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Matias Ottavainen

# **Comparison of the Performance of Active and Passive Funds before, during, and after COVID-19**

Evidence from the Finnish Stock Market

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<b>Author:</b>	Matias Ottavainen		
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**ABSTRACT:**

Tässä tutkielmassa tarkastellaan aktiivisten ja passiivisten rahastojen logaritmisia tuottoja sekä riskikorjattuja tuottoja ennen COVID-19 pandemiaa, sen aikana ja sen jälkeen Suomen osakemarkkinoilla. Viimeisen vuosikymmenen aikana rahastosijoittamisen suosio on kasvanut globaalisti, ja vastaavaa kehitystä on nähty myös Suomessa. Kasvavien sijoitusvarojen virtaaminen rahastoihin on lisännyt valinnanvaikeutta aktiivisten ja passiivisten rahastojen välillä.

Monet aikaisemmat tutkimukset rahastojen suorituskyvyn osalta ovat keskittyneet markkina-arvoltaan suurimpien kehittyneiden maiden osakemarkkinoiden kehitykseen. Tämä tarjoaa tilaisuuden tarkastella aikaisempien tutkimusten paikkansapitävyyttä myös pienemmillä osakemarkkinoilla, joissa markkinoiden tehokkuus tai markkina-anomaliat voivat olla ristiriidassa. Tähän tutkielmaan on valittu yhteensä 22 Suomen osakemarkkinoille sijoittavaa kasvuosuusosakerahastoa, joiden suorituskykyä vertaillaan riskikorjattujen tuottomittareiden ja logaritmisien tuottojen avulla aikavälillä 30.11.2018 – 6.5.2024. Riskikorjatuista tuottomittareista vertaillaan Sharpe ja Treynor luvun sekä Jensenin alphan kehitystä, ja logaritmisien tuottojen avulla vertaillaan rahastojen brutto ja nettotuottoja tarkasteltavilla aikaväleillä.

Tutkimuksen tuloksista selviää aktiivisten rahastojen parempi suorituskyky ennen COVID-19 pandemiaa sekä sen aikana riskikorjattujen tuottomittareiden ja logaritmisien tuottojen perusteella. COVID-19 pandemian aikana koettiin keskuspankkien elvyttävä rahapolitiikka ja alhaiset korot, jotka mahdollistivat tuottavamman aktiivisen salkunhoidon riskisempien pienyhtiösijoituksien avulla. Sen sijaan COVID-19 pandemian jälkeen passiiviset rahastot tuottivat paremmin, kun korot nousivat ja keskuspankit harjoittivat kireämpää rahapolitiikkaa. Tästä seurannut korkea volatiliteetti hyödynsi markkinoiden keskimääräistä kehitystä seuranneita passiivisia rahastoja parempien riskikorjattujen tuottojen ja logaritmisien tuottojen saavuttamisessa. Vaikka tutkimuksen tarkasteltava aikaväli rajattiin vain COVID-19 pandemian ympärille, tarjoaa se hyödyllistä tietoa Suomeen sijoittavien kasvuosuusrahastojen määrästä sekä suorituskyvystä. Tulevaisuuden jatkotutkimuksissa otoskoko voi olla suurempi, kun kiinnostus rahastosijoittamista kohtaan lisää palveluntarjoajien välistä kilpailua sekä pääoman virtauksen määrää Suomen osakemarkkinoille.

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**KEYWORDS:** Mutual fund, Accumulation fund, Active, Passive, Sharpe ratio, Treynor ratio, Jensen's alpha, Logarithmic return

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## 1 Introduction

Over the past few years, inflation has reduced the value of money and the purchasing power of consumers. Households have begun to look for investment opportunities in the market to protect and increase the value of their own wealth in the long run. One of the most popular and growing forms of investing has been mutual fund investing. It has been seen as an effortless way to start investing, as the fund is managed by a professional, and can easily be combined with a monthly investing with low starting amounts.

In mutual fund investing, the fund manager pools the investors' capital together and invests them in different investment asset classes. The different asset classes form a mutual fund that aims to grow the investor's wealth in the long term. Mutual funds in the financial markets can be divided into two different categories, passively and actively managed funds. Funds differ in terms of both management style and investment strategy, but the most significant difference is investment fees (Haslem, 2009, p. 9). Actively managed funds aim to outperform the market by making investment decisions that differ from the benchmark index. Thus, active management is used to achieve excess return. In contrast, passive funds do not attempt to achieve excess returns from the market but instead seek to track the return of the benchmark index through similar stock picks (Carneiro et al., 2022).

Mutual fund investing has gained popularity among Finns over the past ten years. According to research conducted by Statistics Finland (2024), 28,6 % of dwelling population in Finland owned mutual funds at the end of 2023, which was over ten percentage points higher than the corresponding figure in 2013 (17,2 %). The increasing number of customers and competition among asset managers has reduced management fees over the past few years. For example, in 2013 the average fees of actively managed equity funds in Europe were 1,56 %, compared to 1,36 % in 2019 (BlackRock, 2020).

## 1.1 Purpose of the study

The purpose of the study is to provide an insight of mutual fund investing, and to compare the returns of active and passive accumulation mutual funds. The data consists of accumulation mutual funds that invest in the Finnish stock market, and the returns of which are compared before, during and after the COVID-19 pandemic. This study enables an opportunity to compare and evaluate the profitability of accumulation mutual funds in the Finnish stock market in different market conditions. The analysis period from 30 November 2018 to 6 May 2024 is divided into three different subperiods in order to examine whether active accumulation mutual funds can outperform passive accumulation mutual funds over different market cycles. Thus, the first hypothesis of the study is:

$H_1$ : Active accumulation mutual funds outperformed passive accumulation mutual funds during COVID-19 because of successful active management.

This study also examines the risk-adjusted returns of accumulation mutual funds during different market cycles. Investors are risk-averse who seek to get the highest possible return with the lowest possible risk. A rational investor always chooses the one with lower risk from the mutual funds that have yielded the same return. Because of this, the second hypothesis in the study is:

$H_2$ : Passive accumulation mutual funds offer a better risk-adjusted return than active accumulation mutual funds because their ongoing charges are lower.

The motivation of the study is expressed in hypotheses. The purpose is to determine the effect that a mutual fund's choice will have on a long-term and short-term investor, and whether it is worth favouring certain types of mutual funds in a volatile market situation.

## **1.2 Structure of the study**

In the first chapter, the topic and hypotheses of the study is introduced. The second chapter defines the COVID-19 pandemic and examines mutual fund investing, active investing, passive investing, and previous academic studies related to the topic. The third chapter addresses the theoretical framework, and the fourth chapter covers the methods section. After that, the fifth chapter examines the calculated results and finally, the last chapters discuss the limitations, findings, and conclusions of the study.

## 2 Mutual fund investing

According to U.S. Securities and Exchange Commission (2017) mutual fund investing refers to an activity in which an investment fund pools the investors' capital together and invests them in different investment assets. In return, the investor receives a fund share which is equivalent to the invested capital in the mutual fund. Mutual fund investment assets can be e.g., shares, derivatives, bonds, or short-term money market instruments. Together, the investment assets form an investment portfolio, which is managed by the portfolio manager, either actively or passively.

There are two types of funds, open-end and closed-end. The market prices of open-end funds are determined by the fund's net asset value (NAV) after the market closes. NAV is calculated by deducting liabilities from the fund's assets, after which the fund's net assets are divided by the number of outstanding fund shares (U.S. Securities and Exchange Commission, 2017). Subscriptions to open-end funds can be made continuously, as NAV is always calculated before the investor's redeem or purchase order. On the other hand, the weakness of an open-end fund is the slowness of fund subscription, as the investor does not know the NAV at the time of purchase, but only after the stock exchange closes. Most funds are open-end such as mutual funds, but they can also be closed-end (U.S. Securities and Exchange Commission, 2017).

According to Haslem (2009) closed-end funds differ from open-end funds in terms of liquidity, fund size, redemption and purchase (p. 5). The purchase of a closed-end fund share typically takes place at a certain time e.g., when an initial public offering of the fund is made (U.S. Securities and Exchange Commission, 2017). After that, the fund shares exchange takes place between individual investors on secondary market, as on the stock exchange. When a closed-end fund is traded between investors, the actual NAV of the fund does not change, but either an overprice or an underprice is paid between the buyer and the seller. Thus, NAV of a closed-end fund may differ from the market price.

Mutual fund's purpose is to grow investors capital in the long term. The fund's accumulated capital can be distributed in two different ways to the investor, either as an accumulation unit or as an income unit. Accumulation unit means that the mutual fund does not annually distribute any profits to the investor, such as dividends or interest income (Seligson & Co, n.d.). Therefore, all the accumulated income will be reinvested in the mutual fund, without any tax consequences, which will increase the compounding effect. Instead, income unit means that mutual funds regularly pay earnings to investors. The income unit is taxable income, and the distributed amount varies with market trends (Seligson & Co, n.d.).

## **2.1 COVID-19**

Since the analysis period of this study focuses specifically on the COVID-19 pandemic, it is important to define it and describe what impact it had on the financial markets.

COVID-19 is referred to a global pandemic that originated in the Chinese city of Wuhan in December 2019 (World Health Organization, 2020). The pandemic was caused by a virus called SARS-CoV-2, which spread from person to person through droplet infections. It caused health risks and even deaths around the world. The World Health Organization (WHO) declared COVID-19 a global pandemic on 11 March 2020, after which social policies were changed by governments in several countries. Movement restrictions and remote working became more common during the pandemic, which also affected the financial markets as increased uncertainty. As of 5 May 2023, the COVID-19 pandemic was classified as a common viral infectious disease by the WHO, ending a global health emergency (Rigby & Satija, 2023).

The impact of COVID-19 on global financial markets was negative, as the pandemic made it difficult for industries to operate. Increased unemployment, declining purchasing power, and disruptions in supply chains impeded global economic growth during the pandemic (Swanson & Suzuki, 2020). In 2020, the world's average economic growth was

-3,59 % and only 36 countries out of 179 countries experienced positive economic growth during that period (Anggraini et al., 2022). A high level of volatility, typical of crises, was noticeable after WHO declared COVID-19 a global pandemic. As a result, the MSCI World Index that measures the performance of the developed countries' stock market fell 18,9 % over eight days (Anggraini et al., 2022).

According to Wiatt et al. (2024) central banks played a crucial role in combating the pandemic and a possible recession. The expansionary monetary policy enabled lower interest rates, higher liquidity, and the possibility for banks to grant loans to businesses. During the pandemic, the United States' federal government made it possible for a small business with fewer than five hundred employees to obtain a loan called the Paycheck Protection Program (PPP). PPP was utilized to ensure economic growth and employees' purchasing power. A similar stimulus was also undertaken by the European Central Bank (ECB), which granted a pandemic emergency purchase programme (PEPP) of €1,850 billion. Under the PEPP, the ECB purchased bonds from banks and corporates to maintain the purchasing power of households and businesses during the pandemic (European Central Bank, 2025). As a result of bank stimulus, the stock market quickly recovered from the crash. For example, the index OMXH25, which describes the development of the 25 most traded shares on the Helsinki Stock Exchange, yielded over 7 % during 2020, despite the pandemic (Nasdaq, 2025).

## **2.2 Advantages of mutual fund investing**

Mutual fund investing provides the investor an effortless and cost-effective way to increase wealth in the long term. Investing can be started with small amounts and can be easily combined with monthly saving. It is also simpler to start investing in mutual funds, as an investor does not need to have the same type of market knowledge as would be required for direct equity investments. According to Puttonen & Repo (2011) the benefits of mutual fund investing can be considered as following:

### 1. Diversification

The mutual fund allows the investor to diversify the capital into several different investment assets, which reduces the total risk. Diversification can take place e.g., through investments in various investment instruments, industries and continents. In addition, diversification in the mutual fund can be done with small investment amounts. This enables extensive diversification through the mutual fund even for those who do not have a large initial capital to start investing.

