19. This can be attributed to the broad diversification and greater

transparency of passive funds, which make it easier for fund managers to track the market and follow market indices.

Jensen's alpha demonstrated better performance for active funds compared to passive funds in both periods. This result is in line with the previous article by Karlsson and Svanberg, which investigated how Jensen's alpha behaves for active and passive funds before and during a financial crisis. They found, just as we did, that active funds perform better both before and during a financial crisis compared to passive funds. However, it is worth noting that alpha varied significantly more for active funds, with a decrease of 0.0244, while passive funds experienced lower fluctuations, with a change of 0.0079.

6.5 Calculated Net and Gross Asset Value

The results from the calculated net and gross asset value analysis indicate that the average annual returns for both active and passive funds performed better prior to the COVID-19 pandemic compared to during the pandemic. For all 47 active funds examined, the gross and net returns before the pandemic averaged 11.25% and 10,08%, respectively. During the pandemic, the gross and net returns for active funds decreased to 8.66% and 7,49%, as shown in Appendix 13 and 15.

In contrast, the 20 passive funds exhibited an average total return for gross and net of 9.8% and 9,44% before the pandemic. During the pandemic, passive funds exhibited an average total return for gross and net of 8.33% and 8,47%, respectively, see appendix 14 and 16. The analysis revealed that active funds managed to achieve better performance compared to passive funds before the COVID-19 pandemic. During the COVID-19 pandemic, passive funds showed more resilience to fluctuations and volatility, and were able to perform a better result with higher gross and net return.

When taking management fee into account, as mentioned above, passive funds were able to perform a higher return compared to active funds. Passive funds reached a net return of 8,47% and active funds reached a net return of 7,49% during the pandemic. This can partly be explained by the high management fees associated with active funds. This finding is

consistent with previous research, including studies by Moradi and Fransson, and Ljungberg and Halonen, which found that active funds did not outperform passive funds. Moreover, investing in active funds is not advisable due to the elevated management fees associated with active fund management.

7. Limitations

Firstly, we collected data from morningstar and who fit our demands which resulted in 47 actively managed funds and 20 passive funds registered in Sweden. Our results are therefore only based on these funds and could have been differently if we had more or different funds in our analysis.

A major challenge we encountered during our work was the availability and limitation of accessible data. When examining which funds perform best between active and passive funds, we aimed to investigate as many years as possible while ensuring consistency by analyzing the same funds across the two periods to obtain as accurate results as possible. We encountered some issues and constraints when trying to do this. The funds that were active when the pandemic started also had to be active before the pandemic broke out. This resulted in exclusion of some funds due to data unavailability. We did this to avoid bias in our report, as a comparison between active and passive funds with different funds would have yielded misleading results.

Similarly, comparing the performance of active and passive funds over an extended period before and during the pandemic would have resulted in inaccurate conclusions. This limitation stemmed largely from the pandemic's duration, which lasted approximately 3.5 years.

8. Conclusion & Discussion

In conclusion, this study draws conclusions that all models demonstrate better returns relative to their risk during the period of 2015-2019, both for active and passive funds. However, declining returns and high volatility during the COVID-19 period have led to poorer outcomes across all models compared to the earlier mentioned period. Again, this can be explained by significant stress and pressure on the financial markets and society at large during the COVID-19 period.

The risk-adjusted return of actively managed mutual funds yielded a higher result compared to passively managed mutual funds. This includes all the risk metrics we used in this thesis, sharpe ratio, Treynor ratio and Jensen's alpha. However, active funds exhibited greater uncertainty with higher fluctuations compared to passive funds.

The returns for active funds outperformed passive funds before the pandemic, with average returns of 11.25%, while passive funds achieved average returns of 9.8% before the pandemic. During the period of the pandemic, active funds achieved a return of 8.66%, representing a decrease of 2.59 percentage points compared to pre-pandemic levels. This suggests that active funds struggled more to manage the stress and high fluctuations induced by the pandemic. Passive funds, conversely, demonstrated better resilience against the pandemic, experiencing only a marginal decrease of 0.97 percentage points, resulting in an annual average return of 8.83%.

The conclusion drawn from this study is thus that active funds succeed in delivering superior returns relative to risk in both periods. However, passive funds managed to outperform active funds, attaining a higher overall average return. In this instance, investing in passive funds proved to be more advantageous, as they ultimately yielded a more favorable return during the pandemic. The fact that passive funds outperform active funds supports the efficient market hypothesis, which suggests that it is impossible to consistently beat the market over time.

Our results for active funds before the COVID-19 pandemic are in line with the findings of Mohideen and Lopes, who reported that active funds generated higher returns compared to passive funds. When we examined the performance of active and passive funds during COVID-19, we found similar results to Moradi and Fransson, as well as Ljungberg and Halonen, indicating that active funds did not achieve higher returns compared to passive funds. However, it should be noted that our study investigates a different time period compared to the studies mentioned above.

When we compared our results with Karlsson and Svanberg, we found that our conclusions differ. We concluded that active funds generated lower returns compared to passive funds during financial crises, while Karlsson and Svanberg found the opposite. Again, this can be explained by the difference in the time spans investigated. However, we found similar results to Mohideen and Lopes when returns were measured in relation to risk. Active funds managed to achieve better results compared to passive funds in both periods, with the average Sharpe ratio, Treynor ratio, and Jensen's alpha yielding a better result for active funds.

There is no doubt that COVID-19 had negative effects on the economy, but whether one should invest in active or passive funds is up for debate. Active funds may suit risk-neutral and risk-seeking individuals better, who are indifferent to risk and solely seek high returns. Passive funds, which showed lower fluctuations, might be more suited to risk-averse individuals who seek to avoid risk and are looking for safe investments in both more turbulent and less volatile periods in the financial market.