### 2. Liquidity

Most mutual funds are liquid, i.e., easily convertible into cash. This means that redemption and purchase orders to the fund typically take place daily, allowing for a quick response to changes in market conditions.

### 3. Portfolio management

It is effortless to start investing in mutual funds, as the investor does not have to make their own investment decisions. The fund is managed by professionals who follow the market for a living. It is the portfolio manager's responsibility to select a possible benchmark index for the fund, and to make the selections of individual investment instruments for the mutual fund.

### 4. Transaction costs

Mutual funds are institutional investors, which allows for low transaction costs due to high invested capital. In addition, institutional investors will be able to participate more freely in wholesale money markets, where private investors would not be able to participate without a broker.

### 5. Taxation

Mutual fund investments enable to postpone taxation to the future, as the investor is only liable to tax on capital gains when the fund share is redeemed or when income units are paid. In addition, mutual funds can trade the market tax-free and are not

subject to tax on their interest income. Particularly in accumulation funds, deferring taxation enables effective compounding interest effect until the redemption.

### **2.3 Disadvantages of mutual fund investing**

Investing always involves risk. The amount of risk depends on the investor's risk tolerance, long-term goals and the target of the investment. There are also risks in mutual fund investing. However, compared to direct equity investments, mutual fund investing can be considered a less risky investment due to its large diversification. Since it allows to reduce unsystematic risk in the portfolio. There are also other risks associated with mutual fund investing, as listed below:

1. Market risk

Systematic risk i.e., market risk, affects the development of the entire market and cannot be eliminated by diversification. For example, geopolitical conflicts, rising inflation and economic crises are typical market risks, as they affect all investments in the market (Seligson & Co, 2024).

2. Currency risk

If the currency of the fund's listing country differs from the currency of the investments, the fund is exposed to currency risk. Exchange rate fluctuations can have a negative impact on the return on investment if the currency of the fund weakens relative to the currency of the investments (Seligson & Co, 2024). On the other hand, a change in the value of a currency can also increase the return on investment.

3. Liquidity risk

If a mutual fund cannot be realized easily, it is called liquidity risk. The risk may occur in special mutual funds that invest in high-risk companies or during financial crises

such as the COVID-19 pandemic. During periods of liquidity risk, there are more sellers than buyers (Seligson & Co, 2024).

#### 4. Portfolio management risk

The idea of actively managed mutual funds is to generate better return than the average market return by making different investment choices from the benchmark index. Portfolio managers' investment decisions can be riskier due to the pursuit of better returns, which exposes the investor to portfolio manager risk (Seligson & Co, 2024). The risk is also increased by the high management costs of active mutual fund investing, which must be covered before excess returns from the market can be achieved (Kallunki et al., 2019).

#### 5. Political risk

Political risk in mutual fund investing means instability in the political decision-making of the target country. Weak legal protection, the possible expropriation of assets, and changes in taxation are political risks that can create a high-risk mutual fund (Bodie et al., 2023).

## **2.4 Passive investing**

According to Garcia et al. (2013) passive investing is an investment strategy in which unsystematic risk is minimized by investing in a specific benchmark index. In passive investment strategy, diversification is used for achieving average market returns, and the intention is not to outperform the benchmark index. Passive investment popularity has increased because of the difficulty of forecasting stock market as well as the increased awareness of the market efficiency hypothesis (Fama, 1970).

### **2.4.1 Index funds**

Index funds are commonly used way to start passive investing in the mutual fund markets. Their purpose is to provide the investor with an average market return, by following the benchmark index as closely as possible. The first index fund for a private investor was founded by John Bogle of the Vanguard Asset Management Association in 1975 (Gastineau, 2002). According to Gastineau (2002) the creation of index funds was based on studies showing that the average institutional investment manager was unable to generate excess returns from the market after management fees and administrative expenses. In the early 1970s, the stock market was institutionalized which reduced opportunities for non-professional investors to compete against institutional investors. Due to the creation of index funds, it became possible for a private investor to invest in a passive index fund, rather than an active fund. Index funds enabled lower management fees, portfolio selection in line with the benchmark index, low portfolio turnover and tax efficiency.

### **2.4.2 Exchange-traded funds**

Another popular passive investment strategy is exchange-traded funds (ETFs), which combine the best of both mutual funds and shares. Like a mutual fund, an ETF can invest in several different assets, such as bonds, commodities, shares, or a specific index, and its trading takes place during the opening hours of the stock exchange (Abner, 2016, p. 21–22). The first ETF, SPDR S&P 500 Trust, was established in the United States in 1993, after which ETF popularity has steadily increased to this day (Ben-David et al., 2017). The popularity has been increased by high liquidity and low transaction costs, which have attracted investors to ETFs from other asset classes.

According to Ben-David et al. (2017) ETF is founded by an issuer that selects the shares of the fund according to either the benchmark index or other investment strategy. The issuer cooperates with an authorised participant (AP) in the creation, trading, and

maintenance of the correct market value of ETFs. The market price of an ETF is affected by supply and demand, but also by the AP, if the market price of the ETF does not match its NAV. AP purchases or redeems ETFs according to whether the ETF market price is overpriced or underpriced compared to its NAV (Ben-David et al., 2017).

ETFs can be passive or active, but the popularity of passives is higher. For example, in September 2024, 92 % of all assets invested in ETFs were held in passive ETFs (Gabe, 2024). Passive ETFs, like passive index funds, can track a pre-selected benchmark index. According to Ben-David et al. (2017) replicating an index can take place in two different ways, physically or synthetically. Physical ETFs hold shares in the benchmark index, while synthetic ETFs do not physically own shares, but instead mimic shares in the index through derivative contracts. Instead, active ETFs are managed and stock-selected by a portfolio manager who aims to generate an excess return from the benchmark index. ETFs utilize the features of open-end and closed-end funds while trading. ETF trading takes place like a closed fund according to stock exchange opening hours, and price determination is influenced by supply and demand. Instead, ETF redemption and creation occurs like an open-end fund (Ben-David et al., 2017).

## **2.5 Active investing**

The first modern active open-end mutual fund, the Massachusetts Investors Trust (MIT), was established in the United States in 1924 by MFS Investment Management (MFS, 2024). According to MFS (2024) in the past mutual fund investing was not possible for private investors, as funds were closed-end, and were only traded by wealthy institutions. MIT enabled open-end mutual funds for private investors which improved investor liquidity protection and created the current investment fund operations.

According to Hossain (2021) an active mutual fund investment is an investment strategy in which the portfolio manager selects the securities to the portfolio independently. The aim is to select securities in the portfolio that are expected to exceed the average market

return or a certain benchmark index in the future. The strategy is based on utilizing the professional skills of the portfolio manager between different investment categories. The portfolio manager may specialise in certain industries, geographical area or companies of a certain size when making investment decisions (Mähkä, 2021). Undervalued companies can offer growth potential in the future that a portfolio manager can spot with their expertise.

Achieving the excess return of active mutual funds is based on market inefficiencies as well as irrational behaviour by investors. Investors can cause price bubbles in the market when making investment decisions with emotion (Ritter, 2003). Behavioral finance can enable portfolio managers to make potential investments due to mispricing in the market.

## **2.6 The impact of fees on returns**

Although mutual funds are intended to yield a return to the investor in the long term, they are also intended to generate a profit for the owner of the mutual fund. Management of mutual funds is a business in which the investor is charged a commission related to the investment. The fees vary by mutual fund, as the fund's expenses are affected by the investment strategy. The costs of mutual fund investing can be divided into two categories, shareholder fees and operating costs (U.S. Securities and Exchange Commission, n.d.). It is important for the investor to be aware of the size of the fees charged for the fund, as costs reduce future returns.

### **2.6.1 Shareholder fees**

A shareholder fee is an expense that is charged to an investor when an order is placed on a fund. The order may relate to the redemption, purchase, or exchange of the fund, but the fee is one-off in all of these. When an investor purchases a fund share, there are

two types of purchase order fees, front-end sales load, or purchase fee (U.S. Securities and Exchange Commission, n.d.).

Front-end sales load commission is paid to the broker who has been responsible for the sale of the fund (Bodie et al., 2023, p. 108). Instead, the purchase fee is paid directly to the fund to cover the fund's purchase costs. Typically, the amount of purchase commissions is determined by a certain percentage, which is calculated from the order amount. Similarly, in the case of redemption of the fund, the investor may be charged a back-end sales load or a redemption fee (U.S. Securities and Exchange Commission, n.d.).

According to U.S. Securities and Exchange Commission (n.d.) shareholder fees can also be exchanging fees or account fees. In the case of an exchange fee, new shares are not purchased in the fund, but existing shares are transferred from one fund to another within a particular management company for a fee. Instead, the account fee is charged for the maintenance of the investor's fund accounts in the systems.

### **2.6.2 Operating expenses**

In addition to shareholder fees, funds can charge annual fund operating expenses (AFOE) from investors. AFOE are not one-off, as they are charged annually to the fund investor to secure the fund's day-to-day operations. Typically, AFOE include management fees, distribution fees, and other expenses (U.S. Securities and Exchange Commission, n.d.). Management fees consist of the maintenance, management, and cost of fees of the fund's portfolio managers. Especially in active equity funds, the management fees are at the core since the portfolio manager is responsible for managing the fund (Bodie et al., 2023, p. 108). Distribution fees are related to the fund's sales and marketing expenses. They are used to cover the broker fees of the sale of the fund, as well as advertising costs. In contrast, other expenses include accounting costs, custody costs, and other management costs (U.S. Securities and Exchange Commission, n.d.).

The sum of management fees, distribution fees and other expenses constitutes the total expense ratio (TER). According to Morningstar (n.d.) TER is at the centre of investment decisions when an investor reviews a key investor information document (KIID). KIID allows the investor to estimate how much the average annual cost of a fund is per invested capital. When making a mutual fund investment decision, the investor must understand how costs affect the total return. A mutual fund with a higher fee needs to generate higher returns than a low-fee mutual fund so that the total return on investments is the same.

## **2.7 Previous research on the comparison of active and passive funds**

Comparing active and passive funds has been a popular debate topic in academic studies for numerous decades. Arguments have been expressed for and against both active funds and passive funds.

One of the first cross-funds studies was Michael Jensen's (1968) publication: "*The Performance of Mutual Funds in the Period 1945-1964*". The study examined at the performance of 115 actively managed open end mutual funds between 1945 and 1964. Jensen found that, on average, active funds were unable to generate an excess return compared to passive buy and hold strategy. The average annual gross and net alphas of the active funds studied were -0,4 % and -1,1 %, reflecting a weak risk-adjusted return relative to systematic risk. In the calculation of gross alpha, remarkable was that the effect of brokerage commissions on fund returns was not considered in the calculation. Yet, according to Jensen (1968), the passive buy-and-hold strategy was more profitable because during the period under review, active funds only generated losses on average, and were unable to cover their own brokerage fees.

A similar observation was made by Malkiel (1995) in his study of mutual fund returns between 1971 and 1991, considering the survival bias. He found that mutual funds were unable to generate better average net returns compared to market returns. The capital

asset pricing model's alpha which describes the average risk-adjusted excess return over the period under review was -0,06 %. Also, in the calculation of gross return, mutual funds generated less than market on average, although no fund expenses (excluding load fees) had been deducted from the funds' returns. The study showed that taking survival bias into account reduced the mutual fund chances to generate excess return from the market.

Fama & French (2010) examined the performance of 3156 active mutual funds between 1984 and 2010. The purpose of the study was to find out whether the portfolio managers can achieve excess returns from the market through their own professional skills, rather than luck. They found that most of active mutual funds were unable to generate enough excess returns over the analysis period to cover expenses. 97 % of active mutual funds generated less than the average passive index fund, meaning that the average return on index funds was as good as the return on the top 3 % of active mutual funds. In addition, they found that low-cost index funds are more suitable for long-term investment. Based on the calculations, the net alpha of index funds was close to zero, reflecting a cost-effective average market return. The low cost and predictable long-term returns of index funds make them a stable option compared to the uncertain returns of active funds.

Although many studies consider passive funds to be more profitable in the long run due to their lower management fees, that does not mean that active funds specializing in a particular investment strategy cannot outperform passive funds in different market situations.

According to Cremers and Petajisto (2009) active equity mutual funds with smallest assets and highest active share were able to make 6,5 % better net return than their benchmark index. In their research, high active share meant having a large deviation from the benchmark index. They also found that active equity mutual funds with a small active share yielded less than the benchmark index on net return, while a large active share enabled a better net and gross return than the benchmark index.

Instead, Kacperczyk et al. (2005) showed that active fund management could achieve better risk-adjusted returns when fund managers concentrated investments in specific industries. Excess returns were achieved with the investment expertise of fund managers, which enabled them to outperform the diversified portfolios of the benchmark index. Active fund management focused on small businesses in certain industries as well as growth shares.

Otten & Bams (2002) also found in their study that investments in a particular industry yielded better returns. They studied 506 open-ended equity mutual funds using logarithmic returns between 1991 and 1998 in five different European countries. They found that the annualized alphas of the European small cap fund companies were positive both gross return and net return during the period under review. On top of that, they found that four out of five countries managed to achieve positive alpha even after expenses.

Wermers (2000) studied the returns of active equity mutual funds between 1975 and 1994. He found that the gross return on active equity mutual funds was 1,3 % higher than the average return on the market per year. However, in net return, active equity mutual funds yielded 1 % less compared to market returns. It was noteworthy that only 1,6 percentage points of this 2,3 % difference was accounted for by transaction costs and expense ratios of active equity mutual funds. The remaining 0,7 percentage points was explained by the low-yield nonstock holdings, as e.g., bonds or cash. Thus, active equity mutual funds were almost able to cover their transaction costs and expense ratios during the analysis period, indicating the skill of portfolio managers to select the right stocks for the portfolio. In addition, the study showed that between 1975 and 1994, the transactions costs charged by the mutual funds decreased and the funds' turnover levels doubled due to declining trading costs.

Moskowitz (2000) found from a study by Wermers (2000) that active equity mutual funds can potentially generate returns for investors just when they need it most. During the recession, mutual funds managed to generate 1 % more returns than they normally would during other times. Consequently, Moskowitz (2000) was wondering whether active fund managers know how to time market events, or whether they just know how to pick high-yielding stocks in crisis times?

### **3 Theoretical framework**

#### **3.1 Efficient market hypothesis**

Economist Eugene Fama's efficient market hypothesis (EMH) has been considered the central theory of financial markets for the past decades (Shleifer, 2003, p. 1). According to Fama (1970) financial markets are so efficient that it is impossible to achieve excess returns without excessive risk. EMH assumes that efficient market reacts immediately to the information available, which is directly reflected in the prices of listed securities in the financial markets. Based on EMH observations, it is impossible for an active fund to beat the market continuously, so resources for active portfolio management are wasted (Shleifer, 2003, p. 1). Therefore, passive investing can be considered a better solution.

EMH is divided into three different efficiency forms, which are weak, semi-strong and strong (Fama, 1970). According to weak form efficiency, it is not possible to get excess returns from the market by taking advantage of historical prices and returns. Thus, historical returns do not guarantee better risk-adjusted returns for the future, as all previous information is known and incorporated in the market prices (Shleifer, 2003, p. 6). On the other hand, according to medium form efficiency, investors cannot make an excess return by taking advantage of public information, as information has an immediate effect on stock prices. The company's profit warnings and annual reports are typical news of medium form efficiency, whose price volatility cannot be utilized to predict excess returns (Fama, 1970). According to strong form efficiency, it is impossible to make an excess profit from the market by utilizing inside information. Insider information spreads to the market immediately and is incorporated in stock prices (Shleifer, 2003, p. 6–8).

EMH plays an important role in the operation and pricing of today's financial markets. The difficulty of achieving excess returns and the information's immediate effect on stock prices explains the favourableness of passive funds, especially when investors are acting rationally (Shleifer, 2003, p. 1–3). Market anomalies and crises challenge EMH

implementation, which can create temporary inefficiencies in the market, for example during COVID-19.

### **3.2 Modern portfolio theory**

Modern portfolio theory (MPT) originated from an article "*Portfolio Selection*" published in the Journal of Finance by economist Harry Markowitz, examined the optimal investment portfolio structure. Markowitz (1952) found by using mathematical statistical methods that diversification enabled investor to reduce the risk of their portfolio without significantly affecting the total return. In the past, diversification was intuitive and not based on any financial theories (Petzel, 2021, p. 38). According to the MPT, diversification had to be done between assets that were not correlated (Petzel, 2021, p. 31). Thus, the weak return on an individual investment instrument does not affect the return on the entire portfolio, as other assets compensate for the weak return on one investment instrument. The MPT laid the foundation of financial theory in creating an optimal diversified risk-return portfolio ratio. Many financial theories still in use, such as the capital asset pricing model, have been based on MPT observations (Petzel, 2021, p. 31–32).

According to Knüpfer & Puttonen (2018), risk in the stock market can be divided into two parts, systematic risk, and idiosyncratic risk. Systematic risk refers to the market risk that cannot be eliminated by diversification into different assets. Economic crises, interest rate development and inflation fluctuation are typical systematic risks that affect the performance of all assets (Knüpfer & Puttonen, 2018, p. 149). Instead, idiosyncratic risk can be affected by diversification, as it typically only applies to a particular industry or certain type of business. The key findings of MPT are related to reducing idiosyncratic risk from the portfolio through diversification.

According to Kallunki et al. (2019) idiosyncratic risk's diversification in MPT is achieved by looking at the expected return on the selected shares in the portfolio, the standard

deviation of the return and the covariance between them (p. 30–31). This information can be used to form a risk-return space, where the returns and risks of the selected shares are examined with different share weights in the portfolio (Knüpfer & Puttonen, 2018, p. 145). The risk-return space can be used to find an efficient frontier that offers maximum expected returns at a certain risk. A rational investor chooses the one with the highest expected return from a portfolio of the same risk, or the one with the lowest risk from a portfolio of equal returns (Kallunki et al., 2019, p. 35).

### 3.2.1 Calculated variables

The calculation of expected returns aims to predict future returns on shares and is one of the key elements in modern portfolio theory. The calculation principle is a weighted average, which data is past returns or expected future returns (Knüpfer & Puttonen, 2018). The expected return is calculated as follows:

$$E(r) = p_1r_1 + \dots + p_nr_n = \sum_{s=1}^n p_s r_s \quad (1)$$

Where,  
 $E(r)$  = Expected return  
 $p_s$  = Probability of the future state  $s$   
 $r_s$  = Return in future state  $s$   
 $n$  = Number of observations

According to Knüpfer & Puttonen (2018), the total risk i.e., volatility of the portfolio is measured using standard deviation. It describes how much investment returns vary around the expected value. The size of the total risk is affected by how much the portfolio values differ from their average (Knüpfer & Puttonen, 2018, p. 136). The volatility of the portfolio is determined by standard deviation and variance. The variance of return is calculated as follows:

$$\sigma^2(r) = \sum_{s=1}^n p_s [r_s - E(r)]^2 \quad (2)$$

Where,  $\sigma^2(r)$  = Variance of return  
 $p_s$  = Probability of the future state s  
 $r_s$  = Return in future state s  
 $E(r)$  = Expected return  
 $n$  = Number of observations

Once the variance of the return has been calculated, the total risk of the investment can be solved using the square root:

$$\sigma(r) = \sqrt{\sigma^2(r)} \quad (3)$$

Where,  $\sigma(r)$  = Standard deviation of return (total risk)  
 $\sqrt{\sigma^2(r)}$  = Variance of return

In MPT, the correlation between shares should be negative for effective diversification (Kallunki et al., 2019, p. 31). The correlation between shares is compared using a correlation coefficient, and a covariance is needed to calculate it. Covariance describes the co-movement between shares in units of measurable variables, because of which it can be difficult to compare the results between covariances. Therefore, covariance is standardized to a correlation coefficient with values between -1 and 1. Consequently, the covariance between returns is calculated as follows (Kallunki et al., 2019):

$$cov(R_{it}) = \frac{1}{T} * \sum_{t=1}^T (R_{it} - \bar{R}_i)(R_{jt} - \bar{R}_j) \quad (4)$$

Where,  $cov(R_{it})$  = Covariance between returns i and j  
 $R_{it}$  = Return of a security i at time t  
 $\bar{R}_i$  = Average return of a security i  
 $R_{jt}$  = Return of a security j at time t  
 $\bar{R}_j$  = Average return of a security j  
 $T$  = Number of observations in return time series

When the volatilities of the shares and the covariance between them have been solved, the correlation coefficient can be solved using the formula below (Profillidis & Botzoris, 2019):

$$r_{ij} = \frac{cov(i,j)}{\sigma_i * \sigma_j} \quad (5)$$

Where,  $r_{ij}$  = Correlation coefficient

$cov(i, j)$  = Covariance between i and j

$\sigma_i * \sigma_j$  = Standard deviation of i and standard deviation of j

After that, the portfolio variance formula for  $n$  assets can then be determined as follows (Wang, 2006):

$$\sigma_p^2 = \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_{ij} \quad (6)$$

Where,  $\sigma_p^2$  = Portfolio variance

$w_i w_j$  = Weights of securities i and j

$\sigma_{ij}$  = Covariance between securities i and j

### 3.2.2 Efficient frontier

Once the expected returns, the standard deviation of returns and the covariance between the securities in the portfolio have been calculated, a risk-return space can be formed. The risk-return space shows all possible portfolio combinations that can be achieved with different security weights. For a portfolio to be effective, an investor must be able to maximize the expected return over the risk taken. Portfolios with an optimal risk-return ratio form an efficient frontier where it is not possible to obtain a higher expected return without an increase in total risk, and the total risk cannot be reduced

without a decrease in expected return (Petzel, 2021, p. 118). Rational investor chooses a portfolio based on his own risk tolerance from an efficient frontier (Kallunki et al., 2019, p. 35).

According to Petzel (2021) in MPT the expected returns and standard deviations of risky portfolios are used to determine an efficient frontier. However, if a risk-free investment is added to the portfolio, a capital market line (CML) must be added to the risk-return space. CML represents different combinations of risk-free rate and risky portfolio (Bell, 2016, p. 269). Typically, risk-free rates refer to returns from a short-term market rate or long-term government bond (Knüpfer & Puttonen, 2018, p. 154–155). When the risk-free rate based CML has been added to the risk-return space, the most efficient portfolio, i.e., tangent portfolio can be determined from the intersection of CML and the efficient frontier. The tangent portfolio shows which point of a risk-free rate and risky portfolio gives the most optimal risk return ratio. In the figure 1, the tangent portfolio is formed to point O. If an investor wants to minimize their risk, they choose point Y, called the minimum variance portfolio (Kallunki et al., 2019, p. 35). Between points Y and X, a rational investor does not select a single point because it is possible to get a higher return at the same risk. Instead, a rational investor chooses his portfolio from an efficient front formed on the right side of point Y.