If the pandemic had lasted longer, the effects on active funds would have been even more significant. An extended period of high market volatility and economic uncertainty would have further challenged active fund managers, negatively impacting their returns. Similarly, passive funds, with lower fees and broad diversification, would have continued to offer a more stable alternative for investors. Their ability to mirror the market's average returns without attempting to outperform it would have been appealing to risk-averse investors in an uncertain environment. In conclusion, a longer pandemic would likely have affected active funds more negatively than passive funds, emphasizing the importance of investors

understanding their risk profiles and choosing investment strategies that align with their risk tolerance and long-term goals.

This research method and analysis do not cover all relevant factors necessary for making well-informed investment decisions. In our study, we examined the risks and returns of active and passive mutual funds across two different time periods. Future research could contribute by exploring other types of funds, different time periods, or extending the timeline to gain a deeper understanding of how various funds fluctuate over different periods and under varying financial market conditions.

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Appendices

Appendix 1: Yearly Management Fees for Active Funds.

Fund Name	Yearly Management Fee
AstraZeneca Allemansfond	0,90%
Indecap Guide Sverige A	0,50%
SEB Sverigefond	1,30%
Länsförsäkringar Sverige Vision A	1,30%
Handelsbanken Sverige Selektiv (A) SEK	0,95%
Handelsbanken Sverige Selektiv (B1 SEK)	1,85%
Handelsbanken Sverige Selektiv	1,85%
Cliens Sverige C	0,80%
Cliens Sverige B	1,60%
PriorNilsson Sverige Aktiv A	1,20%
SEB Swedish Value Fond	1,50%
Cliens Sverige A	0,90%
SEB Stiftelsefond Sverige A utd	1,50%
Lannebo Sverige	1,60%
Spiltan Aktiefond Stabil	1,50%
Carnegie Sverigefond A	1,40%
Indecap Guide Sverige C	1,30%
Nordic Equities Sweden	1,58%
Lannebo Sverige Plus	1,00%
Ethos Aktiefond A Utdelande (SEK)	0,14%
Agenta Svenska Aktier	0,60%
PriorNilsson Sverige Aktiv B	1,20%
Folksam L0 Västfonden	0,40%

SEB Sverige Expanderad	1,25%
Swedbank Robur Exportfond A	1,25%
Folksam L0 Sverige	0,40%
Aktie-Ansvar Sverige A	1,50%
Humle Sverigefond	1,30%
Case Hållbar Select	1,51%
Swedbank Robur Sverige A	1,25%
Nordea Swedish Stars icke-utd	1,40%
Nordea Alfa	1,40%
Nordea Ideell Aktiefond	0,90%
AMF Aktiefond Sverige	0,40%
Skandia Världsnaturfonden	0,25%
Skandia Cancerfonden Inc	0,25%
Handelsbanken Sverige (A1 SEK)	1,01%
Didner & Gerge Aktiefond	1,22%
Enter Sverige Hållbar Tillväxt A	1,37%
Nordea Swedish Stars utd	1,40%
Cliens Sverige Fokus A	1,40%
Carnegie Spin-Off A	1,00%
Enter Select A	1,76%
Enter Sverige A	1,46%
Öhman Sverige A	1,30%
Lannebo Sverige Hållbar B SEK	1,60%
Ruth Core Swedish Equities	1,40%

Appendix 2: Yearly Management Fees for Passive Funds.

Fund Name	**Yearly Management Fee**
Avanza Zero	0%
Aktiespararna Topp Sverige A	0,34%
SEB Sverige indexnära B Utd	0,25%
Nordnet Sverige Index	0%
SEB Sverige indexnära A	0,25%
Handelsbanken Sverige Indexnära Criteria	0,67%
Skandia Sverige exponering	0,25%
SEB Sverige indexnära C institutional	0,20%
Handelsbanken Sverige Index Criteria (B1 SEK)	0,67%
Länsförsäkringar Sverige Index	0,20%
Storebrand Sverige A SEK	0,21%
Öhman Marknad Sverige Bred A	0,49%
Case Sverige Högutdelande bolag A	0,60%
Öhman Marknad Sverige Bred B	0,49%
Nordea inst aktief Sverige icke-utd	0,48%
Case Sverige Högutdelande bolag B	0,40%
Nordea Sverige Passiv utd	0,40%
Handelsbanken Sverige Index Criteria	0,67%
SEB Sverige indexfond A utd	0,25%
Nordea institutionella Aktiefonden Sverige utd	0,48%

Appendix 3: Average Gross Sharpe Ratio for active funds period 2015 - 2019 and 2020 - 2023 05/05.