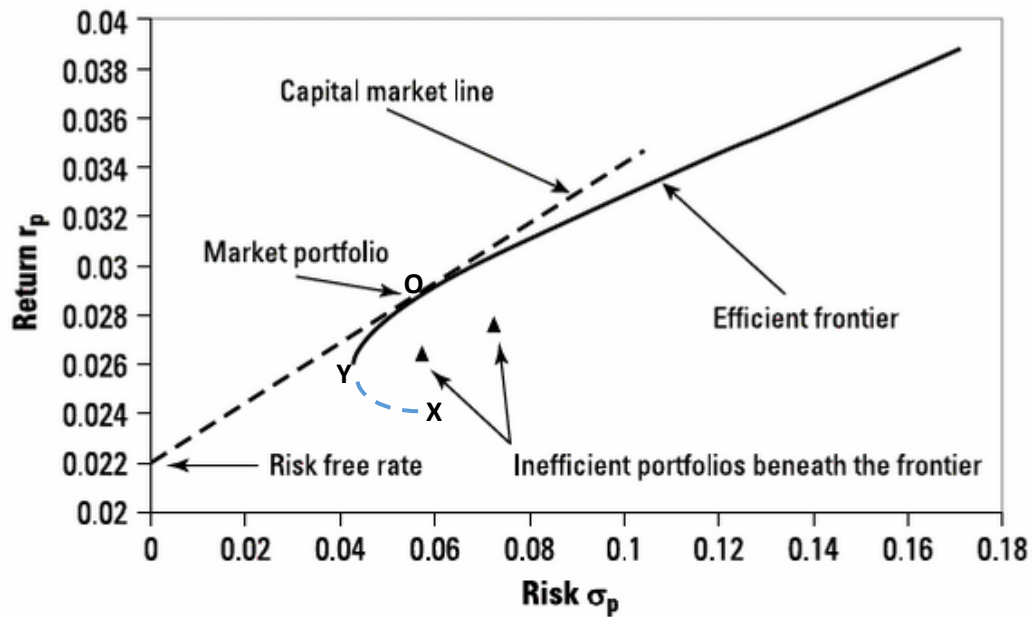


Figure 1. Efficient frontier and the capital market line (adapted from Bell, 2016).

### 3.3 Behavioral finance

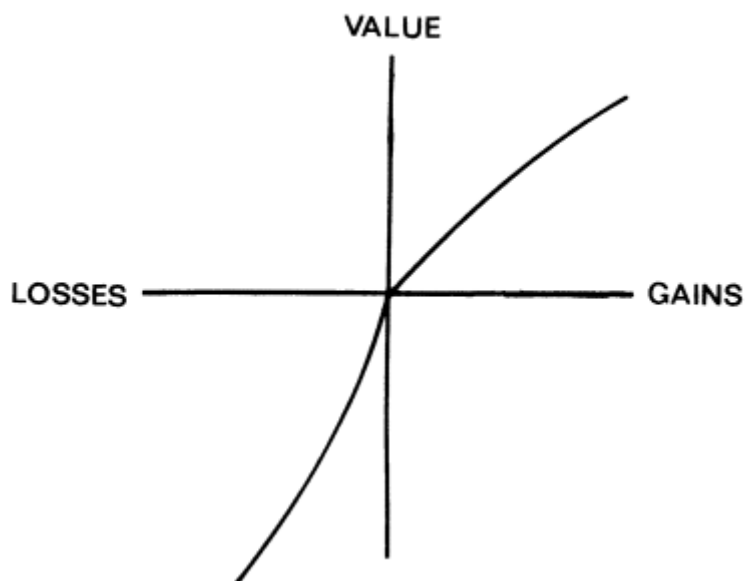
According to EMH, investors make rational decisions and maximize their own utility in the market based on the information available (Fama, 1970). It is not possible to generate an excess return in the long run, as the shares are priced based on the information already available and future news will affect the prices of the shares immediately. However, behavioral finance (BF) questions EMH's realization. BF assumes that markets are not efficient because investors do not act rationally, but rather the emotions and behavior of investors influence decisions. According to Ritter (2003) BF examines how cognitive psychology and the limitations of arbitrage affect the functioning of the market. Cognitive psychology studies how investors think and make decisions in different market situations. By contrast, limitations of arbitrage refer to a situation where the market fails to correct mispricing effectively to remove arbitrage from the market (Ritter, 2003).

### 3.3.1 Prospect theory

Kahneman and Tversky's (1979) paper "*Prospect Theory: A Study of Decision Making Under Risk*" is considered one of the most well-known studies in behavioral finance. The paper showed that investors do not act rationally or objectively when making investment decisions. These decisions were based on a specific subjective value point where the absolute amount of money did not matter (Waymire, 2016). In addition, the study found that investors' risk tolerance varies depending on how the investment has yielded. Kahneman & Tversky (1979) called this a loss aversion phenomenon in which investors behave differently, depending on whether they are profiting or losing. The study found that investors were loss averse who take greater risks when at a loss than when at a profit.

Loss aversion is strongly related to prospect theory, and it refutes the utility theory assumption of investor rationality and maximizing one's own utility (Grewal et al., 2016). In utility theory, realizing a stock investment as a profit or loss feels the same, as objective profit or loss affects the invested capital in the same way (Burton & Shah, 2013, p. 97). According to Grewal et al. (2016) loss aversion affects the benefit experienced by investors not only in terms of objective value, but also in terms of subjective value. The subjective value refers to investors' personal experience of profits and losses, and in prospect theory, the change in value between these two is asymmetric.

Figure 2 shows a table where the y-axis describes the subjective value, and the x-axis describes the objective value. The value change in the table is illustrated by the S-shaped value function, from which it can be observed that the function is concave as gains increase and convex as losses increase (Grewal et al., 2016; van der Pligt, 2001). This leads to the conclusion that investors' behavior becomes riskier at losses, while in the case of gains, risk-taking is reduced. The asymmetric bias caused by loss aversion distorts market pricing which can make the market inefficient.



**Figure 2.** A hypothetical S-curve value function (Kahneman & Tversky, 1979).

### 3.3.2 Limits to arbitrage

The law of one price assumes that the prices of the same asset do not differ from each other in different marketplaces. If prices differ, it allows for arbitrage i.e., to generate risk-free returns. In an efficient market, mispricing is quickly corrected by hedge funds and other professional investors as they try to take advantage of the opportunity afforded by arbitrage to make risk-free returns (Ritter, 2003).

According to Ritter (2003), there are two types of mispricing caused by arbitrage. The first mispricing is repetitive and arbitrageable, while the second mispricing is long-term and not repetitive. Repetitive and arbitrageable mispricing is typical of an efficient market and it does not cause inefficiencies in the market. Instead, long-term and non-repeated mispricing creates market inefficiencies. As a result, noise traders who utilize irrational investment practices make true price determination more difficult in the market (Burton & Shah, 2013, p. 37–38).

Mispricing can increase in the market if it is difficult to take a short or long position, or if investors have no faith that arbitrage will quickly correct the mispricing. As risks increase, arbitrageurs can exit the market, as it becomes more difficult to identify peaks and bottoms (Ritter, 2003). A sudden rise or fall can cause herding behavior, in which investors do not rely on their own knowledge but mimic the actions of other investors (Burton & Shah, 2013, p. 75–76). Herding behavior can cause abnormal bubbles in the market, where arbitrageurs suffer significant losses and are forced to sell their assets due to lack of funding liquidity (Hombert & Thesmar, 2014). As a result of the lack of arbitrage and the non-rational herding behavior of investors, the market is distorted, which increases market volatility.

## 4 Methods

### 4.1 Risk adjusted returns

#### 4.1.1 Sharpe ratio

Sharpe ratio is a risk-adjusted measure developed by William F. Sharpe (1966) to analyse the performance of a portfolio relative to the total risk for a certain historical period. In the calculation of the ratio, the numerator is the portfolio's excess return, which is obtained by deducting a risk-free return from the portfolio's returns. Typically, the risk-free return is U.S. treasury bills or interest return on cash (Bacon, 2008, p. 64–65). Instead, the denominator is the volatility of the portfolio, which is calculated using the standard deviation of the portfolio's returns. The higher Sharpe ratio reflects the portfolio's better historical risk-adjusted return (Morningstar, 2005). According to Bacon (2008) the Sharpe ratio is calculated as follows (p. 67):

$$\text{Sharpe ratio} = \frac{r_p - r_f}{\sigma_p} \quad (7)$$

Where,  $r_p$  = Portfolio return

$r_f$  = Risk-free rate

$\sigma_p$  = Portfolio risk

#### 4.1.2 Treynor ratio

Treynor Ratio is a risk-adjusted measure developed by economist Jack Treynor (1965) that examines the portfolio's development based on risk and excess returns. In the Treynor ratio, the risk measure is systematic risk i.e., beta, which measures how much the volatility of a portfolio varies compared to the volatility of the market (Kölbl et al., 2024). The beta is in the Treynor ratio as the denominator, while the portfolio's excess return is the numerator. The calculation of excess return is defined in the same way as

Sharpe ratio, as the difference between the portfolio's excess return and the risk-free rate (Nagarajan, 2021). Treynor's ratio can be used to define the best excess return portfolios against systematic risk. The beta coefficient of systematic risk is calculated as follows (Knüpfer & Puttonen, 2018, p. 150):

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2} \quad (8)$$

Where,  $\sigma_{im}$  = Covariance between portfolio i and market portfolio returns  
 $\sigma_m^2$  = Variance of the market portfolio's return

When beta coefficient is solved, the Treynor ratio is calculated as follows (Kölbl et al., 2024; Treynor, 1965):

$$\text{Treynor ratio} = \frac{r_p - r_f}{\beta_p} \quad (9)$$

Where,  $r_p$  = Portfolio return  
 $r_f$  = Risk-free rate  
 $\beta_p$  = Portfolio beta

#### 4.1.3 Jensen's alpha

In 1968, Michael Jensen published a study in which he examined the returns of 115 different actively managed mutual funds between 1955 and 1964. The study showed that the average portfolio manager was not able to achieve an excess return from the market relative to the risk taken. In addition, Jensen introduced a risk-adjusted measure called Jensen's alpha, which calculation was based on using the capital asset pricing model (CAPM) to calculate the mutual fund's excess return (Kölbl et al., 2024). Jensen's alpha assesses the fund's ability to generate excess returns from the market, considering the beta of the portfolio. If Jensen's alpha obtains a positive value, the fund has managed

to generate an excess return compared to the average market return. Instead, the negative value indicates underperformance. Jensen's alpha is calculated as follows (Bodie et al., 2023):

$$\text{Jensen's alpha} = r_p - [r_f + \beta_P(r_M - r_f)] \quad (10)$$

Where,  $r_p$  = Portfolio return

$r_f$  = Risk-free rate

$\beta_p$  = Portfolio beta

$r_M$  = Market portfolio return

## 4.2 Logarithmic returns

There are many different calculation methods that can be used to determine mutual fund returns, but the most common ones are simple returns and logarithmic returns. According to Hudson & Gregoriou (2015) the selection of the calculation method has a significant impact on returns, and especially in finance, the logarithmic returns calculating method is preferred. As stated by them, logarithmic returns are suitable for situations where the research focuses on multi-period returns, while simple return calculation method is more suitable for short-term analysis periods. In logarithmic return calculation, continuous compound interest is assumed, where the length of the interest period has no impact on the total return. Therefore, the interest paid on the invested capital is taken into account regularly which facilitates the comparison between different time periods. In addition, logarithmic returns give an accurate representation of fund price change. In a simple return security model, fund prices can become negative, but in a logarithmic security return models it is not possible. In this study, logarithmic returns are used as a calculation method, and it is calculated as follows (Hudson & Gregoriou, 2015):

$$r_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (11)$$

Where,  $r_t$  = Logarithmic return at time t

$\ln$  = Natural logarithm

$P_t$  = Portfolio price at time t

$P_{t-1}$  = Portfolio price at time t-1

## 5 Data

A total of 22 mutual funds were selected for the study, of which 17 were active and 5 were passive. The mutual funds were selected using Morningstar's fund search engine and Finnish investment research fund reports. The mutual funds selected for the study had to be accumulation mutual funds investing in the Finnish stock market that were not special investment funds. In addition, the daily quoted prices of the selected accumulation mutual funds had to be available between 30 November 2018 and 6 May 2024.