Fund name	**Average Gross Sharpe Ratio 2015 - 2019**	**Average Gross Sharpe Ratio 2020 - 2023 05/05**
AstraZeneca Allemansfond	1,0176	1,2792
Indecap Guide Sverige A	0,9787	0,5548
SEB Sverigefond	0,7238	0,5687
Länsförsäkringar Sverige Vision A	0,9794	0,5720
Handelsbanken Sverige Selektiv (A) SEK	0,9907	0,6500
Handelsbanken Sverige Selektiv (B1 SEK)	0,9334	0,5557
Handelsbanken Sverige Selektiv	0,9336	0,6180
Cliens Sverige C	0,7728	0,5616
Cliens Sverige B	0,7694	0,6077
PriorNilsson Sverige Aktiv A	1,2592	0,4045
SEB Swedish Value Fond	0,6949	0,6792
Cliens Sverige A	0,7187	0,5811
SEB Stiftelsefond Sverige A utd	0,7370	0,4711
Lannebo Sverige	1,3417	0,6455
Spiltan Aktiefond Stabil	1,1362	0,5256
Carnegie Sverigefond A	0,7811	0,4424
Indecap Guide Sverige C	0,9578	0,4784
Nordic Equities Sweden	0,6167	0,2196
Lannebo Sverige Plus	1,4883	0,7150

Ethos Aktiefond A Utdelande (SEK)	0,8199	0,4395
Agenta Svenska Aktier	0,9519	0,1524
PriorNilsson Sverige Aktiv B	1,2597	0,3700
Folksam L0 Västfonden	0,8613	0,0975
SEB Sverige Expanderad	0,7408	0,4445
Swedbank Robur Exportfond A	0,9508	0,4694
Folksam L0 Sverige	0,8524	0,3495
Aktie-Ansvar Sverige A	1,1261	0,4735
Humle Sverigefond	0,9329	0,3747
Case Hållbar Select	0,5971	0,2251
Swedbank Robur Sverige A	0,8413	0,3624
Nordea Swedish Stars icke-utd	0,7010	0,3663
Nordea Alfa	0,7853	0,3436
Nordea Ideell Aktiefond	0,8601	0,4035
AMF Aktiefond Sverige	0,8992	0,2969
Skandia Världsnaturfonden	0,7371	0,3327
Skandia Cancerfonden Inc	0,7664	0,3321
Handelsbanken Sverige (A1 SEK)	0,7038	0,3730
Didner & Gerge Aktiefond	0,5999	0,4111
Enter Sverige Hållbar Tillväxt A	0,7717	0,3997
Nordea Swedish Stars utd	0,7010	0,3687
Cliens Sverige Fokus A	0,9589	0,3136
Carnegie Spin-Off A	0,7293	-0,0474
Enter Select A	0,7130	0,3078

Enter Sverige A	0,6800	0,3082
Öhman Sverige A	0,6490	0,3435
Lannebo Sverige Hållbar B SEK	0,9319	0,3374
Ruth Core Swedish Equities	0,7269	0,0060

Appendix 4: Average Gross Sharpe Ratio for passive funds period 2015 - 2019 and 2020 - 2023 05/05.

Fund Name	**Average Gross Sharpe Ratio 2015 - 2019**	**Average Gross Sharpe Ratio 2020 - 2023 05/05**
Avanza Zero	0,6497	0,5515
Aktiespararna Topp Sverige A	0,6296	0,5251
SEB Sverige indexnära B Utd	0,7295	0,3922
Nordnet Sverige Index	0,8489	0,4215
SEB Sverige indexnära A	0,8645	0,3922
Handelsbanken Sverige Indexnära Criteria	0,8083	0,3677
Skandia Sverige exponering	0,7910	0,4014
SEB Sverige indexnära C institutional	0,8816	0,3708
Handelsbanken Sverige Index Criteria (B1 SEK)	0,8084	0,2651
Länsförsäkringar Sverige Index	0,8236	0,3719
Storebrand Sverige A SEK	0,8467	0,3431
Öhman Marknad Sverige Bred A	-0,1892	0,3973

Case Sverige Högutdelande bolag A	0,8794	0,3596
Öhman Marknad Sverige Bred B	0,7971	0,3286
Nordea inst aktief Sverige icke-utd	0,8207	0,3643
Case Sverige Högutdelande bolag B	0,8943	0,3703
Nordea Sverige Passiv utd	0,8175	0,4363
Handelsbanken Sverige Index Criteria	0,8083	0,3677
SEB Sverige indexfond A utd	0,7909	0,7909
Nordea institutionella Aktiefonden Sverige utd	0,8207	0,3341

Appendix 5: Average Net Sharpe Ratio for active funds period 2015 - 2019 and 2020 - 2023 05/05.

Fund Name	**Average Net Sharpe Ratio 2015 - 2019**	**Average Net Sharpe Ratio 2020 - 2023 5:e May**
AstraZeneca Allemansfond	0,9531	1,0219
Indecap Guide Sverige A	0,9351	0,5221
SEB Sverigefond	0,6295	0,4878
Länsförsäkringar Sverige Vision A	0,8730	0,4880
Handelsbanken Sverige Selektiv (A) SEK	0,9283	0,6009
Handelsbanken Sverige Selektiv (B1 SEK)	0,8107	0,4594
Handelsbanken Sverige Selektiv	0,8109	0,5216
Cliens Sverige C	0,7187	0,5276
Cliens Sverige B	0,6605	0,5395

PriorNilsson Sverige Aktiv A	1,1383	0,3331
SEB Swedish Value Fond	0,5830	0,5547
Cliens Sverige A	0,6537	0,5378
SEB Stiftelsefond Sverige A utd	0,6321	0,4064
Lannebo Sverige	1,1264	0,5407
Spiltan Aktiefond Stabil	1,0265	0,4623
Carnegie Sverigefond A	0,6822	0,3513
Indecap Guide Sverige C	0,8400	0,3925
Nordic Equities Sweden	0,5004	0,1384
Lannebo Sverige Plus	1,3528	0,6468
Ethos Aktiefond A Utdelande (SEK)	0,8096	0,4332
Agenta Svenska Aktier	0,8991	0,1250
PriorNilsson Sverige Aktiv B	1,1388	0,2910
Folksam L0 Västfonden	0,8309	0,0813
SEB Sverige Expanderad	0,6404	0,3846
Swedbank Robur Exportfond A	0,8612	0,4001
Folksam L0 Sverige	0,8197	0,3293
Aktie-Ansvar Sverige A	0,9402	0,3680
Humle Sverigefond	0,8269	0,3222
Case Hållbar Select	0,4669	0,1442
Swedbank Robur Sverige A	0,7299	0,2888
Nordea Swedish Stars icke-utd	0,5986	0,2861
Nordea Alfa	0,6722	0,2618
Nordea Ideell Aktiefond	0,7797	0,3495
AMF Aktiefond Sverige	0,8580	0,2801
Skandia Världsnaturfonden	0,7196	0,3220
Skandia Cancerfonden Inc	0,7438	0,3214

Handelsbanken Sverige (A1 SEK)	0,6375	0,3341
Didner & Gerge Aktiefond	0,5143	0,3524
Enter Sverige Hållbar Tillväxt A	0,6866	0,3514
Nordea Swedish Stars utd	0,5986	0,2885
Cliens Sverige Fokus A	0,8619	0,2527
Carnegie Spin-Off A	0,6490	-0,0951
Enter Select A	0,6005	0,2392
Enter Sverige A	0,5875	0,2555
Öhman Sverige A	0,5292	0,2907
Lannebo Sverige Hållbar B SEK	0,7960	0,2490
Ruth Core Swedish Equities	0,5549	-0,0623

Appendix 6: Average Net Sharpe Ratio for passive funds period 2015 - 2019 and 2020 - 2023 05/05.

Fund Name	**Average Net Sharpe Ratio 2015 - 2019**	**Average Net Sharpe Ratio 2020 - 2023 5:e May**
Avanza Zero	0,6497	0,5515
Aktiespararna Topp Sverige A	0,6021	0,5049
SEB Sverige indexnära B Utd	0,7105	0,3812
Nordnet Sverige Index	0,8489	0,4215
SEB Sverige indexnära A	-1,0900	0,7049
Handelsbanken Sverige Indexnära Criteria	0,7560	0,3374
Skandia Sverige exponering	0,7716	0,3901

SEB Sverige indexnära C institutional	0,8659	0,3620
Handelsbanken Sverige Index Criteria (B1 SEK)	0,7561	0,2345
Länsförsäkringar Sverige Index	0,8066	0,3623
Storebrand Sverige A SEK	0,8288	0,3330
Öhman Marknad Sverige Bred A	-0,2228	0,3727
Case Sverige Högutdelande bolag A	0,8317	0,3332
Öhman Marknad Sverige Bred B	0,7533	0,3040
Nordea inst aktief Sverige icke-utd	0,7789	0,3405
Case Sverige Högutdelande bolag B	0,8626	0,3527
Nordea Sverige Passiv utd	0,7830	0,4165
Handelsbanken Sverige Index Criteria	0,7560	0,3374
SEB Sverige indexfond A utd	0,7716	0,3543
Nordea institutionella Aktiefonden Sverige utd	0,7789	0,3104

Appendix 7: T-test for Gross and Net sharpe ratio against risk-free rate for active funds, period 2015-2019 and 2020-2023 05/05.

Gross T-value	**> 1,676**	**Net T-value**	**> 1,676**	**Gross T-value3**	**> 1,676**	**Net T-value**	**> 1,676**
7,2909	Yes	6,8288	Yes	36,5722	Yes	29,2161	Yes
8,5362	Yes	8,1559	Yes	3,6243	Yes	3,4109	Yes
5,2510	Yes	4,5669	Yes	3,5385	Yes	3,0352	Yes
8,0115	Yes	7,1416	Yes	3,6933	Yes	3,1512	Yes
6,5126	Yes	6,1021	Yes	3,3576	Yes	3,1041	Yes
6,1931	Yes	5,3787	Yes	2,8922	Yes	2,3911	Yes
6,1952	Yes	5,3806	Yes	3,2190	Yes	2,7171	Yes
5,2310	Yes	4,8645	Yes	2,3832	Yes	2,2391	Yes
5,2403	Yes	4,4982	Yes	2,5908	Yes	2,3000	Yes
12,6802	Yes	11,4633	Yes	2,4061	Yes	1,9815	Yes
5,1843	Yes	4,3493	Yes	5,6361	Yes	4,6032	Yes
5,1945	Yes	4,7244	Yes	2,7997	Yes	2,5908	Yes
5,1547	Yes	4,4210	Yes	2,0305	Yes	1,7518	Yes
18,0552	Yes	15,1577	Yes	4,2295	Yes	3,5427	Yes
8,3075	Yes	7,5056	Yes	2,2206	Yes	1,9529	Yes
5,5207	Yes	4,8214	Yes	2,8807	Yes	2,2872	Yes
8,6757	Yes	7,6091	Yes	3,1603	Yes	2,5930	Yes
4,5409	Yes	3,6843	Yes	1,1291	No	0,7115	No
20,1666	Yes	18,3306	Yes	4,8808	Yes	4,4149	Yes
6,0765	Yes	5,9996	Yes	1,9890	Yes	1,9603	Yes
8,3709	Yes	7,9069	Yes	0,6953	No	0,5704	No
12,6931	Yes	11,4748	Yes	2,4363	Yes	1,9161	Yes
6,5632	Yes	6,3309	Yes	0,3934	No	0,3282	No
5,9482	Yes	5,1423	Yes	2,1319	Yes	1,8444	Yes