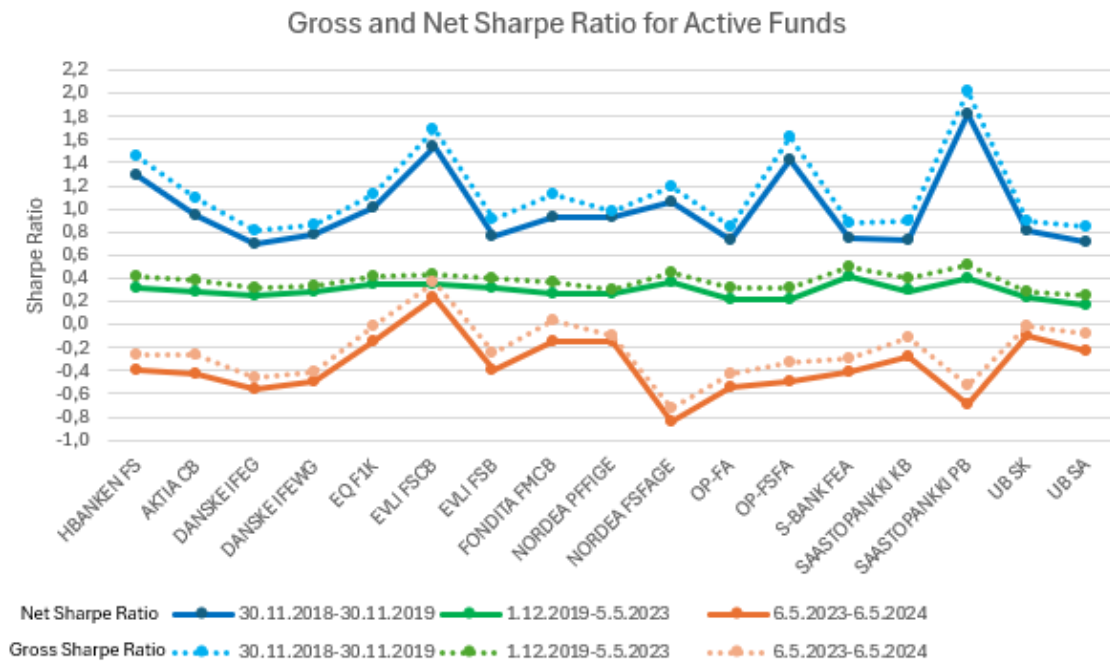
The returns of active and passive accumulation mutual funds were examined in three different subperiods, which were 30 November 2018 – 30 November 2019, 1 December 2019 – 5 May 2023 and 6 May 2023 – 6 May 2024. The first subperiod includes one year before to the first publication related to the COVID-19 pandemic news. Instead, the second subperiod begins in the month of the first news related to the COVID-19 pandemic and ends on the day when WHO abandoned the classification of COVID-19 as a global public health emergency. Finally, the last subperiod is one year after the end of the COVID-19 pandemic.

The accumulation mutual funds' data was collected from Thomson Reuters DataStream, and Excel, The Wall Street Journal (TWSJ) and Morningstar data services were used for calculating the risk-adjusted returns. TWSJ was used to collect a risk-free rate and benchmark index data for the analysis periods. In this study, the risk-free rate is the yield on the German 10-year treasury bond and the benchmark index is the OMX Helsinki Benchmark CAP\_GI (OMXHBCAPGI). In the calculation of net returns of the accumulation mutual funds, only ongoing charges are considered, which were collected from the fund analysis information on Morningstar's website.

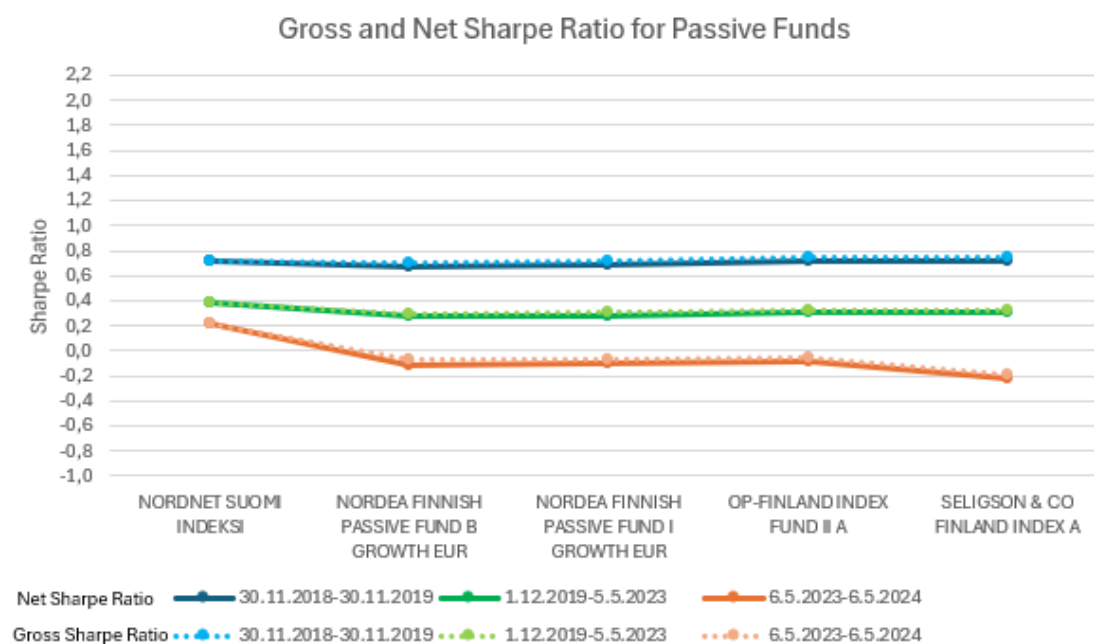
## 5.1 Results

### 5.1.1 Sharpe ratio

The first risk-adjusted return value of the data was calculated for the Sharpe ratio, shown in figures 3 and 4 below. Figure 3 shows the gross and net Sharpe ratios for active funds before, during and after COVID-19 pandemic, and figure 4 shows the corresponding ratios for passive funds. In both figures, the gross Sharpe ratios are depicted with a dashed line, while the net Sharpe ratios with a solid line. The net Sharpe ratios were deducted by the ongoing charges shown in Appendix 1 and 2, which enabled the comparison of the annual returns of the accumulation mutual funds. In the comparison of risk-adjusted returns, a Sharpe ratio greater than 1 is considered favourable, while a value of 0 or less indicates a weak risk-adjusted return.



**Figure 3.** The gross and net Sharpe ratio of Active Funds before, during and after COVID-19.



**Figure 4.** The gross and net Sharpe ratio of Passive Funds before, during and after COVID-19.

Based on figures 3 and 4, the gross Sharpe ratios for active funds before the start of the COVID-19 pandemic, from 30 November 2018 to 30 November 2019 were higher than the corresponding ratios for passive funds. The highest gross Sharpe ratio was measured at 2,02 for the active fund and the lowest at 0,71 for a passive fund. The average gross Sharpe ratio for active funds was 1,13, whereas it was 0,73 for passive funds. It was noteworthy that each active fund had higher gross Sharpe ratio than any of the passive funds. Also, in the net Sharpe ratio that includes annual ongoing charges, the active funds performed better on average compared to the risk taken. The average net Sharpe ratio of the active funds before the COVID-19 pandemic was 0,99, while the passive funds had a net Sharpe ratio of 0,7. On the other hand, passive funds lower annual ongoing charges reduced their net Sharpe by a lower percentage ratio than in the active funds.

During the COVID-19 pandemic from 1 December 2019 to 5 May 2023, active and passive funds gross Sharpe ratios were lower than in the previous subperiod. Based on Appendix 1 and 2, the average gross Sharpe ratio for active funds was 0,38, and net Sharpe ratio

was 0,29. By contrast, the average gross Sharpe for passive funds was 0,33, and the net Sharpe ratio was 0,31. During the COVID-19 pandemic, the average gross Sharpe ratio was higher for active funds, but the average net Sharpe was higher for passive funds.

The gross Sharpe ratios for the subperiod after the COVID-19 pandemic from 6 May 2023 to 6 May 2024, were the lowest in the study. The average gross and net Sharpe ratios for the active funds were -0,23 and -0,36, respectively. Correspondingly, the average gross and net Sharpe ratios for the passive funds were -0,03 and -0,06.

### **5.1.2 Treynor ratio**

Treynor ratio was the second risk-adjusted return value in the study, shown in figures 5 and 6. Figure 5 shows all the Treynor ratios of active funds and figure 6 correspondingly shows all the Treynor ratios of passive funds. The analysis period is similarly divided into three different subperiods, which are before, during, and after COVID-19 pandemic. Different subperiods in both figures have been depicted with solid lines of different colors. The higher the Treynor ratio, the more the fund has succeeded to generate an excess return relative to the systematic risk.

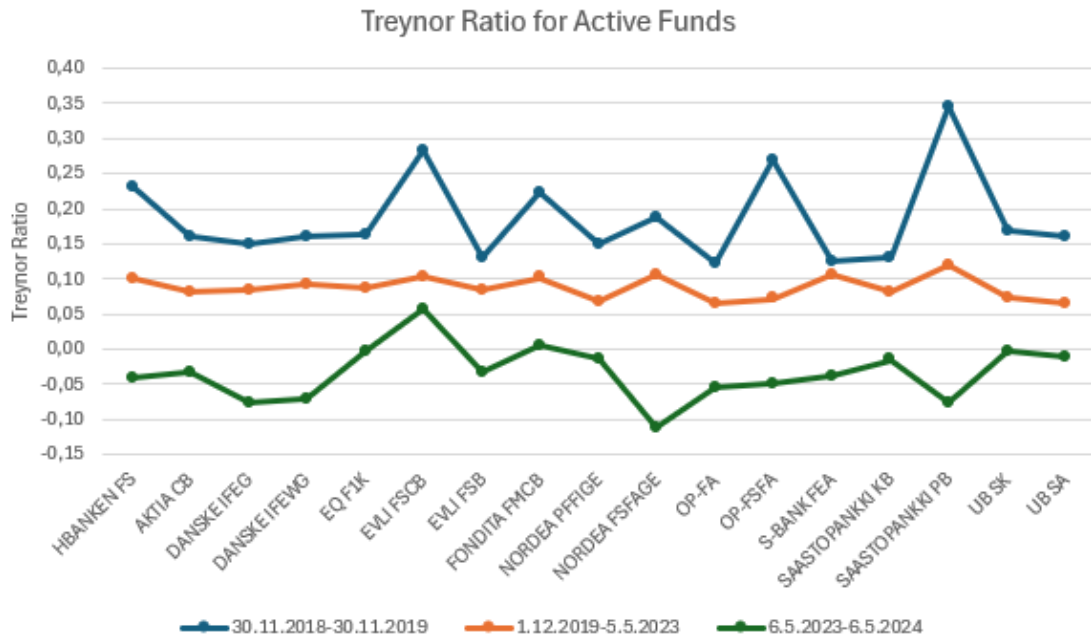


Figure 5. The Treynor ratio of Active Funds before, during and after COVID-19.

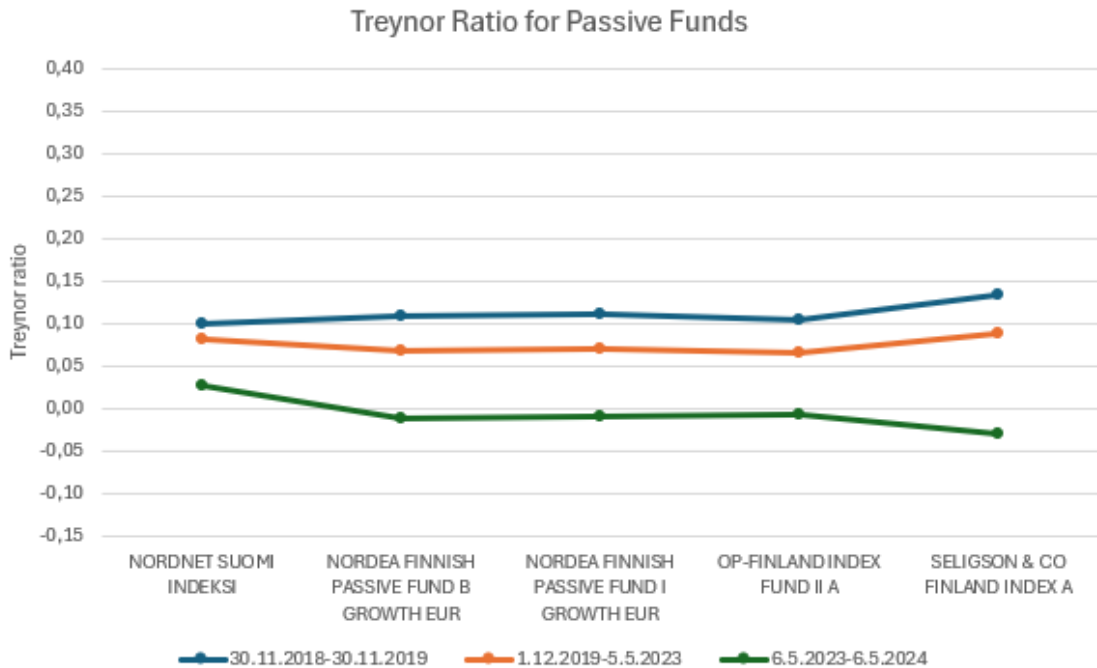


Figure 6. The Treynor ratio of Passive Funds before, during and after COVID-19.

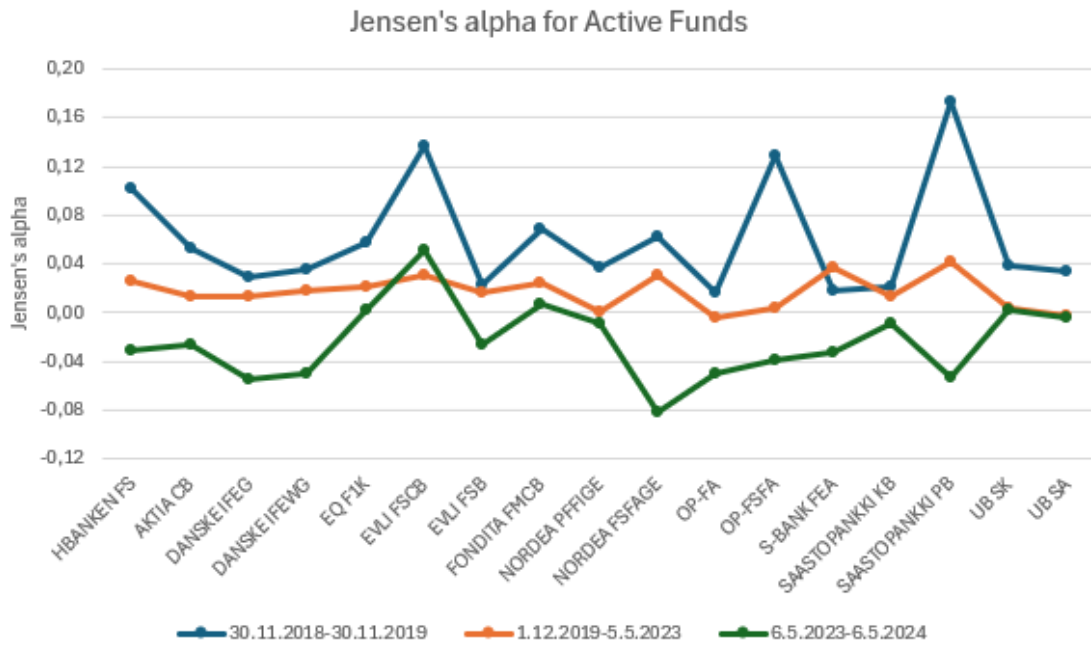
The results revealed a higher Treynor ratio of active funds before and during the COVID-19 pandemic. The annual average Treynor ratios with active and passive funds between

30 November 2018 and 30 November 2019 were 0,186 and 0,112, respectively. By contrast, during COVID-19, the corresponding values were 0,088 and 0,075. The higher Treynor ratio for active funds indicated higher excess return relative to systematic risk during these subperiods.

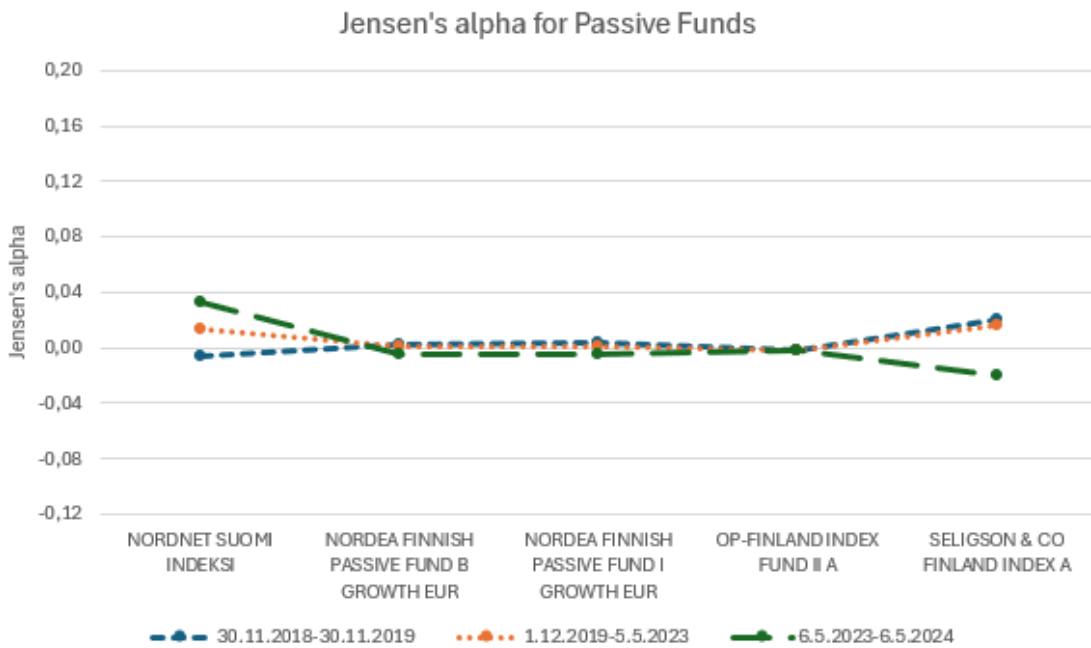
Instead, for the subperiod after COVID-19, the annual average Treynor ratio for active funds was -0,033, while for passive funds the Treynor ratio was -0,006. The negative Treynor ratio of both funds reported poor performance relative to systematic risk over the subperiod considered. Based on the mathematical formula, a negative Treynor ratio is possible if the risk-free rate is higher than the average annual return or the beta is negative. In this study, not a single accumulation mutual fund had a negative beta, but the risk-free rate exceeded the annual average return on negative Treynor ratio funds.

### **5.1.3 Jensen's alpha**

The last calculated risk-adjusted value was Jensen's alpha, shown in figure 7 for active funds and in figure 8 for passive funds. In both figures, the period under review is before, during and after COVID-19 pandemic and different subperiods are depicted by different line colors. A positive Jensen's alpha is considered an optimal value because it indicates that the fund has managed to generate an excess return compared to the benchmark index, when considering the risk-free rate and systematic risk. Instead, negative number indicates underperformance.



**Figure 7.** The Jensen's alpha of Active Funds before, during and after COVID-19.



**Figure 8.** The Jensen's alpha of Passive Funds before, during and after COVID-19.

The average annual Jensen's alpha before and during COVID-19 for active funds was 0,061 and 0,017 respectively. By contrast, the corresponding values for passive funds

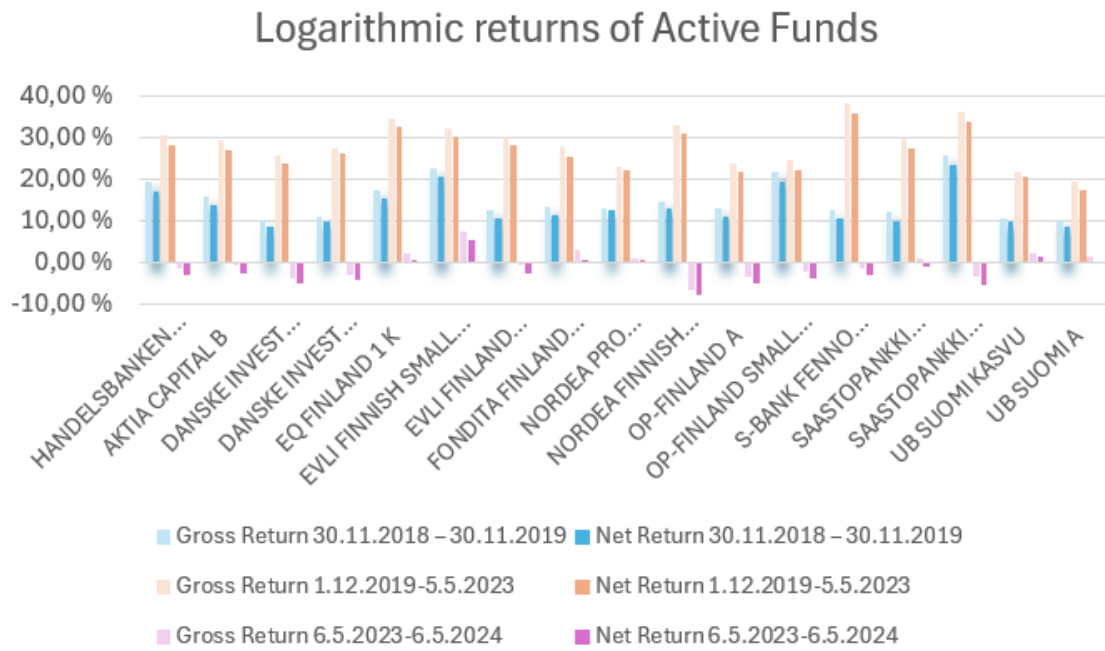
were 0,004 and 0,006. Based on the results, active funds managed to generate better excess returns relative to systematic risk and risk-free rate compared to passive funds. On the other hand, passive funds managed to increase their Jensen's alpha over the subperiods. Instead, active funds Jensen's alpha during the COVID-19 pandemic decreased by over 72 % compared to its value before the COVID-19 pandemic.