6,8088	Yes	6,1677	Yes	2,6002	Yes	2,2166	Yes
6,9774	Yes	6,7094	Yes	1,7673	Yes	1,6651	No
13,9575	Yes	11,6533	Yes	3,3333	Yes	2,5901	Yes
7,6079	Yes	6,7433	Yes	1,5162	No	1,3034	No
5,1468	Yes	4,0247	Yes	1,2066	No	0,7728	No
7,4997	Yes	6,5064	Yes	2,1329	Yes	1,6999	Yes
5,1275	Yes	4,3785	Yes	2,0986	Yes	1,6391	No
6,3443	Yes	5,4305	Yes	2,0078	Yes	1,5298	No
7,6763	Yes	6,9594	Yes	2,4222	Yes	2,0979	Yes
9,2575	Yes	8,8335	Yes	1,2423	No	1,1723	No
5,1797	Yes	5,0562	Yes	1,4236	No	1,3779	No
6,9412	Yes	6,7361	Yes	1,4206	No	1,3748	No
4,6183	Yes	4,1834	Yes	1,4371	No	1,2871	No
4,2046	Yes	3,6052	Yes	1,9797	Yes	1,6968	Yes
4,7925	Yes	4,2641	Yes	1,4087	No	1,2385	No
5,1275	Yes	4,3785	Yes	2,1115	Yes	1,6523	No
6,6403	Yes	5,9689	Yes	1,3638	No	1,0990	No
5,8532	Yes	5,2090	Yes	-0,2263	No	-0,4542	No
4,5551	Yes	3,8367	Yes	1,2011	No	0,9332	No
4,3116	Yes	3,7248	Yes	1,1114	No	0,9215	No
5,9815	Yes	4,8773	Yes	1,3955	No	1,1810	No
7,9169	Yes	6,7622	Yes	1,8650	Yes	1,3762	No
8,9311	Yes	6,8176	Yes	0,0292	No	-0,3042	No

Appendix 8: T-test for Gross and Net sharpe ratio against risk-free rate for passive funds, period 2015-2019 and 2020-2023 05/05.

Gross T-value	**>1,729**	**Net T-value**	**> 1,729**	**Gross T-Value**	**>1,729**	**Net T-value**	**>1,729**
5,2320	Yes	5,2320	Yes	3,3820	Yes	3,3820	Yes
5,0904	Yes	4,8682	Yes	3,1309	Yes	3,0100	Yes
5,5455	Yes	5,4010	Yes	1,7211	No	1,6729	No
7,2769	Yes	7,2769	Yes	2,0668	Yes	2,0668	Yes
6,7587	Yes	- 8,5214	No	1,7211	No	- 3,0931	No
6,3049	Yes	5,8973	Yes	1,6669	No	1,5293	No
6,1367	Yes	5,9862	Yes	1,8090	Yes	1,7582	Yes
6,9157	Yes	6,7927	Yes	1,6260	No	1,5875	No
6,3040	Yes	5,8966	Yes	1,2082	No	1,0690	No
6,9798	Yes	6,8361	Yes	1,7771	Yes	1,7314	Yes
7,1926	Yes	7,0411	Yes	1,6528	No	1,6040	No
-1,2987	No	-1,5296	No	1,9913	Yes	1,8682	Yes
6,9888	Yes	6,6098	Yes	1,5844	No	1,4679	No
7,1128	Yes	6,7226	Yes	1,6468	No	1,5237	No
7,1583	Yes	6,7932	Yes	1,7997	Yes	1,6825	No
7,0869	Yes	6,8357	Yes	1,6288	No	1,5515	No
7,0445	Yes	6,7475	Yes	2,1637	Yes	2,0653	Yes

6,3049	Yes	5,8973	Yes	1,6669	No	1,5293	No
6,1143	Yes	5,9648	Yes	1,6216	No	1,5724	No
7,1583	Yes	6,7932	Yes	1,6504	No	1,5333	No

Appendix 9: Average Treynor ratio between 2015-2019 and between 2020-2023 5:e May for active funds.

Fund Name	**Treynor Ratio 2015 - 2019**	**Treynor Ratio 2020 - 2023 05/05**
AstraZeneca Allemansfond	0,2291	0,0722
Indecap Guide Sverige A	0,1261	0,0954
SEB Sverigefond	0,1096	0,1004
Länsförsäkringar Sverige Vision A	0,1360	0,1007
Handelsbanken Sverige Selektiv (A) SEK	0,1507	0,1258
Handelsbanken Sverige Selektiv (B1 SEK)	0,1407	0,1068
Handelsbanken Sverige Selektiv	0,1407	0,1187
Cliens Sverige C	0,1067	0,1237
Cliens Sverige B	0,1066	0,1345
PriorNilsson Sverige Aktiv A	0,1389	0,0756

SEB Swedish Value Fond	0,1210	0,1063
Cliens Sverige A	0,0938	0,1138
SEB Stiftelsefond Sverige A utd	0,0924	0,0959
Lannebo Sverige	0,1231	0,1216
Spiltan Aktiefond Stabil	0,1426	0,1142
Carnegie Sverigefond A	0,1228	0,0755
Indecap Guide Sverige C	0,1188	0,0814
Nordic Equities Sweden	0,0873	0,0445
Lannebo Sverige Plus	0,1445	0,1378
Ethos Aktiefond A Utdelande (SEK)	0,1006	0,0883
Agenta Svenska Aktier	0,1082	0,0334
PriorNilsson Sverige Aktiv B	0,1421	0,0639
Folksam L0 Västfonden	0,1028	0,0220
SEB Sverige Expanderad	0,0854	0,0858
Swedbank Robur Exportfond A	0,1314	0,0839
Folksam L0 Sverige	0,1011	0,0671
Aktie-Ansvar Sverige A	0,1180	0,0874