After COVID-19 pandemic, the average annual Jensen's alphas of both active funds and passive funds declined compared to the previous two subperiods. Active funds average Jensen's alpha was -0,024 whereas passive funds had 0,0002.

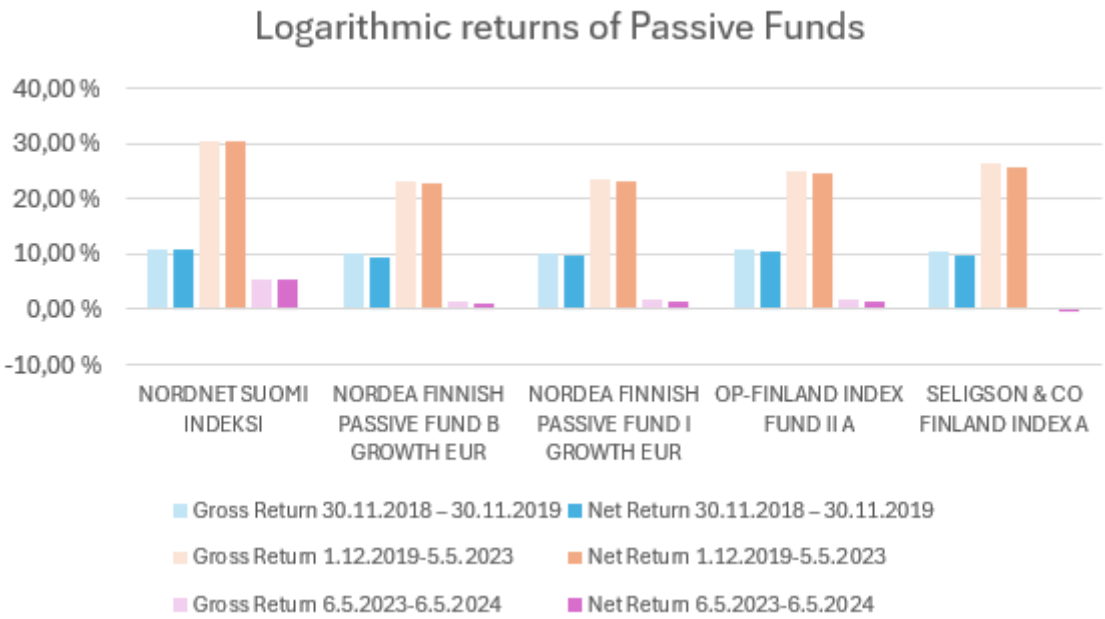
There are similarities in the results of calculated risk-adjusted returns compared to previous studies. Before to the COVID-19 pandemic, the highest risk-adjusted returns were received by active funds, which primarily invested in small cap companies during favourable market conditions. Similar findings were also made by Kacperczyk et al. (2005) and Otten & Bams (2002) in their studies. On the other hand, during the COVID-19 pandemic, passive funds managed to achieve a better net Sharpe ratio than active ones, which is linked to Fama & French (2010) findings of the lower costs and better risk-adjusted returns of passive funds. After COVID-19 pandemic, the risk-adjusted returns of passive funds were better than those of active funds. Passive funds' Jensen's alpha was positive, while for active funds it was negative, just as Jensen (1964) found in his study.

#### **5.1.4 Logarithmic gross and net returns of the funds**

At the end of the study, the average logarithmic gross and net return of active and passive funds was calculated for all three different subperiods, depicted in figures 9 and 10, respectively.



**Figure 9.** Logarithmic returns of Active Funds before, during and after COVID-19.



**Figure 10.** Logarithmic returns of Passive Funds before, during and after COVID-19.

The average gross and net return of active funds before COVID-19 was 15,10 % and 13,31 %, respectively. Whereas the average gross and net return of passive funds in the

corresponding period was 10,43 % and 10,5 %. The better return of active funds was explained by the upward market trend, which enabled superior returns at higher risk.

During COVID-19, the average gross and net return of active funds were 28,6 % and 26,61 %, respectively. In contrast, the corresponding values for passive funds were 25,74 % and 25,31 %. Active funds managed to generate better gross and net returns, although at the start of the COVID-19 pandemic the standard deviation they experienced was higher than those of passive funds. The long analysis period and central banks' expansionary monetary policy, and the resulting bull market enabled active funds to generate higher returns.

In the last subperiod of the study after COVID-19, the average gross and net return of passive funds exceeded those of active funds, being 2,10 % and 1,75 %, respectively, while the corresponding values for active funds were -0,36 % and -1,9 %. After COVID-19, the overall market situation in Europe deteriorated because of rising interest rates, which reduced the returns of both active and passive funds. However, despite the declining market, passive funds managed to get a positive gross and net return, while with active funds values were negative. Noteworthy was the fact that passive funds managed to generate positive net and gross returns over each subperiod under review, making them an attractive investment target for the long run. On the other hand, active funds were unable to generate positive gross and net returns over each subperiod, as their performance was more affected by the overall market situation. In a bull market, active funds succeed to generate better on average, but in a bear market the gross return was negative, and high ongoing charges decreased the net return even further.

## 6 Limitations of the research

The findings of this study were based only on accumulation mutual funds that fulfilled the study's selection criteria. Therefore, if the selection criteria for the mutual funds had been different, the number of mutual funds selected for the analysis period would have been different as well as the result of the research. In addition, it is essential to note that the findings of the study are based only on accumulation mutual funds investing in the Finnish stock market. In terms of international comparison, Finland's market share in the global stock market is minor.

The data calculation method also had an impact on the result obtained. In this study, the calculation of the daily quotation price changes of the accumulation mutual funds was conducted by using logarithmic returns. In addition, 252 trading day assumption was used in the annualization of accumulation mutual fund returns and volatility. Thus, different calculation methods could have given a different result.

The aim was to limit the analysis period in a way that as many accumulation mutual funds as possible, who fulfilled the selection criteria, would have been included in the study. The challenge was the daily quotation prices of the accumulation mutual funds, which were not available for enough years in many mutual funds, although they otherwise met the selection criteria of the study.

The benchmark index selection also had an impact on the results of the study. In this study, the benchmark index was OMXHBCAPGI index, which describes the average movement of the Helsinki Stock Exchange by considering both the reinvestment of dividends and price changes. OMXHBCAPGI is a weight-capped index in which the weight of an individual share relative to an index is limited by a certain upper limit, making it a cost-effective benchmark index for research (Nasdaq Baltic, n.d.; Nasdaq, n.d.).

## 7 Conclusions

The purpose of the study was to provide an insight of mutual fund investing and compare the returns of active and passive accumulation mutual funds investing in the Finnish stock market during different market conditions. At the beginning of the study, the benefits, disadvantages, and fees of mutual fund investing were examined as well as various investment assets. After that, previous studies on the performance of the mutual funds were examined, and a theoretical framework was presented. The results of previous studies varied across studies. Especially studies in favour of passive funds highlighted the EMH as well as better long-term returns (Fama & French, 2010; Jensen, 1964; Malkiel, 1995). By contrast, studies in favour of active funds considered the market to be inefficient, from which it was possible to generate excess returns through irrational behavior by investors (Cremers & Petajisto, 2009; Wermers, 2000).

The results showed better gross and net returns for active funds before and during COVID-19, while passive funds succeeded better after COVID-19. Thus, the first hypothesis ( $H_1$ ) of the study was correct. During the COVID-19 period, active funds managed to generate 2,86 percentage points better gross return and 1,3 percentage points better net return compared to passive funds. The results highlighted active funds that invested in small-cap companies, which generated the best returns during COVID-19. Similar findings on the higher performance potential of small-cap companies were also made by Otten & Bams (2002) and Kacperczyk et al. (2005) in their studies.

Risk-adjusted returns varied depending on the general market situation. The results showed that the risk-adjusted returns of active funds were better than those of passive funds before and during COVID-19. The exception was the net Sharpe ratio during COVID-19, where passive funds outperformed active funds. The result is explained by the lower ongoing charges of passive funds, which averaged 0,35 % over the analysis period, while the corresponding figure for active funds was 1,55 %. After COVID-19, active funds were not able to generate better risk-adjusted returns, as each calculated

figure was negative. By contrast, the risk-adjusted figures for passive funds were close to zero. The results indicate that active funds managed to generate better risk-adjusted returns on average during all the subperiods, which refutes the second hypothesis ( $H_2$ ) of the study. In summary, it can be stated that active funds' higher risk taking managed to generate better risk-adjusted returns during periods of lower interest rates and expansionary monetary policy. Especially, those active funds that used an investment strategy that differed from the benchmark index managed to generate excess returns, despite the high ongoing charges. Instead, based on the results, passive funds were more suitable for long-term investing because of their lower volatility and lower ongoing charges compared to active funds.

This study showed that accumulation mutual fund investing has been profitable despite the COVID-19 crisis. At the end of the analysis period, the NAV of each mutual fund was higher than at the beginning of the analysis period. Through long-term investment, investors were able to grow their capital and protect against the inflation, which has benefited not only investors but also stakeholders and policymakers. Household confidence in the economy enables for an increased investment capital flow, which also encourages companies' willingness to make investments in the future. A growing investment capital flow and corporate investment create economic growth and jobs, which will enable an increase in tax revenue as well as in well-being in the economy. Consequently, competition increases as new investment firms enter the market. This is beneficial to the investor, as competition between companies creates incentives to lower the number of ongoing charges collected by the mutual funds.

The results of the study should be viewed critically. All relevant analysis methods have not been considered to make informed investment decisions. Moreover, Finland's market share in the global stock market is minor, thus the sample in the study is limited. In addition, there is only a specific asset class under consideration, which can be a limiting factor. In the future studies, extending of the analysis period could enable for more reliable observations. In this study, the subperiods, before and after COVID-19,

were only one year long, which are short periods in the financial markets. In the future, a longer symmetric time period will be possible when time passes since the declaration of the COVID-19 global public health emergency. In addition, taking survival bias into account, when comparing returns of the mutual funds in the future, improves conclusions, as potential fund closure is included in the findings.

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## Appendices

**Appendix 1.** Annual total return, risk-adjusted return, and ongoing charges of actively managed accumulation mutual funds before, during and after COVID-19.