Humle Sverigefond	0,0986	0,0798
Case Hållbar Select	0,0660	0,0400
Swedbank Robur Sverige A	0,0934	0,0610
Nordea Swedish Stars icke-utd	0,1114	0,0744
Nordea Alfa	0,1185	0,0717
Nordea Ideell Aktiefond	0,1175	0,0820
AMF Aktiefond Sverige	0,0728	0,0591
Skandia Världsnaturfonden	0,0954	0,0707
Skandia Cancerfonden Inc	0,0769	0,0706
Handelsbanken Sverige (A1 SEK)	0,0958	0,0864
Didner & Gerge Aktiefond	0,0831	0,0829
Enter Sverige Hållbar Tillväxt A	0,1019	0,0930
Nordea Swedish Stars utd	0,1114	0,0749
Cliens Sverige Fokus A	0,1225	0,0638
Carnegie Spin-Off A	0,0874	-0,0095
Enter Select A	0,0930	0,0658
Enter Sverige A	0,0879	0,0700

Öhman Sverige A	0,0592	0,0711
Lannebo Sverige Hållbar B SEK	0,1045	0,0581
Ruth Core Swedish Equities	0,0592	0,0012

Appendix 10: Average Treynor ratio between 2015-2019 and between 2020-2023 5:e May for passive funds.

Fund Name	**Treynor Ratio 2015 - 2019**	**Treynor Ratio 2020 - 2023 05/05**
Avanza Zero	0,0917	0,1022
Aktiespararna Topp Sverige A	0,0885	0,1001
SEB Sverige indexnära B Utd	0,0857	0,0798
Nordnet Sverige Index	0,0934	0,0811
SEB Sverige indexnära A	0,0987	0,0798
Handelsbanken Sverige Indexnära Criteria	0,0917	0,0718
Skandia Sverige exponering	0,0910	0,0795
SEB Sverige indexnära C institutional	0,1003	0,0755
Handelsbanken Sverige Index Criteria (B1 SEK)	0,0917	0,0515
Länsförsäkringar Sverige Index	0,0860	0,0689

Storebrand Sverige A SEK	0,0949	0,0678
Öhman Marknad Sverige Bred A	-0,0262	0,0755
Case Sverige Högutdelande bolag A	0,0979	0,0722
Öhman Marknad Sverige Bred B	0,0851	0,0624
Nordea inst aktief Sverige icke-utd	0,0896	0,0702
Case Sverige Högutdelande bolag B	0,0999	0,0745
Nordea Sverige Passiv utd	0,0895	0,0830
Handelsbanken Sverige Index Criteria	0,0917	0,0718
SEB Sverige indexfond A utd	0,0913	0,0735
Nordea institutionella Aktiefonden Sverige utd	0,0871	0,0626

Appendix 11: Average Jensen's Alpha for active funds for period 2015-2019 and 2020-2023 5:e May.

Fund Name	**Jensen's alpha 2015 -2019**	**Jensen's alpha 2020 - 2023 05/05**
AstraZeneca Allemansfond	0,0948	0,0002
Indecap Guide Sverige A	0,0445	0,0209
SEB Sverigefond	0,0305	0,0260
Länsförsäkringar Sverige Vision A	0,0528	0,0253

Handelsbanken Sverige Selektiv (A) SEK	0,0746	0,0539
Handelsbanken Sverige Selektiv (B1 SEK)	0,0646	0,0349
Handelsbanken Sverige Selektiv	0,0646	0,0468
Cliens Sverige C	0,0328	0,0554
Cliens Sverige B	0,0323	0,0663
PriorNilsson Sverige Aktiv A	0,0566	0,0033
SEB Swedish Value Fond	0,0345	0,0265
Cliens Sverige A	0,0188	0,0444
SEB Stiftelsefond Sverige A utd	0,0186	0,0273
Lannebo Sverige	0,0381	0,0403
Spiltan Aktiefond Stabil	0,0725	0,0461
Carnegie Sverigefond A	0,0420	0,0032
Indecap Guide Sverige C	0,0380	0,0084
Nordic Equities Sweden	0,0107	-0,0263
Lannebo Sverige Plus	0,0520	0,0501
Ethos Aktiefond A Utdelande (SEK)	0,0269	0,0180

Agenta Svenska Aktier	0,0321	-0,0385
PriorNilsson Sverige Aktiv B	0,0581	-0,0071
Folksam L0 Västfonden	0,0293	-0,0549
SEB Sverige Expanderad	0,0101	0,0150
Swedbank Robur Exportfond A	0,0559	0,0121
Folksam L0 Sverige	0,0258	-0,0049
Aktie-Ansvar Sverige A	0,0323	0,0119
Humle Sverigefond	0,0261	0,0092
Case Hållbar Select	-0,0106	-0,0335
Swedbank Robur Sverige A	0,0175	-0,0110
Nordea Swedish Stars icke-utd	0,0304	0,0021
Nordea Alfa	0,0348	-0,0002
Nordea Ideell Aktiefond	0,0340	0,0083
AMF Aktiefond Sverige	-0,0040	-0,0153
Skandia Världsnaturfonden	0,0212	-0,0013
Skandia Cancerfonden Inc	0,0009	-0,0015
Handelsbanken Sverige (A1 SEK)	0,0220	0,0163

Didner & Gerge Aktiefond	0,0072	0,0113
Enter Sverige Hållbar Tillväxt A	0,0314	0,0257
Nordea Swedish Stars utd	0,0304	0,0025
Cliens Sverige Fokus A	0,0525	-0,0091
Carnegie Spin-Off A	0,0117	-0,0847
Enter Select A	0,0203	-0,0074
Enter Sverige A	0,0144	-0,0023
Öhman Sverige A	-0,0201	-0,0010
Lannebo Sverige Hållbar B SEK	0,0298	-0,0144
Ruth Core Swedish Equities	-0,0169	-0,0707

Appendix 12: Average Jensen's Alpha for passive funds for period 2015-2019 and 2020-2023 5:e May.

Fund Name	**Jensen's alpha 2015 -2019**	**Jensen's alpha 2020 - 2023 05/05**
Avanza Zero	0,0137	0,0267
Aktiespararna Topp Sverige A	0,0109	0,0248
SEB Sverige indexnära B Utd	0,0107	0,0088
Nordnet Sverige Index	0,0184	0,0098

SEB Sverige indexnära A	0,0253	0,0088
Handelsbanken Sverige Indexnära Criteria	0,0176	-0,0001
Skandia Sverige exponering	0,0167	0,0085
SEB Sverige indexnära C institutional	0,0271	0,0040
Handelsbanken Sverige Index Criteria (B1 SEK)	0,0177	-0,0231
Länsförsäkringar Sverige Index	0,0112	-0,0034
Storebrand Sverige A SEK	0,0198	-0,0043
Öhman Marknad Sverige Bred A	-0,1075	0,0038
Case Sverige Högutdelande bolag A	0,0247	0,0004
Öhman Marknad Sverige Bred B	0,0094	-0,0099
Nordea inst aktief Sverige icke-utd	0,0142	-0,0018
Case Sverige Högutdelande bolag B	0,0269	0,0030
Nordea Sverige Passiv utd	0,0142	0,0118
Handelsbanken Sverige Index Criteria	0,0176	-0,0001
SEB Sverige indexfond A utd	0,0171	0,0018
Nordea institutionella Aktiefonden Sverige utd	0,0119	-0,0100

Appendix 13: Average gross return on investment for active mutual funds, period 2015-2019 and 2020 - 2023 5:e May.

Fund Name	**Return on investment, 2015 - 2019**	**Return on investment, 2020 - 2023 05/05**
AstraZeneca Allemansfond	0,1472	0,0526
Indecap Guide Sverige A	0,1174	0,0928
SEB Sverigefond	0,1050	0,0993
Länsförsäkringar Sverige Vision A	0,1249	0,0965
Handelsbanken Sverige Selektiv (A) SEK	0,1559	0,1337
Handelsbanken Sverige Selektiv (B1 SEK)	0,1459	0,1147
Handelsbanken Sverige Selektiv	0,1459	0,1266
Cliens Sverige C	0,1194	0,1402
Cliens Sverige B	0,1182	0,1504
PriorNilsson Sverige Aktiv A	0,1302	0,0759
SEB Swedish Value Fond	0,0983	0,0898
Cliens Sverige A	0,1046	0,1285
SEB Stiftelsefond Sverige A utd	0,1106	0,1172
Lannebo Sverige	0,1049	0,1064

Spiltan Aktiefond Stabil	0,1606	0,1323
Carnegie Sverigefond A	0,1157	0,0759
Indecap Guide Sverige C	0,1109	0,0803
Nordic Equities Sweden	0,0890	0,0506
Lannebo Sverige Plus	0,1150	0,1127
Ethos Aktiefond A Utdelande (SEK)	0,1158	0,1050
Agenta Svenska Aktier	0,1134	0,0413
PriorNilsson Sverige Aktiv B	0,1302	0,0641
Folksam L0 Västfonden	0,1182	0,0321
SEB Sverige Expanderad	0,0975	0,1006
Swedbank Robur Exportfond A	0,1380	0,0926
Folksam L0 Sverige	0,1093	0,0770
Aktie-Ansvar Sverige A	0,0961	0,0752
Humle Sverigefond	0,1196	0,1005
Case Hållbar Select	0,0745	0,0499
Swedbank Robur Sverige A	0,0996	0,0695
Nordea Swedish Stars icke-utd	0,1010	0,0719

Nordea Alfa	0,1024	0,0667
Nordea Ideell Aktiefond	0,1016	0,0751
AMF Aktiefond Sverige	0,0925	0,0789
Skandia Världsnaturfonden	0,1101	0,0857
Skandia Cancerfonden Inc	0,0898	0,0855
Handelsbanken Sverige (A1 SEK)	0,1125	0,1047
Didner & Gerge Aktiefond	0,0908	0,0933
Enter Sverige Hållbar Tillväxt A	0,1295	0,1213
Nordea Swedish Stars utd	0,1010	0,0723
Cliens Sverige Fokus A	0,1437	0,0800
Carnegie Spin-Off A	0,0961	-0,0020
Enter Select A	0,1168	0,0868
Enter Sverige A	0,1125	0,0934
Öhman Sverige A	0,0756	0,0925
Lannebo Sverige Hållbar B SEK	0,1149	0,0690
Ruth Core Swedish Equities	0,0644	0,0091

Appendix 14: Average gross return on investment for passive mutual funds, period 2015-2019 and 2020 2023 5:e May.