<b>Active 30.11.2018 – 30.11.2019</b>	<b>Gross Sharpe</b>	<b>Net Sharpe</b>	<b>Treynor</b>	<b>Jensen</b>	<b>Gross Return</b>	<b>Net Return</b>	<b>Ongoing charge</b>
HANDELSBANKEN FINLAND SMABOLAG	1,4486	1,2857	0,2319	0,1011	19,27 %	17,15 %	1,78 %
AKTIA CAPITAL B	1,0891	0,9386	0,1614	0,0520	15,81 %	13,66 %	1,85 %
DANSKE INVEST FINNISH EQUITY G	0,8135	0,6899	0,1504	0,0292	10,32 %	8,77 %	1,40 %
DANSKE INVEST FINNISH EQUITY W G	0,8641	0,7833	0,1596	0,0354	10,96 %	9,95 %	0,91 %
EQ FINLAND 1 K	1,1270	1,0100	0,1621	0,0573	17,29 %	15,53 %	1,50 %
EVLI FINNISH SMALL CAP B	1,6918	1,5411	0,2830	0,1360	22,47 %	20,51 %	1,60 %
EVLI FINLAND SELECT B	0,9088	0,7606	0,1314	0,0230	12,65 %	10,62 %	1,80 %
FONDITA FINLAND MICRO CAP B	1,1222	0,9303	0,2244	0,0692	13,52 %	11,25 %	2,00 %
NORDEA PRO FINLAND FUND I GROWTH EUR	0,9729	0,9299	0,1506	0,0369	13,02 %	12,46 %	0,50 %
NORDEA FINNISH STARS FUND A GROWTH EUR	1,1849	1,0538	0,1890	0,0627	14,80 %	13,20 %	1,40 %
OP-FINLAND A	0,8494	0,7286	0,1220	0,0156	12,93 %	11,13 %	1,60 %
OP-FINLAND SMALL FIRM A	1,6147	1,4314	0,2690	0,1285	21,93 %	19,49 %	2,00 %
S-BANK FENNO EQUITY A	0,8801	0,7511	0,1247	0,0174	12,50 %	10,70 %	1,60 %
SAASTOPANKKI KOTIMAA B	0,8931	0,7319	0,1293	0,0205	12,13 %	9,98 %	1,92 %
SAASTOPANKKI PIENYHTIOT B	2,0203	1,8172	0,3456	0,1733	25,83 %	23,28 %	2,02 %
UB SUOMI KASVU	0,8874	0,8098	0,1675	0,0383	10,81 %	9,88 %	0,84 %
UB SUOMI A	0,8519	0,7075	0,1609	0,0341	10,38 %	8,64 %	1,57 %
<b>x̄</b>	<b>1,1306</b>	<b>0,9942</b>	<b>0,1861</b>	<b>0,0606</b>	<b>15,10 %</b>	<b>13,31 %</b>	<b>1,55 %</b>

<b>Active 1.12.2019-5.5.2023</b>	<b>Gross Sharpe</b>	<b>Net Sharpe</b>	<b>Treynor</b>	<b>Jensen</b>	<b>Gross Return</b>	<b>Net Return</b>	<b>Ongoing charge</b>
HANDELSBANKEN FINLAND SMABOLAG	0,4159	0,3184	0,0998	0,0260	30,58 %	28,25 %	1,78 %
AKTIA CAPITAL B	0,3831	0,2856	0,0819	0,0130	29,22 %	26,83 %	1,85 %
DANSKE INVEST FINNISH EQUITY G	0,3117	0,2435	0,0856	0,0138	25,64 %	23,88 %	1,40 %
DANSKE INVEST FINNISH EQUITY W G	0,3332	0,2886	0,0915	0,0185	27,31 %	26,16 %	0,91 %
EQ FINLAND 1 K	0,4193	0,3458	0,0877	0,0206	34,61 %	32,59 %	1,50 %
EVLI FINNISH SMALL CAP B	0,4394	0,3514	0,1041	0,0299	32,21 %	30,10 %	1,60 %
EVLI FINLAND SELECT B	0,4054	0,3084	0,0856	0,0164	30,29 %	27,94 %	1,80 %
FONDITA FINLAND MICRO CAP B	0,3729	0,2651	0,1021	0,0246	27,77 %	25,21 %	2,00 %
NORDEA PRO FINLAND FUND I GROWTH EUR	0,2998	0,2735	0,0685	0,0001	22,82 %	22,21 %	0,50 %
NORDEA FINNISH STARS FUND A GROWTH EUR	0,4441	0,3675	0,1056	0,0312	32,76 %	30,90 %	1,40 %
OP-FINLAND A	0,3087	0,2250	0,0642	-0,0042	23,63 %	21,65 %	1,60 %
OP-FINLAND SMALL FIRM A	0,3222	0,2168	0,0721	0,0033	24,49 %	22,00 %	2,00 %
S-BANK FENNO EQUITY A	0,5044	0,4178	0,1056	0,0363	37,92 %	35,71 %	1,60 %
SAASTOPANKKI KOTIMAA B	0,3933	0,2913	0,0824	0,0137	29,79 %	27,29 %	1,92 %
SAASTOPANKKI PIENYHTIOT B	0,5174	0,4005	0,1196	0,0422	36,28 %	33,52 %	2,02 %
UB SUOMI KASVU	0,2787	0,2356	0,0737	0,0042	21,71 %	20,69 %	0,84 %
UB SUOMI A	0,2448	0,1646	0,0648	-0,0028	19,22 %	17,35 %	1,57 %
<b>x̄</b>	<b>0,3761</b>	<b>0,2941</b>	<b>0,0879</b>	<b>0,0169</b>	<b>28,60 %</b>	<b>26,61 %</b>	<b>1,55 %</b>

<b>Active 6.5.2023-6.5.2024</b>	<b>Gross Sharpe</b>	<b>Net Sharpe</b>	<b>Treynor</b>	<b>Jensen</b>	<b>Gross Return</b>	<b>Net Return</b>	<b>Ongoing charge</b>
HANDELSBANKEN FINLAND SMABOLAG	-0,2684	-0,4010	-0,0415	-0,0314	-1,13 %	-2,89 %	1,78 %
AKTIA CAPITAL B	-0,2630	-0,4201	-0,0336	-0,0263	-0,63 %	-2,47 %	1,85 %
DANSKE INVEST FINNISH EQUITY G	-0,4549	-0,5602	-0,0769	-0,0547	-3,49 %	-4,85 %	1,40 %
DANSKE INVEST FINNISH EQUITY W G	-0,4178	-0,4866	-0,0706	-0,0499	-3,00 %	-3,88 %	0,91 %
EQ FINLAND 1 K	-0,0218	-0,1430	-0,0028	0,0021	2,27 %	0,74 %	1,50 %
EVLI FINNISH SMALL CAP B	0,3713	0,2343	0,0572	0,0505	7,37 %	5,65 %	1,60 %
EVLI FINLAND SELECT B	-0,2495	-0,3928	-0,0320	-0,0263	-0,67 %	-2,45 %	1,80 %
FONDITA FINLAND MICRO CAP B	0,0320	-0,1485	0,0055	0,0069	2,94 %	0,88 %	2,00 %
NORDEA PRO FINLAND FUND I GROWTH EUR	-0,1023	-0,1415	-0,0143	-0,0086	1,19 %	0,68 %	0,50 %
NORDEA FINNISH STARS FUND A GROWTH EUR	-0,7259	-0,8363	-0,1126	-0,0826	-6,39 %	-7,70 %	1,40 %
OP-FINLAND A	-0,4274	-0,5478	-0,0544	-0,0501	-3,15 %	-4,70 %	1,60 %
OP-FINLAND SMALL FIRM A	-0,3352	-0,4887	-0,0498	-0,0386	-1,88 %	-3,84 %	2,00 %
S-BANK FENNO EQUITY A	-0,2920	-0,4165	-0,0374	-0,0321	-1,28 %	-2,86 %	1,60 %
SAASTOPANKKI KOTIMAA B	-0,1176	-0,2789	-0,0150	-0,0095	1,09 %	-0,85 %	1,92 %
SAASTOPANKKI PIENYHTIOT B	-0,5186	-0,6958	-0,0765	-0,0535	-3,37 %	-5,32 %	2,02 %
UB SUOMI KASVU	-0,0185	-0,0943	-0,0024	0,0022	2,34 %	1,48 %	0,84 %
UB SUOMI A	-0,0806	-0,2214	-0,0106	-0,0049	1,61 %	0,02 %	1,57 %
<b>x̄</b>	<b>-0,2288</b>	<b>-0,3552</b>	<b>-0,0334</b>	<b>-0,0239</b>	<b>-0,36 %</b>	<b>-1,90 %</b>	<b>1,55 %</b>

**Appendix 2.** Annual total return, risk-adjusted return, and ongoing charges of passively managed accumulation mutual funds before, during and after COVID-19.

<b>Passive 30.11.2018 – 30.11.2019</b>	<b>Gross Sharpe</b>	<b>Net Sharpe</b>	<b>Treynor</b>	<b>Jensen</b>	<b>Gross Return</b>	<b>Net Return</b>	<b>Ongoing charge</b>
NORDNET SUOMI INDEKSI	0,7150	0,7150	0,1011	-0,0063	10,93 %	10,93 %	0 %
NORDEA FINNISH PASSIVE FUND B GROWTH EUR	0,7083	0,6696	0,1098	0,0025	10,00 %	9,46 %	0,49 %
NORDEA FINNISH PASSIVE FUND I GROWTH EUR	0,7153	0,6845	0,1109	0,0035	10,10 %	9,67 %	0,39 %
OP-FINLAND INDEX FUND II A	0,7498	0,7192	0,1054	-0,0017	10,76 %	10,33 %	0,39 %
SELIGSON & CO FINLAND INDEX A	0,7511	0,7137	0,1343	0,0206	10,35 %	9,84 %	0,46 %
<b><math>\bar{x}</math></b>	<b>0,7279</b>	<b>0,7004</b>	<b>0,1123</b>	<b>0,0037</b>	<b>10,43 %</b>	<b>10,05 %</b>	<b>0,35 %</b>

<b>Passive 1.12.2019-5.5.2023</b>	<b>Gross Sharpe</b>	<b>Net Sharpe</b>	<b>Treynor</b>	<b>Jensen</b>	<b>Gross Return</b>	<b>Net Return</b>	<b>Ongoing charge</b>
NORDNET SUOMI INDEKSI	0,3898	0,3898	0,0812	0,0130	30,54 %	30,54 %	0 %
NORDEA FINNISH PASSIVE FUND B GROWTH EUR	0,3000	0,2747	0,0690	0,0006	23,25 %	22,64 %	0,49 %
NORDEA FINNISH PASSIVE FUND I GROWTH EUR	0,3047	0,2846	0,0701	0,0015	23,59 %	23,11 %	0,39 %
OP-FINLAND INDEX FUND II A	0,3238	0,3035	0,0667	-0,0017	24,95 %	24,46 %	0,39 %
SELIGSON & CO FINLAND INDEX A	0,3280	0,3050	0,0883	0,0159	26,36 %	25,77 %	0,46 %
<b><math>\bar{x}</math></b>	<b>0,3293</b>	<b>0,3115</b>	<b>0,0751</b>	<b>0,0058</b>	<b>25,74 %</b>	<b>25,31 %</b>	<b>0,35 %</b>

<b>Passive 6.5.2023-6.5.2024</b>	<b>Gross Sharpe</b>	<b>Net Sharpe</b>	<b>Treynor</b>	<b>Jensen</b>	<b>Gross Return</b>	<b>Net Return</b>	<b>Ongoing charge</b>
NORDNET SUOMI INDEKSI	0,2181	0,2181	0,0277	0,0332	5,47 %	5,47 %	0 %
NORDEA FINNISH PASSIVE FUND B GROWTH EUR	-0,0751	-0,1136	-0,0105	-0,0051	1,55 %	1,05 %	0,49 %
NORDEA FINNISH PASSIVE FUND I GROWTH EUR	-0,0676	-0,0982	-0,0094	-0,0041	1,65 %	1,26 %	0,39 %
OP-FINLAND INDEX FUND II A	-0,0577	-0,0896	-0,0072	-0,0022	1,82 %	1,42 %	0,39 %
SELIGSON & CO FINLAND INDEX A	-0,1898	-0,2254	-0,0303	-0,0205	0,02 %	-0,44 %	0,46 %
<b><math>\bar{x}</math></b>	<b>-0,0344</b>	<b>-0,0617</b>	<b>-0,0059</b>	<b>0,0002</b>	<b>2,10 %</b>	<b>1,75 %</b>	<b>0,35 %</b>