Fund Name	**Return on investment, 2015 - 2019**	**Return on investment, 2020 - 2023 05/05**
Avanza Zero	0,0859	0,0978
Aktiespararna Topp Sverige A	0,0831	0,0960
SEB Sverige indexnära B Utd	0,1012	0,0973
Nordnet Sverige Index	0,1042	0,0939
SEB Sverige indexnära A	0,1158	0,0973
Handelsbanken Sverige Indexnära Criteria	0,1088	0,0890
Skandia Sverige exponering	0,1072	0,0970
SEB Sverige indexnära C institutional	0,1176	0,0924
Handelsbanken Sverige Index Criteria (B1 SEK)	0,1089	0,0661
Länsförsäkringar Sverige Index	0,1024	0,0857
Storebrand Sverige A SEK	0,1049	0,0791
Öhman Marknad Sverige Bred A	-0,0224	0,0872

Case Sverige Högutdelande bolag A	0,1159	0,0895
Öhman Marknad Sverige Bred B	0,0945	0,0735
Nordea inst aktief Sverige icke-utd	0,0993	0,0816
Case Sverige Högutdelande bolag B	0,1181	0,0921
Nordea Sverige Passiv utd	0,1001	0,0959
Handelsbanken Sverige Index Criteria	0,1088	0,0890
SEB Sverige indexfond A utd	0,1075	0,0902
Nordea institutionella Aktiefonden Sverige utd	0,0993	0,0755

Appendix 15: Average net return on investment for active mutual funds, period 2015-2019 and 2020 2023 5:e May.

Fund Name	**Total net return for Active funds 2015 - 2019**	**Total net return for Active funds 2020 - 2023 05/05**
AstraZeneca Allemansfond	0,1382	0,0436
Indecap Guide Sverige A	0,1124	0,0878
SEB Sverigefond	0,0920	0,0863
Länsförsäkringar Sverige Vision A	0,1119	0,0835

Handelsbanken Sverige Selektiv (A) SEK	0,1464	0,1242
Handelsbanken Sverige Selektiv (B1 SEK)	0,1274	0,0962
Handelsbanken Sverige Selektiv	0,1274	0,1081
Cliens Sverige C	0,1114	0,1322
Cliens Sverige B	0,1022	0,1344
PriorNilsson Sverige Aktiv A	0,1182	0,0639
SEB Swedish Value Fond	0,0833	0,0748
Cliens Sverige A	0,0956	0,1195
SEB Stiftelsefond Sverige A utd	0,0956	0,1022
Lannebo Sverige	0,0889	0,0904
Spiltan Aktiefond Stabil	0,1456	0,1173
Carnegie Sverigefond A	0,1017	0,0619
Indecap Guide Sverige C	0,0979	0,0673
Nordic Equities Sweden	0,0732	0,0348
Lannebo Sverige Plus	0,1050	0,1027
Ethos Aktiefond A Utdelande (SEK)	0,1144	0,1036
Agenta Svenska Aktier	0,1074	0,0353
PriorNilsson Sverige Aktiv B	0,1182	0,0521
Folksam L0 Västfonden	0,1142	0,0281

SEB Sverige Expanderad	0,0850	0,0881
Swedbank Robur Exportfond A	0,1255	0,0801
Folksam L0 Sverige	0,1053	0,0730
Aktie-Ansvar Sverige A	0,0811	0,0602
Humle Sverigefond	0,1066	0,0875
Case Hållbar Select	0,0594	0,0348
Swedbank Robur Sverige A	0,0871	0,0570
Nordea Swedish Stars icke-utd	0,0870	0,0579
Nordea Alfa	0,0884	0,0527
Nordea Ideell Aktiefond	0,0926	0,0661
AMF Aktiefond Sverige	0,0885	0,0749
Skandia Världsnaturfonden	0,1076	0,0832
Skandia Cancerfonden Inc	0,0873	0,0830
Handelsbanken Sverige (A1 SEK)	0,1024	0,0946
Didner & Gerge Aktiefond	0,0786	0,0811
Enter Sverige Hållbar Tillväxt A	0,1158	0,1076
Nordea Swedish Stars utd	0,0870	0,0583
Cliens Sverige Fokus A	0,1297	0,0660
Carnegie Spin-Off A	0,0861	-0,0120
Enter Select A	0,0992	0,0692
Enter Sverige A	0,0979	0,0788

Öhman Sverige A	0,0626	0,0795
Lannebo Sverige Hållbar B SEK	0,0989	0,0530
Ruth Core Swedish Equities	0,0504	-0,0049

Appendix 16: Average net return on investment for passive mutual funds, period 2015-2019 and 2020 2023 5:e May.

Fund Name	**Total net return for Passive funds 2015 - 2019**	**Total net return for Passive funds 2020 - 2023 05/05**
Avanza Zero	0,0859	0,0978
Aktiespararna Topp Sverige A	0,0797	0,0926
SEB Sverige indexnära B Utd	0,0987	0,0948
Nordnet Sverige Index	0,1042	0,0939
SEB Sverige indexnära A	0,1133	0,0948
Handelsbanken Sverige Indexnära Criteria	0,1021	0,0823
Skandia Sverige exponering	0,1047	0,0945
SEB Sverige indexnära C institutional	0,1156	0,0904

Handelsbanken Sverige Index Criteria (B1 SEK)	0,1022	0,0594
Länsförsäkringar Sverige Index	0,1004	0,0837
Storebrand Sverige A SEK	0,1028	0,0770
Öhman Marknad Sverige Bred A	-0,0273	0,0823
Case Sverige Högutdelande bolag A	0,1099	0,0835
Öhman Marknad Sverige Bred B	0,0896	0,0686
Nordea inst aktief Sverige icke-utd	0,0945	0,0768
Case Sverige Högutdelande bolag B	0,1141	0,0881
Nordea Sverige Passiv utd	0,0961	0,0919
Handelsbanken Sverige Index Criteria	0,1021	0,0823
SEB Sverige indexfond A utd	0,1050	0,0877
Nordea institutionella Aktiefonden Sverige utd	0,0945	0,0707